UNIVERSITY OF SOUTHAMPTON

FACULTY OF MEDICINE, HEALTH AND LIFE SCIENCES

School of Psychology

Analysis System for Self-Efficacy Training: Development and validation of an evaluation tool in diabetes care

by

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ABSTRACT

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The research reported in this thesis investigates the self-efficacy construct in the context of (real world) diabetes self-management programmes. Self-efficacy interventions, although widely implemented in diabetes care, lack basic information on what exactly was delivered. More importantly, there has been no assessment tool which would enable researchers to externally evaluate the use of self-efficacy-based techniques in interventions and provide accurate report information about the process of intervention delivery.

To address this gap, the present PhD aimed to develop a reliable and valid coding tool to assess the use of self-efficacy-based techniques among nurses delivering education for people with diabetes and test its clinical utility by delivering a self-efficacy-based intervention to diabetes nurses.

The four sources of self-efficacy: mastery experience, role modelling, verbal persuasion and physiological and affective states formed the conceptual basis of the coding tool. The findings of the literature review and observation of three educational programmes provided an operationalisation of the four sources of self-efficacy and resulted in 11 verbal behavioural techniques. Four coders rated diabetes programmes to establish reliability of the coding tool. Cross-sectional and longitudinal data from 52 patients, based on self-report and objective measures, as well as demographic information about five nurses were related to nurse-led self-efficacy based techniques to establish the validity of ASSET. In a single pre-post design, the feasibility and effectiveness of ASSET-based interventions delivered to five nurses were evaluated.

The key findings were that ASSET could be a useful tool to identify the use of self-efficacy in interventions. The use of self-efficacy-based techniques reflected nurses' work-related experience gained prior to the study, and to some extent predicted patient-related outcomes including intention and behaviour regarding diabetes management. The use of self-efficacy based techniques by nurses, however, did not predict patients' self-efficacy beliefs. ASSET-based training guided nurses in reflecting on their practice. As a result of that, nurses started using more self-efficacy-based techniques when delivering group-based education. The effect was, however, not maintained over time. Nurses who were less experienced prior to the intervention increased their use of self-efficacy-based techniques to a greater extent than those with prior experience. One of the major limitations of the thesis was that only the author of the thesis coded all nurse-led speech utterances. The other three coders rated a selection of utterances. Therefore, there is no sufficient evidence to conclude on the reliability or validity of ASSET.

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DECLARATION OF AUTHORSHIP

I, Katarzyna Michałowska-Zinken, declare that the thesis entitled "Analysis System for Self-Efficacy Training: Development and validation of an evaluation tool in diabetes care" and the work presented in the thesis are both my own, and have been generated by me as the result of my own original research. I confirm that:

- this work was done wholly or mainly while in candidature for a research degree at this University;

- where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has clearly been stated;

- where I have consulted the published work of others, this is always clearly attributed;

- where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work;

- I have acknowledged all main sources of help;

- where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself

- parts of this work have been published as: Zinken, K., Cradock, S., & Skinner, C. T. (2008). Analysis System for Self-Efficacy Training. Assessing treatment fidelity of self-management interventions. *Patient Education and Counseling, 72,* 186-193.

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ABBREVIATIONS

ASSET	Analysis System for Self-Efficacy Training
CDSMP	Chronic Disease Self-Management Programme
CIDS	Confidence in Diabetes Self-Care Scale (CIDS)
CO	Competent other
DESMOND	Diabetes Education and Self-Management for Ongoing and Newly Diagnosed
DoH	Department of Health
DVLA	Driver and Vehicle Licensing Agency
EAS	Exploration of affective state
EK	Elicitation of knowledge
EPS	Exploration of physiological state
FPS	Facilitating pro-active self
GP	General Practitioner
GS	Group solving
HbA1c	Glycosolated Haemoglobin
ITAS	Insulin Treatment Appraisal Scale
ME	Mastery experience
NICE	National Institute for Clinical Excellence
PAS	Physiological and affective states
PF	Positive feedback
PO	Planning for obstacles
RCT	Randomized controlled trial
RM	Role modelling
SO	Sharing obstacles
SR	Self-reflection
ST	Successful trial
OE	Outcome expectancies
VP	Verbal persuasion

OUTLINE OF THE THESIS

The present research aimed at the development of a reliable and valid coding tool to assess the use of self-efficacy-based techniques in diabetes interventions. The thesis begins with describing the theoretical context of social cognition models and highlights the overlapping theoretical constructs. Then, it presents social cognitive theory focusing on the self-efficacy construct. Bandura not only described how self-efficacy works but also provided tangible strategies on how to modify behaviour by enhancing self-efficacy (Bandura, 1977). Chapter 1 describes these four sources of self-efficacy, outlining specific techniques, which can be used to enhance self-efficacy. Finally, Chapter 1 provides a conceptual framework, based on self-efficacy theory, which was used for the development of the coding tool, ASSET.

Chapter 2 provides an overview of diabetes, discussing the rationale for choosing diabetes as a good example to study self-efficacy-based interventions. Chapter 2 also presents a literature review on self-efficacy and health-related psychological, behavioural and physiological factors. Finally, it discusses methodological issues which have to be considered when studying self-efficacy as a predictor of diabetes-related outcomes.

Chapter 3 discusses the effectiveness of self-efficacy-based interventions in diabetes and provides an overview of self-efficacy-based techniques. In diabetes research self-efficacy has been one of the most widely utilised psychological constructs (Hampson et al., 2000; Koopman-van der Berg & van der Bijl, 2001). The evidence concerning protocol adherence (i.e. implementation of self-efficacy), however, has almost always been based on facilitators' self-report (Koopman-van der Berg et al., 2001). This chapter discusses the methodological issues with regard to intervention studies highlighting the need for a treatment fidelity check.

As a result of the literature review and observation of three self-efficacy based programmes in diabetes, specific self-efficacy-based techniques were identified and described in the coding manual (Chapter 4). Chapter 4 describes the development of the coding tool as well as preliminary results regarding its clinical utility. Next, Chapter 5 presents the content, discriminant, and predictive validity of ASSET. It explores whether ASSET reflects the self-efficacy construct in a comprehensive and accurate way. It investigates whether the use of self-efficacy-based techniques reflects nurses' experience measured as additional training and supervision from senior colleagues prior to the study.

Nurse-led self-efficacy techniques are investigated as predictors of patients' related outcomes, including self-efficacy beliefs, intention and behaviour.

Chapter 6 explores ASSET's clinical utility. It reports the results of a self-efficacy based intervention delivered to diabetes nurses. The intervention consisted of a self-efficacy based educational training and feedback session regarding the use of self-efficacy techniques by nurses.

The final chapter discusses the key results of the studies with regard to their limitations and future directions. It discusses the theoretical implications and clinical applications of this piece of research highlighting its specific contribution to diabetes care and health psychology.

CHAPTER 1: SELF-EFFICACY

"The problem we have in psychology is that we don't profit from our successes,"(…) We construct theories and clarify how they produce their effects, but we lack implementation models for translating theory into effective practice (…) There's also a lack of social diffusion models to promote the widespread adoption of those effective practices" (Bandura, 2002, p.30)

In recent years there has been a dramatic change in health care. Around 80% of patients attending a general practitioner (GP) in primary care are people with a chronic condition (Department of Health, 2008). The National Institute for Clinical Excellence (NICE) has addressed this situation by providing guidelines on how to deliver effective practice for people with chronic conditions (e.g. for diabetes: National Institute for Clinical Excellence, 2003). These guidelines stressed the role of theory-based practice. Nevertheless, evidence that these guidelines are implemented in National Health System-based (NHS) settings is still scarce. Therefore, there is a need firstly to help professionals to implement evidence and theory based practice and secondly to evaluate the process of delivery.

The present thesis is devoted to translating theory into practice. The first chapter provides the theoretical background to the present thesis. It explores social cognitive theory in the context of other social cognition models showing how the models overlap with each other. It gives special prominence to the construct of self-efficacy and to the four sources of self-efficacy. Next, the chapter presents how the four sources of self-efficacy may be operationalised into implementable techniques. Finally, the chapter presents the theoretical conceptual model of self-efficacy which underlies the development of a coding tool to measure the use of self-efficacy in diabetes self-management programmes.

1.1 Integration of social cognition models of behaviour change

There are numerous social cognition models which describe the mechanisms of health behaviours by using socio-cognitive concepts (Sutton, 2002). It is beyond the scope of the thesis to describe them all in detail. Nevertheless, the key construct will be outlined briefly in order to give a broader context for social cognitive theory and to present the rationale for using the social cognitive theory as a base for the present thesis.

Chapter 1: Self-efficacy

The most widely used social cognition models include the health belief model (HBM) (Becker, Haefner, & Maiman, 1977; Rosenstock, 1974), the theory of reasoned action (TRA) (Fishbein & Ajzen, 1975) / theory of planned behaviour (TPB) (Ajzen, 1988), social cognitive theory (SCT) (Bandura, 1986), protection motivation theory (PMT) (Rogers, 1975), and the most recent health action process approach (HAPA) (Schwarzer, 1992).

The HBM addresses the characteristics of the illness and individual consequences of an action as major determinants of health behaviours (Rosenstock, 1974). There are four main constructs in the HBM: illness-related perceived severity (i.e. seriousness in terms of personal consequences of contracting the illness) personal susceptibility (i.e. risk of contracting the disease) as well as behaviour-related perceived benefits and costs. The HBM also includes an additional construct, namely cues for action, which addresses triggers for a behaviour. Cues for action are less specific and hence have been less investigated than the previously described severity, susceptibility, benefits and costs (Sutton, 2001). The revised version of the HBM incorporates also health motivation and perceived self-efficacy (Becker et al., 1977). Health motivation refers to the intention to pursue a health-directed behaviour. Self-efficacy, in turn, is the belief in an individual's own capability to perform a behaviour (Bandura, 1998).

The TRA describes most behaviour as a volitional process (Fishbein et al., 1975). It claims that an individual's intention to perform a behaviour is the best predictor of the behaviour. The determinants of intention, in turn, are attitudes (i.e. the evaluation of the behaviour based on salient behavioural beliefs) and subjective norms (i.e. the perceived expectations of significant others to perform a behaviour based on salient normative beliefs). Behavioural beliefs refer to the perceived benefits and costs of performing a behaviour. Normative beliefs address the perceived beliefs about what the others expect the individual to do. The authors of the TRA acknowledged that not all behaviours are under volitional control (e.g. behaviours which require skills or opportunities to be performed such as healthy eating). Therefore, the TRA developed into the TPB which included the construct of perceived behavioural control. TPB describes the behaviour as being influenced not only by intention but also by the perception of the individual's control over performing the behaviour (Ajzen, 1988). Perceived behavioural control results from control beliefs (i.e. salient beliefs about ease and difficulty of performing specific behaviours in relation to available resources and personal factors such as abilities

and emotions). This chapter later discusses in more detail the construct of perceived behavioural control in the context of self-efficacy beliefs.
PMT was developed to explain threat-related behaviours. It incorporates the following constructs: severity and vulnerability, (corresponding constructs with severity and susceptibility in the HBM, respectively) as well as response costs. The response costs consist of response self-efficacy (i.e. the belief that the behaviour will result in the desired outcome) as well as perceived self-efficacy (i.e. the belief that one is capable of performing a behaviour). The "response self-efficacy" refers in fact to outcome expectancies, whilst "perceived self-efficacy" addresses self-efficacy beliefs. The threat and coping appraisal contribute to the protective motivation which in turn impacts on the behaviour (Rogers, 1975).

The HAPA was developed on the basis of social cognitive theory (Schwarzer, 1992). Its main constructs include self-efficacy, outcome expectancies and risk perception. Self-efficacy is the belief in the capability to perform a behaviour. Outcome expectancies relate to the benefits and costs of an action. Perceived risk addresses health-related threats (i.e. corresponding with susceptibility in the HBM). It influences outcome expectancies, which in turn contribute to self-efficacy beliefs. These three constructs are described as determinants of intention, which in turn, alongside self-efficacy, predicts planning. Planning determines the actual health behaviour. HAPA, in contrast to other health behaviour models, distinguishes between the pre-intentional motivational process and the post-intentional volitional process (Schwarzer, 2008b). Whilst the first leads to the intention, the latter results in the performance of the actual behaviour.

To date there is no one leading theory which explains health behaviours better than other theories. Meta-analyses of HBM, TRA/TPB, SCT, and HAPA show that each of the reviewed theories explains in part the mechanisms of health behaviour and identifies concepts that can be targeted for change (Bandura, 1997; Bridle et al., 2005; Hardeman et al., 2002; Webb & Sheeran, 2006). Thus, the question whether there is one most accurate theory remains unanswered. Little experimental work has been done on comparative analysis of existing theories (Conner & Norman, 2005; Nigg, Allegrante, & Ory, 2002; Weinstein, 1993). There is some evidence that particular theories may explain certain behaviours such as iterative actions (e.g. being on a diet, exercising) or a single action (e.g. having an injection), or address the volitional (e.g. making a plan for diet change) or action stage (maintaining the diet over time) of behaviour change (Norman, Abraham, & Conner, 2000).

Recently, a debate has started concerning the extent to which the components of leading theories overlap by addressing the same constructs under different labels (Conner et al., 2005; Weinstein, 1993). Consequently, researchers have recommended some classifications which unite the leading theories within one model (Ajzen, 2002; Bandura, 2004; Fishbein et al., 2001; Noar & Zimmerman, 2004). The most utilised models, which are HBM, TRA/TPB, HPT, SCT, and HAPA, can be integrated within one meta-model. Depending on the author and their theoretical origin, the classification includes between four and seven components. All these meta-models are consistent in acknowledging the role of perceived self-efficacy, outcome expectancies and intention in explaining behaviour (Bandura, 1998; Conner et al., 2005; Noar et al., 2004; Norman et al., 2000). The inconsistency, however, emerges in the conceptualisation of outcome expectancies and its distinction from attitudes, norms, self-representation and risk of performing the behaviour. Depending on the theoretical preferences of the authors of the meta-models, these constructs are either seen as independent entities or as different aspects of outcomes expectancies. Table 1 brings together the meta-models developed in the attempt to summarise and combine the most prominent health behaviour models.

Table 1 *Meta-social cognition models*.

Authors	**Determinants of health behavior**					
	Self-efficacy	**Outcome expectancies, normative influences and threat**			**Intention**	**Post-intentional factors**
(Abraham et al., 2000)	*Self-efficacy*	*Attitudes* Affect & Evaluation	*Norms* Injunctive (inward) & descriptive (outward: group)	*Self-representations* Self-evaluative expectations, social identity	*Intention*	
(Bandura, 1998)	*Self-efficacy*	*Physical*	*Social*	*Self-evaluative*	*Goals: proximal and distal*	*Impediments* Personal, situational and due to health system
(Noar et al., 2004)	*Self-efficacy*	*Attitudinal beliefs* Appraisal of the positive and negative aspects of the behaviour and expected outcome of the behaviour	*Normative beliefs* Beliefs that other want you to engage in the behaviour; support of others	*Risk-related beliefs and emotional responses* Beliefs that the consequences of non engagement may be severe, may include experiencing of negative emotions	*Intention/commitment/ planning* Intending or planning to perform the behaviour	
(Conner et al., 2005)	*Self-efficacy, behavioural control*	*Perceived consequences* Benefits and costs of behaviour	*Normative influences* Social influences, cues of action	*Threat* Perceived susceptibility and severity	*Intention*	*Self-regulation skills*
(Weinstein, 1993)	*Self-efficacy*	*Probability* that consequence will occur *Perceived cost and barriers of action*	*Normative beliefs* *Perceived value of non health outcome*	*Susceptibility* *Severity* *Effectiveness of precaution* *Perceived internal & external rewards from current behaviour*	*Motivation to comply*	

Table 1 shows that, when treated as separate categories, attitudes towards behaviour are seen as expected advantages and disadvantages of the performance of a particular behaviour. Norms address the social pressure to perform. Self-representation refers to self-evaluative expectations and social identity (Abraham et al., 2000). Conner and Norman (2005) distinguished between outcome expectancies understood as costs and benefits of behaviour and perceived threat understood as susceptibility to and severity of risk. On the other hand, Bandura incorporated norms, attitudes, risk perception and self-evaluation as different outcome expectancies. He argued that attitudes assess the positive and negative aspects and expected outcome of a particular behaviour, with threat being a perceived negative outcome. While norms address expectations of pursuing a particular behaviour by significant others, self-evaluative outcomes relate to individual expectations consistent with one's own identity, values etc. In consequence, behaviour consistent with social or individual expectation will result in positive outcomes such as social or self-approval, respectively.

Prior to an actual behaviour change there is an intention to pursue an action (Abraham et al., 2000). Authors of meta-models consistently acknowledge the role of intention as crucial in pursuing behaviour change (Webb et al., 2006). However, they differ in the definition of the construct, with descriptions ranging from having an intention to change (Weinstein, 1993) to taking an action of setting goals for further action (Noar et al., 2004).

In 1991, a group of prominent researchers, among them Bandura (SCT), Becker (HBM), Fishbein (TRA), Kanfer (self-regulation, self-control), and Triandis (interpersonal relations), met with the aim of agreeing on the components and mechanisms of the behaviour change process in the context of HIV prevention (Fishbein et al., 2001). They distinguished between necessary determinants of behaviour and determinants influencing intention. The necessary determinants of behaviour included strong intention, skills to perform the behaviour and a supportive environment. The intention was predicted by positive expectancies outweighing negative expectancies, perceived social pressure to perform, beliefs that the behaviour was consistent with the individual's self-image, anticipated positive emotions with behaviour performance and high levels of self-efficacy. The determinants which influence intention might also have an impact on behaviour itself. Additionally, this model combined components of social cognition theories with new constructs such as emotional response and consistency with self-image. The authors, however, failed to agree on the relationships between the constructs.

In conclusion, the presented social cognition models are fairly coherent regarding the determinants of intention which are the direct predictors of behaviour change. Nevertheless, the authors are clearly most consistent in their appraisal of the role and nature of only one of the predictors: self-efficacy. Self-efficacy appears across social cognition models to be the most essential component of all major health behaviour models (Luszczynska & Schwarzer, 2005a).

This section provided a brief overview of social cognition models, highlighting how the models overlap with each other and emphasising the role of self-efficacy. The next section presents social cognitive theory, focusing on the self-efficacy construct differentiating it from other theoretical and common sense terms, and describing the ways in which self-efficacy can be enhanced.

1.2 Social cognitive theory

Social cognitive theory is one of the widely recognised behaviour change models (Maddux & Lewis, 1995; Schwarzer, 1992). As presented in the introductory paragraph it incorporates all the key predictors of behaviour change. The outstanding contribution of social cognitive theory when compared with other models is twofold. First, it introduced the concept of self-efficacy, which was later included in other models (e.g. TPB, HPT). Second, the theory not only describes but also operationalises its constructs, providing tangible strategies on how to modify them.

Social cognitive theory was developed in the context of the ‘cognitive revolution’ (Chomsky, 1959). This was marked by the paradigm shift from behaviour to cognition as a predictive factor of human functioning. Social cognitive theory argued that behaviour was not only a result of previous behaviours but that it was a product of the cognitive appraisal of the behaviour (Bandura, 1997).

Social cognitive theory describes human agency by a number of core features. These are intentionality, forethoughts, self-reactiveness and self-reflectiveness (Bandura, 2001a). Intentionality and forethoughts relate to the temporal aspect of functioning. To be an agent of a certain behaviour a person needs to develop an intention to carry out this behaviour. Bandura conceptualised intention as a “representation of a future course of action to be performed” (Bandura, 2001a, p. 6). Thus, intention refers not only to the willingness to perform a certain behaviour but also to specific goals regarding future actions. Based on the anticipation of future action, people follow plans which increase the probability of positive outcomes and decreasing the chances of negative ones. Future action however does not merely depend on the anticipated outcomes. “People display considerable self-direction in the face of competing influences” (Bandura, 2001a, p. 7). Personal outcomes based on self-evaluation might be much more influential than external outcomes. Thus, the anticipated outcomes which, through intention, influence the behaviour, can be both internal (i.e. physiological and emotional) and external (i.e. social). Physical outcomes relate to positive and negative effects of the behaviour including pleasant and unpleasant sensory experiences as well as material losses and benefits. Behaviours which are in line with a personal image influence emotional outcomes such as self-satisfaction. Social outcomes in turn relate to social acceptance, sense of belonging or social support.

Once the intention is established an individual needs self-regulatory skills to perform the action. These include self-reactiveness and self-reflectiveness. Self-reactiveness relates to the way people pursue their goals. This can be done by self-monitoring, self-guidance via personal standards and corrective self-reactions (Bandura, 2001a). People manage their action not only by performing but also by reflecting on it. They reflect on their motivation, values and meaning of their life. People confront the goals with the outcomes and evaluate the effects of others’ action. The most powerful beliefs which develop as a result of the self-reflective process are self-efficacy beliefs. The beliefs in self-efficacy have been shown to be a crucial factor of human agency. Self-efficacy refers to the beliefs in control of individual behaviour and environmental events. A person who perceives themselves in control over the action will set their goal higher, put more effort in the endeavour, sustain it in times of obstacles and if relapsed would more likely start again than someone with little self-efficacy (Bandura, 1997; Maddux et al., 1995; Schwarzer, 1992).

Social cognitive theory describes human functioning in the context of the reciprocal relationship of personal, environmental factors and behaviour (Bandura, 1997). There is a mutual relationship between personal and environmental factors which in turn influence and are influenced by human behaviour. Individuals’ intention, adoption and maintenance of behaviour depend on social impediments and facilitators. A pictorial model of social cognitive theory is presented in Figure 1.

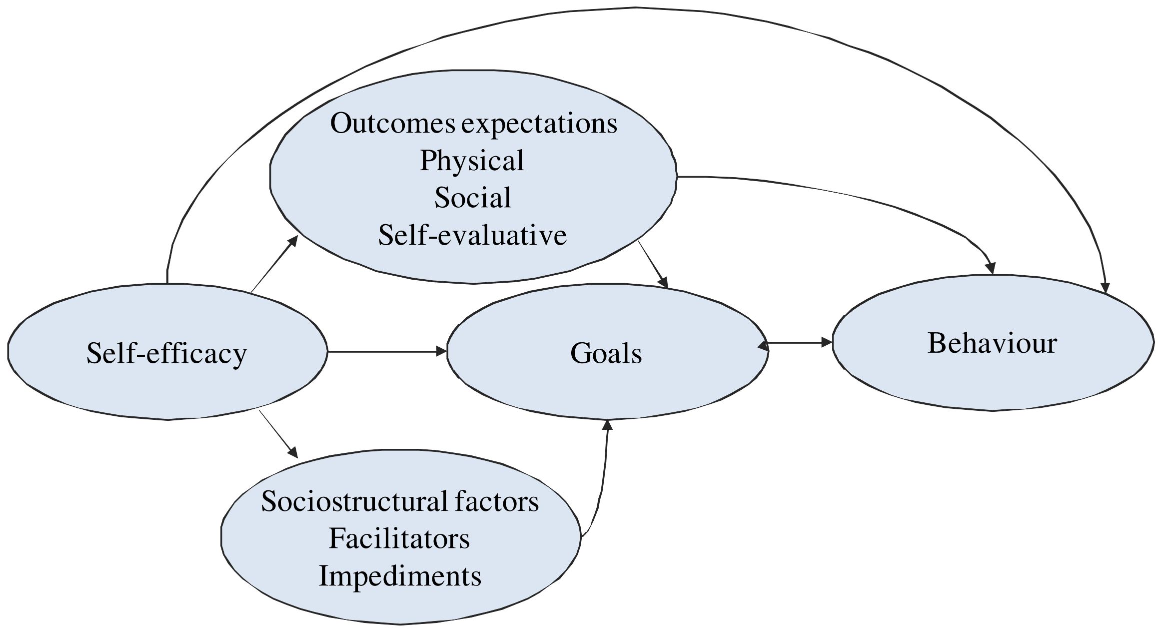


Figure 1 Social cognitive theory model. Adapted from Bandura (Bandura, 2004)

Figure 1 shows that perceived self-efficacy is the core construct of social cognitive theory. It influences behaviour directly and through anticipated outcomes, socio-structural factors and goals. Socio-structural factors include facilitators such as family support, good health, or satisfaction from medical care for treatment of diabetes and impediments which include the opposites of the facilitators such as loss of a job or death of a spouse (Bandura, 1986; McCaul, Glasgow, & Schafer, 1987). Self-efficacy may influence outcome expectancies by anticipation of specific achievements which in turn depends on necessary capabilities. On the other hand, outcome expectancies will also clearly differ from self-efficacy when there is a discrepancy between the desired outcomes and the perceived ability to achieve them (Pintrich & Schunk, 1996). Whereas the weighting of benefits and costs resulting from the behaviour is crucial at the stage of developing the intention and setting goals, self-efficacy supports not only intention but also maintenance of the behaviour.

While Bandura argues that his results show a causal role for self-efficacy beliefs in explaining behavioural and environmental factors, the relationship between socio-structural factors and self-efficacy could be interpreted in the opposite direction. Greater social support and available material resources could contribute to the intention as well as to actual performance, which in turn could strengthen beliefs in personal self-efficacy. One of the sources of self-efficacy is verbal persuasion. Thus, having people around who positively assess someone's capability may influence self-efficacy beliefs directly. Also, it could be possible that not self-efficacy and outcome expectancies influence goals and behaviour, but that behaviour and its positive and negative results influence self-efficacy beliefs and expectations regarding future outcomes.

As already presented self-efficacy has been incorporated into the leading models of health behaviours (Luszczynska et al., 2005a). As Bandura pointed out (2004), the notion of self-efficacy was often confused with other constructs. For example, because it was conceptualised as a personal characteristic it is quite often wrongly understood as a trait (Maddux & Gosselin, 2001). However, self-efficacy is measured as a belief in the ability to use skills to achieve goals in specific situations. In contrast to personality traits, self-efficacy beliefs tend to be situation specific beliefs and can vary depending on the reviewed goals and barriers.

The self-efficacy construct, however, has been mistaken by other theoretical and colloquial constructs like outcome expectancies, locus of control, skills, or confidence. There is still a debate about what constitutes self-efficacy (Fishbein et al., 2001; Luszczynska & Schwarzer, 2005b). Thus, following Bandura's argumentation the next section distinguishes self-efficacy from other theoretical constructs and common sense terms.

1.3 Conceptualization of self-efficacy, differentiation from other constructs

1.3.1 Knowledge, skills and unrealistic optimism

An assumption exists that self-efficacy equals having knowledge and skills (Bandura & Pajares.F., 2006). No doubt, knowledge and skills are a pre-condition of self-efficacy (Bandura, 1997). However, having knowledge and skills is not sufficient for people to become self-efficacious. Self-efficacy relates to a belief in being able to apply the knowledge and skills and not to the knowledge itself. Having knowledge does not automatically show that someone is capable to use it efficiently. On the other hand, some people may regard themselves as highly efficacious without possessing the appropriate knowledge and skills. This would be an expression of unrealistic optimism rather than self-efficacy beliefs. Self-efficacy differs from unrealistic optimism as it is based on previous experience. The experience can come from the individual's own life or from others. Unlike unrealistic optimism, it constructively contributes to performance by setting realistic goals and avoiding risk.

1.3.2 Ability versus capability

Ability means being able to perform a certain behaviour due to having the skills necessary to do so (Bandura et al., 2006). For example, someone is able to adjust the insulin dose according to the amount of food because he or she understands how insulin works and knows the carbohydrate amount in food. On the other hand, capability refers to the self-efficacy beliefs. It means that someone is capable of doing something which is partially dependent on the possessed skills. The performance requires the skills but the person is convinced that he or she is capable to acquire and use the skills to perform a certain behaviour. For example, someone may say that he is not capable of adjusting the dose despite having the knowledge about carbohydrates in food and how insulin works. He or she may feel anxious about having hypoglycaemia (i.e. a low blood sugar level which may lead to coma) and hence is not capable of using their knowledge and skills efficiently.

Self-efficacy beliefs also differ from 'competencies'. Whilst competencies are about what people know and can do, self-efficacy is the individual's belief about his or her competencies (Maddux et al., 2001).

1.3.3 Self-efficacy versus self-confidence

Self-efficacy incorporates more than the colloquial term "self-confidence". While self-confidence refers to the beliefs in being able to perform a behaviour without specifying what the certainty is about, perceived self-efficacy addresses capabilities necessary to perform at a given level (Bandura, 1997).

1.3.4 Self-efficacy versus self-esteem

Whilst self-efficacy addresses cognitive beliefs about the self (i.e. the cognitive evaluation of personal ability to achieve goals), self-esteem relates to emotional beliefs (i.e. emotional evaluation of personal worthiness, Epstein, 1995). Self-efficacy and self-esteem address different areas of human identity, the results from previous studies, however, indicate a possible interaction between them (Johnston-Brooks, Lewis, & Garg, 2002; Weinger, Butler, Welch, & La Greca, 2005).

1.3.5 Self-efficacy versus autonomous self-regulation

Both self-efficacy and autonomy can be interpreted in the context of self-regulation. Autonomous self-regulation refers to intentional behaviours which are driven by self-determined internal choice as in opposite to impulsion of external factors (e.g. approval seeking) (Deci & Ryan, 1987). Self-efficacy and autonomy are not competing but complementary constructs. Studies which explored the impact of self-efficacy and autonomy on self-regulation provided a clear distinction between them (Senecal, Nouwen, & White, 2000; Williams, McGregor, King, Nelson, & Glasgow, 2005a). Whilst self-efficacy strongly contributed to treatment adherence, autonomous self-regulation had a much stronger effect on life satisfaction.

1.3.6 Self-efficacy and barriers for action

The beliefs in one's own ability to perform become crucial in challenging circumstances. When no barriers occur there is no need to gain the strength from personal confidence (Bandura, 1997). For example, the perception of an individual's capability to follow a healthy diet among people with type 2 diabetes turned out to be a significant predictor of diet adherence only when a person perceived high barriers such as effort, substantial life change, or hunger. When the anticipated barriers were low, diabetes self-efficacy did not correlate with diet adherence (Aljasem, Peyrot, Wissow, & Rubin, 2001). Skelly and colleagues (Skelly, Marshall, Haughey, Davis, & Dunford, 1995) found that self-efficacy accounted for more variance in behaviours which were appraised as difficult, than in those appraised as easy. In contrast, Weijman et al. observed that people with lower self-efficacy perceived the diabetes-regime as more burdensome (2005). Interestingly, the lack of self-efficacy alongside limited social support was the main barrier in effective self-management in diabetes (Glasgow, McCaul, & Schafer, 1986).

1.3.7 Self-efficacy versus locus of control and perceived behavioural control

Colloquially, control is perceived broadly as the capability to perform a given behaviour and achieve specific or general outcomes. This definition incorporates the notion of self-efficacy. Bandura, however, provided a clear distinction between locus of control and self-efficacy (1997). Locus of control refers to the person-outcome process (Rotter, 1966). It refers to the causal agent with regard to the outcomes. It is the belief about the ability to control the outcome such as health (Bandura, 1977). Self-efficacy, on the other hand, refers to the perceived capability to exercise a particular behaviour in the face of obstacles. For example, people may think that their bodily shape depends on what they eat and how much they exercise, but at the same time feel not capable to resist snacking and to exercise on a regular basis. Thus, although people may believe that they are responsible for controlling their weight (outcome), they still may feel incapable of dieting (behaviour), which would lead to the outcome.

Researchers who applied self-efficacy to their health models conceptualised it in different ways. The most often discussed and investigated distinction / similarity is the one between self-efficacy and perceived behavioural control. Ajzen, who extended the theory of reasoned action by adding perceived behavioural control, defines self-efficacy as the perception of a potential action in terms of its difficulty or ease (2002). He relates perceived behavioural control in turn not only to the assessment of the task difficulty but also to the individual's control over the action (perceived controllability).

Studies which compared the impact of self-efficacy and perceived behaviour control on performance showed inconsistent results (Povey, Conner, Sparks, James, & Shepherd, 2000; Terry & O'Leary, 1995). Whilst greater self-efficacy predicted intention, behavioural control had an impact on performance (Terry et al., 1995). On the other hand Povey et al. found that self-efficacy predicted both, intention and behaviour (Povey et al., 2000). Trafimow et al. (2002), who made a clear distinction between perceived difficulty and perceived control, experimentally found evidence for the overall predictive strength of perceived difficulty on both intention and behaviour.

Whilst Bandura and Ajzen presented self-efficacy and perceived behavioural control as two different constructs, some researchers assumed that the underlying notions are the same (Luszczynska et al., 2005b). For example, Howorka and colleagues used the term diabetes-self-efficacy and control over diabetes interchangeably (Howorka et al., 2000). It suggest that some researchers conceptualise both, self-efficacy and perceived behavioural control, as an individual's beliefs about having control over behaviours leading to specific goals.

See Figure 2 for a graphical distinction between the most frequent mistaken constructs of self-efficacy, perceived behavioural control and outcome expectancies.

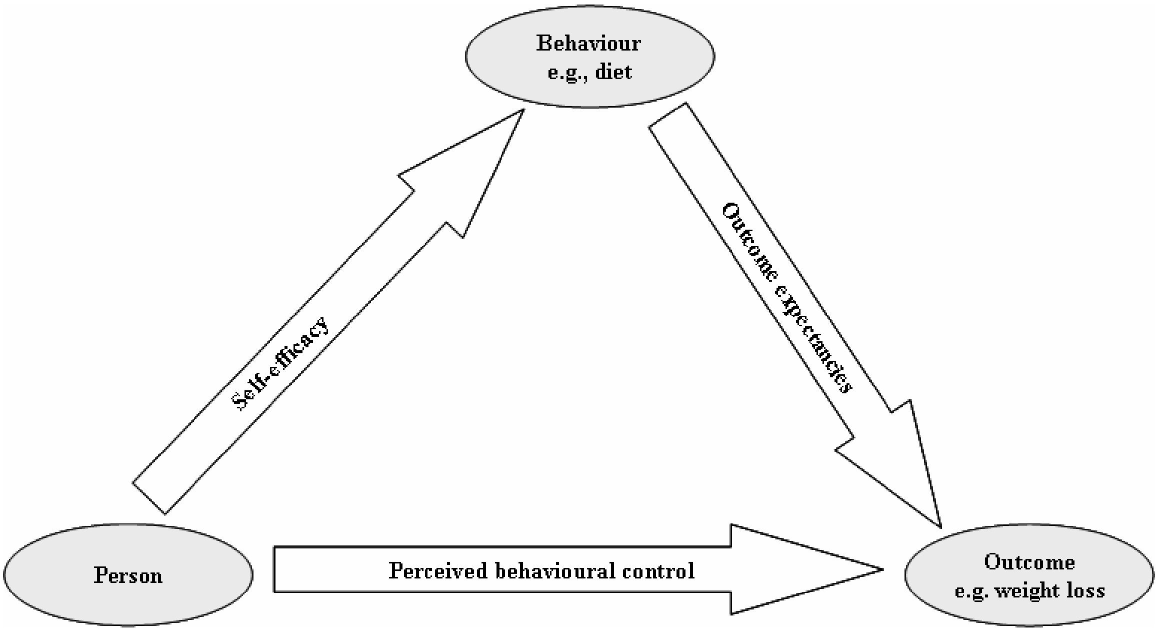


Figure 2 A distinction between self-efficacy, perceived behavioural control and outcome expectancies. Adapted from Skinner (1995).

Figure 2 shows that self-efficacy relates to the capability to perform a behaviour, outcome expectancies address the result of the behaviour and perceived behavioural control focuses on the individual's direct control over the outcome.

1.3.8 Self-efficacy and outcomes expectancies

Self-efficacy is sometimes wrongly interpreted as expectancies of desired outcomes (McKean Skaff, Mullan, Fisher, & Chesla, 2003). In fact, whilst self-efficacy addresses the question whether an individual *can perform* a particular behaviour, outcome expectancies are about whether the pursued action *will work* in the way an individual expects. On the other hand, the perception of personal confidence is associated with anticipation of outcomes. For example, individuals who felt more confident about managing their diabetes regime had expected a more positive outcome resulting from their performance (Skelly et al., 1995). The distinction is presented in Figure 3.

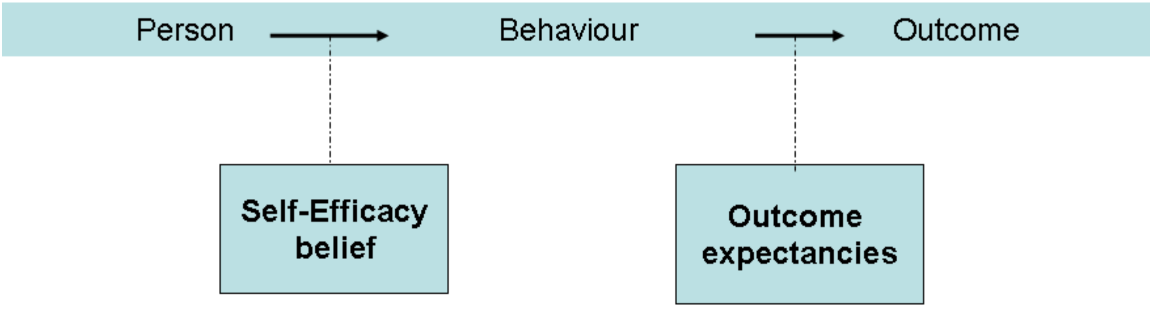


Figure 3 The relationship between self-efficacy beliefs and outcome expectancies as described in social cognitive theory. Adapted from Bandura (1997)

Figure 3 shows the distinction between self-efficacy and outcome expectancies in the context of the process of performing a behaviour. Whilst self-efficacy beliefs relate to the capability to perform behaviours, outcome expectancies address the beliefs about achieving goals when performing the behaviour.

1.3.9 Learned helplessness, self-fulfilling prophecy

A lack of self-efficacy is related to but differs from learned helplessness (Meier & Seligman, 1976). Learned helplessness may result from repeated failures. An individual develops the expectancy that behaviours do not predict the desired outcomes.

In conclusion, the notion of self-efficacy has been mistakenly interpreted by researchers at times as locus of control, expected outcomes, ability, competence, confidence or learned helplessness. It is however a distinctive and clearly defined construct. Self-efficacy is the belief in personal capability to perform a certain behaviour in a given situation (Bandura, 1997). The next section provides an overview of the four sources of self-efficacy. It emphasises the ways in which the self-efficacy beliefs can be enhanced in people using the example of diabetes.

1.4 Operationalisation of the self-efficacy construct: Four sources of self-efficacy

Social cognitive theory, in contrast to other health behaviour models, provides not only “a predictive but also operative power” (Bandura, 1997, page 286). It means that it not only explains the predictors of health behaviours but also describes the origin of its construct and specifies the way in which the predictors can be modified. With regard to self-efficacy, which is the basis for the present thesis, Bandura suggested four possible sources of the beliefs The four sources of self-efficacy includes mastery experience, role modelling, verbal persuasion and physiological and affective states (Bandura, 1997).

1.4.1 Mastery experience

Mastery experience refers to strategies when an individual is guided in successful performance. It has been described as the most influential of all four sources of self-efficacy as it provides the most vivid and personalised information of personal agency. Studies showed that the behaviour change resulting from a mastery experience-based type of influence was the most resistant to change (Bandura, 1977).

The mechanism of behaviour change stemming from previous successful performance has been described, however as not simply as an income-outcome-based process. Self-efficacy beliefs may play a vital role in interpreting the past experience and hence engaging in new behaviours (Bandura, 1997). Therefore, with regard to intervention techniques, it could mean that guiding someone in a positive experience may be insufficient to enhance his or her sense of self-efficacy and trigger behaviour change. For example, two people who have managed to increase their average blood sugar levels might have interpreted the lower HbA1c (i.e. average blood glucose level) as a personal achievement, pure chance, or even a failure if they were aiming for lower-than-achieved levels of blood sugars. Thus, the way people attribute outcomes of behaviour is crucial in modelling the self-efficacy beliefs (Bandura, 1997). There is a strong implication for practice; when using mastery experience-based techniques it is crucial to tailor the technique to the initial level of self-efficacy, personal goals and level of skills.

1.4.2 Role modelling (Vicarious experience)

People do not always have to perform a certain activity themselves in order to gain the confidence that they are capable of doing so. They could use a “short cut” by observing others and transferring the self-efficacy beliefs onto themselves (Bandura, 1997). Bandura stresses that in situations when people possess less skills, observing successful others is a powerful source of self-efficacy and future behaviour. The effect of observational learning depends to a large extent on the similarity between the observer and the role model (Bandura, 1997). The similarity addresses not only personal characteristics like age, gender or education but also the level of skills and self-efficacy. Studies showed that the role model has to be similar enough for the person to be able to identify with him or her and attribute the self-efficacy beliefs (Bandura, 1997;

Luszczynska et al., 2005b). Too distant a role model may in turn cause a drop in the self-efficacy beliefs.

While describing successful modelling, Bandura not only referred to social comparisons but also to learning rules which can be applied to managing diverse tasks. In intervention studies modelling-based techniques included listening to others who verbalised thought processes and provided applied knowledge about problem-solving strategies (Lorig, Gonzales, & Laurent, 1999). The techniques focused on how to apply skills, to find alternative solutions and to monitor the progress. Role modelling-based techniques aim to help people to stay motivated and to overcome self-doubts as well as provide information on how to correct errors and benefit from failures.

1.4.3 Verbal persuasion

Verbal persuasion refers to expressing the beliefs that someone is capable of performing a certain behaviour (Bandura, 1997). This is the most widely utilised source of self-efficacy in interventions (Koopman-van der Berg et al., 2001). Bandura argued that this is because of the fact that verbal persuasion is the easiest source of self-efficacy to perform and is always available. For example, it requires less effort and time to praise someone than to guide a person through a successful performance. At the same time, Bandura claims that the verbal persuasion-based source of self-efficacy is less powerful than mastery experience or role modelling (Bandura, 1977). For example, self-efficacy beliefs which result from mastery experience-based techniques seem to be resistant to occasional failures. In turn, verbal persuasion-based self-efficacy beliefs have been shown to diminish when someone faces obstacles (Bandura, 1997).

As Maddux and Gosselin showed, the effect of verbal persuasion depends to a large extent on the appropriateness of the information and trustworthiness of the source (Maddux et al., 2001). The individual's self-efficacy beliefs may not change at all, if the person who provided verbal persuasion is not credible. Moreover, a non-realistic verbal persuasion may cause a decrease in self-efficacy beliefs.

1.4.4 Physiological and affective states

Physiological and affective states can be an indirect source of self-efficacy beliefs. In challenging situations people may interpret their negative emotions or bodily symptoms as a sign of personal incapability (Bandura, 1997). For example, someone who feels constantly tired may perceive his self-efficacy towards physical activity as very low.

Due to a low energy level he or she may perceive him or herself as a person who is not capable of being physically active. However, if the person attributes the lethargy not to a general bodily condition (i.e. as something stable and generic) but to an increased blood sugar level (i.e. changeable and specific), he or she may believe in his or her own capability to become more active.

Similarly, people may interpret their emotional state as a sign of personal incapability (Bandura, 1997). For example, someone may feel anxious when having a low blood sugar level, and hence overcompensate by eating too much in order to increase the blood sugar very quickly. Someone else may also feel anxious when having low blood sugar, but attribute the emotional state to the dropping sugar and not to personal inability to deal with the symptom. Thus, this person who attributed the emotions to a physiological state and not to personal incapability to cope with the taxing situation may manage the hypogycemia (i.e. low blood sugars) more efficiently.

Negative emotion in general will impair performance. Thus, people who feel depressed or stressed will more likely perform worse than those who feel positive (Rubin & Peyrot, 2001). They may appraise events as more negative, the barriers as greater and their competence as much lower (Beck, 1979) Thus, physiological and affective states may influence self-efficacy beliefs indirectly by influencing performance and the way people attribute symptoms when dealing with taxing situations.

Intervention techniques which enhance self-efficacy beliefs by addressing physiological and affective states could include reduction of stress levels and negative emotions or correct attribution of bodily symptoms (Bandura, 1997).

In sum, according to social cognitive theory human behaviour can be promoted by enhancing one of the four sources of self-efficacy (Bandura, 1977). People assess their capability to perform a certain behaviour by using information coming from four sources of self-efficacy: mastery experience, role modelling, verbal persuasion and physiological and affective states. The beliefs in personal capability do not result merely from accomplished behaviour. The cognitive processing of information plays a crucial role in creating the personal beliefs in self-efficacy.

The next section outlines four sources of self-efficacy as conceptualised in the theoretical framework for the present thesis.

1.5 Self-efficacy as theoretical framework for the present thesis

The four sources of self-efficacy are described in a hierarchical model with mastery experience being the most powerful technique. There is some research evidence supporting the hierarchy. For example, people with a snake phobia benefited more from an intervention based on mastery-experience (i.e. visualising, observing, and touching a snake) than when based on role modelling (i.e. observing another person interacting with snakes) (Bandura, 1977). It could be argued, however, that individuals have personal hierarchies in terms of the influential strength of self-efficacy-based techniques. Different people may interpret each source of self-efficacy as evidence for success or failure (Bandura, 1997). For example, someone who has tried in the past to lose weight and failed may know the obstacles and effort involved in the process. Thus, when he or she eventually does loose weight, he or she might appreciate it more (and start feeling more in control about being on a diet) than someone who has never tried to loose weight before. Furthermore, for example, someone who has never changed his or her insulin dose may need more than guided experience at first. The experience from others to start believing that he or she is capable may help them move to the next step. Thus, for this person role modelling may be the most powerful technique.

The Analysis System for Self-Efficacy Training (ASSET), which is the coding and training tool developed in the presented thesis, describes the four sources of self-efficacy in a complementary model. It places the four sources of self-efficacy on the same level of influence. Within ASSET the four sources of self-efficacy are considered on two broad dimensions: actor of and behaviour involved in pursuing the technique:

Who talks (i.e., who is the source of self-efficacy),

What happens (i.e., action or action related talk versus appraisal of an event).

Whilst 'mastery experience' relates to gaining self-efficacy beliefs from one's own experience (i.e. the facilitator creates the opportunity for an individual to be in action), 'role modelling' addresses the opportunity to gain self-efficacy beliefs from successful others (i.e. facilitator creates the opportunity to observe others in action). In contrast, 'verbal persuasion' is based not on action but on an appraisal made by others (i.e. the facilitator appraises an individual's skilfulness). Physiological and affective states in turn relates to appraisal of symptoms experienced by an individual (i.e. the facilitator creates the opportunity for an individual to attribute physiological and affective symptoms). *Figure 4* represents the conceptual framework underlying the coding tool.

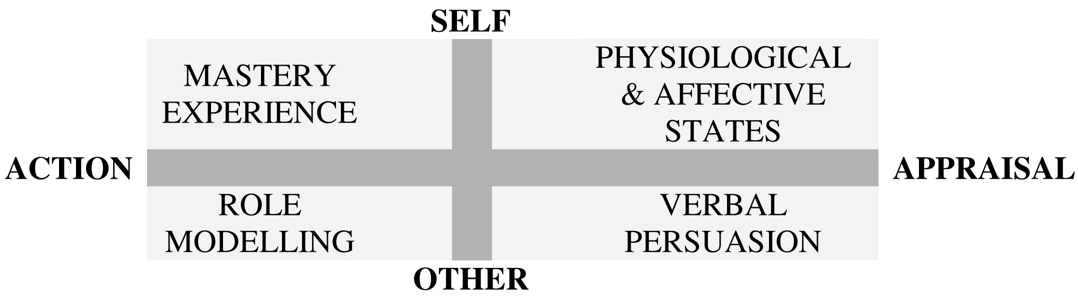


Figure 4 Theoretical framework underlying ASSET

Figure 4 shows that the four sources of self-efficacy can be used to address the same information from four different perspectives: by activating the patient (self), by activating the group (other) and by triggering action or appraisal. The four sources of self-efficacy describe the way of delivery leaving the context of the intervention open. In terms of chronic conditions such as diabetes, the self-efficacy-based techniques can be applied to any aspect of the management. For example, if the targeted self-efficacy beliefs are with regard to lowering blood sugar levels, the techniques used in an intervention could be as follows:

1) Mastery experience: Analysing graphs of blood sugar levels in order to find an individual pattern;
2) Role modelling: Asking others in the group about their management strategies e.g. high blood sugar levels in the morning;
3) Verbal persuasion: Eliciting knowledge from a patient about the way the insulin works in order to understand its impact on blood sugar levels;
4) Physiological and affective states: Exploring bodily symptoms associated with high blood sugar levels in order to learn to recognise them and deal with them quicker.

1.6 Alternative approaches for measuring doctor-patient communication

There are numerous assessment instruments to measure doctor-patient communication (Caris-Verhallen, Timmermans, & van Dulmen, 2004; Heritage & Maynard, 2006; Ong et al., 1995; Roter & Larson, 2002). It is beyond the scope of the thesis to describe them all. Here, a short classification of the most frequently used approaches is given to provide a context for ASSET and to highlight its unique contribution.

As Ford and colleagues summarised, all assessment instruments incorporate the following elements: an observational medium (e.g. video tapes, non-participant observation), particular behaviours of interest (e.g. verbal, kinesic, problem solving strategies etc.), a comprehensive classification system for categorising behaviours, and an operational approach to measure these behaviours (e.g. units of speech, rating procedures) (Ford et al., 2000). Appendix B provides a summary of these elements for the most often used instruments which are discussed in this section.

The most widely used assessment instrument is the Roter Interaction Analysis System (RIAS), which was adapted to health settings from Bales' Interaction Process Analysis (IPA) (Roter & Larson, 2002). IPS was the first interaction assessment system. It codes small group interactions focusing on information exchange between participants (Heritage & Maynard, 2006). Based on the distinction between problem and emotion focused interaction, RIAS assesses the interaction between doctor and patient in general health settings. It codes both verbal and non verbal communication. The limitation of coding with RIAS is that it does not allow for parallel coding. As Ong and colleagues (Ong, de Haes, Hoos, & Lammes, 1995) pointed out, utterances which may aim at both cure (problem focused behaviour) and care (emotion focused behaviour) cannot be coded accurately as the coder has to choose one category. A further two limitations reported by Ford and colleagues were the omission of specific topics in conversations and inability to code how health professionals responded to cues. These limitations were addressed by the Medical Interaction Process System (MIPS) by Ford and colleagues (Ford, Hall, Ratcliffe, & Fallowfield, 2000).

MIPS adapts the RIAS categories to consultations between doctors and patients with cancer. It is designed for parallel and sequential coding. First, it takes account of information transfer on the level of the content as well as the way of delivery. Second, it captures what follows what in the conversation. This means that the accuracy of response and the receptiveness to patients' cues can be judged. The limitation of MIPS is the complexity of the coding. It may take up to 3.5 of the real time to code a consultation.

MEDICODE by Richard and Lussier represents a different way of coding consultations (Richard & Lussier, 2006). It focuses on communication addressing medication during medical consultations. Similarly to MIPS, MEDICODE was developed on the basis of RIAS. It adapted its categories to the specific content of discussing medication. The categories capture the medical content and some of the process of information exchange. In contrast to the speech utterances based coding instruments, MEDICODE uses medications (grouped by pharmacological class) as the unit of analysis. Dividing the material into the medication-based units of analysis may be a time efficient way of coding, however it poses the risk of losing information. The flow of interaction cannot be assessed. MEDICODE is a coding system to assess the exchange of medication based information and is content based. The coders look for specific content and cannot capture specific interactions which took place in each consultation or are specific for each health care professional. In contrast to the previously described assessment systems, it cannot be used to assess the communication skills of health care professionals.

The Medical Interview Aural Rating Scale provides still a different way of assessing interaction (MIARS, Heaven, Clegg, & Maguire, 2006). It assesses nurses' communication skills in palliative care, focusing on behaviours which guide patients' disclosure. MIARS distinguishes between patients' and nurses' cue-related behaviours including cues, function, and form categories. Cues relate to patients' expressions of worries or concerns. Function addresses the adequacy of responding to the cues such as exploration, acknowledging or inappropriate assurance. Form, in turn, refers to behaviours which trigger patients' disclosure including questions or negotiation. The categories are not mutually exclusive. The strength of this assessment instrument is that it allows for the assessment of sequences and, therefore, the use of adequate skills to respond to patients' cues (Caris-Verhallen et al., 2004).

A further frequently used assessment instrument is the VERONA Medical Interview Classification System (VR-MICS; Piccolo, Mazzi, Saltini, & Zimmermann, 2002). It investigates the interaction between doctors and emotionally distressed patients with the aim of helping doctors to recognise patients' cues. Similarly to MIARS, it assesses the general efficacy of intervention techniques with regard to patient disclosure (Piccolo et al., 2005). When compared to MIARS, VR-MICS includes a broader range of categories which relate to both the formulation (i.e. function and form) and the content of speech utterances. For example, patients' categories include cues and statements. The cues consist of life episodes, worries, feelings and emotional themes (Piccolo et al., 2002). Cues could be any verbal or non verbal expression which hints at a new or not sufficiently explored topic. The statements in turn refer to patients' utterances which occurred as a response to previous technique/speech utterance (e.g. answers). Regarding doctors' behaviour, it explicitly divides between patient-centred techniques such as facilitation, non-directive and directive questioning and clarification, and doctor-centred techniques such as closed questions. The strength of this assessment instrument is that it allows sequential coding. VR-MICS comprehensively assesses doctor-patient interaction.

On the one hand it identifies distressed patients which may need psychological support. On the other hand, it provides an insight into individual intervention styles.

Based on a review of 25 instruments to assess patient provider communication in therapy, Russell and Stiles divided the linguistic behaviours into three groups. These were content categories, intersubjective categories and extra-linguistic categories (Russell & Stiles, 1979). 'Content category' refers to the semantic content of words or word groups. All five coding tools discussed here consider the content of the interaction as a part of the assessment. In turn, 'intersubjective category' includes coding of speech structures which imply the relationship between communicator and recipient. For example, a question implies that the doctor seeks information. Frequently, systems based on intersubjective categories may be identified by semantic structures such as questions. Intersubjective categories include also description of specific therapeutic techniques such as reflection or proposing client activity. All but the MEDICODE described assessment instrument focuses on coding of intersubjective categories. This way of coding may give some insight beyond the discussed topics. It provides information about different ways of discussing the same topic as well as the sequence of interaction. The sequences, in turn, help to investigate the receptiveness to patients' cues. Finally, 'extra-linguistic category' addresses speech characteristics such as the quality of the voice, or laughing, and temporal patterning of speech such as repeating words or sentences, percentage of interruptions, or speech rate. Within the discussed instruments two including RIAS and MIPS include the non-verbal categories including body language and a scale to rate the affective quality of the communication.

When considering the classification suggested by Russell and Stiles, ASSET belongs to the intersubjective systems as it focuses on the way in which the communication takes place, independently of the content. It addresses the techniques of talking to patients which can be used for various contents. The coding scores of ASSET will be entered into ELAN (i.e. linguistic annotation tool, Hellwig, 2006). Thus, the information regarding temporal patterning of speech (the extra linguistic category) will also be retrieved and used in the analysis. Similarly to the described instruments, ASSET codes video material and uses the speech utterance as the unit of coding. There are also some significant differences between ASSET and the described assessment instruments.

ASSET focuses on nurses' speech and does not code patients' speech. Thus, it cannot be used to assess the sequences of utterances and therefore lacks information about the receptiveness to patients' cues. It cannot be assessed whether specific nurse-led techniques fit patients' talk. ASSET also differs from all the described instruments in the coded behaviours. Whilst all the described instruments consider patient-centred approaches, ASSET was designed to code theory-driven techniques. It is the first instrument which assesses the use of self-efficacy-based techniques.

1.7 Conclusions

In conclusion, this chapter presented the concept of self-efficacy. It placed social cognitive theory in the context of other health behaviour models emphasising how the models overlap with each other. It distinguished self-efficacy from other theoretical and common sense terms and discussed the four sources of self-efficacy. Finally, the first chapter presented the conceptual framework which underlies the coding tool, Analysis System for Self-Efficacy Training and gives a context of other assessment instruments to code doctor-patient behaviour. The next chapter focuses on diabetes presenting a rationale for why diabetes was chosen for this piece of research emphasising the association between self-efficacy and diabetes-related health outcomes.

CHAPTER 2: SELF-EFFICACY IN DIABETES

2.1 Diabetes – illness characteristics

2.1.1 What is diabetes?

Diabetes is a chronic condition which occurs when the beta cells of the pancreas do not produce enough insulin or alternatively when the body is not able to use the insulin (WHO, 2008). Insulin is a hormone which among other things regulates blood sugar levels by allowing glucose to enter cells (i.e. muscle and organ tissue, brain and fat cells) (Open University, 2005).

There are two major types of diabetes: type 1 and type 2 diabetes. Type 1, previously known as insulin-dependent-diabetes mellitus or childhood-onset, is characterised by a complete lack of insulin. Thus, a patient with type 1 diabetes has to inject insulin in order to maintain health and survive. Type 2 diabetes, previously known as non-insulin-dependent diabetes, is characterised by an insufficient amount of insulin produced by the pancreas or by ineffective use of the insulin produced by the body (Saudek, Rubin, & Shump, 1997). Among people with diabetes, 90% suffer from type 2 diabetes. Because there is an increasing number of younger people developing type 2 diabetes and type 2 diabetes is quite often treated with insulin, the previously used names are not accurate any more (WHO, 2008).

Whilst the onset of type 1 diabetes is usually closely followed by the recognition of the disease, people with type 2 diabetes may live with the condition for many years without being diagnosed (Saudek et al., 1997). This is due to the fact that the symptoms of type 1 diabetes occur suddenly and are remarkable and life threatening, whilst type 2 diabetes develops gradually. In consequence, people with type 2 diabetes often have already developed complications as a consequence of the disease, and suffer from early micro-vascular or macro-vascular problems at the time of diagnosis (WHO, 2008).

There are other diabetes-related health conditions. These are gestational diabetes, impaired glucose tolerance and impaired fasting glycaemia. Gestational diabetes is a hyperglycemia (i.e. high blood sugar) firstly recognised in pregnancy. Impaired glucose tolerance and impaired fasting glycaemia are pre-cursors of diabetes, characterised by increased blood glucose levels (Open University, 2005). The present thesis focuses on type 1 and type 2 diabetes as conditions which require insulin treatment. Only these two conditions are presented in more detail.

2.1.2 Cause

The definitive cause of diabetes mellitus still remains unexplained. However, some risk factors can be named (Saudek et al., 1997). Firstly, family history seems to contribute to the development of diabetes. The risk of diabetes type 1 increases by 3% in individuals whose families have a previous history of the disease (Diabetes UK, 2006). The genetic susceptibility, however, explains only a part of the risk to develop diabetes. Little is known about the external factors which may contribute to the onset of type 1 diabetes. The onset of type 2 diabetes is much more dependent on hereditary factors. Especially, certain ethic groups such as African-Americans and Hispanics are more prone to develop type 2 diabetes (Saudek et al., 1997). The risk of people with a history of the disease in the family developing type 2 diabetes is greater than among people without family members with diabetes. The risk increases by a further 25% with unhealthy lifestyle (TPE research group, 2006). A high saturated fat diet and a sedentary lifestyle as well as being overweight are perceived as the major risk factors of type 2 diabetes (Open University, 2005). Another important risk factor of type 2 diabetes is depression. A meta-analysis of 9 studies showed that the prevalence of type 2 diabetes is 37% higher among people with depression than among those without depression, independently of the other risk factors previously discussed (Knol et al., 2006). None of the reviewed studies looked at the association between self-efficacy beliefs, depression and onset of diabetes. The association between self-efficacy and depression in diabetes will be discussed later.

2.1.3 Symptoms

Both type 1 and type 2 diabetes are characterised by increased blood sugar levels. The common symptoms are excessive excretion of urine (polyuria), excessive thirst (polydipsia), constant hunger (polyphagia), fatigue, and vision change (Bliss, 2007). The difference with regard to the symptoms is that in type 1 diabetes their onset are sudden and intense (they are also accompanied by a significant weight loss). In type 2 diabetes, in turn, the symptoms can develop over years without being identified as signs of a chronic condition. As a result of this people with type 2 diabetes may live many years without knowing that they have diabetes, misinterpreting their symptoms (Saudek et al., 1997).

Apart from the same symptoms caused by an increased blood sugar level, the characteristics of type 1 and type 2 diabetes differ in several points (Saudek et al., 1997).

The first remarkable difference between type 1 and type 2 diabetes is body shape. Whilst individuals with type 1 are usually slim (they loose weight at the onset of the condition), people with type 2 are usually overweight (especially those diagnosed earlier in life). An average person with type 1 is much younger than people with type 2. However, in recent years, an increased number of younger people have started developing type 2 diabetes. This is predominantly seen in indigenous communities and ethnic minorities (WHO, 2008). This could be due to genetic as well as life style factors. It makes the initial diagnosis and first treatment challenging.

In terms of physiological symptoms, diabetes becomes noticeable when blood glucose dramatically falls or rises. The changes in blood glucose levels in particular affect people using insulin. Once injected, insulin cannot be removed from the body, which in certain circumstances may lead to hypoglycaemia (i.e. when the blood sugar is below 4 mmol/l). The symbol of mmol/l represents the amount of glucose per litre of blood (Open University, 2005). Hypoglycaemia, if untreated, may lead to a coma. The range of symptoms in hypoglycaemia is broad and varies from person to person. Irritability and anxiety, sweating, blurred vision, and headache are the most often mentioned symptoms (Bliss, 2007).

On the other hand, when insulin is reduced or omitted, prolonged high blood glucose levels may result among people with type 1 diabetes in the life-threatening state of ketoacidosis (Saudek, 1997). Ketoacidosis occurs when the body is producing ketones (i.e. fat broken down for energy). Due to their acidic character, ketones are damaging for the internal organs. The individual starts vomiting and breathes shallowly and fast in order to get rid of the elevated ketones in the blood.

Managing diabetes as a chronic condition refers, however, not only to treating the physiological symptoms. An everyday commitment to control blood sugars, adjusting insulin or taking the right amount of tablets at the right time of the day as well as the unknown health-related future are only a few factors which may impair psychological well-being of people with diabetes (Rubin et al., 2001). Emotional symptoms, such as depression and anxiety may then become a substantial part of diabetes-related symptoms. A meta-analysis of 42 studies including type 1 and type 2 diabetes showed that people with diabetes when compared to a non-diabetic group are twice more likely to develop depression (Anderson, Freedland, Clouse, & Lustman, 2001). The negative emotions in turn may impair self-care behaviours (Chao, Nau, Aikens, & Taylor, 2005). Depression in diabetes is associated not only with less-active self-care but also with a poorer blood sugar control and greater complications (Rubin, 2005).

2.1.4. Consequences

They are three major health-related risks of having diabetes. These include micro-vascular, macro-vascular and neuropathic damage (Saudek et al., 1997). Frequently high (i.e. HbA1c above 7.5, WHO, 2008) blood sugar levels (i.e. hyperglycaemia) increase the risk of micro-cardiovascular complications such as retinopathy (i.e. impaired eyesight and higher risk of blindness), kidney failure, and impotence. The micro-vascular damage may in turn lead to neuropathy, ulceration and to the loss or damage to the limbs (Bliss, 2007). High blood sugar levels may also cause macro-cardiovascular complications like stroke or heart disease (WHO, 2008). These in turn may lead to reduced life expectancy and impaired quality of life (Snoek & Skinner, 2002).

Improved metabolic control substantially decreases the risk of late complications for type 1 (DCCT, 1994) and type 2 patients (UK Prospective Diabetes Study (UKPDS), 1998a). For example, in a study on type 2 diabetes tight insulin-based blood glucose control and reduced blood pressure resulted in decreased risk of heart disease, stroke, retinopathy and early kidney damage compared to a group treated with other medication. The downside of increased insulin intake, in turn, as the study showed is the greater risk of hypoglycaemia and weight gain (UK Prospective Diabetes Study (UKPDS), 1998b). The weight gain is due to the fact that, with the help of insulin, the body is able to use the glucose which was previously lost in the urine and utilises less energy to produce glucose (Yki-Jaervinen et al., 2007).

2.1.5 Cure and Treatment

Diabetes is a non-curable disease. Since the spectacular discovery of insulin in 1922, type 1 diabetes has become a chronic condition instead of being a death sentence (Bliss, 2007). With the help of insulin, tablets and a healthy life style a person with diabetes is still able to maintain health, postpone and in some cases prevent late complications. Early diagnosis, effective patient and professional education and comprehensive long term care are the most efficient ways to reduce the risk of late complications and to increase patients’ quality of life (DCCT, 1994). This, however, requires an ongoing commitment from the person with diabetes.

In order to survive, a person with diabetes has to adhere to the medication in a form of injections or tablets. It is also necessary for them to control their blood sugar levels by either injecting the right amount of insulin or testing whether the medication is working effectively (Saudek et al., 1997). The recommended range of blood sugars for people with diabetes is 5 – 7 before a meal and 8-10 two hours after having a meal. The range can be challenging to achieve and maintain (Saudek et al., 1997).

Other self-regulatory behaviours include healthy diet and physical activity. The reduction of high-fat and high-salt food as well as daily physical activity are highly recommended, especially for people with type 2 diabetes, where the condition can to a large extent be controlled by a healthy life style. For example, regular physical activity increases insulin-sensitivity, improves glycogen storage, lowers blood pressure and reduces the risk of cardiovascular health disease (Diabetes UK, 2006). As far as a healthy diet is concerned, low carbohydrate and fat intake can regulate blood sugar levels in people with type 2 diabetes. A low fat diet will help to reduce weight which in turn will help to absorb the glucose. Low carbohydrate food in turn can be absorbed with the little insulin the body of a person with type 2 diabetes is still producing.

The other important aspect of diabetes management is a regular medical check up. As mentioned previously, people with type 2 diabetes can have diabetes without knowing about it for many years. Some of the early signs of complications (e.g. foot damage), however, can be checked by the person themselves, others have to be tested in a clinic (e.g. retina damage). Due to the increased risk of micro- and macro-cardiovascular complications, early detection and appropriate treatment can successfully prevent further damage.

In sum, diabetes self-management involves a range of activities which have to be pursued on a daily basis. These include testing blood sugar levels and taking medication (i.e. in the form of insulin injections and/or tablets), eating healthy food and exercising, as well as checking for early complications (e.g. reduced pain perception in feet) and attending medical appointments. Thus, diabetes-related treatment requires a multi-faceted behaviour.

2.1.6 Diabetes type 2 treated with insulin

The first part of this chapter presented the distinction between individuals with type 1 and type 2 diabetes, emphasising the underlying physiological processes and ways of treatment. However, there is a substantial group of type 2 diabetes patients who will eventually need insulin as the illness progresses. An estimated 30-40 % of people with type 2 diabetes will have to start taking insulin in order to gain better glycaemic control (Saudek et al., 1997). This can be due to the fact that their pancreas has stopped producing insulin or, as in the majority of cases, the person is ‘insulin resistant’ (i.e. impaired insulin receptors) so that there is a greater risk of major cardiovascular complications (e.g. myocardial infarction) (Koivisto, Tuominen, & Ebeling, 1999).

Switching from tablets to insulin therapy can significantly improve blood glucose levels (Yki-Jaervinen et al., 2007), with the effect decreasing over a period of three years (Srinivasan et al., 2005). Nevertheless, there several barriers which patients and professionals may perceive with regard to switching from tablets to insulin treatment (Davis & Renda, 2006; Meece, 2006). For example, starting insulin is often taken to indicate a substantial deterioration of the condition among patients and professionals (de Sonnaville et al., 1998). Also, many patients perceive the transmission from tablets to insulin as a personal failure (Hunt, Valenzuela, & Pugh, 1997). People are also worried that insulin causes weight gain. People with type 2 diabetes expect that they can manage their condition well without insulin thinking that insulin is designed for more severe diseases (Polonsky & Jackson, 2004). Finally, insulin is associated with a perceived loss of control over individual’s life. For example, people are worried that they won’t be able to go out, travel and live an independent life. Therefore, people with type 2 diabetes are usually trying to postpone the moment and prefer to adopt more rigorous regimen in terms of healthier diet and more physical activity (Hunt et al., 1997).

Many people with type 2 diabetes who use insulin will take only one or two injections a day and try to regulate their blood sugars by eating a low carbohydrate diet and by being physically active. Thus, the aims for a self-management programme are specific for this group of patients. On the one hand, the programme can involve managing insulin and monitoring blood sugars. On the other hand, it can incorporate topics related to a healthy diet and physical activity.

2.1.7 Educational programmes

As far as type 1 and type 2 diabetes are concerned, self-management programmes focus on various aspects of self-care like adjustment of insulin, carbohydrates counting (Miller, Edwards, Kissling, & Sanville, 2002a), or healthy life style (Steed, Cooke, & Newman, 2003). Whilst type 1 diabetes programmes are aimed at insulin management, type 2 diabetes programmes involve to a large extent the regulation of physical activity and diet (Clark & Asimakopoulou, 2005). The type-specific programmes have a different impact on diabetes self-care and illness-related outcomes. For example, whilst a reduction in HbA1c is an often achieved outcome of programmes for people with type 2 diabetes, people with type 1 diabetes may struggle to improve their HbA1c level but benefit from the programme in terms of improved psychological well-being (Steed, Lankester, Barnard, & Newman, 2005).

2.1.8 Conclusions

In conclusion, this section presented the characteristics of diabetes as a chronic condition which relies on the individual's self-management skills, with a special emphasis on the distinctions and similarities between type 1 and type 2 diabetes. The next section provides the argument why diabetes is a good example to study self-management of chronic conditions stressing the importance of self-efficacy beliefs as a strong predictor of successful management.

2.2 Why choose diabetes mellitus to study self-efficacy?

There are six core reasons why diabetes mellitus provides a good model for studying self-efficacy in the context of chronic illness self-management programmes.

2.2.1 The role of self-management

First, diabetes is a good example of a chronic condition as it relies on the individual's self-management (Glasgow & Anderson, 1999). As discussed in the previous section, self-management relates not only to administering insulin or tablets and blood glucose monitoring but also to maintaining a healthy life style and attending regular medical check ups (Institute for Medicine, 2002). The patient makes the decisions about diabetes management and it is they who will experience the consequences of the decisions (Glasgow et al., 1999). Patients' self-management will have a direct impact on blood glucose control, which in turn will affect long-term health and well-being.

2.2.2 Diabetes as a complex condition

Second, diabetes is a complex condition. As presented in the previous section, diabetes poses the whole spectrum of chronic condition-related challenges (Clark et al., 2005). Patients and indirectly their families experience the consequences of physiological impairment (e.g. the risk of hypoglycaemia), life style adjustment (e.g. new food regimen), psychological distress (e.g. increased risk of depression and burn out) and environmental change (e.g. planning for getting prescription and picking up medication) (Kuijer & de Ridder, 2003). Thus, self-management and self-management programmes can address a whole range of issues.

2.2.3 The role of diabetes health care professionals

Third, the role of health care professionals who consult patients with diabetes is not to advise but to guide the patients in self-management by helping them to develop necessary skills and by enhancing their beliefs in their own capability to manage the illness successfully (Krichbaum, 2003). In the UK, for example, a patient with diabetes sees a health care professional at least once or twice a year (e.g. for the annual review and for eye check). Thus, as presented in the previous section a person with diabetes is fully in charge of their illness management (Glasgow et al., 1999). Thus, the role of health care professionals is to guide people in successful self-management supporting self-management skills (Rapley & Fruin, 1999).

2.2.4 Epidemiology

Fourth, diabetes mellitus is one of the most prevalent chronic conditions around the world. In the last decade the prevalence of diabetes was 177 million. This is expected to increase to at least 300 million by 2025 (WHO, 2008). Approximately, 1.8 million people living in the UK are diagnosed with diabetes with approximately one million others undiagnosed (Department of Health & Diabetes UK, 2005). The treatment of diabetes accounts for about 9% of the National Health Service budget (Currie et al., 1997). Hospital admissions for the treatment of the long-term complications contribute to the major costs of diabetes treatment in the NHS. The costs involve not only the huge financial problems but also the intangible issues, such as pain, anxiety, or lifestyle restrictions. Thus, there is a need to develop accurate and efficient ways to respond to the so highly prevalent condition.

2.2.5 Well investigated area of structured education

Fifth, self-management programmes in diabetes are well investigated and developed. There are a few structured education programmes for people with type 1 and type 2 diabetes which are partly or fully based on a theory (e.g. DESMOND, 2004; Lorig, 1996a). In the UK, there are also clear guidelines on how to improve the service in order to support patient self-management skills and improve blood glucose control (Department of Health et al., 2005). With regard to education in diabetes, NICE guidelines stated that "educational programmes should use a variety of techniques to promote active learning (engaging individuals in the process of learning and relating the content of programmes to personal experience), adapted wherever possible to meet the different needs, personal choices and learning styles of people with diabetes, and should be integrated into routine diabetes care over the longer term" (National Institute for Clinical Excellence, 2003, p. 3). Supporting and developing patients' ability for self-management and applying evidence-based education by qualified facilitators have become the leading recommendations in diabetes care (Hall & MacKinnon, 2003).

2.2.6 Self-efficacy in diabetes-based self-management programmes

Sixth, as presented in the previous chapter, self-efficacy is one of the major predictors of behaviour change (Bandura, 1997) which has been widely investigated in diabetes (Deakin, McShane, Cade, & Williams, 2008; Hampson et al., 2000; Krichbaum, 2003). The reason why diabetes was chosen as an example of a chronic condition is that many of the self-management programmes offered as a part of standard care in the UK and worldwide are based on self-efficacy theory (e.g., Lorig, 1996a; Skinner et al., 2006).

2.2.7 Conclusions

In sum, diabetes is a good example to study the role of self-efficacy in self-management programmes for people with a chronic condition. Diabetes requires self-management and its treatment relies on patients' own engagement and decisions. It is a complex condition which affects not only physiological but also psychological and environmental factors. It is a highly prevalent disease, thus substantial costs are involved in preventing and treating it. Numerous structured and theory-based programmes have been developed and run for people with type 1 and type 2 diabetes. Finally, self-efficacy is the most often utilised theoretical construct in the self-management interventions.

The next section presents a brief overview of research evidence regarding the relationship between self-efficacy beliefs and diabetes-related behaviours. It provides a rationale for why it is important to enhance patients' self-efficacy beliefs when supporting self-management skills.

2.3 Self-efficacy and diabetes-related outcomes - Results from literature search

This review explores different factors of effective self-management including self-efficacy in the context of diabetes self-management interventions. The first part of this section summarises the reviewed studies by highlighting the discrepancies in results, and emphasising the strength of the evidence. The second part of the review critically evaluates the reviewed studies focusing on detail of design, measurements, and conceptual issues with regard to diabetes and self-efficacy.

To the best of my knowledge, there is no literature review which specifically investigates the association between self-efficacy and diabetes-related outcomes measured as psychological (i.e. depression, anxiety), behavioural (i.e. diet, exercise, medication taking and blood glucose monitoring) and physiological variables (i.e. HbA1c or BMI).

Therefore, the literature was searched using the following data bases: MedLine, Embase and PsycInfo for the following keywords: *self efficacy* and *diabetes mellitus*. An abstract search was conducted by the author of the thesis. The cut-off year for the search was 1986, when Bandura published his book on social cognitive theory (Bandura, 1986). Included studies were those involving adults with type 1 or type 2 diabetes being diagnosed at least one year prior to baseline data collection. The reason for this was that people who are newly diagnosed with diabetes may still be producing some insulin, and consequently do not experience the whole spectrum of challenges associated with diabetes management (Marso, 2003). The exclusion criteria were as follows: gestational diabetes, people with newly diagnosed diabetes, children and adolescents, and prevention of diabetes. Papers written in languages other than English as well as abstracts of dissertations were excluded from the literature search.

The initial search identified 286 papers. After the abstract search 42 studies were identified. Of these, one study was excluded as it investigated psychometric properties of a self-efficacy-based scale (van der Ven et al., 2003). Two studies were excluded as self-efficacy was only presented in descriptive statistics and no links to diabetes-related outcomes were investigated (Cavanaugh et al., 2008; Uitewaal, Hoes, & Thomas, 2005). One study was excluded because self-efficacy was not measured. In this study, control over diabetes scale was used as a proxy measure of self-efficacy beliefs (Howorka et al., 2000). One study measured the association between a group of variables including self-efficacy, education and psychosocial factors and diabetes-related functioning (Montague, 2002). Due to insufficient information on the determinant strength of self-efficacy in the model, the study was excluded from the review. Another study was excluded as it explored predictors of self-efficacy beliefs (Bernal, Woolley, Schensul, & Dickinson, 2000). One study was excluded as it used the empowerment scale to measure psychosocial self-efficacy (Via & Sayler, 1999). The empowerment scale measures diabetes-related psychosocial self-efficacy (Anderson, Funnell, Fitzgerald, & Marrero, 2000). However, it does not address the self-efficacy construct described by Bandura (1997). It assesses the general confidence in diabetes-related self-regulatory skills. Another six studies were excluded as self-efficacy was an outcome variable of an intervention (Borges & Ostwald, 2008; Chapman-Novakofski & Karduck, 2005; Gleeson-Kreig, 2006; Matteuci & Giampietro, 2003; Siebolds, Gaedeke, & Schwedes, 2006; Wangberg, 2007). The intervention studies are discussed in the next chapter. Finally, of the initial 286 papers, 29 fulfilled the inclusion criteria, highlighted the relationship between self-efficacy beliefs and diabetes-related self-care outcomes. Of these, two studies were discussed in more than one paper. As the two and three papers, for study 1 and two, respectively, presented the same data set, they were discussed together (for study 1: Sacco et al., 2005; Sacco et al., 2007; for study 2: Kneckt, Syrjala, Laukkanen, & Knuuttila, 1999; Syrjala, Kneckt, & Knuuttila, 1999; Syrjala, Yloestalo, Niskanen, & Knuuttila, 2004). The final number of reviewed studies was 26.

Appendices C and D present a summary of the 26 reviewed studies grouped into cross-sectional and longitudinal designs, respectively, outlining the predictors, mediators and outcome variables broken down into behavioural, psychological and physiological factors. For the present review the measure of association was Pearson correlation coefficient, as reported in 20 of the 26 studies (2 – 11, 13, 14, 17 – 24). Other measures, where correlation coefficients were not reported, were mean differences (12), odds ratios (15), and regression coefficients (1, 10, 11, 16, 19, 25, 26).

The following section summarises the cross-sectional studies outlining the association between psychosocial, behavioural and physiological variables and self-efficacy beliefs. The subsequent section presents the longitudinal studies in more detail, identifying the discrepancies in the results in the context of the studies' strengths and weaknesses. The last section of the chapter gives a general overview of the methodological and conceptual issues identified in all reviewed studies.

2.3.1 Cross-sectional studies

2.3.1.1 Diabetes-related psychosocial outcomes

Self-efficacy beliefs appear to be associated with more positive well-being, life satisfaction and social support (Bandura, 1997). As Appendix C shows, out of the 23 cross-sectional studies, eight investigated the association between self-efficacy beliefs and the psychosocial factors (1, 4. 8, 10, 12, 15, 19, 22).

With regard to depression, diabetes-related distress and quality of life, all seven studies which measured these factors indicated that people with greater self-efficacy beliefs reported fewer depressive symptoms, less distress or better quality of life (1, 4. 8, 13, 14, 20, 23). Four studies showed that depression was negatively correlated with self-efficacy beliefs, which in turn were positively associated with self-care behaviours among people with type 2 diabetes (4, 8, 13, 23). The results may provide evidence for Bandura's claim that cognition plays a substantial role in the performance of health-related behaviours (Bandura, 1997). The way in which people perceive their capability to perform self-care behaviours more than actual adherence may influence how people feel and how they will act in the future. On the other hand, depression may inhibit people from performing self-care behaviours (Rubin et al., 2001). Depressed people may assess their self-efficacy beliefs much lower than non-depressed people, regardless of their actual capabilities. The reported studies, however, provide only correlational data. Thus, it is not possible to conclude on the causal relationship between depression and self-efficacy beliefs. Studies which assess the change in depression and self-efficacy beliefs over a period of time would provide more insight into the causal relationship between these variables.

As Appendix C shows, Whittemore et al. investigated the correlates of the diabetes-related distress and self-care behaviours including self-efficacy and social support factors in women with type 2 diabetes (Whittemore et al., 2005). They showed that greater self-efficacy beliefs combined with social support were related to a lower perceived distress and to a better adjustment to a diabetes-related daily routine (Whittemore et al., 2005). Because the study did not distinguish between the individual psychosocial variables, it was not possible to conclude to what extent the negative association with distress and the positive association with adjustment to diabetes regimen were due to the self-efficacy beliefs. Similarly, emotional support was associated with greater self-efficacy, which in turn was related to diabetes-related stress response among patients with type 1 and type 2 diabetes (Kanbara et al., 2008). Aalto et al. showed that people with type 1 who had higher self-efficacy beliefs assessed their physical and mental health as well as available social support more positively than those with lower self-efficacy beliefs (Aalto et al., 1997).

In sum, all eight studies (1, 4. 8, 10, 12, 15, 19, 22) which investigated the psychosocial variables showed that self-efficacy was associated with psychosocial factors such as depression, anxiety, quality of life and social support among people with type 1 and type 2 diabetes. The studies suggested that self-efficacy may play a mediating role between psychosocial variables and self-care behaviours. However, due to the cross-sectional design of the reviewed studies, the causal relationship has to be interpreted with caution. Longitudinal studies which control for levels of psychosocial factors at baseline are needed to further investigate the impact of self-efficacy beliefs on diabetes-related outcomes.

2.3.1.2 Diabetes related self-care behaviours

Besides physical activity and food choices, a major focus of diabetes-related self-care has been on managing blood glucose level with the help of tablets and/or insulin and by blood glucose monitoring (Saudek et al., 1997). As Apendix C shows, of the 23 cross-sectional studies, 19 focused on the relationship between self-efficacy beliefs and self-care behaviours (2-6, 9-22).

As seen in Appendix C, ten studies investigated the relationship between self-efficacy beliefs and medication and insulin taking (2, 4, 5, 9, 12, 13, 15, 17 - 19). Of these, nine showed a positive association between self-care behaviours and self-efficacy beliefs. In contrast, the study of Skelly et al., 1995 did not confirm that relationship. The study focused on ethnically diverse groups. The low economic status of these groups may be an important factor to explain the lack of relationship between self-efficacy and self-care behaviours. The lack of relationship could also be explained by the fact that the self-efficacy concept is embedded in Western culture but may not reflect a sense of capability in other cultures. There are studies which have investigated general self-efficacy in terms of culture-based differences (e.g. Scholz, Guitierez Dona, Sud, & Schwarzer, 2002). It is beyond the scope of the thesis to discuss the cultural aspect of individualistic versus collectivistic communities. The discrepancy in the findings could be also due to the fact that people who need complex insulin treatment do not produce insulin at all or produce very little. In contrast, patients with type 2 diabetes who take one injection per day still produce some insulin which helps to regulate their blood glucose levels (Saudek et al., 1997). Thus they may not develop the self-efficacy beliefs or may assess their capability to use insulin inadequately due to the lack of experience (Bandura, 1997).

Further, with regard to the discrepancies in results, it must be highlighted that the studies differed with regard to the socio-economic status of their participants. For example, Nakahara et al. recruited patients of a high economic status who had just accomplished an intensive diabetes programme (Nakahara et al., 2006). The high levels of self-efficacy beliefs among all patients may suggest that the group was not representative of the whole diabetic population. Nevertheless, the relationship between self-efficacy beliefs and self-care behaviours reflected a true association. In contrast, Skelly et al. (Skelly et al., 1995) explored the association between self-efficacy beliefs and diabetes self-care behaviours among low income Afro-Americans with type 2 diabetes. Studies with diverse ethnic minorities showed no association between self-efficacy and medication taking (McKean Skaff et al., 2003; Sarkar et al., 2006). Regarding blood glucose monitoring, of 12 studies which investigated the association (2, 3, 5, 6, 9, 13, 15, 17, 18, 19, 21, 22) nine showed that greater self-efficacy regarding blood glucose testing adjustment was associated with frequent blood glucose monitoring for people with type 2 (2, 13, 15, 17, 18, 21, 22) and type 1 diabetes (9, 17, 18, 19, 21, 22). The study by McCaul and colleagues, in contrast to the other studies including blood glucose testing, used not only self-reported data but also objective data from the self-monitoring records (1987). All three studies which did not show the relationship between blood glucose testing-related self-efficacy and the corresponding behaviour focused on type 2 diabetes (3, 5, 6). It has been mentioned previously that the management of type 2 diabetes relies also on other activities such as diet or exercise. This may be a reason why confidence in the management of diabetes is perceived more with regard to these activities than with regard to blood glucose monitoring. It is important to note that two of these threes studies included ethnic minorities. As discussed previously, cultural as well as economic aspects could contribute to the study results (Bean et al., 2007; Chlebowy et al., 2006).

Despite the beneficial effect of a healthy diet many people struggle with maintaining one (Peyrot, 1999). This may be why individuals who had stronger beliefs in their ability to pursue a healthy diet maintained one, even when facing specific barriers such as temptations, negative mood and uncontrollable situations. As can be seen in

Appendix C, all 18 studies which investigated the relationship between self-efficacy and diet suggested that greater self-efficacy was associated with healthier eating (2, 3, 5, 6, 9 - 22). This association has been found in both type 1 (9, 10, 18, 22) and type 2 diabetes (2, 3, 5, 6, 11 – 22) in poorly controlled diabetes (Nelson et al., 2007) and in a diverse range of ethnic groups (Bean et al., 2007; McKean Skaff et al., 2003). People with greater self-efficacy beliefs with regard to their self-management skills were also less likely to engage in binge eating behaviours (Aljasem et al., 2001).

Exercise also has a beneficial effect on people with diabetes and, as with diet, is perceived as challenging (Glasgow et al., 1989; Nelson et al., 2007; Peyrot, 1999). There is a large body of evidence showing that self-efficacy plays a role in the initiation and maintenance of physical activity among people with diabetes (Allen, 2004). Out of 17 studies which investigated self-efficacy and physical activity (2, 3, 5, 6, 9 – 15, 17 - 22), 15 showed a positive association between these two variables. All but one of the studies utilized self-reported questionnaires to measure physical activity (2, 3, 6, 10 – 12, 14, 15, 17, 20, 22). McCaul and colleagues used energy expenditure to assess physical activity (McCaul et al., 1987). The actual, as opposed to perceived/estimated level of activity, seems to be a more accurate measure. On the other hand, the McCaul et al. study had its limitations. It applied a generic questionnaire to measure social cognitive theory-driven variables, including self-efficacy beliefs and outcome expectancies. Thus, it cannot be concluded to what extent the finding reflects the relationship between self-efficacy and the exercise.

Aljasem et al. found no relationship between self-efficacy and exercise. However, whilst they specifically asked about physical activity, the questions concerning self-efficacy beliefs lacked focus on exercise (Aljasem et al., 2001). This may be why they were not able to find a relationship between these variables. Whittemore and colleagues showed no association between physical activity and confidence in diabetes management among women with type 2 diabetes (2005). Forty percent of the woman in this study reported that they did not exercise at all. Nevertheless, they engaged in other physical activities involving household maintenance and child care. Hence, the lack of association between confidence in living with diabetes and exercising could be due to the fact that exercising was not perceived as a part of diabetes care. Thus, the item measuring the confidence in living with diabetes might not correspond with the scale measuring exercising. It also has to be pointed out that the one item measuring confidence in living with diabetes can be questioned. The one item scale addressed a generic construct which can be interpreted in various ways. For example, it could be understood as generic motivation to stay physically active and not reflect the actual capability to overcome barriers. Self-efficacy beliefs target a specific behaviour (Bandura, 1997). It has to be measured with regard to certain activity and in the context of specific barriers.

Nakahara and colleagues showed that perceived self-efficacy belief was the only psychosocial variable which was related to diabetes-self-care behaviours such as diet and exercise among individuals with type 2 diabetes in a set of potential factors that included social support, daily hassles, diabetes-related distress and emotion-focused coping.

One study investigated self-efficacy beliefs in the context of oral hygiene (Syrjala, Ylostalo, Niskanen, & Knuuttila, 2004). Poor metabolic control was associated with dental problems like periodontitis and dental caries (Saudek et al., 1997). Frequent teeth brushing, visiting a dentist as well as the number of decayed surfaces and deepened periodontal pockets were associated with dental self-efficacy. Furthermore, dental self-efficacy was shown to be related to diabetic self-care in general.

2.3.1.3 Diabetes related physiological outcomes

It has been stated that a tight blood glucose control is the main factor preventing pre-mature diabetes-related morbidity and mortality (UK Prospective Diabetes Study (UKPDS), 1998b; DCCT, 1994). HbA1c is the major and most often investigated variable in diabetes-related research (Glasgow & Osteen, 1992b). As can be seen in Appendix C, out of ten studies which included the measure of blood glucose level (3, 5, 7, 10, 11, 13, 18, 19, 20, 23), seven showed an association between greater self-efficacy and lower blood glucose level (3, 7, 10, 11, 18, 19, 23). The studies investigated both the association between self-efficacy and blood glucose level and the mediating effect of self-care behaviours. For example, Ikeda and colleagues showed a negative association between self-efficacy and blood glucose control (Ikeda et al., 2003). However, they did not assess behaviour, therefore it cannot be concluded whether the relationship was direct or whether it was mediated by self-care behaviours.

The direct effect could be explained by the positive association between self-efficacy and psychological health. For example, as the cross-sectional study by Kanbara et al. showed, self-efficacy was associated with lower stress response (2008). Stress triggers adrenalin release which in turn increases the blood glucose level (Cohen, Kessler, & Underwood Gordon, 1997). Thus, individuals with greater self-efficacy beliefs may be less susceptible to stress response and more likely to have better blood glucose control. The cross-sectional data can also indicate a reverse association. Those with better glycaemic control may report better quality of life and be more confident in managing their diabetes. With regard to the non-direct effect of self-efficacy on blood glucose level, McKean Skaff et al. found that a greater sense of self-efficacy in relation to diabetes self-care behaviours was associated with treatment adherence which in turn was related to an improved metabolic control in the European American sub-population (McKean Skaff et al., 2003).

They observed, however, that when controlling for self-care behaviours, the relationship between diabetes self-efficacy and HbA1c became non-significant. Similarly, in a study with individuals of European, South Asian and Pacific Island descent there was a positive association between self-efficacy and self-care behaviours. Self-care behaviours, in turn, contributed to better glycaemic control (Bean et al., 2007).

As Appendix C shows, out of ten studies, four did not find the association between self-efficacy and blood glucose level (3, 5, 10, 13). The mixed results could be due to various reasons. First, HbA1c level depends on various factors such as diabetes-regimen, self-care behaviours, health status, or stress level (Saudek et al., 1997). Self-efficacy can only optimise the outcome of the treatment the person is receiving. Thus, it is challenging to control for all possible predictors of metabolic control. Second, it has been observed that the average blood sugar level of people with type 2 diabetes who take medication gradually goes up (Turner, Cull, Frighi & Holman, 1999). Thus, when the medication is not sufficient, a person who adheres perfectly may still suffer from increasing blood sugar levels. Third, HbA1c is a measure of blood sugar levels over the last 6-8 weeks (Open University, 2005). Self-efficacy beliefs and self-care behaviours are usually measured in relation to a shorter period of time. Thus, there could potentially be a mismatch in terms of the time frame of the information.

2.3.2 Longitudinal studies

As Appendix D shows, all four longitudinal studies included in the literature review explored the predictors of diabetes treatment adherence including self-efficacy beliefs for type 1 and type 2 diabetes (24, 25, 11, 26). Two of the studies included physiological measures of HbA1c level (Johnston-Brooks et al., 2002; Nakahara et al., 2006). In contrast to the cross-sectional data, none of the longitudinal studies included psychosocial factors as the outcomes variables. Three studies showed evidence that self-efficacy beliefs predicted some diabetes-related self-care behaviours (24 – 26). Two studies indicated that the self-care activities predicted blood glucose control (11, 25).

Two studies which included a measure of diet (24, 25) indicated that self-efficacy beliefs predicted current and future healthy eating. Two studies which included exercise as an outcome measure demonstrated that self-efficacy beliefs predicted physical activity six months later (25, and 26). The measurement relied on self-reported data. Thus, the reported activity may not reflect the actual level of activity.

Appendix D shows that one study included blood glucose testing as part of self-care activities (Johnston-Brooks, 2002). The self-efficacy beliefs did not predict blood glucose testing measured six months later. The study included young adults with an age range between 18 and 35. This could be the reason why there was no association between these variables. On the one hand, younger people may pay less attention to their diabetes in their life and hence they may test less. On the other hand, potentially related to a shorter time since the onset of diabetes, they may have better glycaemic control and not suffer from diabetes-related complications. Thus, they may feel confident that they are able to manage diabetes even if they test less frequently. This study, however, does not discuss these issues. The authors discussed the overall self-care score and did not provide any explanation of the lack of relationship between self-efficacy beliefs and blood glucose testing. More information, for example regarding the duration of diabetes, may have given more insight into the results. . A methodological limitation of this study may also have contributed to the results. In this study, diet and exercise self-efficacy beliefs were measured as a predictor of glucose testing (Johnston-Brooks et al., 2002). Thus, the measured self efficacy beliefs did not match the assessed behaviour.

Hurley and Shea (1992) investigated the relationship between self-efficacy beliefs and self-care behaviours measured as sum scores of behaviours including diet, insulin, exercise and foot care. They showed that overall belief in the capability to manage diabetes predicted self-care activities one month later. The study conducted by Hurley et al. used scales that reflected Bandura's suggestions regarding how to measure self-efficacy (Bandura, 2001b; The self-efficacy items were matched with the behaviour items (i.e. "*can you*" was replaced with "*did you*") (Hurley et al., 1992).

Hurley and Shea, as well as Johnston-Brooks et al., investigated the association between self-efficacy beliefs and self-care activities, which they measured at one month and six months respectively (24, 25). However, when analysing the long-term relationship, both studies failed to control for the change in self-efficacy over time. The relationship could, therefore, indicate a cross-sectional association over time rather than a prediction.

Self-care behaviours and self-efficacy beliefs were shown to directly determine blood glucose level measured at six and 12 month-follow up (Nakahara et al., 2006). An association was shown between baseline self-care and HbA1c level as well as between baseline self-efficacy beliefs and HbA1c level measured at six and 12 months. Despite the fact that the authors claimed a causal relationship between self-efficacy beliefs and HbA1c level, the reported results are not sufficient for this claim. A significant correlation between baseline data and follow up data is not sufficient to conclude on the causality of the relationship. Proof of causation can only come from randomised intervention studies. A limitation of this study was that overall scores of self-care and self-efficacy scales were used for analysis. Therefore, it was not possible to further investigate which self-care behaviours and corresponding self-efficacy beliefs predicted HbA1c level.

Johnston-Brooks and colleagues provided more insight into the causal relationship between self-efficacy, self-care and blood glucose control in their study with people with type 1 diabetes. First, they measured self-efficacy beliefs at baseline, self-care behaviours at baseline and six months, and HbA1c level at baseline, six and nine months (Johnston-Brooks et al., 2002). Second, self-care variables included diet, exercise and blood glucose testing. The regression analyses showed that self-efficacy beliefs predicted self-efficacy behaviours including diet, exercise as well as HbA1c. Diet self-care behaviours mediated the association between self-efficacy and HbA1c level.

A limitation of the discussed longitudinal studies is that none controlled for a change in the self-efficacy beliefs and outcome variables including self-care activities and HbA1c. As presented, the studies assessed the association between self-efficacy beliefs at baseline and self-care behaviours and HbA1c at up to 12 months after baseline. Thus, the results could indicate a retrospectively measured cross-sectional association. Analyses which control for baseline levels of variables and therefore assess the change over time should be conducted to explore longitudinal association between variables.

2.3.3 Conclusions

In conclusion, this section presented that self-efficacy may play a substantial role in the self-management of diabetes. It may have a direct impact on self-care behaviour which in turn may influence a better glycaemic control. People who feel confident to pursue a certain behaviour will put more effort into achieving their goal and be less discouraged by obstacles than people with lower self-efficacy beliefs. Moreover, self-efficacy can contribute to self-management indirectly. Self-efficacy was associated with lower levels of depressive symptoms, which was linked to fewer perceived diabetes-related symptoms and more frequent self-care behaviours. The evidence, however, about the relationships between self-efficacy beliefs and metabolic control was mixed. Nevertheless, two longitudinal studies showed a positive effect of self-efficacy-determined self-care behaviours on blood glucose level.

The next section discusses conceptual and methodological issues related to the presented studies. It addresses the concept of self-efficacy and Bandura's recommendation for assessing it, emphasising the complexity of diabetes-related behavioural, psychosocial and physiological outcomes.

2.4 Methodological issues in the descriptive literature

This section discusses conceptual and methodological issues with regard to the previously outlined self-efficacy research in diabetes care. Self-efficacy is a behaviour-specific construct (Bandura, 1986). Its testing requires an in-depth understanding of the specific area of interest. Diabetes is a complex condition which requires a range of self-care behaviours and may result in a range of psychological, physiological and social changes (Saudek et al., 1997). Thus, when investigating the link between self-efficacy and diabetes-related outcomes, several issues have to be taken into consideration, such as the type of diabetes, the specificity of the self-care behaviour, and the stage of self-efficacy beliefs.

2.4.1 Measurement of diabetes-specific behaviour

2.4.1.1 Diabetes type1 and type 2 specific treatment behaviour

As discussed in the first part of the chapter, there are substantial differences between type 1 and type 2 diabetes with regard to treatment, which reflect the physiological characteristics of both types of diabetes (Saudek et al., 1997). Thus, when analysing illness specific self-efficacy, distinctive type 1 and type 2 characteristics have to be taken into consideration. This has not always occurred. For example, as Appendices C and D show, out of 26 studies, five analyse type 1 and type 2 diabetes together (8, 16, 18, 22, 26), in two studies (24, 26) the target population was described as *insulin required*, which could indicate either type 1 or type 2, or a mix of both type 1 and type 2 patients. Even when treated with insulin, type 2 diabetes remains a disease not only of increased blood sugars but also of elevated cholesterol and blood pressure. Hence, the self-care behaviours address not only insulin management but also a healthy life style. This is not so much a focus in type 1 diabetes.

In another study, a scale designed for individuals with type 2 diabetes was adapted to type 1 by replacing the medication items with insulin injection-related items (Aljasem et al., 2001). Thus, with their scale choice Aljasem et al. made the assumption that the diabetes-related self-efficacy beliefs with regard to self-management in type 1 and type 2 diabetes differ only in medication used to control blood glucose level. McKean Skaff adapted a self-efficacy scale designed for cardiac patients (McKean Skaff et al., 2003).

2.4.1.2 Self-care specific behaviour

The second issue which has to be addressed when deciding which scale to use is the identification of a specific area of self-care behaviours. For example, when exploring what predicts self-care behaviours in diabetes, a specific behaviour has to be pin pointed, such as diet, exercise or monitoring blood glucose. In a next step a behaviour specific self-efficacy scale should be identified. Thus, beliefs about the capability to master a specific behaviour have to be matched with measurement of the same specific behaviour. Four reviewed studies including measured the relation between self-efficacy beliefs and self-care behaviours using corresponding variables (3, 6, 22, 24).

Illness-specific barriers across different regime areas, as well as the behaviour itself have to be taken into consideration for the sake of validity. Glasgow at al. (1997) showed that regime-specific behaviours and barriers are better predictors of illness adherence than generic measures among individuals with type 1 and type 2 diabetes. Furthermore, the treatment specific behaviour has to be clear for both patients and professionals to increase the chance of a positive treatment effect (Bellg et al., 2004). This seems to be trivial but previous studies have shown that patients and professionals significantly disagreed when asked about treatment-related decisions after having a consultation (Parkin & Skinner, 2004).

The most crucial focus of current self-management programmes addresses the promotion of *basal bolus therapy* (i.e. multiple dose injection by using basal insulin in combination with meal-time rapid acting bolus insulin). There is a great need to incorporate this new treatment in a scale. For example instead of asking about the performance of stable insulin injections there should be an item which addresses the ability to match insulin to food and exercise. To the best of my knowledge there is only one scale which investigates the self-efficacy with regard to adjusting insulin (Rubin, Peyrot, & Saudek, 1989). This scale is a subscale of a larger scale measuring diabetes-related self-care behaviours. So far, no psychometric properties of the insulin adjustment sub-scale have been assessed (M. Peyrot, personal communication, May 15, 2006).

2.4.2 Measurement of self-efficacy

2.4.2.1 Stage-specific self-efficacy

The first issue with regard to the measurement of self-efficacy addresses the specification of the stage of action and the beliefs in the capability to perform at this particular level. Luszczynska et al. (2006) have found support for the existence of stage specific self-efficacy. For example, physical activity and consequently the beliefs in the capability to pursue the action were divided into three steps: intention to start (i.e. *I believe I can start exercising on a regular basis*), action (i.e. *I believe I can maintain exercising even if I face obstacles*), and recovery from relapse (i.e. *I believe I can start again when I break the routine of exercising*). Stage specific self-efficacy accounted for stage specific behaviours. Evidence that self-efficacy beliefs work at specific stages, can also be found in studies which measure mismatched constructs. For example, Plotnikoff et al. (Plotnikoff et al., 2000) assessed the predictive strength of action self-efficacy (i.e. *I am confident I can participate in regular vigorous physical activity when I have many other demands on my time*) on pre-action and action of exercise. The results confirmed the mismatch, as the relationship was found only for people being at the action stage (i.e. currently exercising). Thus, when looking for the predictive strength of self-efficacy there has to be a match between the measured beliefs and a specific behaviour.

2.4.2.2 Level of self-efficacy

Bandura recommended a 100-point scale ranging in 10-units intervals or a 10-point Likert scale to measure the level of self-efficacy (Bandura, 2001b). He argued that smaller scales are “less sensitive and less reliable” and may pose a risk of omitting some differentiating information. (Bandura, 1997, p. 44). To investigate these claims, Pajares and colleagues ran a study where they compared different response formats for evaluating writing self-efficacy. The results showed that the 100-point scale was psychometrically stronger than a traditional 6-point Likert scale with regard to the scores of the factor and reliability analyses (Pajares, Hartley & Valiante., 2001). In addition, the 100-point scale had stronger correlations with items measuring academic performance than the 6-point Likert scale, and predicted grade point average whilst the 6-point scale did not. The study also showed that the 100-point scale was as easy to use as the traditional 6-point Likert scale.

2.4.2.3 General versus domain-specific self-efficacy scale

Bandura (1997) stressed that the self-efficacy construct works in a specific domain and cannot be perceived as a general belief in the ability to be successful. Individuals who assess their capability to perform a specific behaviour (e.g. exercise for 30 minutes every day), may not posses any confidence with regard to other behaviours (e.g. sticking to healthy diet). Nevertheless, he argued that having an experience of successful attainment will encourage individuals to anticipate future successes in other areas. In fact, the generalisability of skills is based on the assumption that one possesses the capability to learn. Thus, self-efficacy beliefs are the beliefs in the capability to pursue a new action rather than the beliefs to translate specific skills to a different area of performance. There are, however, studies which have operationalised self-efficacy as general beliefs; for example as the “confidence in ability to manage diabetes” (Nelson et al., 2007, p.444) or as the capability to “follow instructions given by the doctor” (Kanbara et al., 2008, p. 57).

2.4.2.4 Ceiling effect

Individuals who have been living with diabetes for many years reported strong beliefs in their capability to manage the illness already prior to taking part in an educational programme (Howorka et al., 2000; van de Wiel et al., 2003). As a result their self-efficacy beliefs may not change after the intervention (Glasgow et al., 1992a). The non-significant differences in self-efficacy before and after the intervention can be explained by the ceiling effect (i.e. high result at baseline).

Bandura provided guidelines on how to deal with overall high results or lack of distribution (2001b). One suggestion is to increase the difficulty of the barriers. Another possible solution for a ceiling effect could be a larger scale which gives more options for specifying the strength of the self-efficacy beliefs (Bandura, 1977). There are some scales which do not incorporate barriers at all, asking only about confidence of exercising (Lo, 1999). The majority of the instruments are based on a 5-point Likert scale. The appraisal of the personal capability to exercise control over action is behaviour specific. The judgement of the capability relates not only to a specific behaviour but also to circumstances which make the performance more specific and challenging (Bandura, 2001b). Another explanation of the ceiling effect could be related to misconceptions of what is required for successful management (Norman, 1994). Individuals may positively judge their ability to manage the illness based on their previous effort and did not consider the challenges involved.

2.4.2.5 Diabetes self-efficacy scales

Since the late seventies numerous self-efficacy scales in seemingly every imaginable area of human functioning have been developed (Bandura et al., 2006; Schwarzer, 2008a). The scales, however, substantially differed not only in their structure but also in their operationalisation of self-efficacy. As a response to this, Bandura (2001) published recommendations for how to develop a self-efficacy based scale. Derived from theoretical assumptions, he suggested an in-depth investigation of the targeted behaviour. He suggested that the scale should be behaviour specific and address different levels of barriers related to the behaviour. In relation to the structure, he recommended the use of a 100-point Likert scale. He also suggested using the word "*can*" instead of "*will*" when introducing the behaviour.

In diabetes research there are some frequently implemented scales measuring diabetes related self-efficacy beliefs for people with type 1 and 2 diabetes (Bijl, Poelgeest-Eeltink, & Shortridge-Baggett, 1999). However, the majority of scales for adults suffer from methodological or practical limitations. A few scales lack reported validity and reliability (Lorig, 2004), whereas others are not available in English (Aalto et al., 1997). Some of the scales are not specific and focus on illness-management in general for example (Kuijer et al., 2003); join both types of diabetes under one scale (Rapley, Passmore, & Phillips, 2003); or are directly derived from a different scale (e.g. from Grossman's adolescent scale, Grossman et al., 1987), with adaptation based on simple re-wording (Aljasem et al., 2001). Two scales, including Chao et al. and Whittemore et al. consisted of one item (Chao et al., 2005; Whittemore et al., 2005).

The other major limitation of a number of scales which measure diabetes-related self-efficacy is that they do not include barriers when asking about specific self-efficacy beliefs (e.g. Chao, 2005; Kanbara, 2008). Without barriers in place, however, confidence is not needed to perform a behaviour. Also, assessment of self-efficacy in the context of the barriers may indicate the strength of the self-efficacy beliefs. Diabetes-specific barriers such as physical (e.g. being sick), psychological (e.g. being depressed), social (e.g. dining with friends) and environmental (e.g. busy GP) may contribute to the clarity of the self-efficacy-beliefs in a specific situation which, in turn, may improve the content validity of the scale.

Some scale consists of conceptually broad items. For example, the Dutch Confidence in Diabetes Self-Care Scale (CIDS) includes an item which addresses adjusting insulin in three activities (exercising, travelling or celebrating) (van der Ven et al., 2003). These situations can potentially require different amounts of effort. Therefore, the barriers can be difficult to assess by one item and may pose the risk of inaccurate answers being given.

To summarise, there are some limitations with regard to the diabetes-related conceptual issues as well as with regard to the measurement of the self-efficacy construct within the reviewed literature. The next section discussed general methodological problems within the studies.

2.4.3 General methodological problems

There are two major general methodological issues regarding the discussed literature. First, the majority of presented data was based on self-report. The information, therefore, may be biased as suggested by previous studies (Kalergis, Nadeau, Pacaud, Yared, & Yale, 2006). For example, people suffering from depression may perceive their symptoms as more severe and their capability to cope with diabetes as being limited (Rubin et al., 2001). Objective data is needed to support self-report data (Toobert, Hampson, & Glasgow, 2000). To increase the validity, behavioural data could be based on direct measures of behaviour such as downloaded blood monitoring, insulin injection devices that record usage or on pharmacy records (Donnan, MacDonald, & Morris, 2002; e.g. Morris et al., 1997). With regard to objective physiological data, Sacco and colleagues asked about diabetes-related symptoms but also measured BMI and biological markers of metabolic control like HbA1c (Sacco et al., 2007). Also, when asked about self-care behaviours, people may not remember and give a random answer. Medication adherence may be difficult to report (Glasgow et al., 1989). Results based on pharmacy tracking data may provide more accurate information of medication taking. However, the questions of whether the medication was taken correctly remind unanswered (Glasgow et al., 1992b). For example, Bean and colleagues asked individuals with diabetes how many doses of medication they forgot to take in the last month (Bean et al., 2007). Questions arise how patients could ever assess the exact amount of medicine they actually forget to take. Interestingly, out of 225 individuals, 135 said that they have never forgotten their medication. This high score makes the reliability of the self-reported data questionable. It could be that when splitting the group into people who reported adherence and those who said that they had forgotten medication, the authors compared in fact groups of people who were more or less under the influence of the social desirability effect, respectively (Aronson & Lindzey, 1968).

Second, the majority of the presented studies had a cross-sectional design (1 – 23). These data cannot provide information about the direction of the relationship between variables. Taking into consideration the four sources of self-efficacy, which to a large extent are based on previous experiences, self-efficacy can be understood as a product of psychological, behavioural and physiological variables (Bandura, 1997). For people with diabetes, self-management is a life-long process. Thus it is crucial to assess the impact of self-efficacy from a longitudinal perspective.

Cross sectional studies use information gathered at only one time point, making conclusions on causal relationships between variables not possible. In correlational studies it is difficult to say which variable came first. Longitudinal data, which are collected at various time points, may give some insight into the longer term relationships. It is not enough to measure self-efficacy at baseline and physical activity at Time 1. Despite the fact that the information is gathered at two time points, the relationship may still indicate only a cross sectional relationship. Thus, assessing the change in variables over time is important to make conclusions on the long term relationship. In addition, the relationships presented in the discussed studies could be due to extraneous variables such as socioeconomic status or previous experience. These variables may influence both self-efficacy beliefs and self-care activities. For example, those who experience success in the past will have greater sense of self-efficacy and may be more likely engage in self-care activities. Therefore, it is crucial to identify all the important variables and control for them in order to ascertain the causal relationships. Experimental methods which control for extraneous factors provide the most accurate data to test the causal relationship between variables (Shadish, Cook and Campbell, 2002).

2.4.4 Conclusions

Since the development of the first diabetes type 1 self-efficacy scale (Crabtree, 1987 as cited in Bijl et al., 1999) the perception and treatment of diabetes have changed dramatically. Patients with diabetes have been perceived as experts on their condition and expected to take charge of their illness management. Simultaneously, there has been an increase in patients with type 1 diabetes changing from stable insulin and food intake to basal bolus treatment. Thus, the new approach acknowledges that patients have some control over their treatment. Due to the shift in the responsibility of illness management, self-efficacy has become more important. The self-efficacy scales need to be revised according to the new expectations and rules of patients' involvement and the illness-management process itself.

The assessment of diabetes-related self-efficacy still remains a challenge. The majority of scales are not sensitive enough to assess changes across participants with different types of diabetes and different types of treatment. The majority of the scales broadly interpret the concept of self-efficacy (Bandura (1997) and do not reflect the recommendations with regard to the development of a self-efficacy scale (Bandura, 2001).

In sum, there are several issues which must be considered when investigating the relationship between self-efficacy beliefs and diabetes-related outcomes. With regard to diabetes, a focus should be given to either type 1 or type 2 diabetes in order to consider type-specific challenges. With regard to the measurement of the self-efficacy construct, the researcher should address the recommendation given by Bandura (Bandura, 2001b) considering the following issues. First, the scale should include a compendium of appropriate, specific and consistent across sub-scales barriers which vary in terms of difficulty. The beliefs should reflect a specific behaviour not a general activity. Second, the items should specify the stage of change (e.g. maintenance versus initiation). Bandura recommended a 100-point Likert scale, and items starting with "*can"* instead of "*will*", as they refer to the beliefs of capability and not motivation or outcomes. In order to accurately investigate the relationship between self-efficacy beliefs and self-care behaviours, these two should be matched. Third, beliefs addressing specific behaviours should be related to these specific behaviours. Sum scores of both several beliefs and different behaviours pose the risk of over or under estimating the association. Fourth, with regard to general methodological issues, longitudinal design should be used when assessing the predictive strength of self-efficacy beliefs. Fifth, objective measures should be implemented to verify the self-reported information and to control for the desirability effect.

This chapter presented numerous studies that have investigated the association between self-efficacy beliefs and diabetes-related outcomes. Numerous studies showed weaknesses including combining of different types of diabetes, mismatching between self-efficacy beliefs and diabetes-related activities, confounding self-efficacy with different other constructs, as well as reliance on self-reported measures, and on cross-sectional data. Despite all the limitations, the relationship between self-efficacy and self-care seems to be relatively robust and consistent. The next chapter presents a brief overview of self-management programmes in diabetes emphasising the role of self-efficacy.

CHAPTER 3: SELF-EFFICACY-BASED SELF-MANAGEMENT INTERVENTIONS IN DIABETES

"People with diabetes are not interested in diabetes.
They are interested in their diabetes".

Martha Funnell, Therapeutic Patient Education (TPE) summit, April, 2006

3.1 Introduction

Patient education has been recognised as a crucial factor in the treatment of diabetes for decades (Lorig, Halsted, & Holman, 2003). What has changed over the years is the way in which patient education has been defined and delivered. Until the early nineties the majority of interventions were education-based with the focus on providing knowledge (Brown, 1999). Thus, patient education referred to the application of acknowledged ways of treating the disease. In the 1990-s a shift towards problem-focused management took place. Diabetes health-care professionals become more aware about the need to provide patient-focused care, (i.e. to guide a patient in effective self-management). Patient-centred education referred to helping patients in recognising and solving their individual diabetes-related issues (Lorig, 2002). In a review of 72 studies, collaborative interventions were shown to be more effective than didactic methods (Norris, Engelau, & Narayan, 2001). Out of 20 studies which used the collaborative approach, 17 reported an improvement in patients' better diabetes-related knowledge after the intervention. The long-term results were mixed. On the other hand, of eight intervention studies which used a didactic approach, five showed positive effects on patients' diabetes-related knowledge. Seven studies which directly compared the impact of collaborative and didactic methods on patients' outcomes showed that collaborative programmes resulted in patients' better glycaemic control, weight loss and lipid profiles.

Research into the effectiveness of diabetes education reflected the underlying assumptions about what was thought to be important in diabetes management (e.g. what was the role of the patient and the health-care professionals, Lorig, 2002). Until the early 1990-s the effectiveness of education programmes was measured in terms of the change of patients' knowledge and blood glucose levels. Since the publication of a review in 1992, however, the focus has shifted towards behavioural and psychological factors (Glasgow et al., 1992b). The review used 82 published studies reviewed in a meta-analysis by Brown (Brown, 1990). It summarised research evidence showing that improvement in knowledge was reported in about 66% of the studies, despite the fact that it was weakly related to successful management (Brown, 1990; Glasgow, 1999). They pointed towards self-efficacy and social support as two major factors in successful management. Knowledge, nevertheless, is a pre-condition for self-efficacy (Bandura, 1997). Knowledge is necessary but not sufficient for pursuing self-care behaviours (Peyrot, 1996).

Since the publication of Glasgow and Osteen (Glasgow et al., 1992b), a number of systematic reviews and meta-analyses to investigate the effectiveness of self-management programmes in diabetes have been published (e.g., Brown, 1999; Hampson et al., 2000; Norris et al., 2002; Steed et al., 2003). The following section provides a brief overview of the results of these reviews emphasising the key factors which contribute to effective self-management in diabetes.

3.2 Overview of systematic reviews exploring the effectiveness of self-management in diabetes

Self-management programmes in diabetes consistently showed positive effects on patients' knowledge, self-care activities and blood glucose levels. Specifically, educational interventions for people with type 1 and type 2 diabetes which included face-to-face contact, cognitive reframing and encouraged physical activity had the strongest impact on individuals' glycaemic control (Ellis, Speroff, Brown, Picher, & Elasy, 2004). Mixed results of describing interventions for people with type 2 diabetes were presented elsewhere (Norris et al., 2001). Of 72 discussed studies, 27 reported improvement in knowledge and self-care skills, seven in diabetes self-care, and 11 reported positive change in life style behaviours including diet and exercise. Studies that included physiological outcomes reported mixed results. Out of 38 studies, 14 showed improvement in glycaemic control in both the control and intervention groups, 14 reported significant decrease in the control condition and 10 reported no intervention effects. Due to the lack of training protocols and measures of protocol adherence the authors were not able to specify what contributed to the effects. The most recent Cochrane review of 11 educational programmes for people with type 2 diabetes showed a positive effect on people's health and well-being as well as knowledge and self-care behaviours when compared to standard care (Deakin et al., 2008). All six studies which investigated HbA1c up to six months post-intervention and seven which included long-term data reported positive effects of group education when compared to standard care. Eight of nine studies which measured the improvement in knowledge showed positive effects of group education between six months and two years post-intervention. Two studies reported an increase in self-efficacy beliefs. Out of six studies which assessed self-care behaviours, two reported improvement in monitoring, three in exercise, one in urinalysis, and two in diet. No improvement was reported in a study assessing change in physical activity.

It has been stated previously that psychological problems like depression and anxiety are more common among diabetes patients than in the general population (Anderson et al., 2001; Snoek et al., 2002). A systematic review of 36 studies investigated the psychosocial outcomes following diabetes interventions when compared to standard care. Regarding psychological state, out of 15 studies, 11 showed improvements in depression, two out of eight reported reduction in the level of anxiety and three out of four studies showed improvement in psychological adjustment. Twenty studies assessed general quality of life including social functioning, mental health, bodily pain, vitality and general health perception. Only two of these showed positive effects (Steed et al., 2003). Out of eight studies which assessed diabetic specific quality of life, seven showed a positive change after the intervention when compared to standard care.

Psychological interventions for people with type 2 diabetes showed positive effects also on blood glucose levels. In a meta-analysis of 12 studies, Ismail and colleagues calculated that glycated haemoglobin decreases by 1% as a result of psychological interventions (Ismail, Winkley, & Rabe-Hesketh, 2004). This reduction was substantial with respect to the prevention of late complication (DCCT, 1994). A meta-analysis of 21 studies describing psychological interventions in type 1 diabetes showed small to moderate effects on HbA1c with an absolute reduction in glycated haemoglobin of 0.5% (Winkley, Landau, Eisler, & Ismail, 2006). When split into age-specific interventions, the absolute reduction in glycated haemoglobin was observed in 10 studies among children and adolescents but not in 11 studies among adults.

In a systematic review of 64 studies in adolescents with type 1 diabetes, Hampson and colleagues showed that only 25 were theory-driven. These interventions were more effective than those without an underlying theory (Hampson et al., 2000). Bandura's social cognitive theory was the most widely used framework either alone or in conjunction with other theories (Hampson et al., 2000). Similarly, in a meta-analysis of 93 studies Padgett and colleagues showed that alongside diet-focused interventions, social learning-based ones were the most effective programmes in terms of improvement of knowledge, physical outcomes, psychological status and compliance (Padgett, Mumford, Hynes, & Carter, 1988).

The techniques directed towards enhancement of patient self-efficacy beliefs about diabetes management described in the reviews were problem solving, decision making, resource utilisation, formation of a patient-provider relationship, action planning and self-tailoring (e.g. Lorig et al., 2003). In line with these strategies were factors associated with successful diabetes management, like lifestyle, self-efficacy, weight concerns, perceived goals, cost-benefit analysis, outside support, practical skills, diet barriers and emotional adjustment (Day, 2000). However, it remains unclear which of these techniques are the most effective (Day, 2000).

3.3 Exploring the role of self-efficacy in diabetes self-management

Two systematic reviews and a literature review explored the factors contributing to effective self-management emphasising the role of self-efficacy (Allen, 2004; Koopman-van der Berg et al., 2001; Krichbaum, 2003). Nancy Allen provided a summary of self-efficacy-based techniques to change physical activity among people with type 2 diabetes (Allen, 2004). Within 24 reviewed studies, 10 included mastery experience techniques such as setting realistic goals, rehearsing performance and activity log diaries. It has to be pointed that in ASSET setting goals has been conceptualised as one of the verbal persuasion techniques (Zinken, Cradock, & Skinner, 2008). In terms of role modelling, two intervention studies used video tapes of role models. Verbal persuasion techniques were described in 12 studies and included providing verbal encouragement and describing benefits of physical activity. Finally, Allen described physiological and affective states techniques such as relaxation training and discussing relapse prevention strategies without giving reference to any specific study (Allen, 2004). It could be argued that the way in which Allen classified some of the self-efficacy techniques was not accurate. For example, she placed relapse presentation as a physiological and affective states based technique (Allen, 2004). Physiological and affective states relates to the correct attribution of symptoms and/or enhancing positive emotions. Relapse prevention addresses the anticipation of future behaviour and potential barriers which may stop the behaviour. Therefore, the technique could be seen as verbal persuasion, when patients/participants are seen as expert in their performance and are asked to foresee future obstacles.

Another brief review of nine self-efficacy-based interventions addressing diabetes-related self-care activities in general was provided by Koopman and van der Bijl (2001). They found that all nine programmes used mastery-experience when applying new knowledge and practicing new skills. Two of the reviewed programmes also used role modelling-based techniques (i.e. using video material), three used verbal persuasion-based techniques (i.e. emphasising people's own responsibility) and two used physiological and affective states-based techniques (i.e. stress and fear reduction). The authors stressed that the main focus of the programmes was not on self-efficacy. Also, they criticised the fact that the use of self-efficacy-based techniques was not sufficiently described (Koopman-van der Berg et al., 2001).

The most recent literature review was conducted by Kathleen Krichbaum (Krichbaum, 2003). It investigated factors which contributed to effective self-management in diabetes emphasising the role of self-efficacy. The review shows that self-efficacy operationalised as involving people in their own care, guiding them in active learning about diabetes, exploring their feelings about having diabetes and teaching them necessary skills to self-care were the best factors was one of the major factors to improve health outcomes (Krichbaum, 2003). With respect to knowledge, the reviewed confirmed that this is a necessary but not sufficient factor in behaviour change. This review lacked information about the number of included studies, the number of studies which showed the association and the size of association between variables. Thus, the information described in the review can be used to inform the compendium of self-efficacy techniques but not to conclude on the impact of self-efficacy techniques on self-management.

In conclusion, all of the presented literature reviews which explore the impact of education on patients' diabetes related outcomes showed consistent positive effects in terms of patients' well-being and self-care behaviours as well as better knowledge and skills. The impact of educational interventions on blood glucose control however, seemed to be mixed across the studies. There were substantial differences between the summarised programmes in terms of group setting, techniques used, or general focus (i.e. behaviour change, knowledge etc.). Hence, it was difficult to conclude what contributed to the positive outcomes (Peyrot, 1996). Nevertheless, theory-based interventions and specifically the socio-cognitive based techniques seemed to contribute to effective self-management the most (Hampson et al., 2000; Padgett et al., 1988). Self-efficacy was shown to be a powerful factor in developing self-care activities. To rephrase Martha Funnel (2006), who has said that “patients with diabetes are not interested in diabetes but in their diabetes”, it should be stressed that an understanding not of diabetes but of personal issues like needs and barriers is most important for effective management.

The next section discusses recently published self-efficacy-based intervention studies in diabetes, emphasising the effectiveness of specific self-efficacy-based techniques.

3.4 Self-efficacy based interventions – literature review

A literature review was performed to explore the impact of self-management programmes on patients’ health outcomes emphasising the role of self-efficacy-based techniques. The presented studies were derived from a literature search in MedLine, Embase and PsychInfo using the following key words: *diabetes, self-management* and *self-efficacy*. The search conducted by the author of the thesis was abstract based. Included studies were those which described self-efficacy based programmes for adults with type 1 or type 2 diabetes. The exclusion criteria were as follows: self-management programmes for children and adolescents, programmes targeting prevention of diabetes and papers describing protocols of future interventions. Papers written in languages other than English as well as abstracts of dissertations were excluded from the literature search.

The cut off year for the search was 2002 to follow on from the systematic review published by Krichbaum (2003). The search identified 186 studies. Of these, 158 papers were excluded either because they focused on various chronic conditions other than diabetes or were not intervention studies.

With regard to diabetes-based studies, seven studies were excluded for the following reasons. Two intervention studies focused on children and adolescents and a further one addressed parents of children with diabetes. A further four papers were excluded as they described designs of future studies outlining the intervention protocols (George et al., 2007; Greene, McClellan, Gardner, & Larson, 2006; Sturt, Hearnshaw, Farmer, Dale, & Eldridge, 2006; Welschen et al., 2007). One study was excluded as it tested cognitive behaviour therapy among diabetes patients (van der Ven et al., 2005). The reason for excluding cognitive-behaviour therapy-based study from the literature review was that self-efficacy was not the main target of this intervention. Cognitive-behaviour therapy uses techniques which may increase self-efficacy (i.e. goal setting and problem solving), however the main focus is on identifying negative thoughts which is not the target of self-efficacy-based techniques.

The aim of the literature review was to identify self-efficacy-based techniques and to explore their impact on patients' diabetes-related outcomes. Therefore, studies which did not provide sufficient information about the self-efficacy-based techniques were excluded from the review. Thus, further ten studies were excluded. Of these, two mentioned self-efficacy as a part of the education intervention (Chapman-Novakofski & Karduck, 2005; Vincent, Pasvogel, & Barrera, 2007) without giving any details of specific techniques used. Vincent and colleagues stated that "self-efficacy was incorporated into the didactic teaching, cooking demonstration and group support" (2007, page 133). This description raises the question to what extent self-efficacy was utilised at all. Similarly, Chapman-Novakofski claimed that she utilised self-efficacy-theory in an intervention which aimed to increase knowledge regarding healthy diet (Chapman-Novakofski & Karduck, 2005). The use of self-efficacy to improve knowledge questioned whether the authors understood the self-efficacy concept correctly. Of these ten which used self-efficacy only as an outcome measure, eight studies did not mention self-efficacy at all when describing the intervention and were excluded from the review (Atak, Koese, & Guerkan, 2008; Gleeson-Kreig, 2006; Matteuci et al., 2003; Vallis, Higgins-Browser, Edwards, Murray, & Scott, 2005; Heisler & Piette, 2005; Faridi et al., 2008; Gerber et al., 2005; Thoolen, de Ridder, Bensing, Gorer, & Rutten, 2008). The final number of reviewed studies was 10.

The reviewed literature included studies which provided some details about the implemented self-efficacy based techniques. Of these, six studies implemented the social cognitive theory and four followed the empowerment approach. When discussing the impact of self-efficacy-based intervention on patients' self-care behaviour, the empowerment-based programmes need to be mentioned. This is due to the fact that empowerment has direct links with self-efficacy. The empowerment-driven techniques are built around experience-based 'mastery' development, recognition of 'physiological and affective states' as well as 'verbal persuasion' and also ‘role modelling’ through group solving. The next section presents these ten studies in more detail outlining the techniques used and discussing the results.

3.4.1 Self-efficacy-based interventions

The reviewed studies presented self-management programmes for people with type 1 and type 2 diabetes emphasising the role of self-efficacy-based techniques. Table 2 summarises the studies in relation to the self-efficacy-based techniques breaking down over four sources of self-efficacy separately for self-efficacy-based and empowerment-based studies. It shows that the majority of interventions included a mastery experience component, usually in a form of guided practice to develop new skills and guided self-reflection to identify patterns of blood glucose, diet habits etc. The other most often implemented source of self-efficacy was verbal persuasion. The interventions usually included goal setting and feedback. Only a few interventions incorporated role modelling-based techniques and physiological and affective state-based techniques.

Table 2 *Summary of self-efficacy-based techniques grouped into self-efficacy and empowerment-based interventions*

Reference			
Mastery experience	**Role modelling**	**Verbal persuasion**	**Physiological and affective states**
Self-efficacy-based interventions			
(Lorig, Ritter, & Jacquez, 2005; Lorig, Ritter, Villa, & Piette, 2008)			
Practising new skills	Lay facilitator with a chronic condition	Evaluative feedback	Recognising the source of physiological and affective states
(Miller, Edwards, Kissling, & Sanville, 2002a)			
Guided activities to practise skills Guided monitoring and self-reflection on behaviours	'Sharing stories' – exchange among participants about positive attempts	Goal setting; Feedback on monitored behaviours	
(Sturt, Whitlock, & Hearnshaw, 2006)			
Guided self-reflection to identify barriers		Goal setting	
(Steed et al., 2005)			
Practising new skills. Reflecting on what has been learned	Group problem solving.	Elicitation of knowledge & beliefs Identifying strategies to overcome barriers & goal setting	
(Wangberg, 2007)			
Internet-based behaviour exercises	Internet-based videos of successful peers	Internet-based goal setting	

Table 2 (continued) *Summary of self-efficacy-based techniques grouped into self-efficacy and empowerment-based interventions*

Mastery experience	Role modelling	Verbal persuasion	Physiological and affective states
Empowerment-based interventions			
(Clark, Hampson, Avery, & Simpson, 2004)			
		Diet and physical activity-focused problem solving, goal setting	
(DeCoster & George, 2005)			
Practising new skills, taking responsibility for learning outcomes	Peer-lead, sharing self-care behaviours	Problem solving, assessing improvement Feedback on previous action	Emotional support
(Funnell, Nwankwo, Gillard, Anderson, & Tang, 2005b)			
Reflecting on self-management		Goal setting and problem solving	Exploring emotions
(Lowe, Linjawi, Mensch, James, & Attia, 2008)			
Reflecting on diabetes Matching insulin dose and carbohydrates		Goal setting and problem solving	Exploring and managing emotions

To date the most widely used self-efficacy-based self-management programme has been the Chronic Disease Self-Management Programme (CDSMP) developed by Kate Lorig and colleagues (Lorig, Hurwicz, Sobel, Hobbs, & Ritter, 2005). Based on social cognitive theory, the intervention aimed at better illness management through enhancement of patients' self-efficacy and anticipation of positive outcomes. Patients are encouraged to identify their problems and set action plans (verbal persuasion-based techniques), then to experiment in order to experience successful attainment (mastery experience-based techniques) and to explore illness-related emotions to reduce negative affective state and correctly attribute the affective and bodily symptoms (physiological and affective states-based techniques). The programme is run by a health professional and a lay person with the relevant chronic condition who serves as a role model (a vicarious experience-based technique). The programmes for people with type 2 diabetes utilising CDSMP showed a positive effect on patients' self-management behaviours, self-efficacy beliefs and health status measured one year after the intervention (Lorig et al., 2005; Lorig et al., 2008). The intervention effect was measured by mean differences. Participants started walking more (30.7 minutes), reported greater self-efficacy beliefs (1.3 based on results from a 10-point Liker scale), had less hospital days (-.09), reported less fatigue (.07 from a 10-point Likert scale), less health distress (-0.88 from a 5-point Likert scale) and less pain (-.05 from a 10-point Likert scale; Lorig et al., 2005). In the second study from 2008, Lorig and colleagues confirmed the previous results in a Randomised Control Trial. The six months post intervention data showed that the participants became more active (9.50 min), reported greater self-efficacy beliefs (0.69), and better health status measured as emergency visits (-.18), fatigue (-0.25), health distress (-0.59) and activity limitation (-0.15). In addition, the level of HbA1c dropped six months after the intervention (-0.4%).

In contrast to CDSMP, other self-efficacy-based interventions aimed at improvement of specific diabetes-self-care behaviours. Two self-efficacy-based interventions focused on improving blood glucose monitoring, diet, exercise, and adherence to medication among people with type 2 diabetes (Steed et al., 2003; Sturt et al., 2006). Self-efficacy was implemented through goal setting, problem solving, and evaluative feedback. Didactic teaching was avoided. The study by Steed and colleagues showed that there was a significant difference in the change score between intervention and control group with regard to diet ($F(1, 97) = 24.97$), exercise ($F(1, 97) = 9.61$), and blood glucose control ($F(1, 97) = 15.21$). The changes in the level of HbA1c between intervention and control group were not significant ($F(1, 103) = 0.93$). The study by Sturt and colleagues presented preliminary results of a new diabetes self-management programme (Sturt et al., 2003). The results based on data from eight participants showed moderate improvement in self-efficacy beliefs towards self-management (change scores were not reported) and a reduction in HbA1c by 0.93%. Due to the limited sample size, the validity of the results may be questioned.

In a two-group randomised controlled trial, Wangberg implemented a web-based programme to improve self-management behaviours in diabetes (Wangberg, 2007). In the first treatment group the participants received tailored treatment only on those aspects of self-management for which they rated themselves as having the lowest self-efficacy beliefs. In the second treatment group the participants received tailored feedback only on those aspects of self-management for which they rated themselves as having the highest level of self-efficacy. Self-efficacy was utilised in both groups by practicing skills, receiving feedback and observing role models. As a result of this intervention all participants improved in self-care behaviours such as monitoring blood glucose, taking medication, checking food labels and exercising (F (1,25) = 5.56). Interestingly, the result of the study showed that people with lower self-efficacy improved more in terms of application of self-care behaviours than those with already higher self-efficacy (F (1,25) = 4.67). This may be due to the ceiling effect. Patients with greater self-efficacy were already performing the behaviours and there was less room for improvement for them. On the other hand, those with greater self-efficacy at baseline reported a decrease in self-efficacy after the intervention. This, in turn, could be due to the fact that the initial level of self-efficacy included also some unrealistic optimism. Once patients were confronted with real challenges they adjusted their self-efficacy beliefs accordingly to the experience. In contrast to the earlier mentioned studies, the focus of this study was on testing the moderator effect of self-efficacy rather than its clinical utility.

In a randomised controlled trial, a self-efficacy-based intervention was implemented to improve dietary habits of people with diabetes. Carla Miller and colleagues (Miller et al., 2002a) provided a nutrition education for older adults based on self-efficacy among other theoretical constructs including the theory of meaningful learning (i.e. building up the knowledge gradually, reflecting back on learned material) and the information processing model (i.e. learning through problem solving). Self-efficacy was utilised by guided activities to develop participants' knowledge and skills. Participants set weekly goals and monitored their food intake and blood sugar levels in order to identify patterns of dietary habits and blood glucose levels. The intervention resulted in improved metabolic control by -0.5% (Miller, et al., 2002a).

3.4.2 Patient Empowerment

Patient empowerment is an applied approach to diabetes management which was developed in opposition to the traditional, medical model approach (Anderson et al., 2000). It is based on the premise that patients are responsible for their own lives in terms of aiming for control over health and well-being, illness management decisions and consequences of their choices made. Patient empowerment represents a set of strategies to support patient "responsibility and mastery" over diabetes (Funnell et al., 2005a) which includes decision making processes (from problem identification to evaluative feedback).

Of the four reviewed empowerment-based interventions, three showed consistent positive effects on patients' self-efficacy beliefs, self-care behaviours, psychological state, quality of life, metabolic control and knowledge (Lowe et al., 2008; Funnell et al., 2005a; DeCoster et al., 2005) among patients with type 1 and type 2 diabetes. Funnel et al. (Funnell et al., 2005a) reported that after the intervention the self-management improved and the HbA1c measured at one-year follow up decreased. However, no numerical data were reported. In contrast to many intervention studies, this paper provided detailed information about the philosophy and techniques used in the intervention. Therefore, because the goal of the literature review was to collect a compendium of techniques, the paper was presented. Lowe et al. (Lowe et al., 2008) showed a reduction in the HbA1c level by 0.17% after the intervention. The improvement with regard to blood glucose level remained stable over a period of 12 months. The results of the diabetes empowerment scale measuring freedom to eat, worries about the future, and ability to perform physical tasks showed an improvement by 0.19 points (on a scale of 5) four months after the intervention (Anderson et al., 2000). The effect was not observed one year after the intervention. The one-group pre-post study by DeCoster and George (2005) showed positive effects of an empowerment programme on elderly people with diabetes. The self-reported self-care behaviours increased by 20%, as did the self-efficacy beliefs. The study reported a 10% decrease in HbA1c measured post intervention.

In contrast, Clark et al. (Clark et al., 2004) reported change in self-care behaviours with regard to diet ($F(6,93) = 15.74$, $p < .001$) and exercise ($F(6,93) = 3.62$, $p < .01$) but not in the corresponding self-efficacy beliefs after an empowerment-based intervention among people with type 2 diabetes when compared to a usual care control group. The result may be due to the already discussed ceiling effect (i.e. the participants reported high self-efficacy beliefs at baseline) or because of the under-representation of the construct (i.e. self-efficacy was measured by two items). Furthermore, no fidelity check was performed. Therefore, it is impossible to conclude whether the intervention was delivered as intended.

3.4.3 Conclusions

In conclusion, self-efficacy-based programmes for people with diabetes consisted of techniques promoting patients' self-efficacy towards illness management. The techniques were patient-centred (i.e. designed according to patients' reported needs) and included practicing new skills, problem solving, action plans, anticipation of obstacles, exploration of emotions and physiological states. All but one study reported a positive effect of these techniques on patients' self-efficacy beliefs, psychological well-being, and self-care behaviours. The results with regard to the impact of the self-efficacy-based intervention on patients' blood glucose control seemed to be mixed. The next section discusses the methodological issues of the reviewed literature focusing on the treatment fidelity in diabetes self-management-based research and emphasising the utilisation of self-efficacy theory in diabetes-based interventions.

3.5 Methodological issues in intervention studies

In order to design, perform and present a methodologically robust study, treatment fidelity has to be taken into consideration. Treatment fidelity addresses the methodological strategies used to ensure that the intervention is reliable and valid (Resnick et al., 2005). The Behaviour Change Consortium suggested a comprehensive framework for assessing treatment fidelity (Bellg et al., 2004). This assessment process includes consideration of study design, training providers, delivery of treatment, receipt of treatment and enactment of skills. The next section summarises the key components of treatment fidelity in relation to the reviewed literature.

3.5.1 Study design

Is the intervention theory driven?

Does the intervention test the hypotheses?

In cases where the interventions are based on a theory, treatment fidelity refers in the first place to the operationalisation of the theory into intervention techniques (Kok, Schaalma, Ruiter, & van Empelen, 2004). To date, a theoretical background has been given a great attention and priority when designing health-based interventions (Michie et al., 2005). The majority of intervention studies in diabetes care, however, did not specify the underlying theory for the design and implementation of the intervention (Day, 2000; Kok et al., 2004; Norris et al., 2001). The studies who specified the theoretical background rarely provide any evidence that the theory was implemented (Michie & Abraham, 2004). For example, in the study by Chapman-Novakofski and Karduck there is no evidence for the intervention was based on social cognitive theory and the stage model (Chapman-Novakofski & Karduck, 2005). The authors built their analysis on social-cognitive and stage of change variables but do not specify any techniques which would utilise these theories. Sturt and colleagues based their intervention on self-efficacy theory (Sturt et al., 2006). However, the description of the techniques is scare. For example, they said that ‘the nurse helped them (patients) to identify ways of achieving goals in the context of patient’s life through exploration of possible mastery and vicarious experiences and verbal persuasion’ (Sturt, 2006, p. 297). More information is needed to provide evidence of the application of the theory and to enable other researcher to replicate the intervention.

Alongside the theoretical issues, the study design process addresses also hypothesis testing, with the aim of ensuring that the treatment conditions differ only in the independent variables. Thus, the treatment conditions should be the same for each participant in terms of length, and frequency of the received techniques. However, the most common design of intervention studies in diabetes care consists of intervention versus control group, with the second being a waiting group (e.g. Sarkadi & Rosenqvist, 2004), having less hours of contact (Steed et al., 2005) or no control condition at all (DeCoster et al., 2005). Thus, it is difficult to conclude whether the improvement of diabetes-related self-management was due to the participation in the course or, for example, due to non specific therapeutic factors. Self-efficacy-based intervention studies may require controlling for at least three non-specific effects of the intervention. First, more than one facilitator should provide the intervention to control for the effect of a skilled facilitator. Second, to control for the Hawthorne effect, a waiting list control group could be used. Third, and most importantly, a parallel intervention group which utilises a different theoretical/philosophical approach could be used (e.g. active listening). A parallel intervention condition which is clearly different from the self-efficacy intervention could however be difficult to design, as self-efficacy techniques incorporate a broad range of self-regulatory techniques.

3.5.2 Training providers

Have the intervention providers received the same training?

Treatment fidelity addresses also the issue of the uniformity of training provided for the facilitators (Resnick et al., 2005). It is crucial to specify not only the programme protocol, but also the training which the facilitators received. The majority of published studies, however, do not provide sufficient information on the providers' training. A rare exception is the CDSMP developed by Lorig and colleagues. To run CDSMP all providers had to attend a standardised preparation training which was followed by a standardised supervision procedure (Lorig et al., 1999). Such procedures ensure not only consistency among providers in terms of preparation but also control for possible delivery shifts across time.

3.5.3 Delivery of treatment

Was the intervention delivered consistently by different providers and across time? Was the intervention delivery in line with the protocol and underlying theory?

Treatment fidelity is most often associated with the adherence to protocol. Failing to adhere to a protocol may be twofold. A certain technique or procedure may be omitted or unplanned ones added (Moncher & Prinz, 1991). Thus, it is crucial to develop and present a detailed intervention protocol which includes anticipated obstacles and possible reactions to them in order to increase the fidelity and to provide other researchers with sufficient information about the delivery process. Such programme protocols, however, are rarely published alongside the results of an intervention (Michie et al., 2004).

The majority of reviewed intervention studies did not provide sufficient details with regard the designed intervention techniques and to the adherence to the protocol (Koopman-van der Berg et al., 2001). Therefore, the intervention remains unclear. First, it cannot be concluded whether the intervention was designed in accordance with the underpinning theory. Secondly, there is no evidence that the intervention was delivered as intended (Michie et al., 2004). For example, Koopman-van der Berg and van der Bijl evaluated self-efficacy based interventions delivered by nurses facilitating diabetes self-management programmes (Koopman-van der Berg et al., 2001). Prior to the observational study, the nurses were asked to report what self-efficacy enhancing methods they used in their work by selecting methods from a list provided by the researchers. In the next step, the independent raters assessed the implementation of self-efficacy driven techniques while observing the nurses at work using the same list of methods. The results obtained from the self-reported and the observational study differed. For example, nurses, who reported to utilise the technique of setting goals, never did according to the independent raters. Disagreement between reported and observed technique implementation was also found elsewhere (Pill, Rees, Stott, & Rollnick, 1998). Thus, testing the protocol adherence is crucial in order to provide evidence that the intervention was delivered as intended. Self-report underlies the assumption that the person who answers the question understands the topic well and is able to reflect on their own practice. This assumption, however, may be wrong as suggested by the disagreement between reported and observed data.

3.5.4 Receipt of treatment and Enactment of treatment

Have the participants understood the intervention?
Have the participants been performing according to the treatment recommendations?

A part of treatment fidelity consists of the intervention-driven outcomes evaluation. This evaluation can address cognitive, behavioural and physiological changes. It includes receipt and enactment of the treatment (Bellg et al., 2004). Receipt of the treatment refers to the extent the participants understood the intervention and acquired the necessary skills in order to change their behaviour. Treatment enactment, in turn, relates to the performance of the specific behaviour addressed by the intervention. For example, Chapman-Novakofski and Karduck assessed both, the receipt and enactment of treatment. The assessment included participants' knowledge regarding diabetes-related nutrition as well as the dietary behaviour after accomplishment of the educational programme (Chapman-Novakofski & Karduck, 2005). Whilst participants gained knowledge about healthy eating as a result of the programme, their actual behaviour did not change. This finding may confirmed the conclusion made by McCaul at al. that knowledge and skills may not be sufficient to trigger behaviour change (McCaul et al., 1987).

Enactment of treatment relates to behaviour change, maintenance and recovery after a lapse. Out of 10 reviewed intervention studies, one measured the effect only directly after the intervention (Miller, Edwards, Kissling, & Sanville, 2002b), and four at up to sic months follow up, including data collection after one month (Wangberg, 2007), three months (Steed et al., 2005; Sturt et al., 2006) and six months follow up (DeCoster et al., 2005). Out of the 10 studies, five investigated the long-term effects measured at least one year after the intervention (Clark et al., 2005; Funnell et al., 2005a; Lorig et al., 2005; Lorig et al., 2008; Lowe et al., 2008).

In sum, treatment fidelity involves a labour-intensive process. It consists of several steps of grounding the intervention in a theory, providing consistent feedback to facilitators, deliver the intervention in a consistent way, as well as testing the different effects of the intervention. It is vital to invest the effort to ensure treatment fidelity. An intervention study based on treatment fidelity principles appears to have sound methodology and have the potential of providing strong evidence for the results. Treatment fidelity-based study may help to test the theory and to understand the mechanisms of behaviour change.

3.5.5 Summary

In conclusion, this chapter showed that there are numerous self-management programmes in diabetes. These programmes addressed the treatment of diabetes and covered topics such as: hypoglycaemia, physical activity, food (carbohydrates, fat intake), and emotion regulation. The self-efficacy-based techniques included four sources of self-efficacy, mastery experience, role modelling, verbal persuasion and physiological and affective states. Their utilisation varied across programmes. The majority of the self-efficacy-driven educational programmes seemed to have a positive effect on patients' health-related outcomes including psychosocial well-being, self-care and physical health which sustained over time.

Because of the fact that none of the programmes tested treatment fidelity it remained unclear what contributed to the intervention effects. It also remained unclear to what extent the results of interventions are influenced by selection bias. We still don't know to what extent the published literature reflects what is offered within standard health-care. Studies testing treatment fidelity of interventions are needed to gain more knowledge on theory-based behaviour change. Exploring the real world interventions may contribute to the understanding about the extent to which theory-based research is utilised and how effective is it in hospital-based programmes. The last section summarises the introduction chapters and formulates research questions and hypotheses addressing the issues highlighted in the introduction chapters.

3.6 Overall Conclusions and Research questions

3.6.1 Conclusions

The intervention chapters provided an argument that diabetes management relies heavily on autonomous self-care behaviours. Being a successful manager requires the beliefs in the personal capability to exercise control over the chronic disease. There are many educational programmes which are designed to enhance patients' knowledge, skills, and motivation in order to strengthen the beliefs in personal abilities to perform self-care behaviours. The positive effect of self-management programmes for people with diabetes has been demonstrated in several meta-analyses. However, attempts to understand the predictors of illness-related variables such as glycaemic control, blood pressure, weight loss, or well-being have shown contradictory findings (Anderson et al., 2000). Self-efficacy is a robust predictor of initiation and maintenance of behaviour (Maddux et al., 2001; Schwarzer & Fuchs, 1996). Social cognitive theory not only describes the mechanism of behaviour but also provides the strategies for how to influence the predictors of behaviour. Interventions which implement self-efficacy based strategies have had a great impact on patients' well-being, self-care behaviours and a moderate impact on blood glucose levels. However, because the analyses were based on outcome measures it is difficult to conclude what actually contributed to results of the interventions. The study of treatment fidelity (i.e. the extent to which the interventions are theory-based and follow the protocol) would enable researchers to analyse the mechanism of the behaviour change process and to identify successful interventions towards enhancement of self-efficacy. Despite these advantages of treatment fidelity a structured tool to evaluate intervention design and delivery is missing. No studies to date provided an assessment of fidelity. This gap between intervention and outcomes is observed not only in diabetes research but in the entire health psychology literature. There is a need to develop a tool to assess fidelity of the interventions.

3.6.2 Research questions

The literature review has raised numerous issues in relation to the role of self-efficacy in the self-management of diabetes. In particular, it has become apparent that there is enough evidence to show that self-management programmes in diabetes work. Nevertheless, further research is needed to explore the factors which contribute to the effectiveness of the programmes. The questions which remain unanswered are what type of education works for what type of patients through what type of process (Peyrot, 1999, p. 71). Answering these questions will, on the one hand, help to develop and provide effective education in diabetes. On the other hand, it will help to understand the process of behaviour change. The present thesis will investigate some of these questions in relation to the implementation of self-efficacy theory in practice.

The overall aim of the present PhD thesis was to translate the theoretical construct of self-efficacy (Bandura, 1997) into practice. In order to do so, there were three objectives of the research.

3.6.2.1 Study 1

To develop a coding tool for the implementation of social cognitive theory (the Analysis System for Self-Efficacy Training, ASSET);

a. To demonstrate its inter-rater reliability;

b. To explore its construct validity (i.e. to what extent does ASSET distinguish between four sources of self-efficacy?) and clinical utility (i.e. what information regarding nurses-led practice can be gained from the ASSET-based coding?).

3.6.2.2 Study 2

To test the validity of ASSET;

a. With regard to content validity: to explore whether the categories distinguished within ASSET reflect the construct of self-efficacy adequately and comprehensively;

b. With regard to discriminant validity: to provide evidence that ASSET can distinguish between more and less skilled facilitators (i.e. measured by qualifications and time spent on group-based work) suggesting more effective delivery of intervention

c. With regard to predictive validity: to provide evidence that the nurse-led techniques identified with ASSET can predict patients' self-efficacy-based outcomes.

3.6.2.3 Study 3

To investigate whether ASSET-based training increases the number of self-efficacy-based techniques used by nurses.

CHAPTER 4: RELIABILITY STUDY: DEVELOPMENT OF THE ANALYSIS SYSTEM FOR SELF-EFFICACY TRAINING (ASSET)

4.1 Aims

The aims of the reliability study were to:

1. Develop a coding tool to assess the use of self-efficacy-based techniques (the Analysis System for Self-Efficacy Training, ASSET) utilising examples from diabetes self-management programmes;

2. Demonstrate inter-rater reliability of ASSET;

3. Explore construct validity and clinical utility of ASSET.

4.2 Hypotheses

In terms of reliability, it was expected that the level of agreement between coders who used ASSET to evaluate a self-management programme for people with type 1 diabetes would be good (i.e. above 0.60, Robson, 1999).

In terms of construct validity, it was expected that self-efficacy driven techniques would be significantly shorter in time than non self-efficacy-orientated speech. It was also expected that patients would talk longer after facilitator-led self-efficacy-based techniques than after non-self-efficacy-based speech. The four sources of self-efficacy are hierarchical with mastery experience being the most powerful technique (Bandura, 1997). Hence, an additional objective of the study was to explore whether there would be a difference in patients' length of speech when responding to different self-efficacy-based techniques.

In terms of clinical utility, it was expected that carrying out data analysis using ASSET would provide detailed descriptions of the intervention delivery process and enable the researcher to identify individual patterns of delivery among facilitators and across time. Participants would develop more diabetes-related knowledge and skills as the programme progressed, resulting in more personal experiences to reflect upon. Therefore, it was expected that the amount of facilitator-led self-efficacy-driven techniques as well as patients' length of speech would increase over the duration of the intervention.

4.3 Method

The method section is divided in two subsections. First, it presents the initial version of the coding tool, ASSET. Second, it describes the procedures to establish the reliability and validity of ASSET.

4.3.1 Development of a coding tool to assess the clinical implementation of social cognitive theory - the Analysis System for Self-Efficacy Training, ASSET

4.3.1.1 Collecting the compendium of verbal techniques.

According to Michie and Abraham, a technique can be defined as "a concrete description of the procedures used by those delivering the intervention in sufficient detail to enable exact replication" (Michie et al., 2004, p. 33). *Intervention* we reflects a collection of techniques. In the coding tool the techniques are described in terms of specific verbal behaviours (see Appendix E for examples of techniques).

To collect the compendium of verbal techniques, intervention studies completely or partially based on social cognitive theory were analysed. Within a systematic literature search, 22 published self-efficacy-based intervention studies (see Chapter 3 for details) (e.g. Steed et al., 2003; Allen, 2004; van der Laar & van der Bijl, 2001) and three programme manuals (Cox, Gonder-Frederick, Julian, & Clarke, 2000; Lorig et al., 1999; DESMOND, 2004) were identified, which described particular techniques for enhancement of self-efficacy. The overview of the self-efficacy-based intervention studies emphasising the self-efficacy-based techniques is presented in Chapter 3.

These self-efficacy-based techniques were used when developing coding criteria. In addition, three educational diabetes interventions (two for type 1 and one for type 2 diabetes) based on self-efficacy principles were observed in order to identify further techniques (Skinner et al., 2006). For example, each session contained elements of the following techniques: reflecting on previous successful action, practicing new skills, setting goals and receiving positive feedback (Skinner, Cradock, Parkin, Skinner, & Cranston, 2002). The particular techniques were allocated to one of the four sources of self-efficacy, mastery experience, role modelling, verbal persuasion, and physiological and affective states and then grouped into mutually exclusive subordinate categories. For example, reflecting on blood glucose patterns in relation to insulin intake, diet and physical activity was described as one of the mastery experience-based techniques; asking the group to help to solve someone else's problem was allocated to role modelling-based techniques, eliciting knowledge was defined as one of the verbal persuasion-based technique and exploring emotions in relation to the diagnosis was allocated to the physiological and affective states-based techniques. Key examples of verbal techniques and the corresponding ASSET-based categories are presented in Chapter 2. The author of the thesis performed the literature search as well as observed programmes to identify a compendium of self-efficacy techniques. The self-efficacy techniques and the corresponding examples were then discussed in detail with the initial supervisor of the thesis, Chas Skinner. When the compendium reached saturation (i.e. no more new techniques were elicited) the authors (i.e. the doctoral student and the supervisor) decided to stop the literature search and the observation of further programmes.

4.3.1.2 First version of the coding manual: ASSET - Categories and definitions.

As a result of the literature search and observation of three diabetes-based self-management programmes built on self-efficacy theory, the coding manual of ASSET was developed by the author of the thesis. The four sources of self-efficacy: mastery experience, role modelling, verbal persuasion and, physiological and affective states were the baseline categories of the coding tool. The definitions of the four sources of self-efficacy that were used in the coding manual are presented in Table 3.

Table 3 *Baseline categories in ASSET coding manual (Bandura, 1997)*

Label	Definition
Mastery experience-based techniques	To create an environment for the experience of successful attainment.
Role modelling-based techniques	To facilitate observation of others' performance To guide the exchange of experiences
Verbal persuasion-based techniques	To verbalise personal skilfulness, to appraise skilfulness. To judge patient's capability and express certainty that success is attainable
Physiological and affective states-based techniques	To identify bodily and emotion-based symptoms To ask about physiological and affective states in order to enhance self-efficacy belief.

Once the basis for the coding tool (i.e. the four sources of self-efficacy) was defined, specific verbal techniques were specified. As mentioned previously, they came from literature review and observation of self-efficacy-based diabetes self-management programmes undertaken by the author of the thesis. The details of the verbal techniques allocated to a specific source of self-efficacy are presented in Table 4.

Table 4 *Verbal behavioural techniques included in ASSET coding manual*

Baseline category	
Verbal behavioural techniques	**Description**
Mastery experience-based techniques	
Facilitating pro-active self	To support patients in taking responsibility for their learning outcomes, well being, illness management, setting benchmarks (e.g. regarding blood glucose level)
Successful trial	To bring out the best of one's capability so the success in illness-management is experienced; to guide the individuals through the task. Future directed performance
Self-reflection	To ask questions which bring people to self-reflection and self-learning based on previous experiences in relation to short-term, specific, and training related goals
Role modelling-based techniques	
Competent other	Lay person with a chronic condition who facilitates the programme. He/she manages the illness well (but is not a perfectionist) and is similar (age, education, illness history) to the participants. Facilitator creates a space for spontaneous expression of positive examples through exchange within the group.
Strategy exemplification	To ask about illness-related management strategies referring to resources; to facilitate resources exchange. To address potential sources of social support, such as family, friends, formal bodies, voluntary sector etc. To ask group for suggestions
Facing obstacles	To guide the evaluation of the tasks and goals To ask about the obstacles met and difficulty of the task

Table 4 (continued) *Verbal behavioural techniques included in ASSET coding manual*

Baseline category	
Verbal behavioural technique	**Description**
Verbal persuasion-based techniques	
Action plan	To support participants by asking questions to facilitate a detailed plan in order to enable success and prevent relapse in future. To make sure that the plan is realistic.
Problem solving	To ask questions which help to define the problem and guide participants in finding a solution in relation to previous difficulties.
Evaluative feedback	To facilitate and give (ability!) feedback about past performance by looking for positive aspects and by praising success. To anticipate future capability To stress the capability to implement new knowledge
Elicitation of knowledge	To ask about knowledge in relation to generic diabetes-related issues, conveying the message that patients are expert.
Elicitation of beliefs	To explore diabetes-related beliefs
Physiological and affective states	
Identification of a source of bodily states / symptoms	To encourage exploration of the sources of a bodily state To make people aware of non-diabetes related causes of symptoms such as fatigue, stress
Identification of a source of emotion	To explore the potential reasons for experienced emotions
Enhancement of physical status	To initiate and support enhancement of physical status
Reduction of negative emotions	To practice reduction of negative emotions
Reduction of stress level	To practice stress reduction techniques

4.3.1.3 Demonstration of a good inter-rater reliability of ASSET

4.3.1.3.1 Study sample and procedure

The study took place in a diabetes centre in a district general hospital in the south of the UK. Four facilitators were invited to take part, who at that time ran a group-based self-management programme for people with type 1 diabetes, which included two nurses, a dietician and a physician.

The self-management programme for people with type 1 diabetes was run and offered to patients throughout the year as part of usual care. The self-management programme lasted 18 hours delivered in three-hour-long sessions over a period of six weeks. The programme was chosen as it was designed to use social cognitive theory throughout. Alongside diabetes specific issues such as matching insulin and food, and managing hypoglycaemia, enhancement of personal confidence was a key component of the intervention (e.g. through tailoring the programme to patients' issues or letting patients decide on their targets). Patients who attended the self-management programme followed a basal bolus insulin regime (i.e. multiple dose injection), had been diagnosed with diabetes for at least one year, and did not report current psychological problems.

For the presented study two full 6-session programmes were video-recorded by the author of the thesis. The same four facilitators who followed the same programme protocol ran both programmes. The participants in both programmes did not differ in terms of age, gender and duration of diabetes. Twelve patients took part in the programmes (6 in each group), seven of whom were female. Patients' mean age was 48.17 (SD = 11.85) and the average duration of diabetes was 16.33 (SD = 11.12) years. Both patients and facilitators gave written consent before the first session started. Subsequently, two complete programmes (6 sessions each) were video-recorded.

4.3.1.3.2 Diabetes self-management programme and its treatment fidelity

An educational programme for people with type 1 diabetes (Jigsaw) was chosen to be evaluated with ASSET as it was based on social cognitive theory. Alongside diabetes specific issues such as matching insulin and food, and managing hypoglycaemia, active participation through discussion of individuals' issues and enhancement of personal confidence were strongly targeted. Jigsaw covered the following topics: session 1, goal setting and blood glucose monitoring; session 2, insulin and food; session 3, adjusting insulin; session 4, hypoglycaemia; in session, 5 physical and emotional stress; and session

6, exercise (see Appendix F for the programme protocol of Jigsaw). The intervention protocol consists of leading questions to ask and main topics to cover for each session. For example, for the session 4 some of the outlined questions and topics to discuss were as follows:

What is hypo? Ask about symptoms and relate to glucose level, brain function.

What are the symptoms of hypoglycaemia? Address the issue of idiosyncratic symptoms

What happens during hypoglycaemia? Address the autonomic versus neuroglycopenic symptoms as an indicator of reliability

What are your problems with hypos?

We assessed the treatment fidelity by evaluating whether the questions and topics were covered. As a result of the assessment it can be concluded that the facilitators adhered to the protocol (i.e. they asked the questions outlined in the protocol).

4.3.1.3.3 Coders

Four coders took part in the study. Three coders (the author included) were health psychologists and one coder was a psychology undergraduate. The age of the coders ranged between 20-28 years. All coders were familiar with self-efficacy theory as it was part of their psychology course. Additionally, the author of ASSET used the self-efficacy-based approach when designing and running health-related interventions prior to the study. Three coders (health psychologists including the author) contributed to the development of ASSET and to the establishment of good inter-rater reliability. The fourth, undergraduate coder, who did not take part in the development of ASSET, contributed to the evaluation of the construct validity and the clinical utility of ASSET. Each coder rated at least 5 sessions (15 hrs of the self-management programme, Jigsaw).

4.3.1.3.4 Rating procedure

In order to establish reliability of the coding tool several steps were undertaken. First, the coders, as a team, were trained by the author of the thesis in the use of ASSET. Second, each session of the programme was coded and the coding decision discussed separately by each coder and the author of the thesis. The procedure is presented in Figure 5.

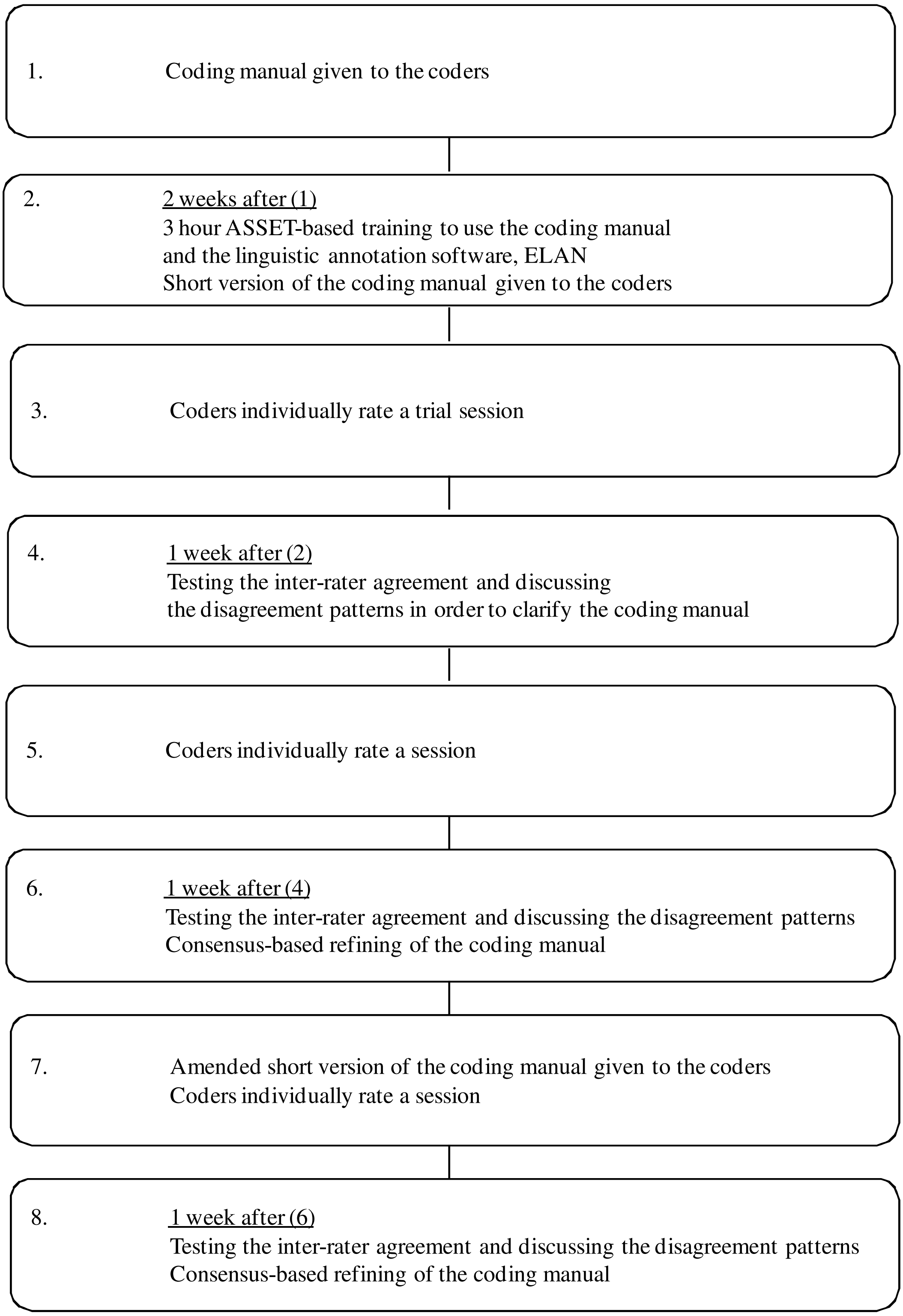


Figure 5 Training and coding procedure design for the development of the coding tool when the first edition of the programme was rated

Note: The procedure continued until the sixth session was coded and discussed

4.4.1.3.5 Training the coders

Two weeks prior to the training provided by the author of the thesis, the coders were given a comprehensive manual. In addition, in the training session coders were provided with a short version of the coding tool (see Appendix E). The training procedure for ASSET was based on social cognitive theory. Within three-hours of training, the coders practiced the implementation of the coding tool and explored the strategies on how to identify the right category (see Appendix H for training materials). The coders were trained together so they were able to exchange ideas on how to identify the right category. The materials used for training purposes were not included in the further coding.

The training consisted of three steps, which were:

First step – insight into the theoretical background of ASSET

Super categories and subordinate categories were given to the coders on loose pieces of paper. The coders were asked to match subordinate categories to the four super categories. If coders wrongly allocated the subcategories, they were asked to explain their decisions. A more exhaustive definition of the category was given to the coders so they could allocate the categories appropriately.

Second step – implementation of ASSET using written examples.

At this stage the coders received a brief two-page version of the coding manual. The coders were asked to allocate examples to each of the categories. The examples of interventions were provided on loose pieces of paper. In case the coders wrongly allocated the examples to the categories, they were asked to explain the rationale behind their decisions. A broader context of the examples was given to the coders to help them to find the right categories for these examples.

Third step – implementation of ASSET with video examples

The coders rated selected excerpts of the Jigsaw programme using the ASSET coding manual and annotated it in ELAN. ELAN is a linguistic annotation software which enables coders to enter a coding category for each utterance whilst seeing the video material (Hellwig, 2006). Within ELAN annotations for visual and audio data could be created, searched, edited, and transported to SPSS. Each speech utterance could be defined in terms of time of occurrence and duration. Matching the video material with the annotated ratings provided the opportunity to elaborate on comparisons of different ratings of the same technique and compare facilitators. A screen shot of ELAN is presented in Appendix I.

In summary, the coding process, as shown in Figure 5 was divided into small steps and took on average 10 weeks for each coder. The same procedure applied for the coding of the next programme with the exception that coders used the finalised version of the coding tool.

4.3.1.4. Deciding on the coding rules

Recorded interventions were coded by three raters (health psychologists) who have attended the training outlined above. The coders discussed their coding decisions in a consensus-based review process. As a result of this, the coding tool was refined and the agreement improved. After each session, the patterns of coding disagreement were discussed with each coder separately, and the coding tool was amended accordingly. The changes were introduced to the coders before they coded the next session. The amendments were finished after the inter-rater reliability measured with Cohen's Kappa achieved a good level (Robson, 1999).

4.3.1.4.1 Coding unit

Within ASSET, every uninterrupted bit of facilitation (i.e. every speech utterance) constituted one implementation of a technique and was coded separately. These could refer to utterances which acted as initiation of new topics, as a reaction to participants' issues or as maintenance of an ongoing self-efficacy based interaction (Bandura, 1997).

Advice was given to the raters to code each particular verbal utterance – not the intervention in general. For example, the facilitator might ask the following questions:

1. "*What would you need from us to learn about hypos?"*
2. "*What made you ask this question?"*
3. "*How can you use this knowledge?"*

Thus, these three questions might be labelled as instances of the process of problem solving. However, for the sake of the presented coding tool, these three speech utterances were coded separately, as three self-efficacy-based techniques. The first question was coded as 'facilitating pro-active self', the next as 'self-reflection', and the third as 'planning for obstacles'. The coding categories are mutually exclusive. Hence, each speech utterance can be only allocated one coding category. When training the coders it was stressed that the specific speech utterance needed to be coded, not the whole sequence of interaction.

4.3.1.4.2 Coding of pre-marked self-efficacy oriented techniques

Diabetes self-management programme was based on self-efficacy theory, several techniques used within the sessions were not self-efficacy-based. Thus, the recorded materials that were given to the coders were prepared by the author of the thesis so that only the speech utterances which were self-efficacy-based could be coded. In order to do that, the author of the coding tool used the ELAN software and pre-marked the start and end of the self-efficacy-based speech utterances. The pre-marked spaces were left blank for the coders to enter the appropriate self-efficacy-based technique. The visual representation of the pre-marked speech utterances can be seen in Appendix I.

4.3.1.4.3 Criteria for amending the coding tool

The inter-rater reliability for the coding of each session was measured with Cohen's Kappa. Subsequently, patterns of disagreement were discussed. The coding tool was amended accordingly. The coding tool was refined based on the patterns of agreement and disagreement as well as subsequently on the discussions with the coders. The changes were introduced to the coders before the next session was coded. Once the inter-rater reliability for self-efficacy-based techniques reached the level of .60, substantial amendments made by the author of the thesis in accordance with the suggestions made by the coders were terminated. The final version of the coding manual is outlined in the result section, and presented in full in Appendix G.

4.3.1.4.4 Testing the reliability of the final version of the coding tool

Two experienced coders (two health psychologists, the author included) and a newly trained coder (health psychology undergraduate) coded the next edition of the diabetes self-management programme (six three hour long sessions) applying the final version of ASSET. The fourth, undergraduate coder, who did not take part in the development of ASSET contributed to the evaluation of the construct validity and the clinical utility of ASSET. The decision to engage a new coder was based on the fact that all other coders were involved in establishing the reliability of ASSET. They were aware of the initial categories and the changes made. The new person was not influenced by the previous version of ASSET and therefore in a less biased position to test the reliability of the final version of the coding tool. Similarly to the coding of the first edition of Jigsaw, inter-rater reliability was computed and decisions were discussed after coding of each session.

4.3.1.5 Ethical issues

Approvals from the NHS (no 05/Q1701/1) and from the School of Psychology ethics committees were obtained prior to the study. All participants received an information sheet explaining the nature and purpose of the video-recording and of collecting patients' data. It was stressed that patients could cease the recording at any time and request that the recorded materials be deleted. All video-recorded materials and questionnaires were kept in a locked cabinet, marked only by the date of participation. All data will be stored in a locked cabinet for a period of 10 years and deleted afterwards, in December 2015. See Appendices J – M for information sheets and consent forms for patients and health care professionals.

4.3.2 Data analysis

4.3.2.1 Assessing the reliability of the ASSET coding manual

To test and improve the inter-rater reliability of the ASSET coding manual, agreement between two coders and the author of the thesis using Cohen's Kappa was calculated. Subsequently, agreement between the fourth coder who used the final version of the coding tool and the author of the thesis was measured using Cohen's Kappa. To explore the patterns of disagreement, cross-tabulations were computed.

4.3.2.2. Exploring construct validity and clinical utility of ASSET

As mentioned previously, a new coder joined the team for this part of the study. After training in ASSET, the coder rated five selected sessions of the self-management programme JIGSAW using the final version of the coding manual. Thus, there were four sets of coding for five sessions. In order to explore the validity and clinical utility hypotheses, one score of each coded speech utterance was needed across four coders. Based on a procedure implemented by Zanbelt and colleagues, the coding decisions made by four coders were compared (Zandbelt, Smets, Oort, & de Haes, 2005). As the data was categorical, the final score was based on the mode value. For all subsequent analyses, the rating was that which most coders (at least two of four, first author included) agreed upon.

4.3.2.2.1 Construct validity

In order to explore construct validity, the frequencies and the duration of self-efficacy-based techniques were computed. To test whether the self-efficacy driven techniques were shorter in time than non self-efficacy-orientated speech, an independent *t*-test was performed. Next, to test whether patients will talk longer after facilitator-led self-efficacy-based techniques than after non-self-efficacy-based speech, an independent *t*-test was performed. Finally, to text whether there will be a difference in patients' length of speech after different facilitator-led self-efficacy-based techniques, a one-way ANOVA was performed.

4.3.2.2.2 Clinical utility of ASSET

In order to assess feasibility of ASSET, descriptive statistics regarding the time spent when coding the programmes were performed and presented. To test clinical utility, the prevalence of self-efficacy-based techniques was assessed with a Chi-square test. Bar charts were created to illustrate the differences between facilitators and across sessions. To assess whether the amount of facilitator-led self-efficacy-driven techniques as well as patients' length of speech will increase over the duration of the intervention, Pearson's correlations were performed. All analyses were performed using SPPS for Windows 14 (SPSS Inc., 2005).

4.4 Results

The first section of the results presents the process of creating and refining the categories using chronological order. At some points in the text there are statements that might seem to be inappropriate for the result section. However, the interpretative remarks serve the purpose of presenting the rationale for each category.

4.4.1 Descriptive statistics

The descriptive statistics, as presented in Table 5, provide the details on the frequency of self-efficacy and non-self-efficacy-based speech utterances identified within two 6-session diabetes self-management programmes, Jigsaw.

Table 5 *Descriptive statistics of coded speech utterances from two diabetes self-management programmes for people with type 1 diabetes*

	Frequency (utterances)		**Duration (hours)**	
	1 + 2 programme	**Total**	**1 + 2 programme**	**Total**
Sum of coded speech utterances	1860 + 2630	4490	7.45 + 8	15.45
Self-efficacy-based techniques	689 + 809	1498	1.20 + 1.15	2.35
Non-self-efficacy-based techniques	1171 + 1821	2992	6.25 + 6.45	13.10

Table 5 shows that 4,490 speech utterances made by the facilitators were coded. Of these 1,498 were devoted to self efficacy. Thus, 33 percent of the speech utterances made by the facilitators aimed at increasing patients' self-efficacy.

The coding procedure consisted of three steps. First, the author annotated the speech utterances made by the facilitators using ELAN. This took on average two hours per hour of programme. Second, the author pre-coded the self-efficacy and non-self-efficacy-based speech utterances. This took on average one hour per hour of programme. Third, the coders rated the pre-coded self-efficacy-based speech utterances. This took on average half an hour per hour of programme. In sum, the coding time lasted on average three times longer than the coded programme.

4.4.2 Inter-rater reliability when using the initial version of the coding manual

In order to test the inter-rater reliability, Cohen's Kappa including cross tabulation statistics were computed separately for each rated session. Subsequently, after all six sessions of Jigsaw were coded, overall inter-rater reliability was calculated. The Kappa coefficient and the cross tabulation statistics provided detailed information about the agreement and disagreement. These served as a base for the amendments made in the coding manual.

The overall inter-rater reliability between two coders (i.e. external coder and the author of the coding tool) when rating the first edition of the programme measured with Cohen's Kappa was good (Robson, 1999). The overall Kappa coefficient was was.61 and .59 for baseline categories (i.e. four sources of self-efficacy) and verbal behavioural techniques, respectively, and ranged across sessions from .59 to .78 for four sources of self-efficacy and .48 and .74 for verbal behavioural techniques. The change across six sessions in the agreement measured with Cohen's Kappa is presented in Figure 6.

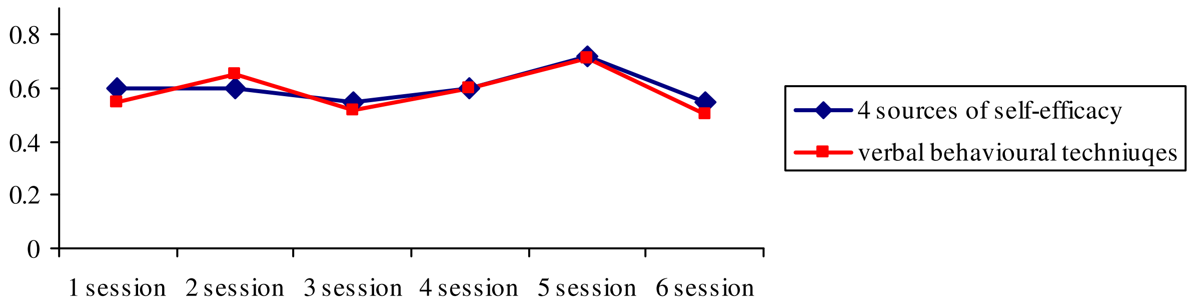


Figure 6 Inter-rater reliability between the first coder and the author of the coding tool rating the first self-management programme (Jigsaw).

Figure 6 shows that the agreement between the coders varied across sessions, staying on a fair (.40 - .60) or good level (.60 - .75) and in one session reaching the excellent level (above .75) (Robson, 1999).

4.4.3 Patterns of agreement and disagreement

In order to further explore whether there was a specific pattern of disagreement, cross-tabulations were computed. Separate analyses were performed for the first and the second programme as well as for the first and the second coder. The details are presented in Table 6. In each column, percentage of agreement between the coders on the self-efficacy category is marked in bold. The figures in the unbolded columns represent the percentage of disagreement on what category was used by the coder instead of author's expected category.

Table 6 *Percent of agreement and disagreement between the author and the coder for the coding of the first edition of the programme using the first version of ASSET*

		1st coder's coding decisions (%)			
		ME	RM	VP	PAS
Author's coding decisions (%)	ME	**61.1**	5.6	32.6	.7
	RM	7.1	**88.1**	4.8	-
	VP	8.3	2.5	**86.7**	2.5
	PAS	3.6	1.9	24.1	**70.4**

Note: ME stands for 'mastery experience', RM stands for 'role modelling', VP stands for 'verbal persuasion', PAS stands for 'physiological and affective states'; '-' indicates that this combination of coding scores did not occurred.

Table 6 shows that the lowest agreement was achieved in the mastery experience-based category. Two coders agreed in 61.1% of cases on the same category. With regard to the disagreement, in 32.6% of cases the speech utterances were coded using the verbal persuasion-based category instead of the author expected mastery experience. Further analyses that are not tabulated here showed that among the mastery experience-based categories, the self-reflection techniques were most often misunderstood as verbal persuasion-based problem solving techniques. The next section outlined the changes in the coding manual in relation to the disagreement patterns.

4.4.4 Summary of the amendments made to the first version of the coding manual

The previous section showed that the agreement between two coders of the Jigsaw programme using the first version of the manual varied between fair and excellent (Robson, 1999). The cross tabulations presented the percentage of agreement and disagreement for specific categories separately between coder1 and the author and coder 2 and the author. The ratings between the author and the fourth coder who used the final version of the coding tool are shown separately after presentation of the final coding manual. The patterns of disagreement served as a base for amendments to the coding manual. In a consensus-based process the coders listened again to the speech utterances that were coded differently by them and agreed on changes in the corresponding categories. The next section outlines the changes made to the coding manual in relation to the disagreement identified in the cross tabulations and by Cohen's Kappa.

4.4.4.1 Creating a new category

When analysing the speech utterances that the coders disagreed on, it was highlighted that there was a distinctive group of codes that contributed to the disagreement in the mastery experience-based and verbal persuasion-based categories. These covered themes beyond the mastery experience category as well as verbal persuasion-based category by addressing future benefits and costs. Therefore, based on the patterns of disagreement and the theoretical premises the coders extended the coding manual by a new category – the outcome expectancies-based category.

The outcome expectancies construct is, besides the self-efficacy, key within social cognitive theory (Bandura, 1997). Anticipated outcomes are relevant at the stage of decision-making. In the observed sessions, the verbal behavioural techniques directed towards an anticipation of outcomes were found most frequently in the beginning of the programme. As further analysis showed, which are not presented here, outcome expectancies-based category became a clear and distinctive category in the context of two other categories: ‘Facilitating pro-active self’ and ‘problem solving’. Whilst ‘facilitating pro-active self’ referred to the decision-making in relation to what an individual would like to achieve, ‘problem solving’ referred to the action taken towards the desired goals. The category ‘outcome expectancies’ in turn addressed the results of the action taken. Table 7 presents the distinction between the discussed verbal techniques providing examples from the Jigsaw programme.

Table 7. *Examples of techniques to distinguish between 'problem solving', 'facilitating pro-active self', and 'outcome expectancies'*

Category	**Description**	**Example of speech utterances**
Problem solving	The action is the subject	What would you need to do to achieve your goals?
Facilitating pro-active self	The person is the subject	How would you like it (e.g. blood glucose level) to be different?
Outcome expectancies	The event (anticipated outcome) is the subject	What would it give you? How would you know you have achieved your goals?

According to social cognitive theory ‘outcome expectancies’ address, not only the anticipated benefits, but also the costs of an action (Bandura, 1997). Thus, the category covers both the positive and the negative outcomes. For example, the following speech utterance was coded as ‘outcome expectancies’ and addressed the anticipation of costs: “You said you have been forgetful. What will happen when you forget to take long insulin?”

4.4.4.2 Clarifying the mastery experience-based and verbal persuasion-based categories

In order to analyse the disagreement between mastery experience and verbal persuasion-based techniques further analyses were performed on the level of verbal behavioural techniques. The analyses are not presented here. Nevertheless, the following section presents the main results that led to changes in the coding manual.

The analyses showed that the most frequent disagreement in relation to mastery experience and verbal persuasion-based categories was between self-reflection techniques and problem solving-based techniques. Table 8 presents the examples of the discussed verbal techniques.

Table 8 *Examples of techniques to distinguish between 'self-reflection' and 'problem solving'*

Category	**Example of speech utterances**
Mastery experience/ Self reflection	What did you do? What have you learned from this? What made you ask this question?
Verbal persuasion/ Problem solving	How would you do it differently? What would you need to do to find out?

Table 8 shows the description that was added to the coding manual. It was stressed that whilst ‘self-reflection’ addressed the past and present-oriented events; ‘problem solving’ referred to the future.

4.4.4.3 Clarifying the verbal behavioural techniques addressing the order of occurrence

The further analyses on the level of the verbal behavioural techniques showed that the facilitating pro-active self techniques were frequently used at the beginning of the session. These verbal techniques were usually followed by addressing a specific topic such as solving someone else’s problem (‘self-reflection’ or ‘problem solving’) or presenting new information (‘elicitation of knowledge’). Table 9 presents the examples of the discussed verbal techniques.

Table 9 *Examples of techniques to distinguish between 'facilitating pro-active self', 'problem solving', and 'elicitation of knowledge'*

Category	**Example of speech utterances**
Mastery experience/ Facilitating pro-active self	What would help you to understand insulin and food? What questions, issues come up for you when you think about insulin and food?
Verbal persuasion/ Problem solving	The group brings up the topic. The question results from obstacle met by a participant
Verbal persuasion/ Elicitation of knowledge	Facilitator is introducing a new topic by eliciting the knowledge from the participants.

Furthermore, the analysis showed that there was a disagreement between problem solving and elicitation of knowledge. To address this issue, we specified in the coding manual that whilst the problem solving technique resulted from a question brought by a participant, ‘elicitation of knowledge’ came from a facilitator.

4.4.4.4 Clarifying the verbal behavioural techniques within the mastery experience-based category

In order to clarify the mastery experience-based category further analysis in relation to successful trail and self-reflection –based techniques were performed. The analysis showed some disagreement patterns among verbal behavioural techniques within the mastery experience-based category. The coder used self-reflection- techniques instead of the expected by the author successful trial-based category. See the examples in Table 10 for clarification of these verbal techniques.

Table 10 *Examples of techniques to distinguish between 'successful trial' and 'self-reflection'*

Category	**Example of speech utterances**
Mastery experience/ Successful trial	What can you see on this graph? What happened at this point when you had blood glucose of 13?
Mastery experience/ Self reflection	How was your experience this morning by looking on other peoples’ data and analysing it? What have you learned from it?

It was clear from the pattern of disagreement that changes need to be made to the mastery experience-based category in order to better describe the differences between categories. Therefore, the following changes were made: With regard to the successful trial-category we changed part of the definition from “to bring the best of one’s capabilities so the success is experienced” into “to guide participant in practicing new skills so the success is experienced”. In relation to the self-reflection the definition was extended by “reflecting on past and current action; addressing positive effects and learning outcomes of an action”. In order to distinguish between self-reflection and successful trial the author stressed in the manual that whilst successful trial-based techniques are directed towards gaining new skills through practice, self-reflection-based techniques are about reflecting on previous experiences. For the complete description of the categories see Appendix G.

Further analyses within the mastery experience-based category showed a pattern of disagreement between facilitating pro-active self-technique and self-reflection-techniques. Therefore, the author amended the description of the techniques by adding that facilitating proactive-self technique relates to generic questions that usually initiated a new topic. For example, the facilitator might elicit burning issues or questions from the patients. The examples of the discussed verbal techniques are presented in Table 11.

Table 11 *Examples of techniques to distinguish between 'facilitating pro-active self' and 'self-reflection'*

Category	**Example of speech utterances**
Mastery experience/ Facilitating pro-active self	What question have you got when you think about the previous week?
Mastery experience/ Self reflection	What made you ask this question? What was your experience last week? What did you observe?

Table 11 shows that when using ‘facilitating pro-active self’ the facilitator indicated that the patient was responsible for the learning outcomes. Also, by using this verbal technique the facilitator gave the patients the opportunity to decide on the content of the session. In contrast, self-reflection technique aimed at guiding patients in reflection on specific events or experiences.

4.4.4.5 Re-formulating the labels of categories

It was clear from the preliminary work that the labels need to be changed in order to better describe the content of the categories. Therefore, the following labels of the categories were changed:

1. ‘Problem solving’ into ‘planning for obstacles’;
2. ‘Evaluative feedback’ into ‘positive feedback’;
3. ‘Facing obstacles’ into ‘sharing obstacles’.

4.4.4.6 Classification of non-self-efficacy oriented speech utterances

While running a session facilitators used not only self-efficacy-based techniques. They provided knowledge, discussed practicalities or were making small talk. Table 7 shows that a third of all speech utterances was devoted to self-efficacy. Thus, in order to capture what else was said within a session a few additional non-self-efficacy-based categories were developed. Details including labels, definitions and examples of the non-self-efficacy-based categories are presented in Table 12.

Table 12 *Examples of techniques to distinguish between non-self-efficacy oriented interventions.*

Category	Definition and examples
Lecturing	Providing information F: When you are ill you are more prone to have high blood sugar level.
Summary	Summarising or paraphrasing what was said F: You said you had three hypos last week.
Feedback	Giving information on what was said/observed F: I have got very confused about all the data which you have collected.
Data collection	Asking about diabetes-related facts, numbers etc. F: What insulin are you on?
Small talk	Conversation about subjects unrelated to the starting insulin programme F: How was your holiday?
Meta-level	Meta-level messages; talking about the programme (e.g. schedule, practicalities etc.) F: Today we will be talking about hypos.

Note: 'F' stands for 'facilitator'.

Table 12 shows that the non-self-efficacy-related speech included summarised within following categories: 'lecturing', 'summary', 'feedback', 'data collection', 'small-talk' and 'meta-level'.

4.4.5 Inter-rater reliability when using an amended coding manual

After the discussed changes in the coding manual were made, three coders rated the next self-management programme, Jigsaw. The inter-rater reliability was measured with Cohen's Kappa and the cross tabulation statistics were run after each rated session.

When coding, using the amended version of the ASSET coding manual, Cohen's Kappa ranged between fair and excellent level (Robson, 1999). The agreement for individual session's coded by three coders (i.e. two external coders and the author) ranged between .47 and .79. The Cohen's Kappa measures an agreement between two coders; hence each coder's decisions were compared with coding of the author of the coding manual. Figure 7 presents the inter-rater agreement in details.

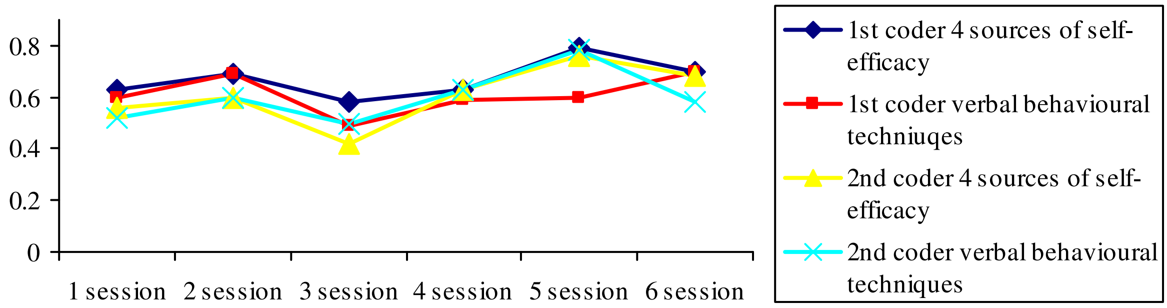


Figure 7 Inter-rater reliability between two coders and the author using the amended version of the coding manual

Figure 7 shows that the inter-rater reliability between author and two coders was fairly similar across sessions, although a higher consensus was reached across sessions with the first coder. When coding sessions two, four and five, coders reached higher consensus than when coding session one, three and six. The pattern was similar to those when using the first version of the coding manual.

The patterns of disagreement in accordance to Kappa dropped suggesting that the changes improved inter-relater reliability. The overall agreement increased by .06 to the level of .67 for four sources of self-efficacy and by .04 to the level of .63 for verbal behavioural techniques for coder one and was on a level of .59 and .60 for four sources of self-efficacy categories and for verbal behavioural techniques, respectively for coder two.

4.4.6 Frequency of speech utterances

Figure 13 shows that the agreement varied between sessions. Therefore, to further explore the potential reasons for the fluctuation of the agreement rates descriptive statistics were performed. The frequencies of speech utterances are presented in Table 13.

Table 13 *Frequency of self-efficacy-based speech utterances in the first and second programme*

	Session no					
	1	**2**	**3**	**4**	**5**	**6**
1st programme	133	112	157	145	100	43
2nd programme	150	168	161	139	92	99

Table 13 shows that the frequency of self-efficacy-based speech utterances varied across the sessions. There were a different number of speech utterances to code for each session. Nevertheless, the number of coded speech utterances was not related to the agreement rates (*r* = .18, *p* = .58)

4.4.7 Patterns of agreement and disagreement

In order to further explore whether there was a specific pattern of disagreement between the coders cross tabulation statistics, as previously described for the first version of the coding tool, were performed. Separate analysis was performed for the first and the second coder when using the amended version of the coding tool. The details are presented in Table 14.

Table 14 *Percent of agreement and disagreement between the author and first coder when coding the second programme*

		1st coder's coding decisions (%)				
		ME	RM	VP	PAS	OE
Author's coding decisions (%)	ME	**79.5**	.6	18.3	.9	.6
	RM	38.2	**47.1**	14.7	-	-
	VP	11.7	.8	**87.2**	.3	-
	PAS	32.6	2.2	6.5	**54.3**	4.3
	OE	3.7	-	14.8	-	**81.5**

Note: ME stands for 'mastery experience', RM stands for 'role modelling', VP stands for 'verbal persuasion', PAS stands for 'physiological and affective states' and OE stands for 'outcome expectancies'; '-' indicates that this combination of coding scores did not occurred.

Table 15 *Percent of agreement and disagreement between the author and second coder when using the amended version of the coding manual*

		2nd coder's coding decisions (%)				
		ME	RM	VP	PAS	OE
Author's coding decisions (%)	ME	**82.3**	1.2	13.8	.3	2.4
	RM	70.6	**8.8**	17.6	2.9	-
	VP	17.6	.8	**79.7**	1.1	.8
	PAS	28.3	6.5	6.5	**56.5**	2.2
	OE	44.4	-	-	11.1	**44.4**

Note: Abbreviations are as in Table 14.

Tables 14 and 15 present the patterns of agreement and disagreement when two coders (one new) and the author were using the amended version of the coding tool. The categories where the coders most frequently disagreed were role modelling- and physiological and affective states-based. The percentage of codes when both coders agreed on increased in relation to mastery experience-based and verbal persuasion-based categories suggesting effectiveness of the amendments in the manual.

4.4.8 Summary of further changes made

There was improvement in terms of overall inter-rater reliability when using the amended version of the coding manual. However, Tables 14 and 15 show that there was still some disagreement between the coders in relation to the role modelling-based and physiological and affective states-based categories. The percentage of agreement between the coders and the author of the coding manual dropped from 88.1% to 47.1% for coder 1 and to 8.1% for coder 2 with regard to role modelling. In terms of physiological and affective states, the percentage of agreement with the author decreased from 70.4 to 54.3% for coder 1 and to 56.5% for coder 2. It was clear that further amendments were needed to distinguish between the categories. These changes are summarised in the next section.

4.4.8.1 Merging categories

The coders agreed in 54.3 and 56.5% of cases with the author when coding the physiological and affective states-based codes. Therefore, in order to establish more focused techniques ‘identification of affective state’, ‘reduction of negative emotions’ and ‘reduction of stress’ were combined into one category, labelled ‘exploration of affective state’. It was done in order to reduce the interpretation of the speech utterances. For example, a facilitator asked: “You said you feel burned out? How does it feel for you?” This could be coded as exploration of negative emotions or reduction of stress. At the same time, however, it could be seen as technique aiming at identification of the negative emotions or at the reduction of stress. Thus, we decided to combine these three techniques as they addressed the same issue of exploring emotions.

Also, ‘identification of a source of body state/symptom’ and ‘enhancement of physical status’ were combined into one category, labelled ‘exploration of physiological state’ as they have the same underlying aim of enhancing self-efficacy belief by increasing the awareness the physical state by correct attribution of symptoms.

4.4.8.2 Clarifying the role modelling-based category

In order to distinguish more clearly between role modelling-based techniques and mastery experience-based techniques some changes were made in the coding manual. Table 16 shows examples of facilitator's speech utterances made in response to the following statement made by a patient: "My diabetes is different now when I compare it with the time after diagnosis".

Table 16 *Examples of techniques to distinguish between 'self-reflection' and 'sharing obstacles'*

Category	**Example of speech utterances**
Mastery experience/ Self reflection	F: What has changed for you?
Role model/Sharing obstacles	F: What is the others' experience? Is your diabetes the same as it was after the diagnosis?

Table 16 shows potential responses to patients following statement: "My diabetes is different now when I compare it with the time after the diagnosis". The responses show that whilst 'self-reflection' was about getting people to reflect on their previous experiences in order to identify the successes and the problems, the main aim of 'sharing obstacles' was to give someone else the message that he/she was not the only one person who experienced this particular problem.

Furthermore, in order to clarify the role modelling-based category the following clarification was made to distinguish between group solving and sharing obstacles. Role model-based techniques address someone's problem by asking the other participants about their experience in order to help the person to solve his/hers problem. Whilst the behavioural technique of sharing obstacles aimed to convey the message to a patient that he/she was not alone with the problem, (i.e. others may face similar difficulties), group solving technique was directed towards collecting ideas from the group about strategies to tackle someone else's problem.

4.4.9 Final version of the coding tool, ASSET

4.4.9.1. Pictorial representation of ASSET

The final version of the coding manual took into account the changes described in previous sections. The following section summarises the changes made in the coding manual with regard to the initial coding manual. To avoid repetitions, the categories that remained the same or underwent minor wording amendments are not presented. The complete coding manual can be found in Appendix G. Figure 8 gives a pictorial framework of ASSET.

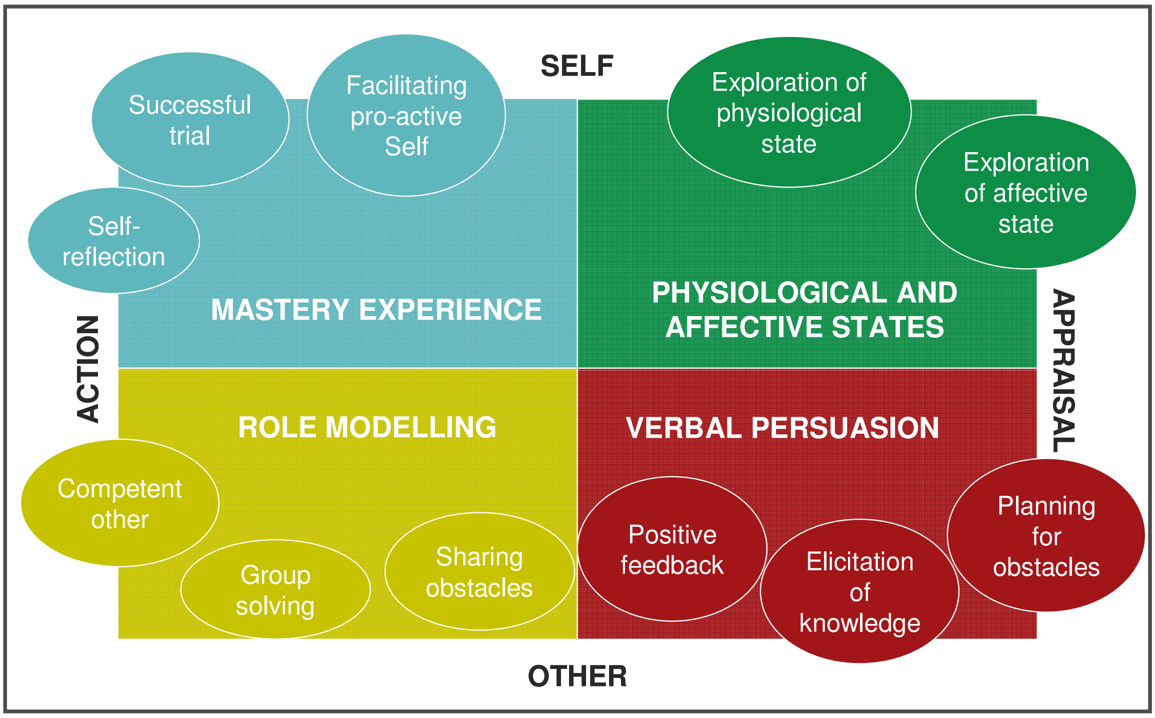


Figure 8 Analysis System for Self-Efficacy Training (ASSET).

Figure 8 shows that the framework of ASSET is based on the two axes of self/other and action/appraisal. As discussed in Chapter 1, this distinction relates to the person who is addressed by the self-efficacy technique. The final version of ASSET consists of four underpinning conceptual categories, mastery experience, role modelling, verbal persuasion and physiological and affective states as well as the 11 verbal behavioural techniques. The coding manual includes a label, a definition, a positive example of the occurrence and a negative example (i.e. illustrating typical mistakes by using a non-accurate category).

4.4.9.2 Four sources of self-efficacy

Table 17 presents a summary of the changes made to the description of these baseline categories.

Table 17 *Baseline categories of ASSET derived from social cognitive theory*

Category	**Description**
Mastery experience	
Positive example	F guides individuals in the analysing of blood glucose graphs to identify individual patterns.
Negative example	F advises, asks closed questions implicating the answer
Role modelling (Vicarious experience)	
Definition	Facilitator creates an environment for an observation of others' performance
Positive example	F gets the group involved in solving of someone else's problem.
Negative example	F talks about participants' successful experiences.
Verbal persuasion	
Definition	Facilitator verbalises personal skilfulness of the participants and anticipates future successes. Facilitator conveys the belief of participants' ability to identify and manage illness-related issues.
Positive example	F guides participants in the setting of an action plan.
Negative example	Inaccurate praise; F asks closed questions implicating the answer
Physiological and affective states	
Definition	Facilitator acknowledges and explores emotions expressed by the participants. Facilitator guides participants in the correct attribution of physiological and affective symptoms.
Positive example	F asks participants about their symptoms of hypos.
Negative example	F recognises the emotion but does not explore it.

Table 17 (continued) *Baseline categories of ASSET derived from social cognitive theory*

Category	**Description**
Label	**Outcomes expectancies**
Definition	Facilitator guides the participants in the anticipation of benefits and costs resulting from their performance. F asks what will be a result of a specific action.
Positive example	F: *Once you achieve your goals* (e.g. less frequent hypos) *what change would that make for you*?
Negative example	F asks about the performance but not the results of it.

Note: "F" refers to facilitator.

Table 17 shows that three of four baseline categories were re-formulated and extended. Initially, role modelling included facilitating observation of others' performance, and guiding exchange of experience. In the final version, the definition was extended by addressing the social comparison effect (i.e. the influence of the attainment of others). With regard to physiological and affective states, the old category included asking about physiological and affective states to enhance self-efficacy and to identify bodily and emotion-based symptoms. Positive and negative examples were added to each category. Additionally, as Table 17 shows, outcome expectancies were included in the coding manual. This was because, as presented in Chapter 1 outcome expectancies are another concept of social cognitive theory and contribute to self-efficacy beliefs (Bandura, 1997).

4.4.9.3 Verbal behavioural techniques

The 16 initial verbal behavioural techniques were reduced to 11. The final categories included: 'successful trial', 'self-reflection', 'facilitating pro-active self', 'competent other', 'group solving', 'sharing obstacles', 'positive feedback', 'planning for obstacles', 'elicitation of knowledge', 'exploration of physiological state', and 'exploration of affective state'. Tables 18 to 21 present a summary of the behavioural categories outlining the changes in relation to the initial version of ASSET. For more detailed description of the verbal behavioural techniques, including definition, context and positive and negative examples, see Appendix G.

Table 18 *Mastery-experience-based verbal behavioural techniques*

Category	**Description**
Facilitating pro-active self	
Context	This technique is often used at the beginning of the programme to initiate a new topic e.g. *What issues come up for you, when you think about insulin and food?* This technique can be followed by a discussion about a specific topic (e.g. problem using 'self-reflection', new knowledge using 'elicitation of knowledge')
Positive example	F: *What else would you like to discuss? What would you need to know from us which would help you to understand X.* F guides the patient in taking the responsibility for their illness. This question can be followed by specific questions about the future action ('planning for obstacles').
Negative example:	*We cannot go into your body; you know what the insulin does for you*. F conveys the message that she/he does not take the responsibility for participant's health but it does not bring things forward.
Successful trial	
Definition:	Facilitator guides the patients in practicing new skills so the success can be experienced. Participants are practicing new skills, (e.g. learn to understand the graphs about blood glucose fluctuation) or are managing new tasks (e.g. estimating amount of carbohydrates). Facilitator gives participants tools to practice new skills (e.g. Charts of amounts of carbohydrates in food)

Table 18 (continued) *Mastery-experience-based verbal behavioural techniques*

Category	**Description**
Successful trial (continued)	
Positive example	F guides the analysis of graphs within the session.
Negative example	F: *You can experiment, start to get things to behave differently. You understand what you are doing*. F is talking about action but do not ask participant to practice new skills. This is verbal persuasion-based positive feedback techniques (i.e. praising patients' ability to try things out and using new knowledge).
Self-reflection	
Positive example	*What did you learn from this experience?*
Negative example:	P: I went low this day although I scrutinised my blood glucose. F: *Has something extraordinary taken place on this day? Physical activity, stress?* P: Not really, I only cut the lawn. F: This may be the reason why you went low. P: But it was not exhausting at all… P2: I go low even after hovering. F: *Try to do something similar next week and monitor your blood glucose.* The techniques presented was from the "professional" level, and did not encourage the patient to reflect on his/hers performance.

As can be seen in Table 18, the description of each category has been extended by positive and negative examples, as well as by a context for the techniques. There are some techniques that occur frequently at a certain time point in the intervention. For example, facilitating pro-active self is one of the most often used opening techniques to initiate a new topic and to activate patients' issues with regard to this topic. If applicable, the description of each category includes also potential techniques that may follow from the discussed techniques. For example, as seen in Table 18 facilitating pro-active self can be followed by a discussion about an individual's experiences (i.e. with regard to action - self-reflection, or symptoms – physiological state). Facilitating pro-active self could also be followed by discussion of new knowledge (i.e. elicitation of knowledge). The outlined changes with regard to the format of the categories were also introduced to the role modelling-based techniques. Table 19 presents the details of the changes.

Table 19 *Role modelling-based verbal behavioural techniques*

Category	**Description**
Competent other	
Positive example	Lay facilitator who has a personal experience of managing a chronic condition.
Negative example	Facilitator brings up the example of 5th-time Olympic medalist: Steve Redgrave who manages his diabetes well. The risk is that the participants may not identify with him.
Group solving	
Definition	When a participant struggles with a problem facilitator brings group to solve the problem for her/him.
Context	In contrast to “component other” this intervention is directly guided by the facilitator.
Positive example	*If it was your problem how would you react?*
Negative example	P1: Is there something you can do about it? F: *Some of our patients check their blood glucose in the night.* Because the suggestion came from the F this technique is a verbal persuasion-based technique than strategy exemplification.
Sharing obstacles	
Definition	Facilitator asks others about similar obstacles met and difficulty of the task in order to convey the message to an individual that he/she is not the only one experiencing such a problem.
Positive example	P: My diabetes is different when I compare it with the time when I was first diagnosed. F: *What about others. Is your diabetes the same now as it was when you were diagnosed?* The group responds that their diabetes is different which gives the individual the feeling of not being alone with the problem.

Table 19 (continued) *Role modelling-based verbal behavioural techniques*

Category	**Description**
Sharing obstacles (continued)	
Negative example	P: I would like to improve my memory. I constantly forget something. P2: Oh yes. F: *It sounds like you are not alone here* The facilitator speaks about the shared difficulty and is not facilitating group to share obstacles.

Table 19 shows that the strategy initially labelled exemplification technique has been changed into group solving. The new label reflects the focus of the category, which is on activating the group in solving someone else's problem. The new label contributed to a clearer distinction between this and the facing obstacles category. In contrast to the group solving category, the facing obstacles category focuses on exploring the problems of others. Table 20 summarises the changes made with regard to verbal persuasion-based techniques.

Table 20 *Verbal persuasion-based verbal behavioural techniques*

Category	**Description**
Planning for obstacles	
Definition	Facilitator guides participants in finding a solution and making an action plan.
Positive example	F: *How would you find out what happened to you after having a different meal?*
Negative example	P: I regularly drink a lot of lemon tea. Is it possible that I go high from it? F: *How many do you usually have?* P: Two cups. F: *How much tea powder do you take?* P: Half a spoon each. F: *How many carbohydrates may it be?* P: About a half each. F does not encourage independent problem solving.

Table 20 (continued) *Verbal persuasion-based verbal behavioural techniques*

Category	**Description**
Positive feedback	
Positive example	F*: If you monitor and apply these principles, what you will find with time that you will be able to make sense of the information.*
Negative example	P: What I am doing now is not right. F: *You have managed your diabetes for so many years, you must do it right.* This is a contradiction to what patient said, and a missed opportunity to explore patients' beliefs.
Elicitation of knowledge	
Definition	Facilitator asks participants about their knowledge and general issues regarding diabetes management. He/she refers to generic issues and explores beliefs about the illness. In contrast mastery experience-based self-reflection technique refers to exploring an experience-based knowledge.
Positive example	F.: *What would your total insulin dose depend on*? P1: Life style, duration of diabetes P2: Weight
Negative example	F.: *When you think about hypoglycaemia, what are the issues for you?* This is mastery experience-based facilitating pro-active self technique (i.e. participants are asked to relate to their past experiences).

When compared to the initial coding manual, the verbal persuasion-based techniques underwent three major changes. First, the number of techniques was reduced from five to three. Action plan and problem solving became one technique labelled planning for obstacles. The combined category emphasises two issues including future action (planning) and potential problems (obstacles). Second, evaluative feedback was re-labelled as positive feedback. Third, elicitation of beliefs which was defined as exploring patients' diabetes-related beliefs was removed from the coding manual as it addresses the Common sense Model (Leventhal, Diefenbach, & Leventhal, 1992) rather than social cognitive theory.

As can be seen in Tables 18 – 20, the mastery experience-based, role modelling-based and verbal persuasion-based techniques address the way in which self-efficacy belief can be changed. They can be used for any content. For example, self-reflection which is one of the mastery experience-based techniques can be used to discuss previous attempts to change the insulin dose, to follow a diet as well as to help in understanding blood glucose levels. In contrast, the physiological and affective states-based techniques relate to a specific content. As can be seen in Table 21, physiological and affective states-based techniques address bodily symptoms only. Bandura (1977) described physiological and affective states as an indirect source of self-efficacy.

Table 21 *Physiological and affective states-based verbal behavioural techniques*

Category	**Description**
Exploration of physiological state	
Definition	Facilitator guides exploration and attribution of physiological symptoms in order to make people aware of non-diabetes related causes of symptoms such as fatigue. Fatigue may be a sign of a low blood sugar, it can however also be a result of bad eating habits, or a disturbed sleep patterns.
Positive example	P: I have had a hypo for the first time within the last 5 years. F: *What made you have a hypo this time? How did you feel when you were having a hypo?*
Negative example	F.: *What are the symptoms of a hypo?* This is verbal persuasion-based elicitation of knowledge technique.
Exploration of affective state	
Definition	Facilitator guides recognition and correct attribution of illness specific emotions.
Positive example	P: I was told to take tablets but my body does not like it; I feel apprehensive about taking more than one. F: *What worries you about taking more than one?*
Negative example	F: *What you said sounds very frustrating.* This is a closed statement, which does not bring things forward.

The verbal behavioural techniques within the physiological and affective states category were reduced from five to two. Table 21 shows that the initial, overlapping categories, including reduction of negative emotions, reduction of stress level and identification of a source of emotion, were combined as exploration of emotional state.

Further, enhancement of physical status was removed from the coding manual as it addresses an action plan and not attribution of symptoms.

In summary, the final version of the coding manual was extended by one basis category, outcome expectancies, and reduced by five verbal behavioural techniques. The categories were described in more detail addressing the context of the occurrence. Examples of accurate and non-accurate coding were given. The major changes in relation to the initial coding manual included re-labelling and re-definition of techniques, combining and removing of some techniques.

4.4.9.4 Inter-rater reliability when using the final version of the coding manual

The inter-rater reliability was assessed between the coders who used the final version of the manual. Cross-tabulation and Cohen's Kappa of two coders were calculated. The details are presented in Table 22.

Table 22 *Prevalence of agreement and disagreement between the author and the new coder expressed in percentages*

		New coder's coding decisions (%)				
		ME	RM	VP	PAS	OE
Author's coding decisions (%)	ME	**81.8**	.3	16.2	1	.7
	RM	13.2	**68.4**	18.4	-	-
	VP	10	.3	**86.6**	1.9	.9
	PAS	24.2	-	21	**51.5**	3
	OE	-	-	6.7	3.3	90

Table 22 shows that the higher agreement was when rating mastery experience and verbal persuasion-based techniques. Least agreement was achieved when coding physiological and affective states-based techniques. The overall inter-rater reliability between two coders was .71 for four sources of self-efficacy and .70 for verbal behavioural techniques.

4.4.10 Exploring the construct validity and clinical utility of ASSET.

4.4.10.1 Set of scores used for the analysis

In order to assess the construct validity and clinical utility of ASSET, one set of scores was needed. Therefore, the codes made by four coders were compared. Following the procedure applied by Zandbelt and colleagues (Zandbelt et al., 2005), codes upon which at least two of four coders agreed were used as final scores. In terms of the four sources of self-efficacy, the agreement between at least two coders (the author included) was 96 % of all codes. Of the remaining 4%, in 2 % of cases there was no agreement between the coders. In these cases the categories applied by the author of the tool were chosen. The relevant categories were scrutinised to improve the clarity of the definitions. The other 2% of cases referred to a situation where, despite the agreement of two coders, a different category (i.e. used by the author) was applied.

With regard to self-efficacy-based verbal techniques, agreement was achieved in 91 % of codes. In 7 % of cases a decision on final scores was made by the author of the coding tool due to a lack of overall agreement. In 2 % of cases the author chose a category despite the agreement on a different category between two other coders.

4.4.10.2 Descriptive statistics

Overall, seven sessions were coded which altogether lasted 21 hours and were run by four facilitators. Of all 2,175 speech utterances, 711 were devoted to self-efficacy. Table 23 shows the descriptive statistics indicating that nurses most often used a non-self-efficacy-based speech. In the self-efficacy-based category, nurses most frequently used verbal persuasion-based techniques and mastery experiences-based techniques. Specifically, they asked knowledge related questions (i.e. elicitation of knowledge) and explored patients' previous experiences (i.e. self-reflection) with regard to diabetes management.

Table 23 *Descriptive statistics of self-efficacy techniques and non-self-efficacy orientated techniques*

Sum of speech utterances = 2,175	**Frequency per 10 minutes**	**Average length in seconds**	
	M	***M***	***SD***
Mastery experience	8.58	5.64	4.14
Self reflection	4.25	5.34	3.66
Facilitating pro-active self	2.72	5.82	3.66
Successful trial	1.87	5.52	5.52
Role modelling	0.82	5.64	3.78
Competent other	-	-	-
Group solving	0.68	5.82	3.92
Sharing obstacles	0.20	4.32	3.06
Verbal persuasion	9.09	5.77	3.66
Elicitation of knowledge	7.65	5.64	3.72
Positive feedback	0.48	6.78	1.98
Planning for obstacles	0.85	6.66	4.02
Physiological and affective states	0.74	5.76	4.38
Exploration of affective state	0.54	6.12	4.86
Exploration of physiological state	0.23	4.51	2.34
Outcome expectancies	0.91	5.64	4.14
Non self-efficacy-based utterances	42.09	11.64	14.28

Note: '-' indicates the techniques which were nor used in the programme

4.4.10.3 Use of verbal techniques: their length and impact on patients' talk

To test construct validity the length of self-efficacy and non-self-efficacy-based speech was compared using a *t*-test. As predicted, single self-efficacy orientated utterances were significantly shorter than non self-efficacy utterances such as lecturing, inquiring data (e.g., about insulin intake) or summarising ($t(2175) = 14.62$, $p < .001$). Furthermore, to test the construct validity, the impact of self-efficacy-based techniques and non-self-efficacy-based speech on patients' length of speech was compared using a *t*-test. It has been observed that self-efficacy orientated techniques were followed by significantly longer speech (almost twice as long) by participants than non self-efficacy-based speech utterances ($t(2166) = 5.58$, $p < .001$).

To analyse whether there will be a difference in the length of patients' speech after different facilitator-led self-efficacy-based techniques one way ANOVA was performed. When looking at the length of participants' speech following specific self-efficacy orientated techniques significant difference were observed ($F(4, 706) = 10.22$, $p < .001$), as shown in Table 24.

Table 24 *Length of participants' speech after specific verbal techniques*

Sum of speech utterances=2,175	**Average length of participants' response in seconds**	
Preceding technique	***M***	***SD***
Mastery experience	22.78	31.16
Role modelling	32.12	30.29
Verbal persuasion	10.98	23.59
Physiological and affective states	26.60	35.85
Outcome expectancies	13.66	12.60
Non self-efficacy-based utterances	9.31	15.12

Table 24 shows that role modelling-based techniques triggered the greatest amount of talk by participants, which was followed by mastery experience-based techniques and physiological and affective states-based techniques. The shortest expressions, although still longer than after non self-efficacy techniques, came as a response to outcome expectancies-based techniques and verbal persuasion-based techniques.

4.4.10.4 Overall distribution of techniques in the intervention

To test the hypothesis that as the programme progresses participants will talk more, Pearson correlation was used. When analysing the overall use of self-efficacy promoting techniques, measured by time spent talking, facilitators devoted less than half of each session to implementing any of the techniques. Figure 9 shows the time spent by the participants and by the facilitators talking, divided by the self-efficacy and non self-efficacy-related speech.

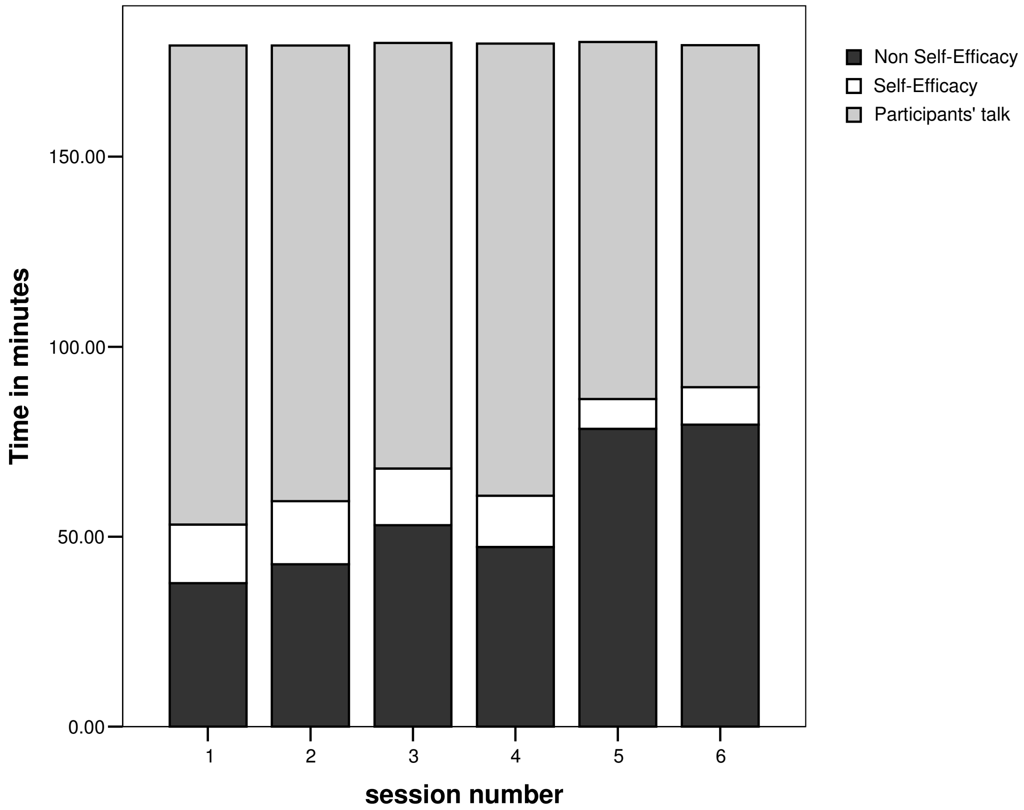


Figure 9 Overall time spent by facilitators and participants talking.

Figure 9 shows that the vast majority of the time was taken up with non-self-efficacy orientated speech such as lecturing, summarising or just interacting for the sake of relationship building (e.g. making jokes etc.). There was no relationship between the time the facilitators spent using self-efficacy-based techniques and session number ($r = -.01$, $p = .63$). This result suggests that as the programme progressed, the time devoted to the enhancement of self-efficacy remained at the same level. In contrast, there was a negative correlation between the length of time the facilitator made the non-self-efficacy-oriented speech and the session number ($r = .11$, $p < .001$). As the time progressed, facilitators spent more time on non-self-efficacy orientated speech and left less time for the participants to talk ($r = -.91$, $p < .05$).

4.4.10.5 Patterns of behaviours across facilitators

To test the clinical utility the distribution of self-efficacy-based techniques by two facilitators was analysed using Chi-square statistics. Two the same facilitators ran the first session of two subsequent editions of Jigsaw. Whereas in the first edition facilitator 1 guided goal setting and facilitator 2 introduced a new topic, in the second edition of Jigsaw facilitators exchanged tasks. Facilitator 2 guided the goal setting and facilitator 1 introduced the new topic. Figure 10 shows the frequency of self-efficacy-based techniques between two facilitators when delivering a three-hour session

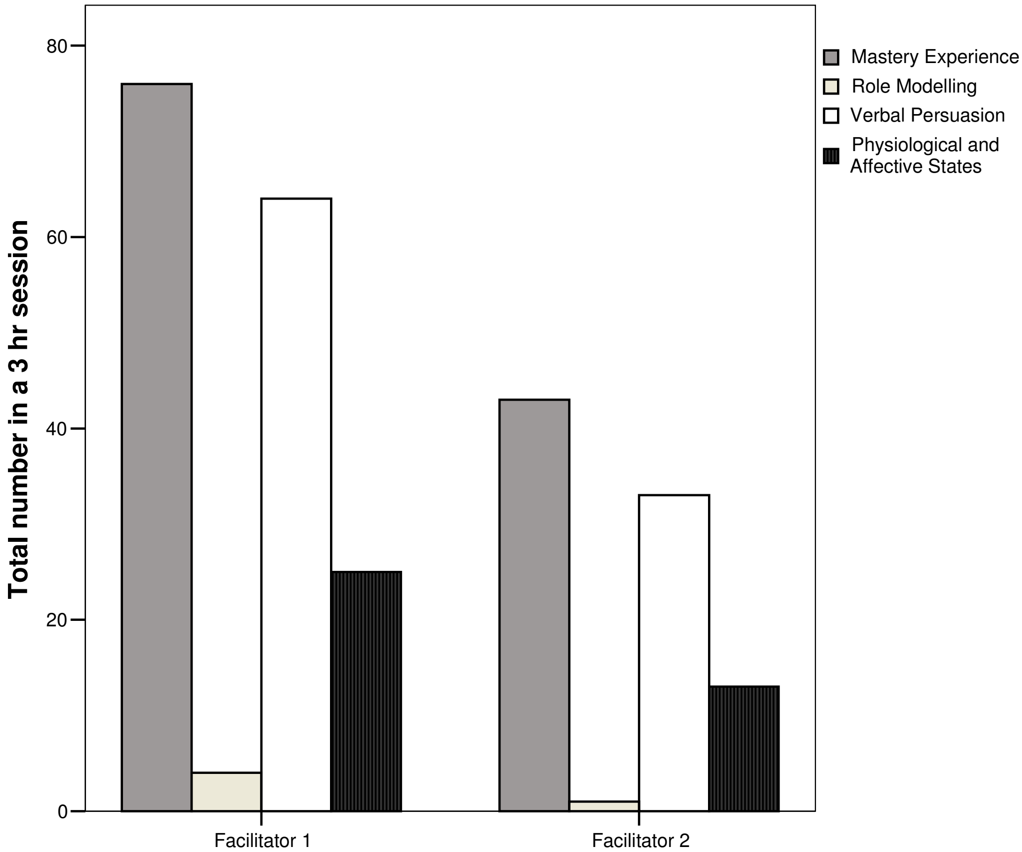


Figure 10 Frequency of interventions directed towards enhancement of self-efficacy across two facilitators during one 3 hour session

Figure 10 shows that there were no differences in the relative distribution of the delivery of self-efficacy orientated techniques ($\chi^2(3, N = 259) = .61, p = .89$). However, the facilitators differed, in the amount of techniques implemented per minute of the programme ($F(1, 257) = 158, p < .001$). Furthermore, both facilitators delivered significantly different amounts of specific strategies ($\chi^2(3, N = 259) = 127, p < .001$) as shown in Figure 10.

4.5 Discussion

The present study introduced the Analysis System for Self-Efficacy Training (ASSET). The inter-rater reliability measured after coding each session was good (Robson, 1999). Certain steps were undertaken to ensure a clear distinction between categories. In contrast to many other coding tools where the whole sum of the decisions made was analysed (e.g. Hardeman, 2006), in the present study the decisions regarding each single technique based on a speech utterance were compared separately. This allowed the author and the coders to scrutinise each pair of ratings individually. Based on the specific patterns of disagreement the categories were then reformulated by the author of the thesis and discussed with the first supervisor. Moreover, data for analysis was retrieved from coding made by four coders and not from a random selection of ratings (Zandbelt et al., 2005).

The Analysis System for Self-Efficacy Training consists of two levels of categories, including four baseline, theory-driven sources of self-efficacy and 11 verbal behavioural techniques. These include self-reflection, facilitating pro-active self, and successful trial; competent other, sharing obstacles, and group solving, positive feedback, elicitation of knowledge and planning for obstacles, exploration of affective state and exploration of physiological state.

ASSET was designed to assess the number of self-efficacy based techniques used during an intervention. The coding instrument allows the exploration of the patterns of techniques and the ratio of self-efficacy techniques to other speech in overall speech. The quality of the intervention, however, cannot be directly derived from the number of self-efficacy based techniques used in a session. Further research is needed to investigate the relationship between the number and the quality of self-efficacy techniques.

The preliminary analyses of construct validity revealed that the four sources of self-efficacy can be distinguished with ASSET. These include mastery experience, role modelling, verbal persuasion and physiological and affective states. However, it has to be stressed that the analyses were based on the assumption that the length of nurses' and patients' speech can be used to differentiate between the verbal techniques. The length of nurses' and patients' speech was measured because shorter length of speech delivered in health communication by a professional is often presumed to be a sign of effective communication and to correspond with better information processing and greater change in reported illness beliefs (e.g. Padgett et al., 1988; Skinner et al., 2008). A meta-analysis of 28 intervention studies showed that cognitive re-framing alongside face-to-face contact and physical exercise was the most powerful intervention component to predict better glycaemic control (Ellis et al., 2004). Ellis and colleagues explained the positive effects of cognitive re-framing on blood glucose control as an effective means for activating patients and for engaging them in the self-management process. Thus, in the present study, the length of patients' speech was used as a directly accessible indicator of patients' activation (i.e. the longer they spoke the more they were activated). Also, the length of nurses' speech was considered as an indirect indicator of patients' activation. The more nurses talked, the less time was left for patients to speak and to engage in the self-management by bringing their own issues into the discussion.

In addition, the length of patients' speech as a response to self-efficacy techniques was compared to explore the individual effects of specific self-efficacy techniques. This was done to explore Bandura's claim that the four sources of self-efficacy differ in their impact (Bandura, 1977). Because the analyses were based on verbal responses, the length of speech seemed to be an appropriate measure of the magnitude of the response to specific techniques.

However, a more specific measure is needed to differentiate between good communication skills in general and the use of specific self-efficacy based techniques. The length of speech could be influenced by many non-specific factors. For example, a nurse could start a sentence, then break off when thinking about the question she was going to ask, and then carry on with her speech. This speech utterance would probably be relatively long, but it would still incorporate a self-efficacy technique. At the same time, patients who are more talkative may tend to give longer responses than those who are rather quiet. Thus, the length of speech should not be the only primary target of assessment and more accurate methods should be applied. For example, new coders could be asked to rate selected self-efficacy and non self-efficacy techniques and to differentiate between diverse self-efficacy techniques.

When analysing the impact of specific self-efficacy-based techniques on patients' talk, the techniques belonging to the 'role modelling' source of self-efficacy appeared to be the most powerful in terms of activating patients' talk. Physiological and affective states-based techniques as well as mastery experience-based techniques were the second most engaging techniques. Finally, verbal persuasion-based techniques were the least effective among self-efficacy techniques in relation to patients' length of speech. This observation seems to support Bandura's argument that self-efficacy-based strategies can be ordered hierarchically (Bandura, 1997). Interestingly, the presented results revealed that, in contrast to Bandura's claim, a role modelling-based source of self-efficacy was the most effective in activating patients and not mastery experience. However, this finding supported Bandura's idea that lack of experience made people particularly receptive to this technique (Bandura, 1997). The hierarchy of self-efficacy-based techniques needs further investigation. It could be argued that the length of speech may be an inappropriate indicator of the impact of self-efficacy on patients' activation. When patients' do not say much, it could mean that they are thinking about what was said and hence are actively processing the information. Nevertheless, it is interesting to observe that different self-efficacy-based techniques triggered different length of response. This observation will be further explored in the next study discussed in Chapter 5.

The distribution of self-efficacy orientated techniques was the same when comparing two facilitators delivering the same content during two editions of the self-management programme. Although facilitators kept the balance between mastery experience-based, role modelling-based, verbal persuasion-based and physiological and affective states-based techniques, they differed in the amount of implemented techniques. This could be due to the fact that whereas both initiated the recommended techniques (i.e. asked questions according to the protocol), only one of them carried on with the techniques. This facilitator frequently asked follow up questions.

All self-efficacy techniques were followed by a longer response than non-self-efficacy-related speech. The distinctive difference in speech length might be an indicator of good facilitation skills. When coding with ASSET, it relates to the implementation of self-efficacy driven techniques. Patients spoke significantly longer when the facilitator implemented a self-efficacy orientated technique than when they used non-self-efficacy-orientated speech or asked non-self-efficacy-orientated questions. Numerous studies have shown that active participation is superior to passive information intake, in terms of better information processing and applying the intervention (Padgett et al., 1988; Ellis et al., 2004; Norris et al., 2001; Skinner et al., 2008). Thus, it could be expected that the longer time left for patients to talk would be positively linked with increase in self-efficacy belief. Nevertheless, it can be argued that because knowledge is a pre-condition for self-efficacy (Bandura, 1997), passive information intake may be necessary to initially develop individuals' confidence. Studies have shown that only perceived self-efficacy and anticipated outcomes, but not skills, knowledge and a supportive environment, predicted health related behaviours in diabetes (McCaul et al., 1987; Glasgow et al., 1986). The association between speech length and cognitive and behavioural outcomes needs to be further explored. This issue, however, is beyond the scope of the present thesis.

Participants of the studied self-management programmes had had diabetes for at least one year. Consequently, they would have previous experience in daily self-management (e.g. blood glucose monitoring, insulin injecting, dealing with hypos etc.). The pre-conditional knowledge was already there and we would expect facilitators to deliver a substantial amount of self-efficacy-driven techniques. In the present study this was only partially true. Overall, facilitators spent the vast majority of time on non-self-efficacy-orientated speech.

Over time in the studied diabetes programme, the proportion spent on delivery of non-self-efficacy techniques increased as the self-management programme progressed. We would expect a reverse trend; as Jigsaw progressed and the patients' diabetes related knowledge increased, facilitators would spend more time building on the resources and implementing self-efficacy-driven techniques. The expectation, however, was built on a following assumption. When patients understand diabetes more (e.g. are able to work out individual patterns of blood glucose level in relation to insulin, food exercise) then they are more able to reflect on their illness. This, in turn, may encourage the facilitator to ask more self-efficacy-based questions. Nevertheless, the assumption may be wrong as it could also be argued differently. The less the patients are able to reflect on their illness, the more activating techniques are needed in order to enhance people self-management.

With regard to the feasibility of ASSET as a clinical research tool, numerous issues have to be considered. As presented in the method section, the training of ASSET takes about two hours. To master the coding tool, the coders, however, met up for another half an hour after coding each session of the programme to discuss and clarify the coding scores. The results of the inter-rater reliability showed that the coder who coded the largest amount of programmes achieved the greatest agreement with the author of ASSET. This could indicate that the coding manual is fairly complex and requires a substantial amount of training to be used reliably. The author of the thesis developed a detailed coding manual and training cards so potential users could train themselves in using the tool. However, so far all coders have been trained by the author of ASSET. Therefore, it cannot be concluded whether the coding manual is good enough to be used reliably as a self-teaching instrument. It also has to be added that the coding of ASSET takes a substantial amount of time. As presented in the results section, to annotate the speech utterances and to code the appropriate fragments takes about three times as long as the recorded material. While it is possible for a PhD student to invest so much time in the work, this may not be realistic for a clinician. A simpler version of the coding manual should be developed in the future to reduce the time spent on actual coding. For example, the coding manual could be used in vivo, so the work involved in annotating speech utterances would be excluded.

ASSET was developed to evaluate interventions among diabetes patients. However, it can be used in other patient populations. The core concept of facilitating self-management through promoting self-efficacy is common to all chronic illnesses. The widely utilised 'Chronic Disease Self-management Program' developed by Kate Lorig and colleagues provides evidence for how self-efficacy can be effectively utilised in the context of various chronic conditions (Lorig et al., 1999). ASSET is generic, thus it can be applied to evaluate any self-management interventions. The examples of each technique are, however, so far diabetes-specific. Incorporating appropriate, (i.e. disease specific) examples into the coding manual would be necessary when training people to use the coding tool for other patient populations. Thus, in future studies other disease-specific examples need to be coded and the reliability of ASSET re-established.

There are numerous coding tools in the area of health psychology designed to evaluate interventions (e.g. Flanders, 1970; Piccolo del et al., 2005; Roter & Larson, 2002; Zandbelt et al., 2005). They provide means to describe certain features of the interaction between health care professionals and patients. Some instruments, such as MEDICODE, concentrate on a specific aspect of the consultations (Richard & Lussier, 2006). None of these tools, however, explores the adherence to a specific theory. In addition, the existing coding tools have been designed to calculate an overall number of specific techniques used in the intervention. For example, Michie and colleagues have developed a general taxonomy of behaviour change techniques (Michie, Johnson, Francis, & Hardeman, 2005) so that researchers can use pre-defined techniques to describe their interventions. This taxonomy provides a useful common language to describe but not to evaluate an intervention. In contrast, patient-centred behaviour coding instruments assess single speech utterances within an intervention (Zandbelt et al., 2005). To date, ASSET is the first coding tool published to date which tests adherence to a theory by coding single speech utterances (Zinken et al., 2008).

4.5.1. Limitations

The study has its limitations.

One of the main limitations of the study was that only the author of the thesis rated the entire programme and distinguished between self-efficacy and non-self-efficacy based speech utterances. Three other coders rated only the pre-marked self-efficacy-based techniques. Thus, the scoring which served as a base for the analysis may have been biased. This raises a question regarding the internal validity of the results based on scoring assessed by one coder only. To address this issue, in the next study two independent raters will code all nurse-led speech utterances of randomly selected number of sessions to reliably identify self-efficacy-based speech utterances.

Another substantial limitation of the study was the small sample size. The reliability of the coding tool was tested on a group of four health care professionals who delivered two editions of the same programme. Although mean differences were observed in the use of specific techniques across facilitators and sessions, the limited diversity of facilitators and programmes pose a risk of biased results. Also, all facilitators came from one diabetes centre. Thus, there could potentially be a centre effect. In the future, ASSET should be tested on a greater number of health care professionals working in different centres and delivering various education programmes.

The coding of speech was not completely blind. The author of ASSET was aware of patients' and nurses' characteristics. The knowledge about years of nurses' experience or patients' length of diabetes could have influenced the assessment regarding specific techniques used. For example, in situations when the speech utterance was difficult to code, the coding score could be in favour of nurses' ability to use the desirable technique when the nurse was perceived as being more experienced in general. As mentioned earlier, verbal persuasion is perceived to be easier to apply than mastery experience technique. Thus, a speech utterance like "how do you treat your hypo", could have been coded as elicitation of knowledge (verbal persuasion) when the nurse was less experienced or as self-reflection (mastery experience) when the nurse had greater experience in general.

Another limitation of the coding procedure was that the majority of coders contributed to both the development and the initial evaluation of construct validity and clinical utility of ASSET. The developers of ASSET may have been biased and may not be comparable with future users of the coding manual.

For the presented study four coders (i.e. three external coders and the author) used the coding manual to rate two self-management programmes for people with type 1 diabetes. The overall agreement for each coder and the author ranged between .61 (the amended version of the coding tool) and .71 (for the final version of the coding tool). The Kappa level showed that inter-rater reliability for all coders was good. Cohen's Kappa is a rigorous measure as it accounts for chance agreement. Thus, in the presented study only actual agreement was measured. Nevertheless, some variance in terms of overall agreement between the coders was observed. For example, the coder who used the final version of ASSET agreed with the author of the thesis on role modelling scores in 68.4% of the cases and on physiological and affective states in 51.5% of the cases. In the light of the reduced agreement, the potential implications for theory and practice should be considered. It may be expected that other researchers would differentiate between the self-efficacy categories differently. This could have a strong implication for theory testing. Bandura's claim that mastery experience based techniques are the most powerful remains an untested hypothesis unless there is a strong consensus regarding the distinction between self-efficacy categories. On the other hand, the reduced agreement between coders regarding specific self-efficacy categories could be less relevant for practice. As long as the coders agree on the distinction between self-efficacy and non-self-efficacy techniques, the professionals who use these techniques may receive effective training and feedback about their implementation of self-efficacy techniques.

The author, the first supervisor and the coders tried to reduce the discrepancies. The author aimed at simplifying the categories so less cognitive processing was required to use the coding manual. Nevertheless, the categories still required some interpretation of the coded material. Thus, in future it would be interesting to describe ASSET in a simpler way. This could be done by splitting the verbal behavioural techniques into specific questions. For example, mastery experience-based self-reflection techniques could be split into three single questions such as: 'what did you learn from this experience?', 'what did you do to address the issue?' and 'what is the purpose of the activity we asked you to do?'. As can be seen from these examples, in order to create such a detailed description of each technique, we would have to capture all questions that may be asked when using each technique. This would require observing a substantial number of various diabetes-based self-management programmes. Moreover, using such an extended coding manual, coding would become an even more time consuming process than it is at the moment. Also, reducing the coding manual to single questions may pose a risk of missing some of the self-efficacy-based techniques.

Another limitation of the coding manual was that coder's cognitive abilities and attitudes might have influenced the way the coding manual was used. For example, a coder who used a self-efficacy approach in their own practice might have found it much easier to use the coding manual than someone who knew self-efficacy only as a theory. Coding is not a test of memory but a test of the understanding and rigorous application of a coding manual. Nevertheless, someone who tried to remember previous coding decisions would be more consistent within the overall process of coding. As observed in the presented study, the coder who rated two editions, improved. Thus, the inter-rater agreement may depend on the expertise in using the coding tool. This, however, is a general limitation of coding manuals that has to be taken into consideration when analysing coding results (Robson, 1999).

It has been stated that the inter-rater agreement varied across sessions. This might be due to the fact that there were certain techniques that the coding tool did not capture. Another explanation might be that coders followed the coding manual more rigorously when coding a session after achieving lower agreement in a previous one.

The clarity of the categories could be impaired by the fact that the author of the coding tool is not a native speaker. The coding manual was checked by a few English-native speakers, but there still may be some rooms for improvement in terms of clarifying the definitions.

The preliminary analyses to explore construct validity were based on the assumptions that self-efficacy techniques will be shorter in time than non self-efficacy speech and that the self-efficacy techniques will trigger longer verbal response than non-self-efficacy-based techniques. These assumptions was based on previous studies which showed that active participation was related to better information processing and applying the intervention than passive information intake (Padgett et al., 1988; Ellis et al., 2004; Norris et al., 2001; Skinner et al., 2008). Thus, it was expected that the longer time left for patients to talk would be positively linked with increase in self-efficacy belief. However, it also can be argued that because knowledge is a pre-condition for self-efficacy (Bandura, 1997), passive information intake may be necessary to initially develop individuals' confidence. To address the limitation, the next study measures the validity in more detail assessing content validity, discriminant validity and predictive validity.

4.5.2 Future directions

This chapter presented the reliability study showing some examples of what data could be retrieved when applying the coding tool.

To address the major limitation of the study, the coding of the complete programme should be done by more than one coder to identify the self-efficacy techniques. A good practise could be for the second coder to rate only a random selection of speech utterances (e.g. Ford, Hall, Ratcliffe, and Fallowfield, 2000).

Further, to address the small sample size and little diversity among facilitators, diabetes centres, and programmes, a greater number of health care professionals could be involved in the study. Health care professionals from different diabetes centres and delivering different educational programmes would provide a more comprehensive picture of the use of specific techniques.

The predictive validity of ASSET and therefore the impact of self-efficacy-driven techniques on patients' cognition and behaviour related to self-management will be explored in the next study. A few distinctive (in terms of self-efficacy implementation) programmes needed to be investigated in order to evaluate the predictive validity of ASSET. A self-efficacy scale tailored to the intervention is needed to evaluate patients' belief change. The distal outcomes in terms of patients' behaviour change should be assessed in the future. Furthermore, more detailed analyses of patient responses are needed in order to identify potential interactions between such responses and facilitators' delivery of techniques. All these issues will be explored in the following studies.

As mentioned earlier, ASSET measures the number of self-efficacy techniques. However, it does not directly assess the quality of the intervention. Nevertheless, the detailed information on specific techniques may provide an insight into the process of intervention delivery. Thus, another potential area to explore when analysing facilitators' behaviour with ASSET is the flow of verbal techniques. Since with ASSET each self-efficacy-based speech utterance is coded as a separate entity, the sequence of verbal techniques can be identified. For example, a potential sequence of techniques when discussing hypoglycaemia could start with a mastery experience-based facilitating pro-active self-technique; followed by a physiological and affective states-based exploration of physiological state technique; and finishing with a verbal persuasion-based elicitation of knowledge technique. For example, the presented sequence of techniques could incorporate questions like:

1. "When you think about hypoglycaemia, what are the issues you would like us to discuss today, which may help you to understand it better?"

2. "Can we just quickly go around and share the different symptoms that you all experience".

3. “You can see that I have done something to these symptoms you told me about” (facilitator wrote them in two columns on the board). *Why do you think I have put them into two different categories?*

This is just one potential sequence when discussing hypoglycaemia. Nevertheless, there are more potential ways of steering the discussion. For example, the facilitator could focus on someone’s hypoglycaemic episode and decide to guide this person in finding a solution for how to deal with it next time. Alternatively, after asking the group about their knowledge of hypoglycaemia the facilitator could provide some information. Thus, there are always more ways (i.e. sequence of verbal techniques) of discussing a topic. It would be interesting to explore whether some of these are more effective than others (e.g. in terms of activating patients’ talk).

The sequences nurses use could be explored. Specifically, the sequences of techniques could show how many steps the nurses use to discuss one topic and, for example, how many steps they use before they start lecturing. This could give some insight into individual delivery style and give some hints about the quality of interventions. When analysing the sequences of techniques, the challenges described by Kratochwill have to be considered. These include focusing on patterns that occur only in close proximity (Kratochwill, 1992).

ASSET is a non-symmetric coding instrument. It focuses on nurses’ techniques. Including analysis of patients’ response and questions would give more insight into the quality of the self-efficacy techniques.

Self-efficacy enhancing techniques work best when combined (Bandura, 1997). A facilitator who utilises self-efficacy techniques in a comprehensive way will take an advantage of all resources provided. Also, the sequences of techniques could be used when training facilitators in how to deal with difficult situations when running a group session.

In conclusion, this chapter presented the development of ASSET emphasising its reliability and exploring its clinical utility. It showed that the Analysis System for Self-Efficacy Training described social cognitive theory in terms of implementable and assessable behaviour change techniques. The analysis of these techniques provided reliable data to establish treatment fidelity of self-efficacy orientated interventions and gave some insight into patient-provider interaction. These detailed analyses guided facilitators of chronic disease self-management programmes in sound, theory driven intervention delivery and provided researchers with an insight into the underlying mechanisms of the intervention process. The next chapter further explores the characteristics of ASSET focusing on its content, discriminant and predictive validity.

CHAPTER 5: VALIDITY STUDY

5.1 Aims

The aim of the present study was to establish content, discriminant and predictive validity of a coding tool – Analysis System for Self-Efficacy Training (ASSET). The study had the following objectives:

With regard to content validity: to provide evidence that the categories distinguished within ASSET reflect the construct of self-efficacy adequately and comprehensively;

With regard to discriminant validity: to provide evidence that ASSET can distinguish between more and less experienced facilitators suggesting more effective delivery of intervention;

With regard to predictive validity: to provide evidence that the nurse-led self-efficacy-based techniques identified with ASSET can predict patients' health-related outcomes.

5.2 Hypotheses

The following hypotheses have been formulated:

1. With regard to content validity, it was expected that there would be agreement between two independent coders who rated the speech utterances without using ASSET and the rater who used ASSET in terms of nurses' use of self-efficacy-based techniques.

2a With regard to descriminant validity, it was expected that with ASSET significant differences in delivering self-efficacy-based techniques would be observed between individual nurses who differed in terms of experience. Nurses who had additional training and supervision from a senior nurse prior to the study would use more self-efficacy-based techniques than those without additional experience.

2b It was also expected that self-efficacy-based techniques would be followed by longer verbal responses from patients that non-self-efficacy oriented speech.

3a With regard to predictive validity, it was expected that the number of nurse-led self-efficacy-based techniques identified with ASSET would predict patients' self-efficacy beliefs, intention and behaviour. Specifically, the more self-efficacy-based techniques used by the nurses the higher the patients' titration self-efficacy beliefs, the more likely the intention to titrate insulin, and performance of insulin titration.

3b It was also expected that patients' self-efficacy beliefs would predict intention which in turn would predict behaviour in relation to insulin titration. Further, the behaviour would lead to an increase in HbA1c level.

3c It was expected that greater self-efficacy beliefs would predict fewer perceived barriers regarding insulin adjustment.

With regard to predictive validity exploratory questions were formulated. These were:

3d Will the patients' beliefs regarding insulin titration change after accomplishment of the starting insulin programmes? If so, is the change associated with the use of self-efficacy-based techniques by the nurses?

3e Will there be a relationship between self-reported and objectively measured behaviour?

5.3 Pilot study

5.3.1 Aim

Before testing the key hypotheses a pilot study was conducted. The aim of the pilot study was to adapt self-efficacy, intention and behaviour items from a larger self-management scale (Peyrot & Rubin, 1988) to the starting insulin programme and to Bandura's previously discussed guidelines, and subsequently to assess their internal validity.

5.3.2 Method

5.3.2.1 Participants of the starting insulin programme

The participants were six individuals with poorly controlled type 2 diabetes (HbA1c above 8) who participated in two starting insulin programmes (3 per group). There were two female participants, the average age was 53.33 (*SD* = 14.05) and the average duration of diabetes was 13.31 years (*SD* = 11.23). Prior to the starting insulin programme each patient met with a diabetes nurse in a one-to-one consultation to discuss the option of starting insulin treatment. Later on, during the group session the patients made their decision about the insulin regimen (i.e. number of injections per day). Based on patients' blood glucose levels and the regimen chosen by a patient, the nurse decided on the initial insulin dose.

5.3.2.2 Starting insulin programme

The starting insulin programme was a group-based educational programme for people with poorly controlled type 2 diabetes. It was developed without reference to any specific theory. The aim of the starting insulin programme was to guide people in starting insulin and to encourage them to adjust the initial insulin dose according to blood sugar levels.

During the first session participants discussed their current symptoms related to high blood-sugar levels. They were guided in the decision on which insulin to take and how often to take it. Once patients agreed on the insulin regimen, the nurse suggested a dose to each of the patients and distributed appropriate pens and insulin. Subsequently, participants practised setting up the insulin pen and making an injection. After practising using the pen, the nurse introduced the general principles of adjusting the dose according to blood sugar levels. The session finished with discussing some practical issues regarding starting insulin treatment such as informing the Driver and Vehicle Licensing Agency (i.e. DVLA) or ways of disposing spare needles. The main focus of session two was on exploring patients' first attempts to use and to titrate insulin. In the context of using insulin nurses discussed the impact of food, exercise, and illness (such as the common cold) on blood sugar levels and how to adjust insulin levels in relation to these factors. The second session was less structured than the first as it relied heavily on the issues which the patients brought to the session after having experienced taking and adjusting insulin. Details of the programme protocol are presented in Appendix F.

The starting insulin programme was chosen for the study for two reasons. First, the content and structure of the programme created opportunities to exercise self-efficacy techniques. Patients were introduced to a new treatment, had some time between sessions to make first attempts to experience and practise insulin management, and, when they came back for session two, had the chance to reflect on their performance and learning outcomes. Second, we utilised the starting insulin programme because of the characteristics of the potential participants. In self-efficacy-based intervention research the ceiling effect (i.e. patients' reported high self-efficacy beliefs at baseline) has often been an issue (e.g., Kanbara et al., 2008). Because of this, we chose a group of patients who did not have any previous experience of and thus no self-efficacy in performing the behaviour.

5.3.2.3 Measurements

The insulin adjustment self-efficacy beliefs, intention and behaviour sub-scales are parts of a larger instrument to measure general self-management behaviours in type 2 diabetes. The scale assesses diverse self-management behaviours to control blood glucose levels including insulin titration, diet and exercise (Peyrot et al., 1988; Peyrot & Rubin, 1990). To the best of my knowledge this is the only scale which includes a measure of self-efficacy beliefs with regard to insulin titration among people with type 2 diabetes. The instrument, however, has not been validated.

For this study, the items addressing insulin adjustment were used. With regard to insulin titration, the self-efficacy items addressed confidence to adjust insulin in a variety of situations including hypoglycaemia, hyperglycaemia, greater than usual physical activity, and larger amount of food as well as ketoacidosis. With regard to the intention and parallel behaviour items, there are two separate measures. First, there are five items assessing future intention and past behaviours with respect to titrating insulin. The five-point Likert scale ranges from never to often. Second, there are two items (one for intention and a parallel one for behaviour) which assess the purpose of adjusting the amount of insulin (Peyrot et al., 1988). The six-point scale ranges from avoiding hypoglycaemia to keeping blood sugar levels normal. The sub-scales were re-formulated in order to address the specific behaviours targeted in the starting insulin programme and to follow Bandura's recommendation on how to design a self-efficacy scale (Bandura, 2001b).

5.3.2.3.1 Adaptation of the self-efficacy items

The initial items were adapted addressing the feedback received from nurses who ran the starting insulin programme concerning the characteristics of the programme and the patients who attend it. The scale was then amended in accordance with guidelines on how to develop a self-efficacy scale (Bandura, 2001b). First, the scale focused on a specific behaviour which was adjusting the amount of insulin. Second, the barriers covered the most frequently occurring situations for people with type 2 diabetes who were starting an insulin regimen with regard to adjusting insulin, including high blood sugars, feeling unwell, low blood sugars and having reoccurring hypos. The situations presented in the barriers were in accordance with the regimen suggested in the starting insulin group. Third, the Likert scale was extended from 5 points to 10 points, rated from 'can not do at all' to 'certain can do'. Table 25 presents the initial and adapted items of the self-efficacy scale.

Table 25 *Summary of changes made when adapting the self-efficacy scale*

Original items	**Adapted items**
I believe I can:	*
1. Work out how much extra insulin to take when my blood sugar is high.	1.
2. Work out how much insulin to take when I'm sick.	2.
3. Work out how much less insulin to take or how long to wait for my shot when my sugar is low.	3. Work out what to do when my insulin is low.
4. Work out how much extra insulin to take when I eat more than usual.	Left out
5. Work out my usual regimen when I am having lots of reactions.	4. Work out my usual regimen when I am having lots of low blood sugars/hypos
6. Work out how much extra insulin to take when I have ketones. .	Left out

Note: *The boxes where no changes applied were left blank. Please note that in the subsequent discussion the numbers of the amended scale will be used, unless talking about the excluded items.

Table 25 shows that some wording was changed to use expressions more accurate for the British context in two items (items 3 and 4). Two items were left out as the topics were not discussed in the starting insulin programme (initial items 4 and 6). See Appendix O for the final version of the scale.

5.3.2.3.2 Adaptation of the intention and behaviour items

Addressing the feedback received from nurses some changes were also made in the intention and behaviour scales. Table 26 presents the initial and adapted items of the intention and behaviour scales. The initial scale ranging from "never" to "very often" was used.

Table 26. *Summary of changes made when adapting the intention and behaviour scales*

Original items	Adapted items
Intention sub-scale	
7. When you have low blood how often do you intend to decrease your insulin dose?	* 5.
8. When you are going to be eating more than usual, how often do you intend to increase your insulin dose before the meal?	6. When you have high blood sugars how often do you intend to increase your insulin dose?
9. When you are going to be unusually active physically, how often do you intend to decrease your insulin dose?	Left out
10. When you adjust your medication and the amount of food you ate, do you intend to do it more to **avoid insulin reactions** or more to keep your blood sugars as close to normal as possible? (Circle the number on the scale below which best describes why you intend to make adjustments. For example, if you expect to make adjustments exclusively to avoid reactions, circle number 1).	7. When you adjust your medication and the amount of food you ate, do you intend to do it more **to avoid low blood sugars/hypos** or more to keep your blood sugars as close to normal as possible? (Circle the number on the scale below which best describes why you intend to make adjustments. For example, if you expect to make adjustments exclusively to avoid reactions, circle number 1).
Behaviour sub-scale	
11. When you had low blood sugar how often did you decrease your insulin dose?	* 8.
12. When you knew you were going to be eating more than usual, how often did you increase your insulin dose before the meal?	9. When you had high blood sugars how often did you increase your insulin dose?

Table 26 (continued) *Summary of changes made when adapting the intention and behaviour scales*

Original items	Adapted items
Behaviour sub-scale (continued)	
13. When you knew you were going to be unusually active physically, how often did you decrease your insulin dose?	Left out
14. When you adjusted your medication and the amount of food you ate, did you do it more to avoid **insulin reactions** or more to keep your blood sugars as close to normal as possible? (Circle the number on the scale below which best describes why you made adjustments. For example, if you made adjustments exclusively to avoid reactions, circle number 1).	10. When you adjusted your medication and the amount of food you ate, did you do it more to avoid **low blood sugars/hypos** or more to keep your blood sugars as close to normal as possible? (Circle the number on the scale below which best describes why you made adjustments. For example, if you made adjustments exclusively to avoid reactions, circle number 1).

Note: *The boxes where no changes applied were left blank.

Table 26 shows that items 7 and 10 were re-formulated in order to use expressions more accurate for the British context. Items 6 and 9 were re-formulated to address the content of the starting insulin programme more accurately. Initial items 9 and 13 were left out as the topics were not discussed in the starting insulin programme.

The response to items 5-6 and 8-9 was on a 5-point-Likert scale ranging from (0) never to (4) very often. In contrast, items 7 and 10 used a different scale. As can be seen in Table 26 those items measure the purpose of insulin titration and ranged between (1) - using insulin to avoid hypos to (6) - using insulin to keep blood sugar normal. See Appendix O for the final version of the scale.

5.3.2.4 Procedure

Participants completed the questionnaire in the reception area while waiting for the programme to start and in the seminar room after the programme had finished. The self-efficacy beliefs and the intention scales were administered before and after the starting insulin programme, whereas the behaviour scale was administered after the programme had finished. This was because the behaviour addressed in the scale was not performed until the beginning of the programme.

5.3.2.5 Data analysis

To assess the internal consistency, descriptive statistics based on mean value and Cronbach's alpha of the self-efficacy scale, as well as the Cochran Chi-square for the dichotomous intention and behaviour scales were calculated. The analyses were performed in SPSS (SPSS Inc., 2005).

5.3.3 Results

All six patients assessed the questions as premature and crossed 'cannot do at all' or 'not appropriate'. Two weeks later, after accomplishment of the programme, some differences between patients were observed. Table 27 presents the descriptive statistics of the patients' responses.

Table 27 *Descriptive statistics from the self-efficacy, intention and behaviour scale.*

	Baseline		**After the programme**	
Item	**Range**	**(*M, SD*)**	**Range**	***M, (SD)***
Self-efficacy sub-scale				
Item 1.	0		3-10	8 (3.16)
Item 2.	0		3-10	8 (3.16)
Item 3.	0		3-10	8.2 (3.03)
Item 4.	0		3-10	7.6 (2.87)
Intention sub-scale				
Item 5. decrease the dose	0		1-2	1.83 (0.41)
Item 6. increase the dose	0		2-3	2.21 (0.44)
Item 7.	0		1-6	4.33 (2.58)
Behaviour sub-scale*				
Item 8. decrease the dose			0-2	0.83 (0.98)
Item 9. increase the dose			0-3	2.16 (1.16)
Item 10.			1-6	3.66 (2.25)

Note: * no behaviour data was collected at baseline due to a lack of experience in using insulin

Table 27 shows that there was no variance in the sample at baseline with regard to self-efficacy beliefs and intention. The data collected after the programme suggested that there was some variance among the participants. The reported self-efficacy beliefs with regard to adjusting insulin ranged from 'cannot do' to 'certainly can do'. Participants reported greater intention to increase the insulin dose, rather than to decrease it. The responses ranged between 'sometimes' and 'often'. With regard to behaviour, patients reported that they increased the insulin dose more often than decreased it. The response range was, however, greater than in the intention scale and ranged between 'never' and 'often', suggesting greater variability in behaviour. The items regarding the purpose of adjusting the dose revealed that patients were more likely to adjust the dose in order to avoid hypos. The responses, however, ranged between 1 and 6 indicating that there were patients who adjusted in order to avoid hypos but also those who adjusted in order to keep blood sugars normal.

The internal consistency of the self-efficacy scale after the starting insulin programme measured with Cronbach's alpha was 0.75, which indicates good reliability (Field, 2005). With regard to the intention and behaviour scales Cochran Chi-square was .58 and .55. These relatively low values may indicate the multi-dimensionality of the intention and behaviour scales.

Cronbach's alpha was measured separately for items seven and ten which assessed the purpose of insulin titration (Field, 2005; Peyrot et al., 1988). Cronbach's alpha calculated for these two items was 0.95 indicating good reliability.

5.3.4 Discussion

Internal validity of the self-efficacy scale was good, indicating good reliability (Field, 2005). At baseline all six patients assessed the self-efficacy and intention scales as premature choosing the 'not appropriate' or 'cannot do at all' answers. Two weeks later, after accomplishment of the starting insulin programme, patients varied in their self-efficacy beliefs with regard to titrating insulin. All participants reported an intention to titrate insulin in the future. At baseline, patients' response when asked to fill in the self-efficacy and intention scales was very negative. Most of the approached patients seemed to feel offended by being asked whether they were confident and intended to adjust insulin before they had a chance to gain any experience of using insulin. Two patients expressed concerns that they were not sure whether they would start insulin, thus it was impossible for them to answer the questions. After the starting insulin programme finished, three out of six people found the behaviour questions premature. For example, in the period of two weeks they did not experience hypos so they were not able to answer the question which refers to adjusting insulin when having a hypo.

Starting insulin could be a very difficult moment for patients with type 2 diabetes. Insulin is usually offered to people whose health has significantly deteriorated and who are at greater risk of cardiovascular morbidity and mortality (Saudek et al., 1997). Many patients interpret starting insulin as a personal failure in managing their diabetes (Davis et al., 2006). Thus, patients were often anxious and uncertain about insulin, and not confident about administering insulin (Meece, 2006).

The aim of the starting insulin programme was to guide people in the decision about changing their treatment from tablets to insulin. Theoretically, patients were still able to refuse starting insulin during the programme. The idea of the starting insulin programme was to support people in their decision to choose the most appropriate treatment for them. Therefore, the questionnaire regarding self-efficacy beliefs to titrate insulin, as well as the intention to titrate insulin seemed to be premature and inappropriate before the programme started.

Thus, in the next phase of the research I decided to administer the questionnaire after the programme only after patients had made a decision about their insulin regimen. This decision was supported by Bandura's description of the notion of self-efficacy and discussion with experts in the self-efficacy field. Self-efficacy belief, although driven by the individual's own or observed experience, requires prior knowledge and skills (Bandura, 1997). Patients who attended the starting insulin group had no experience with titrating insulin at all.

With regard to the intention and behaviour scales, the relatively low values of the Cochran Chi-square test might be due to multi-dimensionality of these scales. It has to be pointed out that all patients started insulin treatment with a very low dose. The participants were people with poorly controlled diabetes. In the majority of cases a small initial dose would not improve their very high blood glucose levels. Thus, the first experiences of titration for patients were most likely to be an increase in the insulin dose. This could be the reason why the intention and behaviour scales were revealed to be inconsistent. Out of six patients, five increased the dose whilst only one decreased it. For the main study, however, I decided to keep both items in order to identify those individuals who may be more sensitive to insulin and who will have to decrease the initial dose. The analysis however will be based on single items.

The pilot study had some limitations. There was no other attempt to collect baseline data on self-efficacy beliefs. The self-efficacy beliefs could have been assessed retrospectively. After the programme was finished, we could have asked about self-efficacy beliefs regarding insulin titration which people might have had prior to starting the programme. However, asking retrospectively raises questions concerning the validity of the response.

Another limitation of the study was that the psychometric parameters were not fully assessed. Test-retest reliability, concurrent validity and factor structure were not measured. The choice of questionnaires and the subsequent data analyses were limited due to the fact that the study had a naturalistic design and the sample size was small. As mentioned earlier the study was part of an audit to assess the quality of the starting insulin programme. The participants were asked to answer the questionnaires only at the times when they attended the starting insulin programme. Due to the design, it was not possible to collect the data so the test-retest reliability could be measured. For the sake of ecological validity, the measures to assess patients' outcomes focused on direct effects of the programme. Therefore, the concurrent validity could not be measured. Also, as mentioned earlier the pilot study had a small sample size. Thus, the analysis to investigate the factor structure could not be performed. In the future, a study to assess the psychometric properties of the scales based on a larger sample size including test-retest reliability, concurrent validity and factor structure should be conducted.

Individuals who attended the programme might have had some prior knowledge about insulin. However, they did not have any opportunities to practice the relevant skills as they had never used insulin before. To address the lack of a measurement at baseline, I added a valid self-report Insulin Treatment Appraisal Scale, ITAS (Snoek, Skovlund, & Pouwer, 2007) to assess patients' beliefs regarding insulin therapy (see Appendix N for ITAS). The 20-item ITAS measures barriers about starting insulin and beliefs about using insulin. It captures both positive and negative beliefs. The questions address the impact of using insulin on the individual's everyday functioning, social life, and future health. The five-point Likert scale ranges from "strongly disagree" to "strongly agree".

The pilot study resulted in the amended self-efficacy beliefs, intention and behaviour scales which are appropriate for the starting insulin programme and follow Bandura's recommendation on how to assess self-efficacy beliefs. The next section presents the main study where these scale will be used to assess the association between nurse-led behaviours and patients' health-related outcomes.

5.4 Main study

5.4.1 Method

5.4.1.1 Starting insulin programme

As presented in the Method section of the Pilot study the starting insulin programme was a two session long group-based educational programme for people with poorly controlled type 2 diabetes. The aim of the starting insulin programme was to guide people in starting insulin and to encourage them to adjust the initial insulin dose according to blood sugar levels (see pilot study for more details on the programme). For the present study, 12 starting insulin programmes were video recorded. They were delivered in two sessions, two weeks apart and lasted two hours each. Figure 11 presents the response and drop out rates with regard to the video-recorded starting insulin programmes.

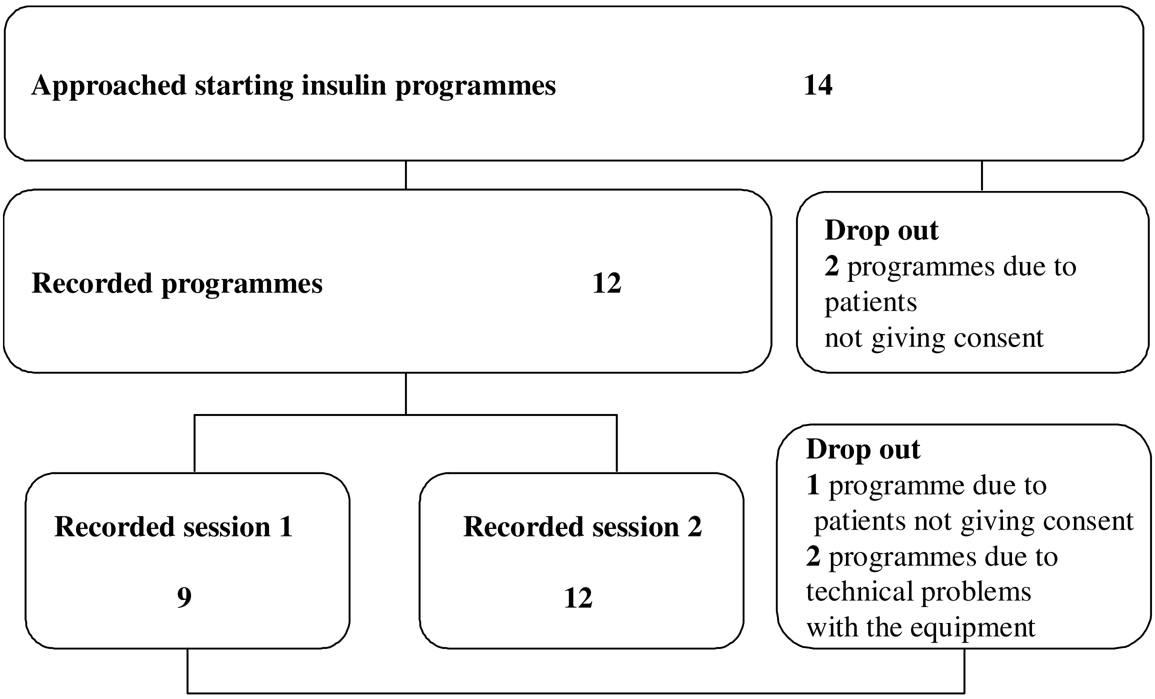


Figure 11 Response and drop out rates of recorded programmes

As Figure 11 shows, 12 starting insulin programmes were included in the study. Within these, 9 first sessions and 12 second sessions were video recorded. The reasons for drop outs included patients not giving consent for the programme to be recorded and technical problems with the video equipment.

5.4.1.2 Nurses

Nine nurses from three diabetes centres who were running or planning to run starting insulin programmes for people with type 2 diabetes agreed to take part in the study. Of these, five nurses from the same diabetes centre were recorded when delivering the starting insulin programmes. With regard to the drop outs, one nurse from the diabetes centre stopped running the starting insulin programmes due to health reasons before the video recording started. Three more nurses from two other centres were not able to recruit enough participants to run groups. Thus, they could not be video recorded and as a result were not included in the analysis. The age of nurses who took part in the study ranged between 30 and 48 (M = 39.61, SD = 8.53). The details of the nurses' characteristics are presented in Table 28.

Table 28 *Descriptive statistics of nurses' diabetes-related experience*

Criteria N = 5	**Range (*M, SD*)**
Age	30-48 (39.61, 8.53)
Years of working in diabetes	3-20 (9.11, 6.91)
Years of providing group education	2-6.5 (3.8, 1.68)
Number of hours per year spent on delivery of group education in 2007	8-204 (63.21, 81.25)
Hours of supervision/audit in 2006-2007	1-8 (4.61, 4.22)
Hours and topic of additional training in 2006-2007	0-3 (1.21, 1.31)

As can be seen in Table 28, the nurses differed in terms of years working in diabetes, in their experience of delivering group education and in additional training. Three out of five nurses had additional training and supervision from a senior nurse. The most frequently attended further education by the nurses focused on consultation skills, diabetes-related knowledge and self-efficacy. With regard to educational levels, one nurse had a BSc in health studies, three had a diploma in nursing and all were registered nurses.

5.4.1.3 Patients

Sixty patients were approached by the researcher in the waiting area before the first session of the starting insulin programme. Of these, 55 agreed to take part in the study. Two people did not give consent for the starting insulin programme to be recorded.

Three people were not asked for their consent as the first person from the group who was approached did not give consent. Thus, the session could not be recorded. The consent form addressed both, agreement to collect data and to record a session. Thus, it seemed to be inappropriate to further seek consent after someone had not agreed for the session to be recorded. Hence, due to the requirement of group consent for the data to be collected (i.e. a session to be recorded) data from three patients was not used and data from three further patients were not collected at all. Thus, although only two people did not give consent for the session to be recorded, a further six potential participants were lost.

Fifty two individuals with type 2 diabetes who were starting insulin and attended the nurse-led starting insulin programme took part in the study. Figure 12 summarises the response rates of patients broken down by session (session 1, session 2 and follow up data collection).

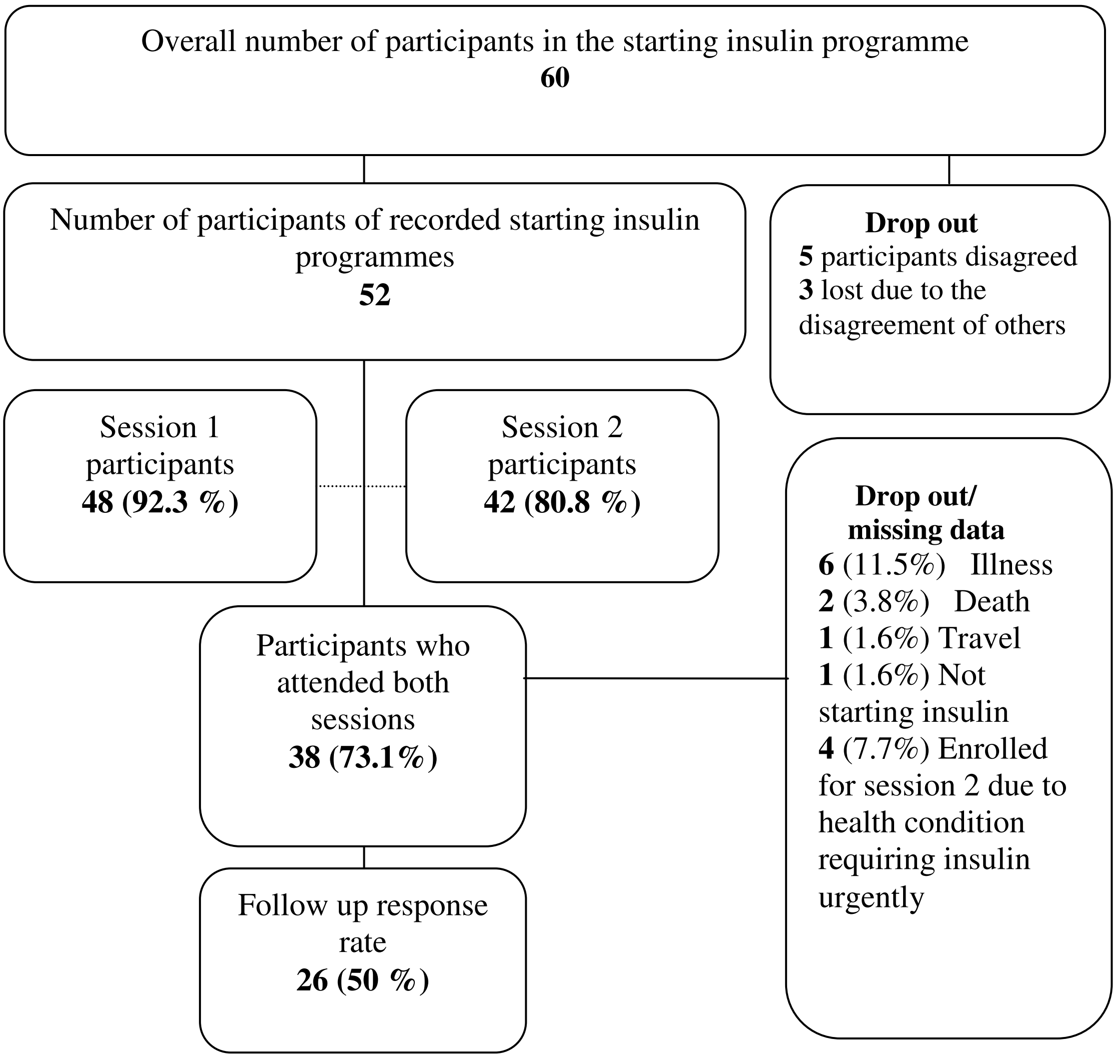


Figure 12 Flow chart of the response and drop out rates of patients.

As Figure 12 shows there was a large drop out between session 1 and 2. Patients did not attend the second session for various reasons, most often related to health issues. Out of 52 recorded patients, four attended only session 2. These were patients who were urgently required to start insulin due to recent cardiac surgery. The reasons for the follow up drop outs are unknown as once the follow up questionnaires were sent out, the patients were not contacted again, due to ethical requirements.

The majority of the patients were male and most had diabetes for some time as can be seen in Table 29. They were patients with poorly controlled diabetes (HbA1c above 8) and high blood sugar based symptoms (i.e., lethargy, polydypsia – i.e. excessive thirst, polyuria – i.e. frequent urination). The patients differed with regard to age, ranging between 42 and 83 and with regard to the duration of diabetes, ranging between 1 – 37 years.

Table 29 *Characteristics of patients participating in the starting insulin programme*

***N* = 52**	***M* (*SD*)**	**%**
Gender		73% male
Age (in years)	62 (11.48)	
Duration of diabetes (in years)	12 (8.16)	
Insulin regimen (daily)		
0 injections		1.9 %*
1 injection		28.8%
2 injections		63.5 %
4 injections		5.8 %

Note: * One person did not start insulin treatment during the programme.

Table 29 shows that there were three recommended insulin regimen for patients staring insulin, including one dose of long-acting insulin, two doses of a mixed long and short acting insulin and four dose consisting of one injection of long acting insulin and three injections of short acting insulin. As Table 29 shows, the majority of patients decided to use the mixed insulin and have injections twice daily. Out of 52 patients, 75.8 % adjusted their insulin dose in the time between sessions 1 and 2.

5.4.1.4 Ethical issues

Approvals from the School of Psychology ethics committee and from a local NHS at the Queen Alexandra Hospital audit group were obtained prior to the study. All participants received an information sheet explaining the nature and purpose of the video-recording and of collecting patients' data. It was stressed that patients could cease the recording at any time and request that the recorded materials be deleted. All video-recorded materials and questionnaires were kept in a locked cabinet, marked only by the date of participation. All data will be stored in a locked cabinet for a period of 10 years and deleted afterwards, in December 2017. The details of the ethics forms are presented in the Appendices Q – T.

5.4.1.5 Procedure and Measurements

5.4.1.5.1 Study design

The study had a naturalistic design. The starting insulin programme was a part of an ongoing educational programme offered to patients with type 2 diabetes changing from oral medication to insulin. The data were collected before the first session started and two weeks later directly after accomplishment of the second session. Three months later patients received letters including the follow up questionnaire and a stamped envelope. Figure 13 presents the study design.

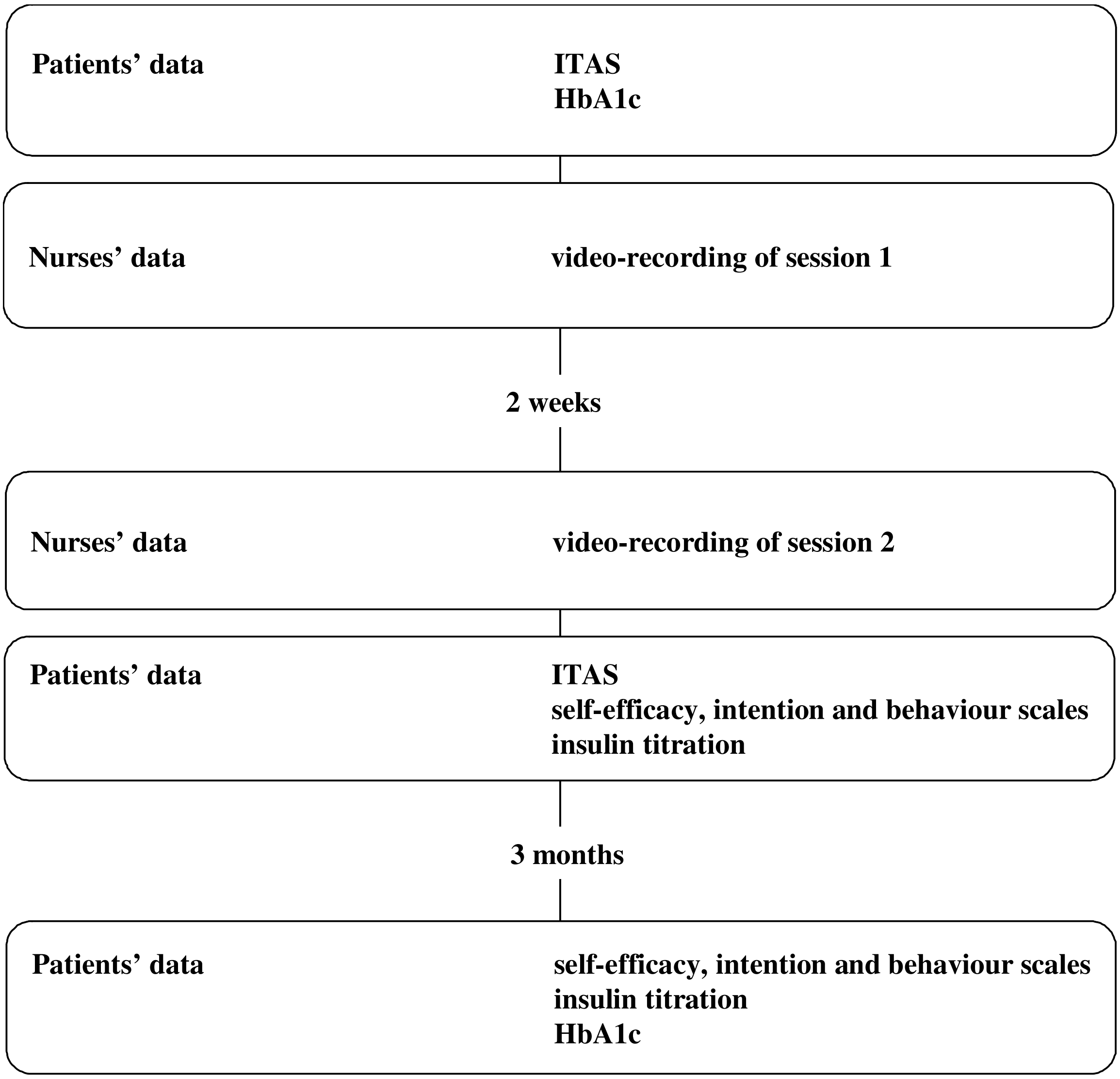


Figure 13 Study design

As Figure 13 shows, the patients' data were collected at three time points including baseline – before the starting insulin programme started, two-weeks later, after the programme finished, and three months later. With regard to nurse-related data, the nurses were recorded twice, when delivering both sessions of the starting insulin programme.

5.4.1.5.2 Observational measures to assess nurses' behaviour

The application of self-efficacy-based techniques by nurses was measured using ASSET (Zinken et al., 2008). Details on the development and application of ASSET are presented in Chapter 4.

5.4.1.5.3 Self-report measures to assess patients' outcomes

5.4.1.5.3.1 Self-efficacy, intention and behaviour towards insulin titration scales

As presented in the Pilot study, the self-efficacy, intention and behaviour scales with regard to insulin adjustment were adapted from a larger self-management scale (Peyrot et al., 1988). When analysing the data the intention and behaviour scales were dichotomised. This was done by re-scoring the 5-point Liker scale. 'Never' and 'almost never' were transformed into zero and 'sometimes', 'often' and 'very often' into one. The 'not applicable' option was copied as it was. The reason for transforming the scale into a dichotomous one was the fact that patients were advised to adjust the insulin dose every three days and not every time they observed a deviation in their blood sugar levels. A scale ranging from 'never' to 'very often' posed a risk of misinterpretation of patients' responses. The scales based on row data showed a skewed distribution. Previous studies used dichotomised values for skewed distribution (Bean et al., 2007).

As presented previously, Cochran Chi-square test suggested that the intention and behaviour scales might not be consistent. Therefore, the analyses relating to the self-reported insulin titration and intention to titrate were performed separately for decrease and for increase of the insulin dose. All participants of the starting insulin programme were people with highly elevated blood sugar levels. Thus, it was expected that there could be different practices regarding increase and decrease of insulin dose. It was expected that, due to overly high blood sugar levels, people would have to increase their insulin dose much more often than they would have to decrease it. Also, because of the very low dose of insulin which patients started with, the probability of experiencing low blood sugar which would require a decrease of the insulin dose was small.

In the analysis to compare the self-reported and objectively measured behaviour the scale for the self-reported behaviour towards insulin titration was transformed. The response 'not appropriate' was transformed into 'no behaviour'. It was assumed that people who assess a question about performing a specific behaviour as inappropriate must have not performed the behaviour. Thus, they were included into the analysis as non performers. This was done to include the entire sample in the analysis.

5.4.1.5.3.2 Insulin Treatment Appraisal Scale

As presented in the Pilot study, the Insulin Treatment Appraisal Scale, ITAS is a valid, self-report 20-item instrument to measure peoples' attitudes towards insulin therapy

(Snoek et al., 2007). The instrument was designed to assess barriers to starting insulin treatment and to explore common beliefs with regard to insulin treatment. The new scale was validated in insulin naïve patients as well as in patients who used insulin and showed high homogeneity. It can be used to assess people's beliefs when starting insulin as well as to capture changes related to insulin treatment. Apart from the validity data, to the best of my knowledge the scale has not been used in any other published study yet. A longitudinal data based on ITAS are currently under analysis (F. Snoek, personal communication, November 25, 2008).

5.4.1.5.4 Objective measures to assess patients' outcomes

Insulin titration undertaken in the first two weeks after starting insulin and three months after finishing the programme were recorded, as were pre and three months post programme HbA1c levels (i.e. glycated haemoglobin). The person who recorded the session made a note about the initial insulin dose the patients took directly after session 1 and about the insulin dose they took when coming to session 2. Patients reported the insulin dose at three-month-follow up. With patients' consent, the HbA1c levels were retrieved from their medical records before and three months after the starting insulin programme.

5.4.1.6 Data analysis

5.4.1.6.1 Descriptive statistics and testing for normal distribution

Descriptive statistics based on percentage values were calculated to assess the prevalence of insulin titration by patients broken down by various insulin regimens.

Nurses' verbal behaviours when delivering the starting insulin programmes were coded using ELAN (Hellwig, 2006). First, all nurse-led speech utterances were annotated by the author of the thesis. Second, the author distinguished between self-efficacy and non self-efficacy techniques. Third, the coders rated pre-defined self-efficacy based speech utterances. The inter-rater reliability was measured with Cohen's Kappa. Descriptive statistics based on median values were performed for the frequency per 10 minutes and duration in seconds of the self-efficacy-based techniques.

Relative scores of the nurse-led self-efficacy techniques were calculated. These included the percentage of nurses' length of speech in relation to the length of the session, the percentage of self-efficacy-based techniques in relation to all speech utterances and the percentage of self-efficacy-based techniques in relation to all speech utterances adjusted by the number of participants. A longer session (i.e. a longer nurses' speech) might potentially have given more opportunities to deliver self-efficacy techniques. Also, when a nurse followed the protocol, she repeated the same question as many times, as many participants were in the group (e.g. 'What symptoms have you been recently experiencing?'). Thus, the relative score of the percentage of self-efficacy-based techniques within all speech utterances adjusted by number of participants were used in the analyses.

The variables used in the analyses were tested for normal distribution using the Kolmogorov-Smirnov test. In cases, when the Kolmogorov-Smirnov test revealed that the variable was not normally distributed, I followed a procedure described by Field (Field, 2005). This included computing the z-scores for skewness and kurtosis, then identifying and transforming outliers and finally re-testing for normality using the Kolmogorov-Smirnov test.

5.4.1.6.2 Content validity

To evaluate the extent to which the ASSET categories reflect self-efficacy theory in an accurate and comprehensive way, content validity was assessed. Two independent coders rated randomly selected one 2 hour long session. They coded all nurse-led speech utterances and distinguished between self-efficacy and non self-efficacy techniques. All coders, the author included, were blind to nurses' and patients' characteristics. Inter-rater reliability using Cohen's Kappa between these coders and the author of the thesis was measured.

5.4.1.6.3 Discriminant validity

To test the discriminant validity, nurses' self-efficacy-based techniques were correlated with their level of experience. The analyses were based on the raw scores of the self-efficacy-based technique used by nurses. The experience was measured by a number of additional trainings, and hours of supervision by a senior nurse. In order to evaluate whether ASSET distinguishes between more and less experienced nurses, cross-tabulations and Chi-square statistics were performed, and odds ratios calculated.

To assess whether there was a difference with regard to patients' length of speech between self efficacy and non-self-efficacy-oriented speech, Mann-Whitney test and descriptive statistics based on Median values were performed. To further explore the potential difference in patients' length of speech after different self-efficacy-based techniques, Kruskal-Wallis test and descriptive statistics based on Median values were performed. As a follow up to the Kruskal-Wallis tests, the Mann-Whitney test was used (Field, 2005).

5.4.1.6.4 Predictive validity

To evaluate the predictive validity of ASSET, the association between nurse-led self-efficacy-based techniques and patient-related outcomes was measured. The use of self-efficacy-based techniques used here expressed the percentage of self-efficacy-based techniques per participant in relation to all nurse-led speech utterances. To test predictive validity, the sum scores of the use of self-efficacy-based techniques in session 1 and 2 were first calculated and tested for normal distribution. Because the variables were normally distributed, parametric test could be used.

With regard to patients' self-efficacy beliefs, Pearson correlations were performed to test whether there was an association with nurse-led self-efficacy-based techniques. Sum scores, individual items and median scores were used in the analysis to look for potential self-management areas which may have been affected by the self-efficacy-based techniques. The potential change in self-efficacy beliefs between time 2 and follow-up was measured with Pearson correlations and with dependent *t*-tests. Further, a logistic regression was performed to assess whether self-efficacy beliefs predicted intention to titrate insulin and behaviour.

With regard to insulin beliefs measured with ITAS (Snoek, Skovlund and Pouwer, 2005) descriptive statistics were performed based on mean value. To assess the change between baseline and time 1, a dependent *t*-test was used. The change score of two selected items (i.e. with regard to difficulty of insulin management and life flexibility when using insulin) were correlated with the nurse-led self-efficacy-based techniques to explore the potential impact of nurses-led techniques on change in beliefs. These items were used as they indicated perception of barriers. It was assumed that greater self-efficacy beliefs would predict fewer perceived barriers. To explore this assumption a Pearson's correlation was performed between ITAS scores and self-efficacy scores measured at time 2 as well as between ITAS change scores and self-efficacy beliefs.

To assess whether nurse-led self-efficacy-based techniques predict patients' intention to titrate after accomplishment of the programme logistic regression was performed, separately for the increase and the decrease of insulin dose. Subsequently, the score of the initial intention was added as a covariate to test its potential impact on this relationship. Intention was measured as a dichotomous variable. The reasons for dichotomisation and separate analysis for the scores are presented in this chapter, section: "Self-report measures to assess patients' outcomes". Further, to assess whether intention to adjust insulin dose predicts future behaviour, a Chi-square test was calculated.

Logistic regression was performed to assess the relationship between nurse-led self-efficacy-based techniques and patients' self-reported behaviour. Behaviour was measured as a dichotomous variable. For the rationale about using the dichotomous behavioural variable see *Procedure and measurements/ Self-report measures to assess patients* outcomes. Subsequently, it was assessed whether intention predicts behaviour using Chi-square and odds ratios.

With regard to objectively measured behaviour several analyses were performed. First, to assess the difference between patients' who titrated and who did not with regard to the number of self-efficacy-based techniques they received when participating in the starting insulin programme, an independent *t*-test was performed and bar graph created. Second, to assess whether nurse-led self-efficacy-based techniques predict patients' behaviour, a logistic regression was performed, separately for the increase and for the decrease of insulin dose. To explore whether there was a relationship between self-reported and objectively measured behaviour, cross-tabulations, and a Chi-square test were performed.

When reporting the results of logistic regression I followed Field who based his recommendations on APA guidelines. He stated that "the beta values, their standard errors, their significance and general statistics about the model (e.g. R^2) should be reported (...) as well as "standard beta values and its confidence interval" (Field, 2008, p. 249).

To assess whether the blood glucose levels changed three months after starting insulin treatment, a dependent *t*-test was calculated. Subsequently, baseline HbA1c, intention to titrate, self-reported and objective behaviour towards insulin titration were analysed as separate predictors of the HbA1c change using regression analysis.

5.4.2 Results

5.4.2.1 Descriptive statistics of patients, nurses and recorded programmes

5.4.2.1.1 Prevalence of insulin titration among patients

The initial dose for the patients ranged between eight and 22 units. Out of 52 participants, objective data regarding change in insulin dose was retrieved from 40 patients. This data was measured based on number of used insulin units. Of these patients, 38 attended both sessions and two participated in session 2 after using insulin for some time.

Table 30 summarises the initial attempts to adjust insulin dose according to blood sugar levels between sessions 1 and 2.

Table 30 *The prevalence of initial insulin regimen and initial insulin titration*

***n* = 40**	**% of patients who changed their dose***	**% of patients in column 1 who increased their dose**
Within the specific regimen		
those having 1 injection	80%	89.9%
those having 2 injections	84.4%	83.3%
those having 4 injections	100%	100%
Overall insulin titration	**75.8%**	**87.7%**

Note: * Percent of people who made at least one attempt to adjust their insulin dose in the two weeks after the first and before the second session of the starting insulin programme.

Table 30 shows that out of 40 patients who had the opportunity to use insulin, 75.8 % adjusted their insulin dose in the time between sessions 1 and 2. Of these, the majority (87.7%) increased their initial dose. The change in insulin dose ranged between a reduction by 12 units to an increase by 54 units.

With regard to the self-reported information, when answering the items about increasing the insulin dose, 16 (40 %) out of 40 people reported that they titrated and 10 (25 %) that they did not. Four (10 %) assessed the question not applicable and 10 (25 %) left it unanswered. Regarding decreasing insulin dose, 7 (17.5 %) people reported that they titrated the dose and 8 (20 %) that they did not when responding to low blood sugars.

Fourteen (35 %) people assessed the questions as not appropriate and 11 (27.5 %) did not answer it.

5.4.2.1.2 Coding of nurses' behaviour

Within 42 hours of recorded starting insulin programmes nurses made 6,967 speech utterances, of which 2,035 were devoted to self-efficacy. Six selected (i.e. first recorded) sessions were coded by two independent raters. Since the inter-rater reliability was high (K = .87) the remaining 15 sessions were coded by the author only.

5.4.2.1.3 Prevalence of self-efficacy-based techniques

Utilisation of self-efficacy techniques across all sessions ranged from 5 % to 48 % of overall speech. With regard to the self-efficacy-based techniques, in 77.8 % of speech utterances nurses used verbal persuasion, in 11.3 % mastery experience techniques, in 9.6 % physiological and affective states techniques and in 1.3 % role modelling techniques. The frequencies of specific self-efficacy-based techniques per 10 minutes of nurses' speech are presented in Table 31. It shows that nurses used substantially more non-self-efficacy-driven speech utterances than self-efficacy-based techniques. In every 10 minutes of the session nurses used most typically 38.24 non self-efficacy-driven speech utterances and 16.73 self-efficacy-based techniques. Of the self-efficacy-based techniques per 10 minutes of a session, nurses most often used verbal persuasion-based techniques (12.72), of which 11.21 were focused on eliciting knowledge. Further, within 10 minutes of a session nurses explored patients' symptoms (i.e. physiological and affective states) 1.51 times, and addressed patients' experiences 2.33 times, most often using self-reflection techniques. Getting the group involved to share experiences (i.e. role modelling) was the least used technique (0.27 times per 10 minutes of a session).

Table 31 *Descriptive statistics of self-efficacy-based techniques and non-self-efficacy-orientated speech based on raw data*

Sum of coded speech utterances = 6,967	**Frequency per 10 minutes of nurses' talk**	**Average length in seconds of one speech utterance**
	Mean	***Median****
Mastery Experience	2.33	4.55
Self Reflection	1.21	3.95
Facilitating Pro-active Self	0.85	4.59
Successful Trial	0.18	10.74
Role Modelling	0.27	4.43
Competent Other	0.06	5.26
Group Solving	0.13	4.48
Sharing Obstacles	0.06	3.54
Verbal Persuasion	12.72	5.52
Elicitation of Knowledge	11.21	5.52
Positive Feedback	0.31	4.31
Planning for Obstacles	1.21	5.95
Physiological and Affective States	1.51	4.39
Exploration of Affective State	0.21	3.61
Exploration of Physiological State	1.29	4.57
Non self-efficacy-oriented speech	38.24	5.52

Note. * As the distribution of the presented variable was not normal, the median values are presented, as this is more appropriate for non-parametric analysis (Field, 2005).

5.4.2.2 Testing the normal distribution

To test whether the variable of patients' length of speech was normally distributed, a Kolmogorov Smirnov test was performed. The results revealed that the variable was not normally distributed. A procedure recommended by Field (2005) was followed to transform the variables in order to improve the distribution. This included identifying and reducing outliers, then transforming the data using log-transformation and testing again for normal distribution using the Kolmogorov-Smirnov test. The distribution of patients' speech was skewed. *Z*-scores of the patients' speech variable revealed that 1.4 % of all cases were greater than 3.29 (i.e. lay behind two standard deviations). Thus, the variable was transformed using logarithmic transformation and the test was re-run. The distribution improved, (i.e. skewness = 0.511, kurtosis = 0.128). However, the distribution was still not normal ($K\text{-}S = 3.71$, $p < .001$). The high skeweness was expected given the fact that the variable reflected patients' speech utterances. A speech utterance lasted at least a few seconds. Non-parametric tests were used in analyses including this variable.

To test whether the self-efficacy techniques variable used in analyses of predictive validity (i.e. sum scores of the percentage of self-efficacy speech in overall speech per participant) was normally distributed, Kolmogorov Smirnov tests were performed. The test score was: $K\text{-}S = .969$, $p = .304$ indicating a normal distribution.

5.4.2.3 Content validity

In order to assess the agreement between two independent coders and the author of ASSET, cross-tabulations were created and Cohen's Kappa calculated.
The agreement between the author and the nurse coder who coded 182 speech utterances was not satisfactory. The Cohen's Kappa was $K = .074$ which indicates no association between two coders. In contrast, the agreement between a student coder and the author was good, $K = .72$.

With regard to the agreement between the nurse coder and the author, 80.4 % of self-efficacy-based techniques were rated as self-efficacy-based by coder 1. This coder, however, identified more self-efficacy oriented techniques than the author. Coder 1 rated 69% of the non-self-efficacy-oriented speech utterances as self-efficacy-based techniques. There was a pattern of disagreement. Of the 69% non-self-efficacy-based speech utterances rated by coder 1 as self-efficacy-based, 62% were 'summaries' and 'lectures' (see Chapter 4 on details of non self-efficacy-based categories).

With regard to the agreement between student coder and the author, 95% of the codes were the same. The disagreement was random, no patterns were observed.

5.4.2.4 Discriminant validity

5.4.2.4.1 Prevalence of self-efficacy versus non-self-efficacy-based speech among nurses with and without additional training

In order to evaluate whether ASSET distinguishes between more and less experienced nurses, Chi-square statistics were performed and odds ratios calculated. The results of the Chi-square test revealed that there was a difference in the use of self-efficacy-based techniques between nurses with and without any additional training prior to the study ($\chi^2 = 44.18(1)$, $p < .001$). Figure 14 presents the differences in the use of self-efficacy-based speech utterances between nurses divided into those with and without additional experience prior to the study.

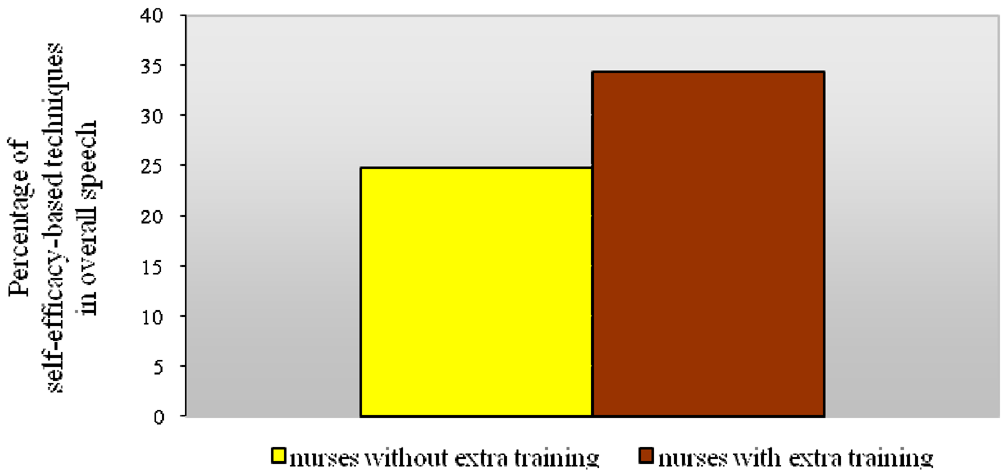


Figure 14 The percentage of self-efficacy-based speech utterances in overall speech by level of experience of the nurses

As Figure 14 shows, three nurses with additional training used self-efficacy-based techniques in 34.3% of their speech. In contrast, two nurses without additional experience prior to the study used self-efficacy-based techniques in 24.7% of their speech. In line with this, the results of the odds ratio suggest that nurses were 1.57 times more likely to use self-efficacy-based techniques when they had had additional training prior to the study.

5.4.2.4.2 Prevalence of elicitation of knowledge versus lecturing across more and less experienced nurses

To further assess whether ASSET-based coding may indicate levels of experience, the patterns of delivery of the two most prevalent verbal techniques, namely self-efficacy-based elicitation of knowledge and non-self-efficacy-driven lecturing, were compared across nurses using Chi-square test and odds ratios.

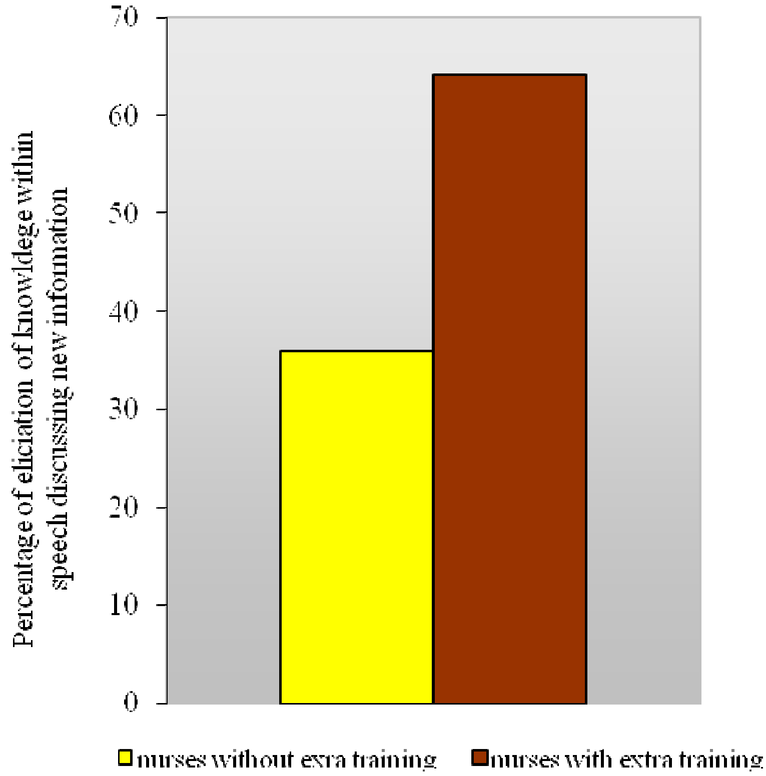


Figure 15 Differences in the use of self-efficacy techniques and non-self-efficacy speech when discussing new information between more and less experienced nurses

Figure 15 shows that three nurses with additional training prior to the study were more likely to elicit knowledge from patients instead of delivering information than two nurses without any additional training ($\chi^2 = 30.27(1)$, $p < .001$). When discussing new content, nurses with additional training prior to the study used self-efficacy-based elicitation of knowledge in 64.1% of cases. On the other hand, nurses without additional training used self-efficacy-based elicitation of knowledge in 35.9% of situations. Based on calculation of the based on odds ratio, nurses with additional training prior to the study were 1.72 times more likely to elicit knowledge than to provide information.

5.4.2.4.3 The length of patients' talk following self-efficacy techniques delivered by a nurse

To test whether there was a difference in the length of speech utterances by patients after nurse-led self-efficacy-based techniques when compared to non-self-efficacy based speech, the non-parametric Mann-Whitney test and descriptive statistics based on Median values were performed. Patients spoke significantly longer after a non self-efficacy-based speech (*Mdn* = 3.73 seconds) delivered by a nurse than after self-efficacy-driven techniques (*Mdn* = 3.06 seconds; $U = 1861514$, $p < .05$, $r = -.04$) however the effect size was small, below the .3 criterion for a medium effect size (Field, 2005).

5.4.2.4.4 The impact of self-efficacy techniques on patients' speech – distinction between specific techniques.

To assess whether there was a differences in the length of patients' response to individual self-efficacy-based techniques, the non-parametric Kruskal-Wallis test and descriptive statistics based on Median values were performed. The results revealed that there were significant differences in patients' length of speech after different self-efficacy-based techniques ($H(3) = 47.99$, $p < .001$). Patients talked longer when responding to 'mastery experience' (*Mdn* = 4.67 seconds) and 'physiological and affective states' (*Mdn* = 4.76 seconds) driven techniques than when responding to 'role modelling' (*Mdn* = 2.16 seconds) and 'verbal persuasion' (*Mdn* = 2.89 seconds). A Mann-Whitney test was used to follow up this finding (Field, 2005). The results suggest that after mastery experience and physiological and affective states-based techniques patients were more likely to talk longer than after verbal persuasion and role modelling-based techniques ($U = 127515$, $p < .001$, $r = -.12$).

5.4.2.5 Predictive validity

5.4.2.5.1 Self-efficacy beliefs with regard to titrating insulin

5.4.2.5.1.1 Relationship between nurse-led techniques and patients' beliefs

To assess the relationship between nurse-led self-efficacy-based techniques and patients' self-efficacy beliefs, the sum of self-efficacy-based techniques delivered in sessions one and two (measured by percentage of self-efficacy-based techniques per participant in relation to all nurse-led speech utterances) were correlated with a mean score of the self-efficacy scale after accomplishment and three months after the starting insulin programme. There was no association between the frequency of nurse-led self-efficacy-based techniques used in the two sessions and patients' self-efficacy beliefs measured after accomplishment of the programme and three months later (for T1 $r = .20$, $p = .23$; for T2 $r = .01$, $p = .99$). Additional non significant statistics including the correlation between nurse-led self-efficacy techniques and single self-efficacy items and the sum score of the self-efficacy scale are presented in Appendix U.

To assess whether there was an association between patients' self-efficacy beliefs measured after completion of the programme and three months later, Pearson correlations and dependent *t*-tests were performed. Self-efficacy beliefs after the programme finished tended to be correlated with the self-efficacy beliefs three months later ($r = .44$, $p = .06$). No significant differences in the self-efficacy beliefs were observed between the beliefs measured when the programme finished ($M = 7.31$, $SE = .52$) and three months later ($M = 7.71$, $SE = .54$, $t(18) = -.71$, $p = .07$).

5.4.2.5.1.2 Relationship between patients' beliefs and intention to titrate

To assess whether there was a relationship between patients' self-efficacy beliefs and intention to titrate, a logistic regression was performed separately for increase and decrease of insulin dose. The results are reported in Table 32.

Table 32 *Logistic regression for the impact of self-efficacy beliefs on patients' intention to increase insulin*

		95% CI for exp β		
	B (*SE*)	Lower	Exp β	Upper
	Included			
Constant	-2.21 (1.32)*			
Self-efficacy techniques	.46 (.18)*	1.10	1.59	2.30

Note: R^2 = 6.59 (Hosmer & Lemeshow), .19 (Cox & Snell), .22 (Nagelkerke). Model χ^2 (1) = .33 *, * $p < .05$.

As Table 32 shows, self-efficacy beliefs predicted the intention to increase the insulin dose measured at time 2. However, there was no relationship between self-efficacy beliefs and intention to decrease the dose as presented in Table 33.

Table 33 Logistic regression for the impact of self-efficacy beliefs on patients' intention to decrease insulin

		95% CI for exp β		
	B (*SE*)	Lower	Exp β	Upper
	Included			
Constant	1.48 (1.40)^{ns}			
Self-efficacy techniques	-.073 (.17)^{ns}	.66	.93	1.30

Note: R^2 = 3.57 (Hosmer & Lemeshow), .01 (Cox & Snell), .01 (Nagelkerke). Model χ^2 (1) = .18, p = .67.

5.4.2.5.2 Are Insulin Treatment Appraisal Scale change scores related to the use of self-efficacy-based techniques by nurses?

To assess whether there was a change in patients' beliefs about insulin treatment measured with ITAS before and after the starting insulin programme, dependent *t*-tests for selected single items and a sum score were performed. There were changes in terms of the beliefs regarding taking insulin. After the programme finished, people perceived taking insulin as less difficult (M = 2.61, SE = .21) than before the programme started (M = 1.88, SE = .15) (t (27) = 4.03, p < .001). Life was perceived as less flexible after starting insulin (before M = 2.68, SE = .17 and after M = 2.37, SE = .16, t (32) = 1.71, p (one tailed) < .05). The general beliefs with regard to insulin treatment measured with an overall score (after reversing the scoring on items 3, 8, 17 and 19) after the programme did not differ when compared to the score at baseline (t (32) = 1.41, p = .17).

To assess whether the change in the insulin-related beliefs was related to the frequency of nurse-led self-efficacy techniques Pearson correlation was performed. The changes in terms of perceived difficulty adhering to the insulin regimen and impaired life flexibility were not associated with the amount of self-efficacy techniques used by the nurses (r = -.01, p = .92 for item 5, measuring perceived life flexibility when on insulin; and r = .17, p = .37 for item 15, measuring perceived difficulty to inject).

To assess whether the selected ITAS items reflected self-efficacy beliefs a Pearson correlation was calculated. The results revealed that there was no correlation between self-efficacy beliefs and ITAS items measured at time 1 (r = .01, p = .96) and ITAS change score from baseline to time 1 (r = .24, p = .18).

5.4.2.5.3 Intention to titrate insulin

5.4.2.5.3.1 Relationship between nurse-led techniques and patients' intention to titrate insulin

A logistic regression was performed to assess whether the frequency of nurse-led self-efficacy techniques had an impact on patients' intention to titrate measured as a dichotomous variable after the programme finished. There was no association between nurse-led self-efficacy-based techniques and patients' intention to adjust insulin measured separately for the intention to increase and decrease of insulin dose.

Table 34 and Table 35 present the results of the logistic regression for the intention to decrease and increase the insulin dose, respectively.

Table 34 *Logistic regression for the impact of self-efficacy techniques on patients' intention to decrease insulin dose.*

		95% CI for exp β		
	B (*SE*)	Lower	Exp β	Upper
	Included			
Constant	-3.88 (2.79)^{ns}			
Self-efficacy techniques	.64 (.33)^{ns}	.98	1.63	2.68

Note: R^2 = 14.53 (Hosmer & Lemeshow), .347 (Cox & Snell), .619 (Nagelkerke). Model χ^2 (1) = 8.94, *p* = .003.

Table 35 *Logistic regression for the impact of self-efficacy techniques on patients' intention to increase insulin dose.*

		95% CI for exp β		
	B (*SE*)	Lower	Exp β	Upper
	Included			
Constant	-1.26 (1.27)^{ns}			
Self-efficacy techniques	.24 (.13)^{ns}	.98	1.27	1.63

Note: R^2 = 31.67 (Hosmer & Lemeshow), .178 (Cox & Snell), .267 (Nagelkerke). Model χ^2 (1) = 4.916, *p* = 0.27.

Table 34 and 35 show that the overall frequency of self-efficacy-based techniques delivered by a nurse in session one and two did not predict the intention to further titrate insulin after the programme finished.

However, the sum score of the intention to increase and decrease insulin dose were predicted by nurse-led self-efficacy techniques as shown in Table 36.

Table 36 *Logistic regression for the impact of self-efficacy techniques on patients' intention to decrease insulin dose.*

	95% CI for exp β			
	B (*SE*)	Lower	Exp β	Upper
Included				
Constant	-1.25 (.25)*			
Self-efficacy techniques	.48 (.25)*	.98	1.63	2.68

Note: R^2 = 25.63 (Hosmer & Lemeshow), .19 (Cox & Snell), .34 (Nagelkerke). Model χ^2 (1) = 5.60 *, * $p < .05$

5.4.2.5.3.2 Did the initial attempt to titrate contribute to the relationship between nurse-led self-efficacy-based techniques and patients' intention measured at time 2?

To assess whether the initial attempt to adjust insulin performed in the two weeks after the first and before the second session contributed to the association between nurses-led self-efficacy techniques and patients' intention to titrate, a titration variable (i.e. measured as a dichotomous variable) was added as a covariate to the logistic regression analysis. The initial attempts to adjust the dose did not contribute to the relationship between self-efficacy techniques used by a nurse and patients' intention to titrate the dose as shown in Table 37.

Table 37 *Logistic regression to investigate the impact of self-efficacy techniques and experience of titration on patients' intention to titrate in future.*

		95% CI for exp β		
	B (*SE*)	Lower	Exp β	Upper
	Included			
Constant	-3.68 (2.11) ns			
Self-efficacy techniques	0.52 (.25)*	1.04	1.69	2.75
Previous titration	1.07 (1.67) ns	0.11	2.91	77.68

Note: R^2 = 8.62 (Hosmer & Lemeshow), ..39 (Cox & Snell), ..63 (Nagelkerke). Model χ^2 (2) = 13.01, p = .001, * p = .03.

After the programme finished, 84 % of people reported an intention to adjust their insulin dose according to blood sugar levels independently of their initial attempts to titrate.

5.4.2.5.3.3 Relationship between intention and behaviour with regard to adjusting insulin

To assess whether there was an association between patients' intention to titrate and behaviour, separate analyses with regard to increasing and decreasing the dose were performed using Chi-square tests. A relationship was observed between intention and behaviour with regard to increasing insulin dose (χ^2 = 7.04(1), p < .05). Of those who intended to titrate, 80% reported that they changed their dose. Calculation of the odds ratio revealed that patients who reported an intention to increase their insulin dose were 17 times more likely to report that they changed their dose than those who reported that they had no intention to titrate. As expected frequencies in one cell fell below the expected value of 2.5, Chi-square test could not be performed for the intention and behaviour with regard to decreasing the insulin dose (Robson, 1993).

5.4.2.5.4 Self-reported insulin titration

As discussed previously, the analyses regarding self-reported behaviour were performed separately for an increase and a decrease in insulin dose. The behaviour scores were dichotomised as outlined in the Data analysis. To assess whether the frequency of nurse-led self-efficacy techniques had an impact on patients' self-reported insulin titration, logistic regression was performed. The details of the logistic regression are presented in Table 38.

Table 38 *Logistic regression to explore the impact of self-efficacy techniques on patients' first attempts to increase the insulin dose*

		95% CI for exp β		
	B (*SE*)	Lower	Exp β	Upper
Included				
Constant	-1.81 (.69)*		.01	
Self-efficacy-based techniques	.32 (.14)*	1.06	1.38	1.81

Note: R^2 = 14.29 (Hosmer & Lemeshow), .15 (Cox & Snell), .21 (Nagelkerke). Model χ^2 (1) = 6.75 **, * p < .05. ** p < .001.

Table 38 shows that the more self-efficacy techniques used by a nurse, the more likely the patient attempted to adjust their dose when blood sugars were high.

5.4.2.5.5 Self-efficacy techniques used by nurses and objectively assessed behaviour change

To assess the difference between patients who titrated and those who did not with regard to the number of self-efficacy-based techniques they received when participating in the starting insulin programme, an independent *t*-test was performed. Patients who titrated the insulin dose were compared to patients who did not titrate in the time between the two sessions using the independent *t*-test. There was a difference in the received self-efficacy techniques between individuals who titrated and those who did not (t = -2.47 (27), p <.05). See Figure 16 for a pictorial representation.

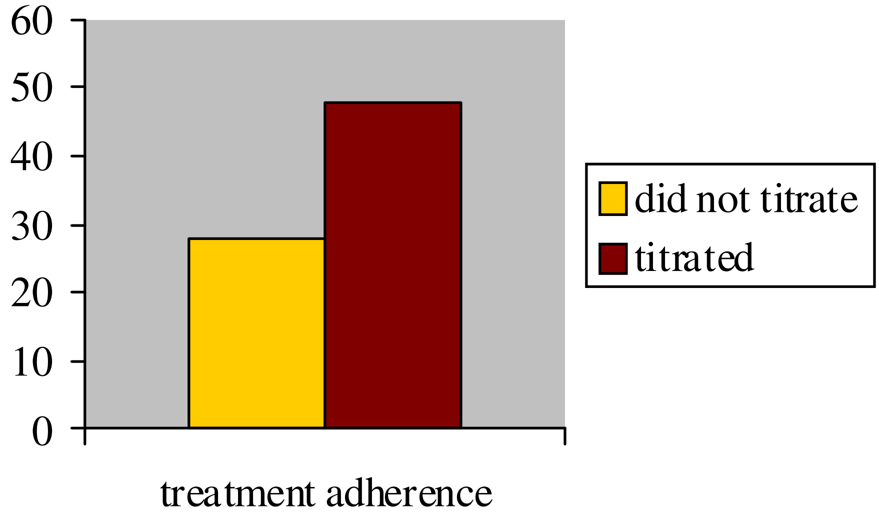


Figure 16 The differences in the amount of self-efficacy techniques received by people who titrated and did not titrate within the two weeks between first and second session

Note: The amount of self-efficacy techniques reflects the percentage of self-efficacy speech in overall speech made by a nurse adjusted by a number of participants in the group.

Figure 16 shows that patients who adjusted insulin received more self-efficacy techniques than those who did not titrate.

To assess the impact of nurse-led self-efficacy techniques on patients' objective behaviour measured as the attempt to titrate insulin, logistic regression was performed. The details of the analysis are presented in Table 39.

Table 39 *Logistic regression to explore the link between self-efficacy techniques and observed behaviour*

		95% CI for exp β		
	B (*SE*)	Lower	Exp β	Upper
Included				
Constant	-.82 (.75)*		.	
Self-efficacy strategies	.51 (.24)*	1.05	1.67	2.66

Note: R^2 = 13.34 (Hosmer & Lemeshow), .24 (Cox & Snell), .34 (Nagelkerke). Model χ^2 (1) = 8.06 **, * $p < .05$, ** $p < .001$.

As Table 39 shows, patients were more likely to adjust their dose when nurses used self-efficacy-based techniques.

5.4.2.5.6 Observed and self-reported behaviour

To explore the association between self-reported and objectively measured behaviour regarding insulin titration, a Chi-square test was performed. The details are presented in Table 40.

Table 40 *Cross-tabulation to explore the link between reported and observed behaviour when missing variables were excluded*

***n* = 17**		**Observed titration**	
		Not titrated	**Titrated**
Reported titration	Not titrated	2 (50%)	2 (15.4%)
	Titrated	2 (50%)	11 (84.6%)

Note: The percentage values relate to objective titration. For example, 15.4% of all people who titrated reported that they did not adjust their insulin dose.

Table 40 shows, there was no association between patients' reported behaviour and observed behaviour (χ^2 (1) = 2.04, p = .15). As presented in descriptive statistics on page 148, the behaviour questions were assessed as "not appropriate" by 14 individuals (i.e. four times with regard to increasing the dose and 14 times with regard to decreasing the dose). For the next analysis, these people were included in the analysis as those who did not perform the behaviour. The details are presented in Table 41.

Table 41 *Cross-tabulation to explore the link between reported and observed behaviour when missing variables (regarding reported behaviour) were treated as non titration*

***n* = 37**		**Observed titration**	
		Not Titrated	**Titrated**
Reported titration	Not Titrated	6 (66.7%)	12 (42.9%)
	Titrated	3 (33.3%)	16 (57.1%)

Note: The percentage values relate to objective titration. For example, 42.9% of all people who titrated reported that they did not adjust their insulin dose or assessed the question as not appropriate.

Table 41 shows that the percentage of agreement between reported and observed behaviour increased. After including these people in the analyses as those who did not titrate, the results revealed a trend towards a relationship (χ^2 (1) = 3.33, p = .068) between self-reported and observed data.

5.4.2.5.7 HbA1c level

To assess the change in the glycosylated haemoglobin level after introduction of insulin treatment, a dependent *t*-test was performed. A change in HbA1c level ($t(19) = 5.69$, $p < .001$) from baseline ($M = 10.01$, $SE = .31$) to three months later ($M = 8.75$, $SE = .24$) was observed.

Subsequently, baseline HbA1c, self-efficacy, intention to titrate, self-reported and objective behaviour towards insulin titration were analysed as separate predictors of HbA1c change using linear regression. HbA1c change was predicted by initial HbA1c level ($\beta = .72$, $p = .001$, R^2=.51) only. No association was observed between self-efficacy beliefs ($\beta = .05$, $p = .66$, R^2=.11), intention to titrate ($\beta = .72$, $p = .34$, R^2=.32), self-reported behaviour towards titration ($\beta = .06$, $p = .94$, R^2=.03), or objective behaviour ($\beta = .46$, $p = .37$, R^2=.27) and the change in the HbA1c level.

5.4.3 Discussion

The present chapter investigated the content, discriminant and predictive validity of a new coding tool to assess the frequency of self-efficacy-based techniques, Analysis System for Self-Efficacy Training (ASSET). When coding with ASSET, specific self-efficacy-based techniques could be distinguished, including mastery experience, role modelling, verbal persuasion and physiological and affective states. Significant differences between nurses in the use of self-efficacy-based techniques could be identified which reflected the level of experience measured as additional training and supervision from a senior nurse prior to the study. There was a difference in patients' response to self-efficacy and non-self-efficacy- based speech. However, in contrast to the results presented in the previous study, patients spoke longer after non-self-efficacy-oriented speech than after self-efficacy-based techniques (Zinken et al., 2008). There was a difference in the length of response to different self-efficacy-based techniques. Patients spoke longer after mastery experience and psychological and affective states-based techniques than after role modelling and verbal persuasion-based techniques. Self-efficacy techniques used by nurses identified with ASSET predicted observed self-efficacy-related behaviour of patients. In terms of self-reported data, self-efficacy techniques identified with ASSET predicted the intention to change behaviour measured as a sum score of increasing and decreasing the dose but not when analysing separately intentions for the increase and decrease of insulin dose. Self-efficacy-based techniques used by the nurses had an impact on patients' behaviour with regard to the increase of insulin dose. However, the use of self-efficacy-based techniques by nurses did not predict self-efficacy beliefs and behaviour with regard to decreasing of insulin dose. The number of nurse-led self-efficacy-based techniques determined future insulin adjustment measured as an objective variable.

5.4.3.1 Content validity

Whilst the agreement between the nurse coder and the author was not satisfactory, the agreement between the student coder and the author was good. On the one hand, the contradictory results may indicate that ASSET misses some aspects of self-efficacy-based techniques. On the other hand, the results may indicate that the nurse coder misinterpreted the notion of self-efficacy. The emerging pattern of disagreement between nurse coder and the author of the coding tool showed that the coder understood self-efficacy in a much broader way, including 'clarification' and 'information giving' as part of confidence building. The author made a conscious decision not to incorporate 'summaries' and 'information giving' as self-efficacy strategies. According to Bandura (1997), knowledge is a "pre-condition" of self-efficacy building. 'Information giving', although important in the process of confidence building, put the patient into a passive role which contradicts the idea of enhancing self-efficacy. There is a broad range of strategies which a facilitator can use before providing information, including asking the group ('role model') or referring to individual experiences ('self-reflection'). The mixed results with regard to agreement about what constitutes self-efficacy may reflect a broader problem with defining and understanding self-efficacy. See Chapter 1 for a broader discussion about misinterpretation of the self-efficacy construct. Involving more coders in testing the content validity could provide more insight into the quality of ASSET.

5.4.3.2 Discriminant validity

More experienced nurses used more self-efficacy-based techniques than those with less experience prior to the training. The additional experience was measured as hours of additional training and supervision by senior nurses. The difference became more pronounced when evaluating the two most often used techniques including elicitation of knowledge and lecturing. As previously presented, the starting insulin programme introduced a new diabetes regimen. Therefore, there was a lot of new information to discuss in order to prepare patients for insulin self-management. This could be done by eliciting knowledge from the patients or by providing information. As the data show, nurses with experience prior to the study activated the patients by asking knowledge-related questions instead of lecturing more than those without additional training. It has to be stressed that the comparison between more and less experience nurses has been based on very small numbers. The “groups” consisted of three and two nurses, respectively. This raises the question of the external validity of the results.

The techniques identified with ASSET were associated with different lengths of speech by patients. In contrast to the results presented in the previous chapter, however, patients’ responses after the self-efficacy-based techniques were shorter than after non-self-efficacy-based speech. There are several possible explanations for this. First, it may be that self-efficacy-based techniques were not as effective in activating patients as has been claimed previously. Second, nurses who used self-efficacy in this programme might have been less effective than those evaluated in the previous study. Third, the self-efficacy techniques might have been less suitable for the group of patients included in this study. As discussed previously, the participants did not have previous experience with using insulin. In contrast, patients participating in the previous study, discussed in Chapter 4, had experience in self-management of their illness. They might have been able to reflect on their previous practice and have had more issues to be discussed. Fourth, the fact that there was no consistent pattern of the length of response among patients could indicate that the length of speech is not an accurate indicator of patients’ activation and response to specific self-efficacy techniques. There may be various non-specific factors including personality, mood or number of people in the group which contribute to patients’ length of verbal response.

Patients talked longer after ‘mastery experience’ and ‘physiological and affective states’ techniques than after verbal persuasion and role modelling-based techniques. Mastery experience and physiological and affective states-based techniques directly addressed patients’ experience, by asking about using insulin, blood sugar, and symptoms related to insulin taking. They encouraged patients to process information by relating to their own experiences. On the other hand, ‘verbal persuasion’ was followed by the shortest responses. This could be due to the fact that when responding to the elicitation of knowledge techniques or when planning future action people may have been unsure about the ‘right’ answer and hence have given short answers. On the other hand, the knowledge related questions might have been more focused than the experiences or symptoms-based questions. Patients might have been more consistent when answering those questions.

More skilled nurses may use a broader range of techniques to activate patients and increase their self-efficacy. New knowledge could be elicited not only within a discussion but also by giving people the opportunity to experience and practise new skills. This could be done by 'mastery experience' based techniques and by 'physiological and affective states' (see Chapter 4 for a broader discussion). Within the presented programme, nurses used very little 'role modelling'. Again, this could be related to the fact that the group consisted of people with no experiences at all in the discussed topic (i.e. using insulin). Nevertheless, in the two weeks between the first and second session people started injecting insulin and had some opportunities to deal with problems. Thus, they gained initial experiences which they potentially could have shared with the group (i.e. using the 'competent other' technique). Thus, it is up to a skilled facilitator to guide people in exchanging experiences and work on solving someone else's insulin-related problems (i.e. using the 'group solving' technique).

5.4.3.3 Predictive validity

The results showed that the self-efficacy-based techniques identified with ASSET predicted intention and titration behaviours but did not predict self-efficacy beliefs.

When measuring the predictive validity of a coding tool, potential difficulties when interpreting the data have to be considered. No link was observed between the self-efficacy based techniques delivered by nurses and self-reported self-efficacy belief by patients. This lack of a relationship could be interpreted in four different ways. First, assuming that there is a link between self-efficacy-based techniques and patients' self-efficacy beliefs, the coding tool may not have been accurate in identifying the self-efficacy techniques. Second, assuming that the tool identified the techniques accurately, the self-reported self-efficacy scale may not have been valid. Nevertheless, the self-efficacy beliefs predicted patients' intention to increase insulin dose, which suggests that the scale is likely to be valid. As discussed previously, one of the limitations of the study was that the self-reported self-efficacy data were collected only after the intervention, and the assumption was made that at baseline all patients were lacking confidence in adjusting their insulin dose. Thus, in fact the change from before to after the intervention could not be assessed. The lack of a change score could potentially be the reason why the results did not reveal any link between patients' self-reported self-efficacy and nurses-led use of self-efficacy techniques. Third, assuming that both measures were valid, the self-efficacy techniques may not have been successful in changing self-efficacy beliefs. Fourthly, the theory could be disputed. The four sources of self-efficacy described by Bandura may not be effective in bringing about change in self-efficacy beliefs. This, however, seems to be a very tentative argument considering the large body of evidence for the effectiveness of self-efficacy strategies and the predictive strength of self-efficacy on behaviour (Bandura, 1997). Taking into account that nurse-led self-efficacy techniques were related to the objective patient behaviour of titrating insulin, the most promising hypothesis seems to be that the self-efficacy scale was not valid. A reliable and valid scale to measure insulin titration related self-efficacy belief is needed to explore these questions.

The dynamic of self-efficacy belief change when triggered by self-efficacy based techniques could be threefold. The self-efficacy belief may increase, decrease or stay the same depending on the initial level of the beliefs. People who gain some experience may become confident that they can master adversities in order to achieve their goals (Bandura, 1997). However, sometimes the initial confidence can diminish after experiencing some obstacles and gaining a more realistic view about one's own abilities (Schwarzer, 1992). For example, in one study patients reported a decrease in self-efficacy belief after being guided in setting an action plan to increase their adherence to blood pressure medication (Theunissen, de Ridder, Bensing, & Rutten, 2003). In another study, when goal setting was one of the techniques used to increase self-management behaviour among patients with a chronic condition, an increase in self-efficacy was observed (Lorig et al., 2008). Thus, it is crucial to distinguish between initial unrealistic optimism and self-confidence based on real ability. This was a limitation of the presented study as no information on the initial confidence regarding insulin taking was collected. Therefore, the lack of a relationship which was observed in the present study could potentially be due to the fact that these two counteracting processes may have levelled each other out. This hypothesis could be tested if baseline data were available. People with overly high and overly low self-efficacy at baseline could be compared in terms of the change in their self-efficacy belief to see whether the hypothesised trend occurred.

At baseline, expectations regarding taking insulin were explored. Among others, the difficulty of adhering to the insulin treatment and the flexibility when on insulin were investigated. These items related to the self-efficacy construct (as used in the first diabetes self-efficacy scale by Crabtree, 1986). They indirectly addressed perceived ability to manage insulin injections. It was assumed that people who perceived injecting insulin as difficult would probably rate their confidence as low. Similarly, people who perceived taking insulin as a substantial obstacle in having a flexible life would probably perceive themselves as less able to manage the insulin well (so their life could remain as it was beforehand). There was an improvement in both expectations after the programme finished. However, the change was not linked to the amount of self-efficacy techniques used by a nurse. Thus, having the baseline information regarding patients' expectations of insulin only confirmed the lack of relationship between self-efficacy belief and nurses' use of self-efficacy techniques. However, addressing conceptually different constructs (self-efficacy addresses the individuals' ability based on experience whereas initial expectations address knowledge), the results could not be linked to each other and hence should be interpreted with caution.

Participants were asked to change their insulin dose every three days in order to identify patterns of blood sugar change, and also to change their insulin dose when specific problems occurred (e.g. too low or too high blood sugars). Thus, as discussed previously, in order to capture just the intention without misinterpreting the frequency of intended change, the scale was transformed into a dichotomous one. The results then revealed that intention to increase and decrease insulin dose were not associated with the use of self-efficacy-based techniques. However, overall intention with regard to increasing and decreasing insulin dose after the programme finished was predicted by the amount of self-efficacy techniques used by a nurse in session one. The patients' initial attempts to titrate insulin during the two weeks between sessions one and two did not contribute to the relationship. This could be due to the fact that a vast majority of people intended to adjust their dose anyway after the programme finished. Potentially, the impact of self-efficacy techniques could have been strong enough to encourage people to change their dose according to their needs, regardless of number of attempts to titrate, or lack of titration.

The aim of the starting insulin programme was to encourage people not only to start but also to actively manage insulin treatment (i.e. change the dose according to blood sugars). Thus, the vast majority of programme participants started using and adjusting their insulin dose. Nevertheless, the self-efficacy techniques used by nurses supported the desired behaviour. Patients who received more self-efficacy techniques during the programme were more likely to titrate than those who received fewer self-efficacy techniques. This finding was based on both, self-reported and objective data.

Patients' self-reported behaviour regarding adjusting insulin, however, did not reflect their observed behaviour. These results are consistent with a substantial number of studies showing a discrepancy between self-reported and observed data (e.g. Koopman-van der Berg et al., 2001). This striking result in the present study could be due to at least two reasons. First, patients may have perceived the questionnaire as a form of test, thus they chose the desirable behaviours as recommended during the session and not what they actually did. Second, the most striking inconsistency related to those who did not report behaviour change, despite the fact that they changed their insulin dose. This could be due to the fact that they did not perceive the change as an established new behaviour. For example, changing their insulin dose only once might have been not enough for them to perceive this as a habitual change. What was recorded objectively, however, was the change in insulin dose, so even one insulin adjustment would be enough to categorise this person as someone who changed their behaviour.

Participants often commented that they lacked experience of managing the insulin dose and that the questions were asked prematurely. To further explore patients' response with regard to the behaviour questions, people who assessed the behaviour questions as inaccurate were classified as those who did not titrate. I assumed that they did not titrate if they found these questions inappropriate for them. Including the people who assessed the behaviour questions as inappropriate in the analysis as those who did not titrate confirmed the previous results that objective and reported behaviour data were not associated.

HbA1c level decreased in the period of three months after the programme finished. The change was partially due to the initial HbA1c level. The higher the blood glucose levels were before the insulin treatment, the greater the drop. No link was observed between intention and behaviour and change in blood sugar levels (i.e. HbA1c). More data are needed to explore this relationship. Glycated haemoglobin level was collected three months after the programme finished. This was the earliest possible time point to assess the impact of the insulin treatment on the average glucose level (Saudek et al., 1997). There are many other factors which may influence HbA1c level. Undoubtedly, a change in HbA1c level has been the most desired outcome when testing the effectiveness of an intervention (Glasgow et al., 1992b). However in the context of the presented study the impact on HbA1c was considered an exploratory finding.

Interventions which followed the self-efficacy theory appeared to have a positive effect on patients' diabetes management (Krichbaum, 2003). It has to be mentioned, however, that to date the majority of self-efficacy-based studies which investigated the effects of an intervention on patients' outcomes did not provide evidence regarding protocol adherence (Davis et al., 2006). Thus, the overall conclusions outlining the substantial role of self-efficacy in supporting behaviour change needs further investigations. The present study based its results on objective measures. It linked the actual intervention techniques with patients' related outcomes. The results showed that there was an association between the nurse-led self-efficacy-based techniques and self-management behaviour. However, in contrast to previous studies, the present study did not show a relationship between self-efficacy-based techniques and patients' self-efficacy beliefs.

5.4.3.4 Limitations

Several limitations of the presented study have to be considered.

First, the analyses presented in this study are based on a small sample size. Regarding the discriminant validity, the analyses were partially based on comparisons of more and less experienced "groups" of nurses which consisted of three and two nurses, respectively. Regarding the predictive validity, for some of the analyses not all of the 52 patients who took part in the study were included in the analysis. For example, to assess the change in titration-related behaviour only the 48 patients who attended the first session of the programme could be analysed. The limited sample size which was used for multiple statistical tests raises the issue of validity of the results. There is a risk that the findings may be due to chance.

Second, concurrent criterion validity analysis to validate the tool against other similar instruments could be performed. This was due to the fact that there was no other coding tool which assessed self-efficacy-based techniques. However, the discriminant analyses were partly based on the assumption that self-efficacy techniques were aimed at activating patients and enabling them to exchange their experiences (Bandura, 1997). Numerous studies have shown that active participation is superior to passive information intake, in terms of better information processing and application of the intervention (e.g. Skinner et al., 2008). Thus, it was expected that self-efficacy techniques would trigger longer patient responses than non-self-efficacy speech, as observed in study one (see Chapter 4). The preliminary results of the reliability study showed that patients spoke significantly longer when the facilitator implemented a self-efficacy orientated technique than when they used non-self-efficacy orientated speech or asked non-self-efficacy orientated questions (Zinken et al., 2008). However, this association was not replicated in the present study.

Third, there was no control group to verify whether the changes among patients were accurately explained by ASSET-based techniques. For example, a change was observed in insulin-related beliefs in terms of perceived difficulty injecting the right amount of insulin at the same time every day. Due to the lack of a control group it could not be claimed that the change was due to participation in the programme. However, this limitation was not relevant for the study aims regarding validation of the coding tool.

Fourth, change in self-efficacy was not assessed. It was not possible to analyse whether the use of self-efficacy-based techniques predicted change in self-efficacy beliefs.

Fifth, the study used multiple significance tests of which numerous were not significant. Therefore, there is a substantial risk of type 1 error, and that the significant results are therefore due to chance (Bland & Altman, 1995). Also, the tests included multiple outcome measures such as self-efficacy beliefs, self-reported and observed behaviour. These variables may not be independent and hence the test results might be difficult to interpret. To address this, a Bonferroni correction could have been applied. The significance value could have been reduced to .01 or alternatively adjusted by the number of performed comparisons (Bland & Altman, 1995). Although the Bonferroni correction appears to be effective in terms of controlling for Type 1 errors, it results in a reduction of statistical power (Field, 2005). Consequently, as the numbers included in this study were small, Bonferroni correction was not used.

Research evidence on the association between the process of intervention delivery and participant-related outcomes is very scarce (Michie et al., 2008). The few studies which have investigated the relationship provided mixed results (Hardeman et al., 2008). Hardeman and colleagues reported a detailed analysis of intervention fidelity, but did not assess the association between specific techniques and participants' related outcomes (Hardeman et al., 2008). The self-efficacy techniques identified with ASSET were linked to some patients' self-efficacy-related health outcomes. The amount of self-efficacy techniques predicted objective and reported behaviour change as well as intention to carry on with the new behaviour of adjusting insulin. More research is needed to further explore the link between self-efficacy techniques and self-efficacy related outcomes.

5.4.3.5 Future directions

The results of the present study raised several issues which could be explored in future studies. First, the limitations discussed previously could be addressed in future research. Second, the results of the present study could be further investigated.

With regard to discriminant validity, more specific information should be linked to the use of the self-efficacy techniques. For example, exact number of groups run per week, topics delivered, or attitudes towards patient-led versus nurse-led education and self-management should be used as discriminating factors to predict the use of self-efficacy-based techniques. A greater number of nurses should be included in the analyses in order to establish external validity of the results.

With regard to predictive validity, future research could focus on development and validation of insulin-titration-related self-efficacy, intention and behaviour scales. When developing such scales, professionals providing education in self-management of insulin use as well as insulin users should be involved to assure internal validity. Furthermore, when evaluating the impact of nurse-led self-efficacy-based techniques delivered within an intervention focusing on patient outcomes, the results should be based on comparisons with results from a control group.

With regard to the potential areas of future research which emerged from the present thesis, the first relevant question appears to be to what extent the nurse-led self-efficacy techniques work for patients. It would be interesting to explore the effectiveness of self-efficacy-based techniques with regard to patients' outcomes. These in turn could be compared to other intervention techniques. There are various strategies to enhance patients' self-management skills. It is crucial to find out what works for whom (Peyrot, 1999). The second relevant question addresses the use of self-efficacy-based techniques by nurses. It would be interesting to further explore the determinants of the use of specific self-efficacy-based techniques. Third, more detailed analysis with regard to the association between different verbal behavioural techniques and patients' outcomes could be investigated. Fourth, the presented results suggested that there was a link between self-efficacy techniques delivered by a nurse and patients' initial attempts to titrate insulin. It would be interesting to further explore this relationship and its potential impact on HbA1c levels.

CHAPTER 6: INTERVENTION STUDY

6.1 Aim, hypotheses and research questions

The aim of the intervention study was to increase the use of self-efficacy-based techniques among nurses delivering self-management education for people with type 2 diabetes who were starting insulin treatment. The intervention delivered to the nurses consisted of two parts. The nurses attended a self-efficacy-based educational training. Then, the nurses received individualised feedback about the number of self-efficacy-techniques they used when running the starting insulin programme. In order to achieve the aim the following objectives were formulated:

1. To develop and provide a training programme to introduce self-efficacy theory and the self-efficacy based coding tool, ASSET, to diabetes nurses;
2. To develop and provide ASSET-based feedback regarding the number of self-efficacy-based techniques the nurses used while delivering the starting insulin programme.

During the educational training nurses agreed that their main goal of the starting insulin programme was to support patents' self-management by increasing self-efficacy beliefs. Therefore, a number of hypotheses and exploratory research questions were formulated. These were:

6.1.1 Regarding the prevalence of self-efficacy-based techniques used by nurses

RQ 1.1: What was the prevalence of self-efficacy-based techniques before and after the intervention?

RQ 1.2: What self-efficacy-based techniques did the nurses use? Was there any pattern to the implemented self-efficacy-based techniques?

6.1.2 Regarding the impact of the ASSET-based intervention on nurses' self-efficacy-driven behaviour

6.1.2.1 Regarding the whole intervention

H 2.1: It was expected that the self-efficacy-based training and feedback would increase the number of self-efficacy-based techniques used by nurses when delivering the self-management programme for people with type 2 diabetes. It was also expected that the increased frequency of self-efficacy techniques would be maintained at 3-months follow up.

H 2.2: It was expected that the time the nurses spent talking would decrease after the intervention. This effect would be sustained over time.

6.1.2.2 Regarding feedback related goals

RQ 2.1: What verbal behavioural techniques will the nurses choose to increase?

H 2.4: It was expected that the nurses would increase the number of their chosen self-efficacy-based techniques. It was expected that the effect would be maintained over time.

6.1.3 Regarding the impact of nurses' characteristics on nurses' behaviour

H 3.1: It was expected that the frequency of verbal techniques would be related to nurses' experience gained prior to the intervention. Nurses who attended additional training and received supervision prior to the intervention would use more self-efficacy-based techniques than those without additional training.

H 3.2: It was expected that nurses without additional experience prior to the intervention would improve more in terms of the number of self-efficacy-based techniques used after the ASSET-based intervention than nurses with additional experience.

6.2 Methods

6.2.1 Study design

The study followed a naturalistic design. It was an external peer review delivered for three local diabetes centres as part of the National Institute for Clinical Excellence (NICE) guidance on structured and evidence-based education (National Institute for Clinical Excellence, 2003). Three diabetes centres which were offering or planning to offer group education for individuals with type 2 diabetes starting on insulin were approached to take part in the study. After obtaining relevant ethics approval from the ethics committee of the School of Psychology and approval from the Queen Alexandra Hospital audit groups all three centres signed up to take part in the study. Information sheets and consent forms for patients and nurses are presented in Appendices Q-T. Only one centre participated in the study as the other two were not able to recruit participants into their starting insulin programmes. A one group pre-post design was applied. The details are presented in Figure 17.

Pre-intervention condition	Video recording of a 2 hour long second session of the starting insulin programme
ASSET intervention	2 weeks after the last programme recorded 8 hour long ASSET-based educational group training
ASSET intervention	2 weeks before the next starting insulin programme 2 hour ASSET-based tailored feedback
2 weeks later post-intervention condition	Video recording of post-condition 2 hour long second session of the starting insulin programme
3 months follow up post-intervention condition	Video recording of 2 hour long second session of the starting insulin programme
Post-ASSET intervention training	**O**ne day 8 hr long "closing up" ASSET-based training

Figure 17 Flow chart of the study design

As presented in Figure 17, the ASSET-based intervention consisted of a group-based , 8-hour-long educational training day (see Appendix V), and a 2-hour tailored feedback session (see Appendix W). The educational day training took part after the recording of the pre-intervention starting insulin programmes. Two weeks after the feedback session post-intervention the starting insulin programme was recorded. The follow up programme was recorded three months after the feedback session. The study finished with an 8-hour group-based group training where the researchers presented the results to the nurses. The nurses who were video-recorded when running the starting insulin programme took part in each part of the ASSET-based intervention. All nurses who signed up for the study took part in the group-based training programmes.

The diabetes centres involved offered a maximum of two starting insulin programmes per month. Thus, it took four months to video record five nurses when delivering the starting insulin programme. As a result, the time between running a programme and taking part in the ASSET-based training ranged between one and four months for each nurse. The feedback session was delivered on individual basis within the two weeks prior to the post-intervention starting insulin programme. Thus, the time span between the educational training and the feedback session ranged between one and four months. For this reason, the feedback session started with a re-capture of the self-efficacy concept. At the beginning of the session, the nurses were asked what self-efficacy is and what the main sources of self-efficacy are. The protocol of the feedback session is presented in Appendix W. Also, the video recorded follow-up starting insulin programme was delivered between five and nine months after the educational ASSET-based training.

The group-based summarising training took place after all three nurses who stayed in the study (two drop out as presented in Figure 18) delivered the 3-month follow-up starting insulin programme, and the data had been analysed. The time span between the pre-condition educational ASSET-based training and the closing-up summary training was 14 months. The time span between the tailored feedback and the summarising training ranged between 10 and 14 months. The data collection for the 12 starting insulin programmes took 16 months.

6.2.2 Starting insulin programmes

Twelve starting insulin programmes were video recorded and analysed. Of these, five were pre- intervention, four post-intervention and three, three-months post intervention. The reasons for drop out were health problems for one nurse, transfer to a different working area by one nurse and patients not giving consent for one session to be recorded. The details of the recruitment rates are presented in Figure 18.

The starting insulin programme was a group-based educational programme attended on average by three people (range between one and seven per group). During the first session participants discussed their current symptoms related to high blood-sugar levels and decided which insulin regimen to choose. During the second session participants discussed their first experiences with using insulin. More details about the programme and rationale for choosing it for the study are presented in Chapter 5.

For the presented study session two, rather than session one, was included in the analysis. This was because session two provided significantly more opportunities to implement self-efficacy techniques than session one. I expected to observe a larger variety of techniques used and hence capture more differences between nurses.

6.2.3 Nurses delivering the starting insulin programme

Nine nursing facilitators from three diabetes centres who were running or planning to run starting insulin programmes for people with type 2 diabetes took part in the study. All of them took part in both training sessions (i.e. the pre-condition ASSET-based educational training, and after follow-up, the post-ASSET intervention training). Of these, five nurses from the same diabetes centre were video-recorded when delivering the starting insulin programme and received individualised feedback regarding the number of self-efficacy techniques that they used. Due to maternity leave, one nurse from the diabetes centre stopped running the starting insulin programmes before the video recording started. Thus, she did not receive any feedback and was not included in the analysis. Three more nurses from two other centres were not able to recruit enough participants to run groups. Thus, they could not be video recorded and as a result were not included in the analysis. The recruitment rates are presented in Figure 18.

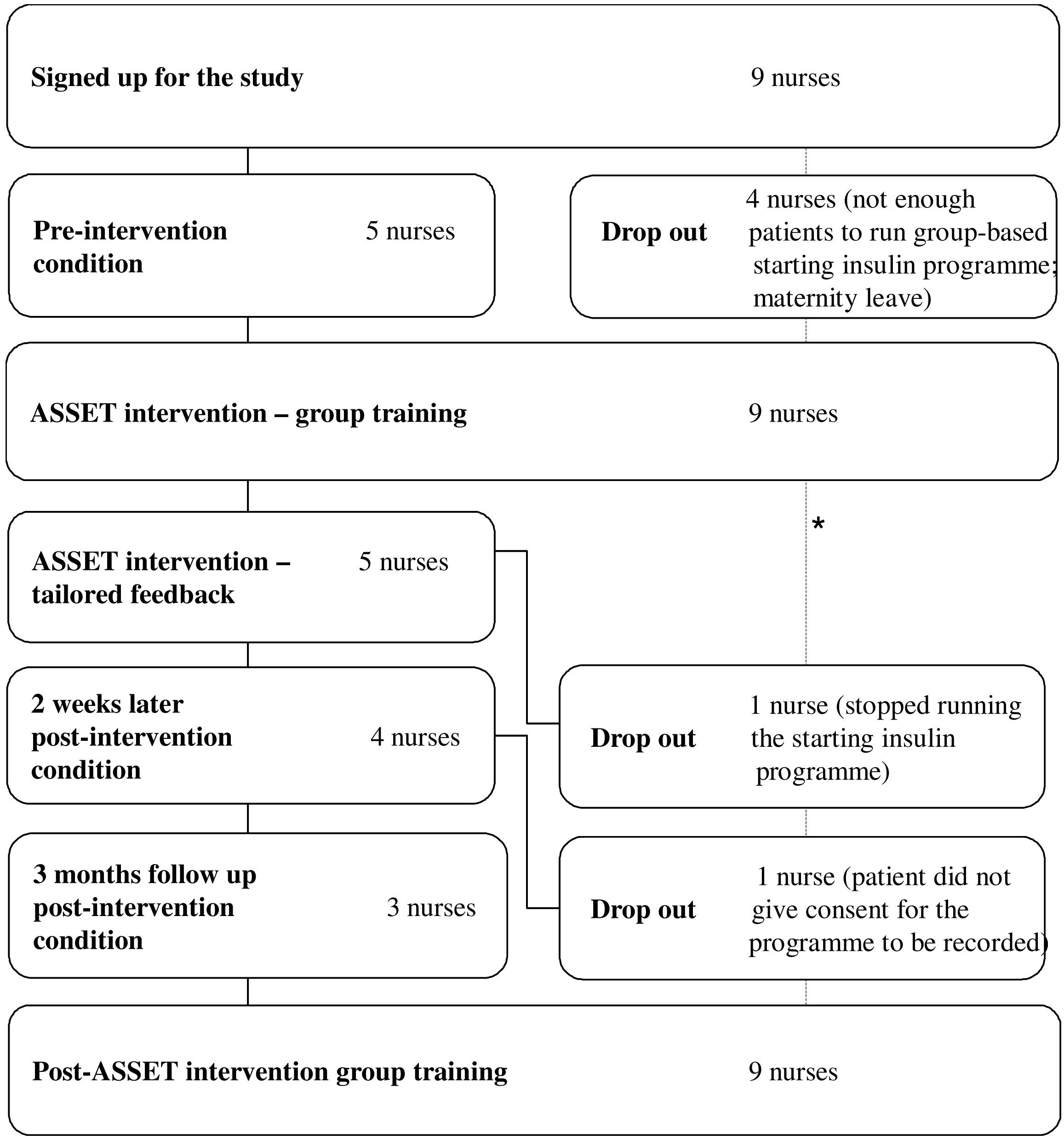


Figure 18 Flow chart of recruitment rates

Note: * All nurses who signed up for the study took part in the ASSET-based educational training.

The descriptive statistics of nurses' age and diabetes-related experience are presented in Chapter 5.

6.2.4 Patients participating in the starting insulin programme

As presented in Chapter 5, 52 individuals with type 2 diabetes took part in the nurse-led starting insulin programme. They were patients with poorly controlled diabetes (HbA1c above 8) and high-blood sugar based symptoms (i.e. lethargy, polydypsia - thirst, polyuria - passing urine frequently) (Open University, 2005). The demographic characteristics including gender, age, duration of diabetes are presented in Chapter 5.

6.2.5 ASSET-based intervention

The ASSET based intervention was a standardised procedure based on self-efficacy theory. It consisted of self-efficacy training and feedback about the use of self-efficacy techniques. Modelling was a key component of the intervention, i.e. when delivering the training and giving the feedback the researchers applied self-efficacy techniques which later were expected to be implemented by the nurses when working with patients.

6.2.5.1 ASSET based educational training in self-efficacy theory and techniques

The educational training had two key aims, to give nurses the opportunity to gain more insight into social cognitive theory (Bandura, 1997) and to introduce the self-efficacy based coding tool, ASSET. The aim therefore was that when receiving the feedback, the nurses would understand the language and the categories used to evaluate their behaviour.

The eight-hour training was run by two health psychologists. In the first part, nurses discussed the goals of the starting insulin programme and corresponding behaviours (i.e. specific techniques and prompts) in order to achieve the goals. By the end of the activity nurses agreed on the main goal and sub-goals of the starting insulin programme and appropriate behaviours in order to achieve them. This was done in order to ensure that the common goal for all nurses was to get patients to self-titrate their insulin doses. For example, the nurses were asked to individually list the goals of the first and second sessions of the starting insulin programme. Subsequently, we asked them to reach consensus as a group on the goals. Finally, we asked them to group the goals in order to identify the main themes.

In the next step, we presented the self-efficacy theory by using examples of self-efficacy-based techniques. Nurses reflected on examples (questions and statements) collected from already video-recorded and analysed starting insulin programmes. They were asked to distinguish between self-efficacy and non self-efficacy-based examples. Then they re-formulated the non self-efficacy-based examples into self-efficacy-based ones. The nurses mapped the self-efficacy examples into appropriate ASSET-based self-efficacy techniques. In the last part of the educational training, the nurses formulated the framework of the feedback session addressing the ASSET-based self-efficacy categories. They identified a sequence of self-efficacy-based techniques that should be used when giving feedback to them. At the end of the training the nurses reflected on the day and identified which self-efficacy-based techniques the trainers were using throughout the day.

In sum, the educational day aimed to fulfil the following objectives:

1. For nurses to achieve consensus on the overall goal of the starting insulin programme and on the goals of each session;
2. For nurses to agree on activities to achieve the goals;
3. For nurses to be able to name and give practical examples of a few self-efficacy techniques;
4. For nurses to have the opportunity to self-reflect on their work and to relate the knowledge of four sources of self-efficacy to their own practice.
5. For nurses to be able to list the NICE guidelines and reflect on them in relation to their practice.
6. For nurses to develop a structure of the feedback based on ASSET-based techniques.

The details of the educational training are presented in Appendix, V.

6.2.5.2 ASSET based feedback

The ASSET-based feedback was designed in collaboration with the nurses as a part of the educational training. Nurses were asked to pick self-efficacy techniques which they would like us to use when delivering the feedback. As a result the feedback consisted of a sequence of the following verbal behavioural techniques:

1. Facilitating proactive self / Mastery experience

Already in the educational training, nurses were asked to take responsibility for their learning outcomes by designing the structure of the feedback.

2. Self-reflection / Mastery experience

As the first part of the feedback nurses were guided in reflecting on their performance in order to identify their attempts to use self-efficacy-based techniques

3. Positive feedback / Verbal persuasion

Video recorded excerpts from their starting insulin programme were shown to the nurses to provide examples of their successful use of self-efficacy-based techniques.

4. Successful trial / Mastery experience

Nurses were shown excerpts from their starting insulin programme when they missed an opportunity to use a self-efficacy-based technique. Then, they were asked how they would respond differently in this given situation in order to increase patients' self-efficacy beliefs.

5. Planning for obstacles / Verbal persuasion

Finally, as a result of the feedback nurses set an action plan to target one or two specific techniques they would like to use next time when running a starting insulin programme.

As previously mentioned, due to the varied time span between educational training and the feedback session, the feedback started with a short reminder about the self-efficacy construct and self-efficacy-based techniques summarised in ASSET. The session took two hours and was delivered by the author of ASSET. The detailed feedback protocol is presented in Appendix W.

Each nurse received the feedback about the delivery of self-efficacy orientated techniques at a time after the second session and before the next starting insulin programme (2-4 weeks before the next programme). The protocols including individual nurse-tailored examples are presented in Appendix Z.

6.2.5.3 Follow up training

The nurses expressed an interest in getting more opportunities to practice the self-efficacy techniques. They were interested in the outcomes of the study particularly regarding the similarities and differences within the team in terms of delivered content and self-efficacy techniques in the starting insulin programme. The follow-up training was therefore designed and delivered following data collection. The eight-hour follow up training was run by a nurse and a health psychologist. The training protocol is presented in Appendix X.

Prior to the training, nurses were asked to choose excerpts from their video recorded programmes which they would like to reflect on during the training. Thus, the first part of the training was devoted to discussing their practice in relation to the use of self-efficacy using these excerpts. Nurses who were not video recorded by the researcher were given a digital voice recorder prior to the training, so they could have the opportunity to bring excerpts from their practice as well. During the afternoon, the results of the study were presented and discussed. In the last part of the training, nurses practised the use of self-efficacy techniques. Each nurse picked one self-efficacy technique and was asked to suggest how they could implement it when discussing the impact of alcohol on blood sugar levels. We finished the training by asking for feedback on our practice as external peer reviewers.

6.2.5.4 Treatment fidelity of ASSET-based intervention

Several steps were undertaken in order to assure the fidelity of the ASSET based intervention (Bellg et al., 2004). The intervention addressed social cognitive theory not only in its content but also in the way it was delivered. The trainers used the self-efficacy-based techniques themselves when working with nurses. For example, they guided the group in exchanging experiences (role modelling) and created space to practise the implementation of self-efficacy techniques (mastery experience). A detailed intervention protocol was written describing the specific activities and questions asked. The educational training was video recorded. An external coder evaluated the protocol adherence while watching 10 randomly selected two-minute excerpts of the video-recorded educational training. With regard to the receipt of the intervention (Bellg et al., 2004), nurses were asked to give their examples of specific self-efficacy techniques in order to practice them but also to check that they understood the techniques. The summary of the intervention process in the context of the treatment fidelity based on Bellg and colleagues' criteria (2004) is presented in Table 42. The details on treatment fidelity are presented in Chapter 3.

Table 42 *The summary of the intervention process in the context of treatment fidelity*

Treatment fidelity steps	ASSET based intervention
Study design *Is the intervention theory driven?* *Does the intervention test the hypotheses?*	Content and method of delivery based on social cognitive theory All nurses received the same intervention
Training providers *Have the intervention providers received the same training*?	All providers were experts in self-efficacy theory (i.e. used self-efficacy in research and clinical practice)
Delivery of treatment *Was the training delivered consistently by different providers and across time?* *Was the intervention delivery in line with the protocol and underlying theory?*	The educational training and the post-intervention training were delivered to all nurses at the same time; The same provider delivered feedback for each nurse; Both training and feedback were based on detailed protocol; The method of delivery was based on self-efficacy theory (i.e. providers used four sources of self-efficacy when delivering training and feedback); An external coder evaluated the protocol adherence.
Receipt of treatment and Enactment of treatment *Have the participants understood the intervention?* *Have the participants been performing accordingly to the treatment recommendations?*	Within the training, nurses distinguished between self-efficacy and non-self-efficacy examples by matching examples of speech utterances to ASSET-based categories; Nurses started using more self-efficacy-based techniques after the intervention. The change was maintained over time for some of them.

6.2.6 Coding of nurses' behaviour

The starting insulin programmes were coded using the linguistic annotation software ELAN (Hellwig, 2006). As described in Chapter 4, ELAN enables coders to enter a self-efficacy technique for each speech utterance whilst viewing the video material.

Twenty-four video recorded hours of facilitation were rated using ASSET (Zinken et al., 2008). A detailed description of ASSET is presented in Chapter 4.

To ensure the validity of the coding process, one of the coders was blind to the condition when coding the pre- and post intervention programmes. Both coders were health psychologists. The inter-rater reliability of the two coders was measured using Cohen's Kappa (Robson, 1999).

6.2.7 Analyses of the data

As presented in Figure 18, of nine nurses who signed up for the study, five received both parts of the ASSET-based intervention (i.e. training and feedback). Of these, three were able to run a third starting insulin programme and hence, these three nurses provided follow-up data. Due to the small sample size all analyses with regard to change across participants were based on single case-research design (Edgington, 1992). The nurses were treated as a group of individual cases.

Single-case design-based methods are often used in applied psychology (e.g. clinical) with the aim to investigate outcomes of specific intervention techniques (Kratochwill, 1992). The analyses are based on the individual's behaviour focusing on changes over time, sequences and patterns of behaviour as well as social interactions (Kratochwill, 1992). In a single-case research design, visual representations, supplemented by statistical tests, are the most frequently used methods of analysis (Busk & Marascuilo, 1992). The following section, based on single-case design-based methods, explores research questions and hypotheses using visual and statistical analysis.

6.2.7.1 Inter-rater reliability of the coding, descriptive statistics and assessment of normal distribution

To assess the inter-rater reliability of the coding, Cohen's Kappa was measured. Descriptive statistics for the duration of each session, the amount of time the nurses spent talking and the frequency of speech utterances in general and self-efficacy-based techniques were computed. The amount of time the nurses spent talking was tested for normality following a procedure described by Field (Field, 2005). This was done by computing the z-scores for skewness and kurtosis as well as by using the Kolmogorov-

Smirnov test. Bar charts were created and chi-square statistics were performed to analyse the distribution of specific self-efficacy-based techniques across nurses.

6.2.7.2 The prevalence of self-efficacy-based techniques used by nurses

To assess the prevalence of the self-efficacy-based techniques at baseline, post-intervention and three-month follow-up, descriptive statistics based on mean values were computed for both frequency and duration of self-efficacy-based techniques used. To gain scores which enabled comparison across nurses, relative values were computed (Gross, Giacquinta, & Bernstein, 2004). First, the percentage of the time the nurses spent talking in relation to the overall length of the session was computed. Second, the percentage of self-efficacy-based techniques in relation to the overall number of the nurses-led speech utterances was calculated. Third, the percentage of self-efficacy-based techniques adjusted by the nurses-led overall frequency of speech was divided by the number of participants.

To further explore the patterns of the four sources of self-efficacy used by each nurse, the percentage scores of specific techniques in relation to the overall frequency of self-efficacy were calculated and presented graphically.

6.2.7.3 The impact of the ASSET-based intervention on nurses' self-efficacy-driven behaviour at baseline.

To evaluate whether there was a difference in the length of nurses' speech at the three time points, a non-parametric Friedman's ANOVA was performed. The analysis was based on percentage values (i.e. length of nurses' speech in relation to the duration of the session, and length of self-efficacy-based speech in relation to the nurses' overall speech). To further explore individual differences between nurses and across time points, descriptive statistics were performed based on median values. Median values are more appropriate for non-parametric tests (Field, 2005). Bar charts were created to explore the change in the use of self-efficacy-based techniques and in the overall length of speech between nurses and across the three time points.

In relation to the goals set by each nurse during the feedback session, descriptive statistics of the prevalence of the self-efficacy techniques at the pre-, post- and the 3-months follow-up starting insulin programme were calculated. Frequency and percentages of self-efficacy-based techniques were computed.

6.2.7.4 The impact of nurses' characteristics on nurses' self-efficacy-based behaviour

To test the relationship between nurses' and group characteristics and the delivery of the self-efficacy-based techniques a three-way loglinear analysis following Field (Field, 2005) was applied. Following Field's (2005) recommendation, in order to break down the effect, separate chi-square tests were performed on the condition and self-efficacy variables for each nurse, and on the nurse and self-efficacy for each condition.

To further investigate the relationship between nurses and the use of self-efficacy-based techniques nurses' experience prior to the intervention was added to the analysis. Additional experience was measured by a dichotomous variable addressing additional training prior to the intervention and supervised practice. Pearson Chi-square statistics were performed and odds ratio calculated to assess the impact of nurses' experience prior to the intervention on the use of self-efficacy-based techniques for three time points. The odds ratio was calculated by dividing the odds of self-efficacy-based techniques after additional training by odds of self-efficacy without additional experience (Field, 2005). To break down the effect, separate chi-square tests were performed and odd ratios calculated separately for post-intervention conditions, separately for nurses with and without additional training.

SPSS version 14 was used to perform the analyses (SPSS Inc., 2005).

6.3 Results

6.3.1 The inter-rater reliability

The inter-rater reliability of two independent coders who rated the first six of 12 recorded starting insulin programmes (i.e. three pre and three post-intervention conditions) measured with Cohen's Kappa was excellent ($K = .87$) (Robson, 1999). Due to the high inter-rater agreement the further six sessions were coded by the first coder only.

6.3.2 Descriptive statistics

Twelve second sessions of the starting insulin programmes were video-recorded and rated using ASSET. Within the 12 recorded programmes, 4,304 speech utterances by the nurses were annotated and coded. A session lasted on average 104.58 minutes (SD = 18.96, Mdn = 102.5, Range 77 - 134) and included an average of 352.63 (SD = 107.23, Mdn = 329, Range 159 – 516) speech utterances made by a nurse. Table 43 presents the details of the frequency and length of speech utterances broken down by the three intervention conditions.

Table 43 *Frequency and duration of coded speech utterances*

Sum of speech utterances 4304	**Pre-intervention Range (*Mdn*)**	**Post-intervention Range (*Mdn*)**	**3-month follow up Range (*Mdn)***
Number of recorded programmes	5	4	3
Overall frequency of nurse's speech utterances	246 – 502 (329)	287 – 516 (427)	159 – 377 (302)
Frequency of self-efficacy-based speech utterances per session	25-203 (72)	88-241 (124)	30-183 (64)
Duration of the session in minutes	87-131 (105)	87-134 (119.5)	78-115 (90)
Duration of nurses' talk per session in minutes	50-89 (59)	61-79 (61)	59-76 (59)
Duration of participants' talk per session in minutes	20-57 (47)	27-72 (49.5)	14-29 (18)

Note. As the next section shows, the distribution of the presented variables was not normal. The median values, therefore, are presented throughout the present chapter, as more appropriate for non-parametric analysis (Field, 2005).

Table 43 shows that there were different numbers of speech utterances between nurses and between conditions. Nurses differed in the length of average speech utterance within and between conditions. For example, a noticeably large number of speech utterances was used by one nurse throughout the programmes (502 at baseline, 516 after the intervention and 377 at follow-up). In contrast, another nurse used noticeably less speech utterances after the intervention (408 at baseline, but 287 after the intervention and 159 at follow up). With regard to the average length of a speech utterance, nurses' length of speech varied and changed across conditions. Noticeably, nurses who used less speech utterances spoke longer than those who used more speech utterances. For example, the nurse who used 159 speech utterances at follow-up spoke for 75 minutes which comprised 83 % of the session time. In turn, the nurse who used 516 speech utterances after the intervention spoke for 60 minutes which made 68% of the session time.

6.3.3 Testing the normal distribution of duration of speech

To test whether the scores of the length of nurses' speech as well as the adjusted values of nurses' speech listed in Table 43 were normally distributed a procedure described by Field (Field, 2005) was performed. This included computing descriptive statistics to assess kurtosis and skeweness, transforming the data using logarithmic transformation, and performing the Kolmogorov-Smirnov test.

To test whether the normal distribution improved after changing the scores of the outliers and transforming the data by using the logarithmic transformation a Kolmogorov-Smirnov test was performed. All variables including the duration of nurses' speech, $D(4530) = .262$, $p < .001$, the percentage of length of nurses' speech in relation to the length of the session, $D(4304) = 17.27$, $p < .001$, the percentage of the number of self-efficacy techniques in relation to overall number of speech utterances $D(4304) = 17.27$, $p < .001$, the percentage of self-efficacy techniques adjusted by nurses' overall speech and number of participants $D(4304) = .223$, $p < .001$ were significantly non-normal. Because of the lack of normal distribution non-parametric tests were used in the analysis.

6.3.4 The prevalence of self-efficacy-based techniques used by nurses

6.3.4.1 Prevalence of self-efficacy-based techniques before and after the intervention

To explore the prevalence of the self-efficacy-based techniques, descriptive statistics based on Median values were performed. As presented previously, the duration of the starting insulin programmes as well as the number of participants per programme varied substantially. Also, the number of self-efficacy-based techniques used by each nurse was different for each session. Therefore, to allow comparison between nurses and conditions relative scores based on percentages were computed. Table 44 shows the details of the prevalence of self-efficacy-based techniques used in each condition.

Table 44 *Relative scores of nurses' self-efficacy techniques (i.e. frequency and length) based on raw data*

	Pre-intervention Range (*Mdn*)	**Post-intervention Range (*Mdn*)**	**3-month follow up Range (*Mdn*)**
Percentage of nurses' length of speech in relation to the length of the session	50-76 % (56.19)	45-70% (58.81)	67-84% (76.62)
Percentage of self-efficacy techniques in relation to overall number of speech utterances	10-40% (22)	25-47% (34.05)	19-48% (21.2)
Percentage of self-efficacy techniques adjusted by nurses' overall speech and number of participants	2-13% (2)	6.4-15.6% (7.48)	5.2-19% (9.7)

Table 44 shows that the use of self-efficacy-based techniques by nurses was analysed in terms of the frequency and length of the speech. The relative scores illustrate the frequency of self-efficacy-based speech in relation to overall length of the session and the number of participants. This was done because, a longer session provided more time and more potential opportunities to talk, and hence to use the self-efficacy-driven techniques. Also, a greater number of participants created potentially more opportunities to implement self-efficacy-based techniques. For example, within the starting insulin programme nurses were exploring patients' current symptoms. Having seven patients would allow the nurse to use the 'exploration of physiological state' seven times, whereas when there were three participants the nurse would potentially use the same strategy only three times.

Table 44 shows that on average nurses used self-efficacy-based techniques 22% of the time when they were talking before the intervention. The average percentage increased after the intervention to 34.05%, whilst the standard deviation decreased. Three months later nurses used on average the same amount of self-efficacy-based techniques as before the intervention (21.2%), however, in relation to the post-intervention condition the percentage decreased. The relative range values confirm the observation based on absolute scores that nurses differed amongst each other in the use of these techniques, in terms of their frequency and duration.

6.3.4.2 Pattern of the implemented self-efficacy-based techniques

To explore the potential patterns of the self-efficacy-based techniques descriptive statistics were performed. The frequency of the four sources of self-efficacy (i.e. mastery experience, role modelling, verbal persuasion and psychological and affective states) used by the nurses before and after the intervention was measured. Table 45 presents the range values of raw scores and percentages of occurrence in all self-efficacy-based speech utterances.

Table 45 *Descriptive statistics of the prevalence of the self-efficacy techniques used by nurses based on absolute numbers*

	Pre-intervention	**Post-intervention**	**3-month follow up**
Overall number of self-efficacy-based speech utterances	438	595	277
Mastery experience			
Frequency	3-30	12-22	4-13
% of all self-efficacy techniques	12-30%	6.2-14.8%	7.1-18.8%
Role modelling			
Frequency	0-4	1-5	0-1
% of all self-efficacy techniques	0-4.1%	1.1-2.5%	0-0.5%
Verbal persuasion			
Frequency	18-159	65-208	23-145
% of all self-efficacy techniques	60.2-78.3%	72.6-86.3%	76.7-79.2%
Physiological and affective states			
Frequency	3-17	9-15	3-24
% of all self-efficacy techniques	5.1-16%	5.4-12.3%	9.4-13.1%

Table 45 shows that the nurses differed in the amount of the implemented self-efficacy-based techniques.

To explore individual patterns of the use of self-efficacy-based techniques, bar charts were created. Figures 19-21 illustrate the distribution of the four sources of self-efficacy at pre-, post- and three-month follow up by each nurse.

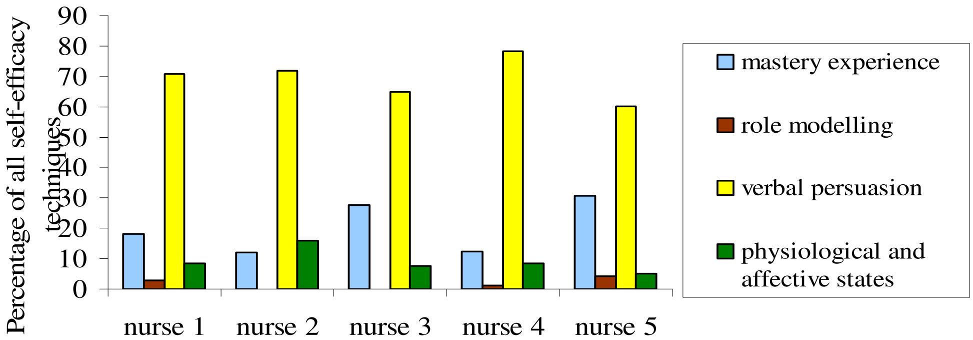


Figure 19 The prevalence of four sources of self-efficacy-based techniques among nurses when delivering the pre-intervention starting insulin programme.

Figure 19 shows that verbal persuasion-based techniques were the most prevalent techniques across all nurses. Second were mastery experience-driven techniques. Third were based on exploring physiological and affective states. Role modelling-based techniques were the least utilised by all nurses. The pattern was different for nurse 2: The second most frequently used techniques were physiological and affective states-based. Third were mastery experience-based techniques. Similarly to other nurses, verbal persuasion-based techniques were most frequently used. As Figure 19 shows, this nurse did not use any role modelling-based techniques.

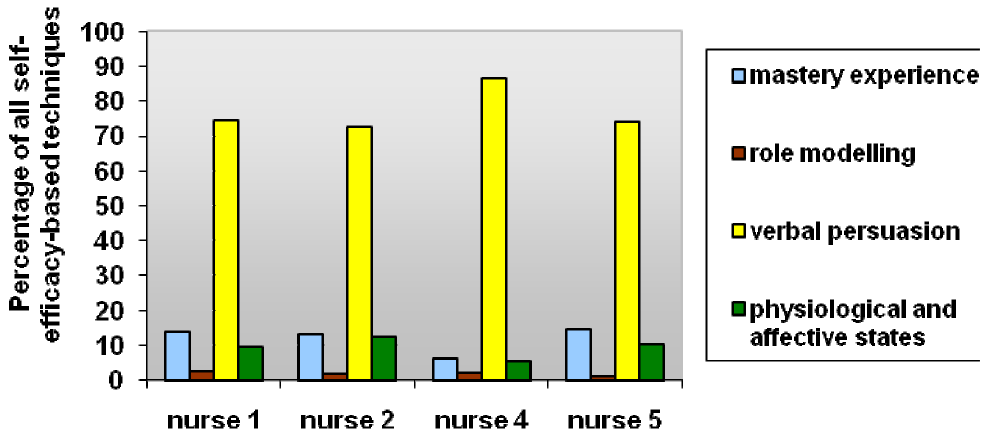


Figure 20 The prevalence of four sources of self-efficacy-based techniques among nurses when delivering the post-intervention starting insulin programme

Note. The numbering of the nurses is consistent through the text for comparison purposes. Nurse 3 did not run a post-intervention programme, as shown in Figure 20.

Figure 20 shows that verbal persuasion-based techniques were used most often by all nurses. Mastery experience-based techniques were the second, closely followed by physiological and affective states-based techniques. All nurses implemented role modelling-based techniques to a limited extent. The pattern of the four sources of self-efficacy at post-intervention resembles the distribution of techniques at baseline.

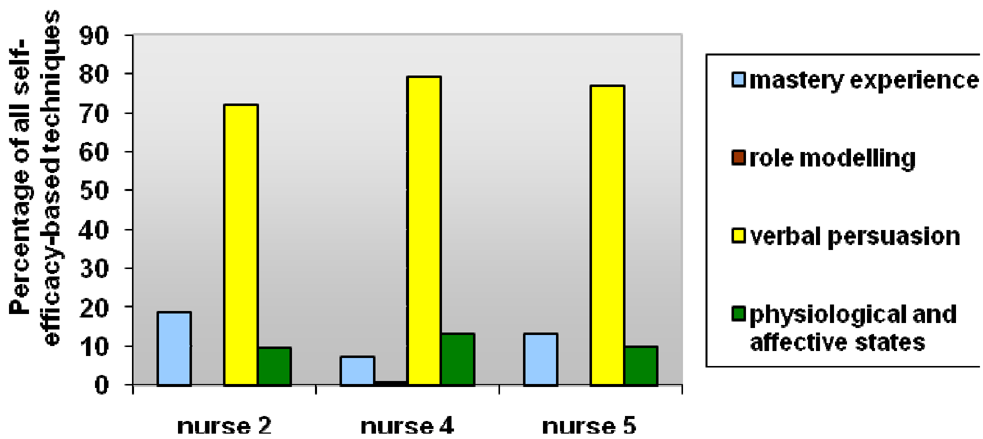


Figure 21 The prevalence of four sources of self-efficacy-based techniques among nurses when delivering the 3-month follow-up

Note. The numbering of the nurses is consistent through the text for comparison purposes.

Nurses 1 and 3 did not run the 3-month-follow up programme. Figure 21 shows that nurses used verbal persuasion-based techniques most often as at baseline and post intervention conditions. For nurses 2 and 5, the second most frequently used group of techniques were mastery experience-based. For nurse 4 they were physiological and affective states-based. Only nurse 4 implemented role modelling-based techniques.

In sum, the data show that when delivering the starting insulin programme the vast majority of self-efficacy-based techniques were verbal persuasion-driven, ranging from 60.2% to 86.3% of the implemented four sources of self-efficacy. Thus, the next section presents detailed descriptive statistics exploring the frequency and pattern of specific verbal persuasion-based techniques.

6.3.4.3 The prevalence of verbal persuasion-based techniques

To explore the prevalence of verbal persuasion-based behavioural techniques descriptive statistics were performed. The frequency and percentage within four sources of self-efficacy were computed. Table 46 present the details of the prevalence of behavioural techniques within the verbal persuasion category for each condition. The verbal persuasion-based techniques include ‘elicitation of knowledge’, ‘positive feedback’ and ‘planning for obstacles’. ‘Elicitation of knowledge’ refers to situations where nurses asked patients knowledge-related questions. ‘Positive feedback’ refers to situations where nurses praised successful self-management attempts and expresses trust in patients’ future success. ‘Planning for obstacles’ refers to situations where a nurse guided patients in making action plans in order to foresee and manage obstacles. The details of the techniques (i.e. coding criteria and examples) are presented in Chapter 4 and in Appendix E.

Table 46 *The prevalence of verbal persuasion-based techniques based on absolute values*

	Pre-intervention	Post-intervention	3-month-follow up
Overall number of verbal persuasion-based speech utterances	313	469	214
Elicitation of knowledge			
Frequency	14-150	52-195	14-139
Percent in VP-based techniques	77.8-94.3%	67.5-95.8%	60.9-95.5%
Positive feedback			
Frequency	2-8	1-3	0-1
Percent in VP-based techniques	3.1-13.6%	0.8-1.5%	0-.7%
Planning for obstacles			
Frequency	2-9	4-24	5-9
Percent in VP-based techniques	2.5-22.5%	3.4-31.2%	3.4-39.1%

Note. VP stands for 'verbal persuasion'

Table 46 shows that 'elicitation of knowledge' was the most frequently utilised verbal persuasion-based techniques ranging between 60.9% and 95.5 % of nurses' verbal persuasion-based speech. The high prevalence of 'elicitation of knowledge' was consistent among all nurses at all three time points when delivering the starting insulin programme. Figures 22 - 24 present the distribution of verbal persuasion-based techniques delivered by each nurse at baseline, post-intervention, and at three-month-follow up.

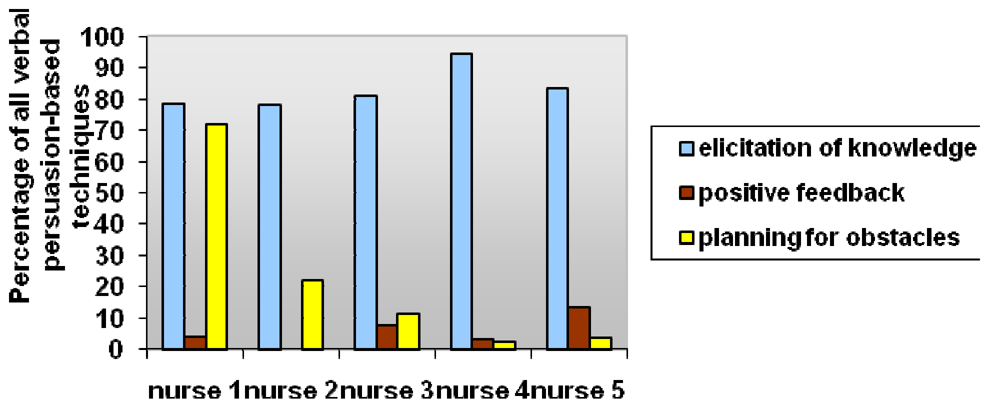


Figure 22 The prevalence of verbal persuasion-based techniques at baseline

As presented in Figure 22, four of five nurses delivered a similar pattern of verbal persuasion-based techniques at baseline. In contrast, nurse 1 used more than others of the 'planning for obstacles' technique.

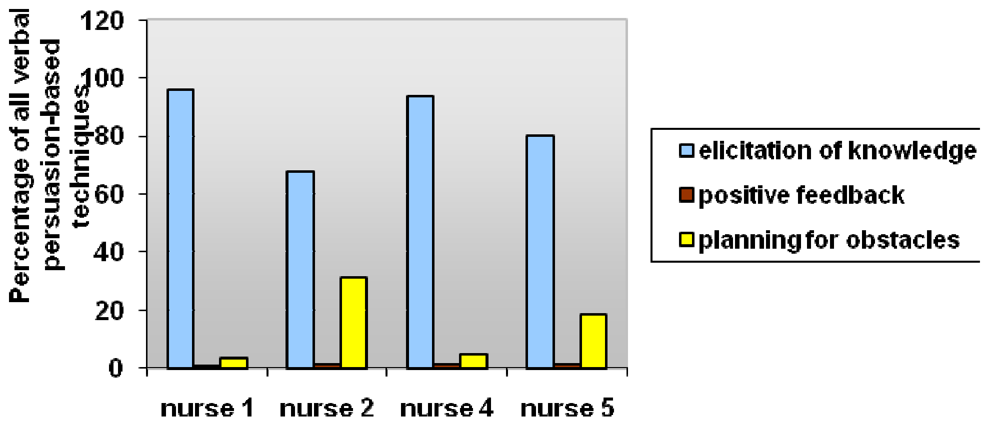


Figure 23 The prevalence of verbal persuasion-based techniques at post-intervention
Note. Nurse 3 did not run a post-intervention programme.

After the ASSET-based intervention, verbal persuasion-based elicitation of knowledge continued to be the most frequently used techniques. The second most often used techniques were planning for obstacles-based. Positive feedback-based behavioural techniques were used to a limited extent by all nurses.

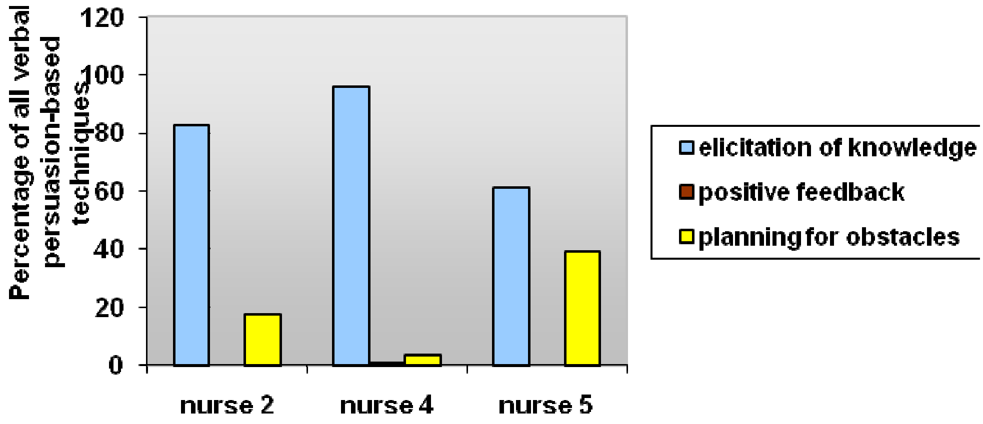


Figure 24 The prevalence of verbal persuasion-based techniques at three-month follow up
Note. Nurses 1 and 3 did not run the 3-month-follow up programme.

As at baseline and post-intervention, at 3-month follow up, all nurses used elicitation of knowledge-based behavioural techniques to the greatest extent. The second most frequently used behavioural techniques were planning for obstacles-based. Only nurse 4 used positive feedback-based techniques.

In sum, the distribution of verbal persuasion-driven behavioural techniques remained similar at baseline, post-intervention and at three-month follow up. Elicitation of knowledge remained the most frequently used technique among all nurses.

6.3.5 The impact of the ASSET-based intervention on nurses' self-efficacy-driven behaviour

6.3.5.1 Frequency of self-efficacy-based techniques

To illustrate the change in the use of self-efficacy-based techniques a bar chart was created. Figure 25 represents the percentage of self-efficacy-based speech utterances in nurses' overall speech broken down across the three time points.

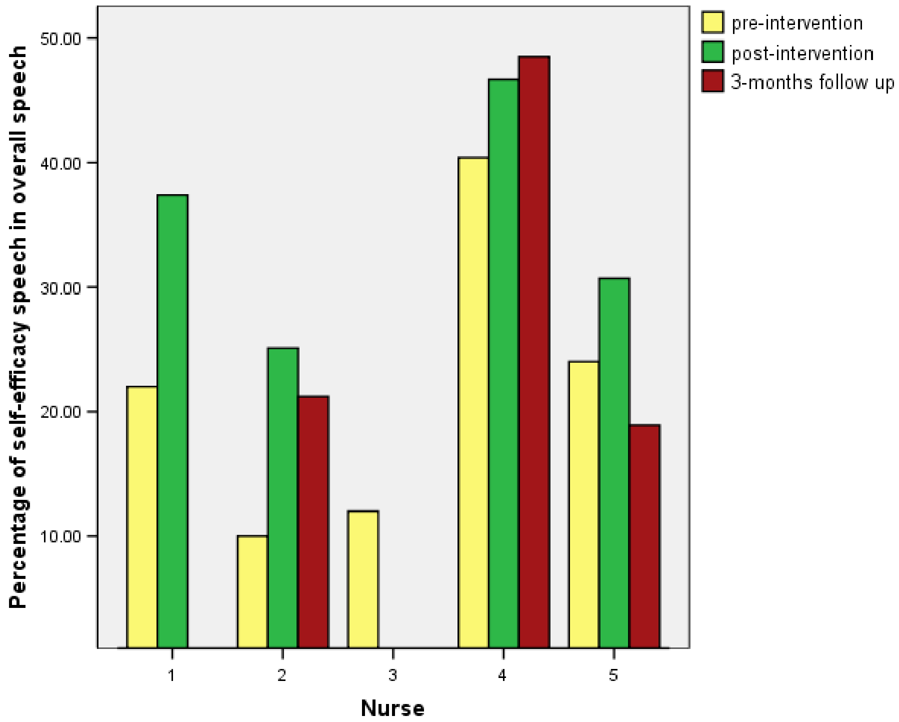


Figure 25 The percentage of self-efficacy-based speech utterances in nurse's overall speech before and after the ASSET-based intervention

Note. Nurse 1 and nurse 3 were recorded at two time points and one time point only, respectively.

As presented in Figure 25 all nurses increased the frequency of self-efficacy techniques used directly after the ASSET-based intervention. The effect, however, was not sustained over time by all nurses. Whilst nurse 2 and nurse 4 used more self-efficacy-based techniques after three months when compared to baseline, nurse 5 used less self-efficacy-based techniques.

6.3.5.2 Length of nurses' speech

To evaluate whether there was a significant difference in the length of nurses' speech at the three time points a non-parametric Friedman's ANOVA was performed. The analysis was based on percentage values (i.e. length of nurses' speech in relation to the duration of the session). The Friedman's ANOVA showed that there was no significant difference in the time spent talking before and after the ASSET-based intervention ($\chi^2(2) = 4.67$, $p = .09$).

To further explore the differences in relation to individual nurses and for each time point descriptive statistics based on mean values were performed and a bar graph was created. Figure 26 shows the percentage of nurses' speech in relation to the length of the session broken down into three conditions.

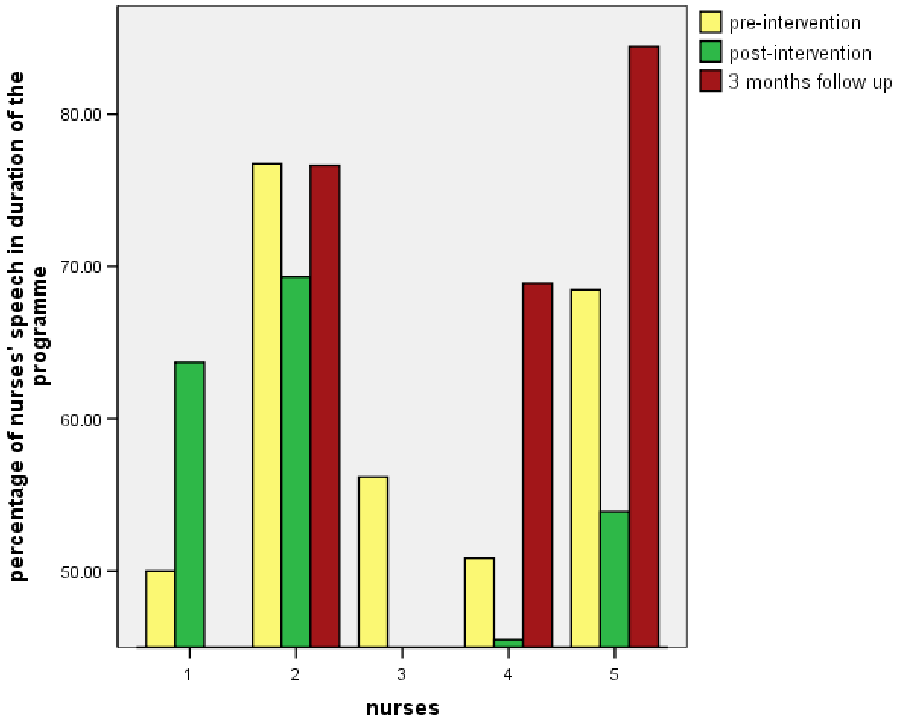


Figure 26 The percentage of nurses' length of speech in relation to the duration of the starting insulin programme

Figure 26 shows that three of the four nurses spoke less after the intervention (M = 56.25, SE =12.15) leaving participants more time to interact, exchange experiences and ask questions than before the intervention (M = 65.35, SE =13.21). During the 3-month follow up programme all nurses increased the length of speech (M = 76.65, SE =7.77): two spoke for longer than at baseline, while the third spent an equal amount of time talking as at baseline.

6.3.5.3 The duration of self-efficacy-based techniques

To measure whether there was a change in the duration of self-efficacy-based speech after the ASSET-based intervention; a non-parametric Friedman's ANOVA was performed based on percentage values. The analysis revealed that there was no significant difference in the percentage of time spent using self-efficacy-based techniques before, after the intervention and at 3-month follow up ($\chi^2(2) = 2$, $p = .37$).

To further explore the individual differences across nurses at the three time points descriptive statistics based on mean value were performed and a bar chart was created.

Figure 27 illustrates the percentage of self-efficacy-driven speech in nurses' overall speech at each condition.

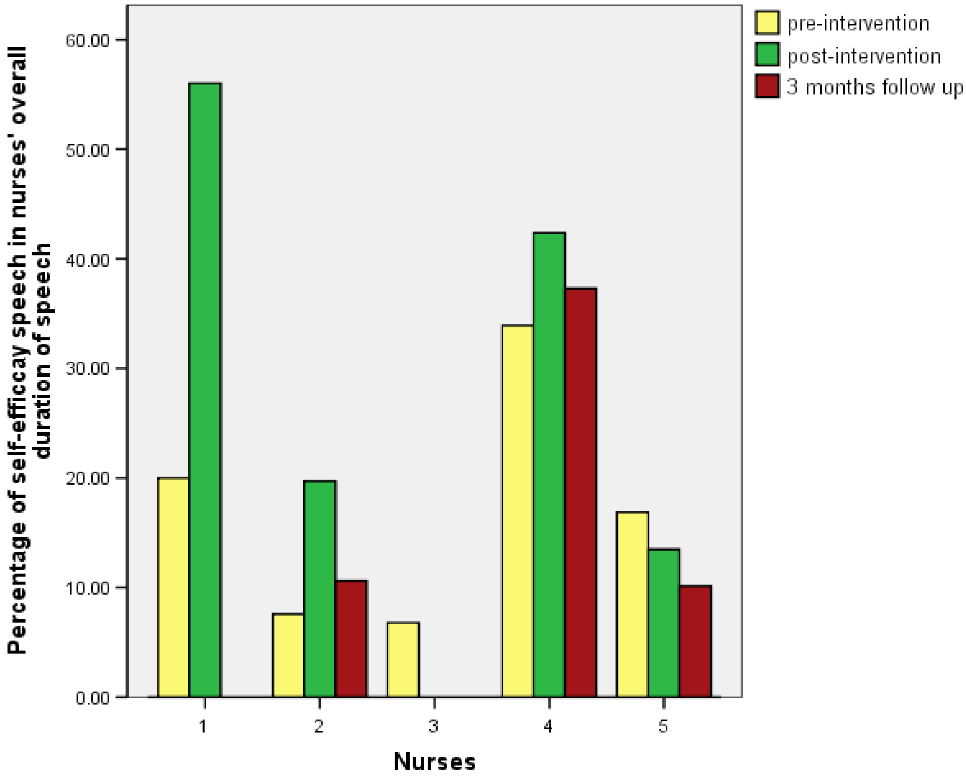


Figure 27 The length of self-efficacy-based speech in nurses' overall speech

Figure 27 shows that nurses spent more time delivering self-efficacy-based techniques after the ASSET-based intervention (M = 32.88, SE =19.78) than before the intervention (M = 19.58, SE = 10.90). The change was not sustained over time (M = 19.44, SE = 15.54).

In sum, no statistically significant change was observed after the ASSET-based intervention in terms of nurses' duration of speech. However, individual differences were observed across nurses and conditions. With regard to the overall length of speech, three of the four nurses talked less when delivering the post-intervention programme. The observation was not repeated at 3-month follow up. With regard to the proportion of self-efficacy versus non-self-efficacy-driven talk, three of four nurses used longer self-efficacy-driven speech utterances directly after the ASSET-based intervention. This change was maintained by two nurses.

6.3.5.4 Feedback-driven self-efficacy-based techniques

6.3.5.4.1 What techniques did the nurses target?

As a part of the feedback session nurses set goals to implement when running the next starting insulin programme. There were two groups of goals.

First, there were goals which addressed self-efficacy theory. These were:

1. To use **mastery experience**-driven techniques, i.e. to guide the patients in reflecting on their insulin use and to identify obstacles in relation to insulin use;
2. To use the facilitating pro-active self technique (i.e. mastery experience-based) by asking about patients' burning issues;
3. To use **role modelling**-driven techniques, i.e. to get the group more involved, bringing the questions back to the group instead of answering;
4. To use **verbal persuasion**-based techniques, i.e. to explore patients' knowledge based on their previous experiences instead of providing information, to guide patients in setting goals;
5. To use **physiological and affective states**-driven techniques, i.e. exploring patients' symptoms in relation to the insulin use;

Second, there were goals in relation to generic communication skills. These were:

1. To ask simpler questions, i.e. to ask one question at a time;
2. To allow silence and give patients more time to think instead of answering the questions themselves;
3. To ask open-ended questions;

The operationalisation (i.e. the way the goals were evaluated to assess the behaviour change) of the goals is presented in Table 47.

Table 47 *Feedback-related goals set by the nurses*

Goal	**Operationalisation (i.e. the criteria to assess that the goal was achieved)**	**Prevalence of the goal***
Mastery experience-driven techniques, i.e. to guide the patients in reflecting on their insulin use, to identify obstacles in relation to the insulin use;	Frequency of mastery experience-driven speech utterances	3 (60%)
Role modelling-driven techniques, i.e. to get the group more involved;	Frequency of role modelling-driven speech utterances	3 (60%)
Verbal persuasion-driven techniques i.e. to explore patients' knowledge and to bring a question back to the group instead of answering it, to guide patients in setting action plans;	Frequency of verbal persuasion-driven speech utterances	2 (40%)
Physiological and affective states-driven techniques, i.e. exploring patients' symptoms;	Frequency of physiological and affective states-driven speech utterances	1 (20%)
Using the flipchart to write down patients' issues;	The frequency of the use of 'facilitating pro-active self' (i.e. one of the mastery experience techniques); Using a flipchart	1 (20%)
Simpler questions, i.e. to ask one question a time;	The average duration of one speech utterance	2 (40%)
Silence to give patients more time to think instead of answering the questions themselves;	The duration of patients' talk	1 (20%)
Open-ended questions;	Frequency of occurrence	1 (20%)

Note: * reflects the number and percentage of the nurses who set the goal

Table 47 shows that nurses targeted all four sources of self-efficacy. The goal chosen most frequently was to implement more mastery experience-based and role modelling-based techniques. The second most frequently chosen goal was to use verbal persuasion-based techniques. With regard to generic goals, nurses aimed to ask more simple questions.

6.3.4.5.2 The use of the targeted self-efficacy-based techniques

To assess the implementation of the goals the nurses set as a result of the ASSET-based feedback descriptive statistics were performed. Each nurse set goals individually, thus the analyses were performed for each nurse separately. This section presents the self-efficacy-based techniques only which each nurse targeted in the feedback.

6.3.4.5.2.1 Nurse one

The first nurse who received the tailored ASSET-based feedback aimed to use more mastery experience-based techniques, i.e. getting the patients to discuss their experiences with insulin, and encouraging the patients to ask questions. She also aimed to use more verbal persuasion-driven techniques by bringing patients' questions back to the group instead of answering them herself. In addition, she set a generic goal to use the flipchart to write up patients' issues and questions.

Table 48 *Descriptive statistics of goals implemented by nurse 1*

	Pre-ASSET Sum (%)	**Post-ASSET Sum (%)**	**3-months follow up Sum (%)**
Mastery experience	13 (4%)	22 (5.1%)	---
Self-reflection	8 (2.4%)	8 (1.9%)	---
Facilitating pro-active self	4 (1.2%)	4 (0.9%)	---
Verbal persuasion	51 (15.6%)	119 (27.8%)	---
Elicitation of knowledge	40 (12.2%)	114 (26.6%)	---

Note. 'Sum' reflects the frequency of speech utterances within the session, '%' stands for percentage in all speech utterances, '---' stands for session not recorded

As presented in Table 48, nurse 1 used 12.2 % more verbal persuasion-based techniques after the ASSET-based intervention than before the intervention. With regard to mastery experience-based techniques she used a similar number of 'facilitating pro-active self' and 'self-reflection'-based techniques before and after the intervention. When exploring patients' issues the nurse started using the flipchart.

6.3.4.5.2.2 Nurse two

As a result of the ASSET-based feedback the second nurse aimed to use more physiological and affective states-driven techniques, i.e. to explore patients' symptoms in relation to insulin treatment by asking open-ended questions. She also expressed the intention to ask simpler questions (i.e. one question at a time).

Table 49 *Descriptive statistics of goals implemented by nurse 2*

	Pre-ASSET Sum (%)	**Post-ASSET Sum (%)**	**3-month follow up Sum (%)**
Physiological and affective states	4 (1.6%)	13 (3.1%)	6 (2%)
Exploring physiological state	4 (1.6%)	11 (2.6%)	6 (2%)
	***M* (*SD*)**	***M* (*SD*)**	***M* (*SD*)**
Length of self-efficacy-based speech utterance in seconds	11.89 (11.58)	7.06 (6.55)	6.28 (7.05)

Note. 'Sum' reflects the frequency of speech utterances within the session, '%' stands for percentage in all speech utterances

Table 49 shows that nurse 2 started using 1% more physiological and affective states-based techniques after the ASSET-based intervention than before. She asked more questions exploring patients' symptoms. At 3-month follow up the nurse was still using more self-efficacy-based techniques when compared to baseline, but less than when compared to the programme delivered directly after the ASSET-based intervention.

Table 49 shows that the goal regarding asking simpler questions was measured by analysing the average length of speech utterance. It was assumed that shorter speech utterances would indicate more simple questions. Nurse 2 started making shorter speech utterances after the ASSET-based intervention which she continued to implement in the 3-months follow up starting insulin programme.

6.3.4.5.2.3 Nurse three

The third nurse who received the tailored ASSET-based feedback aimed to use more role modelling-driven techniques, i.e. getting the group more involved. She also set a goal to use the facilitating pro-active self verbal technique, i.e. exploring patients' issues in relation to the insulin treatment. At baseline, she used 11 mastery experience-based techniques (i.e. 3.3% of all self-efficacy-based speech utterances). Of these, one (0.3% of mastery-experience-based techniques) was facilitating pro-active self. She did not use any role modelling-based techniques at baseline.

Due to a transfer to a different working area she did not run the starting insulin programme post-intervention. Thus, there was no data to analyse the implementation of goals.

6.3.4.5.2.4 Nurse four

Nurse four aimed to use more verbal persuasion-driven techniques i.e. to bring the questions back to the group instead of answering them and to use more role modelling based techniques by getting the group involved. She also set a more generic goal to leave longer pauses to give patients more time to think and answer the questions. The pauses were analysed by computing the average time between single speech utterances made by the nurse.

Table 50 *Descriptive statistics of goals implemented by nurse 4*

	Pre-ASSET Sum (%)	**Post-ASSET Sum (%)**	**3-month follow up Sum (%)**
Role modelling	2 (0.4%)	5 (1%)	1 (0.3%)
Group solving	0	2 (0.4%)	0
Verbal persuasion	159 (31.7%)	208 (40.3%)	145 (38.5%)
Elicitation of knowledge	150 (29.9%)	195 (39.8%)	137(36.3%)
	***M* (*SD*)**	***M* (*SD*)**	***M* (*SD*)**
Average length of pauses in seconds	6.87 (8.82)	8.43 (15.11)	4.72 (5.65)

Note. 'Sum' reflects the frequency of speech utterances within the session, '%' stands for percentage in all speech utterances

Table 50 shows that nurse 4 started using 8.7 % more verbal persuasion-based techniques as a result of the ASSET-based feedback. As intended the nurse elicited knowledge from the patients more frequently (by 10%). When delivering the 3-month follow up starting insulin programme she used 6.8% more verbal persuasion-driven techniques than at baseline, but 1.8% less than directly after the intervention. With regard to role modelling-based techniques the nurse improved marginally and started using 0.5% more group solving-techniques than before the intervention. When delivering the 3-month follow up starting insulin programme she did not use the role modelling-based techniques at all.

With regard to the goals to leave longer pauses for patients to speak, the nurse increased the length of silence after the ASSET-based intervention when compared to baseline. However, Table 50 shows that nurse four started talking more and reduced the duration of pauses between single speech utterances when delivering the 3-month follow up starting insulin programme.

6.3.4.5.2.5 Nurse five

Nurse five aimed to use more mastery experience-based techniques, i.e. to guide people in learning from their experiences and to use more role modelling-driven techniques by getting the group more involved. She also set a more generic goal which was to ask more simple and open-ended questions. The simpler questions were assessed by the average length of a speech utterance. The open-ended questions were analysed by comparing the total number of self-efficacy-based questions before and after the ASSET-based intervention.

Table 51 shows that nurse 5 did not change her self-efficacy-driven behaviour after the ASSET-based intervention when compared to baseline. Three months later when delivering the starting insulin programme she was using even less mastery experience-based techniques and none of the role modelling-techniques. Two of three patients who attended session one of the three-months follow up starting insulin programme dropped out, so only one patient attended the second session. Thus, the role modelling-based techniques were not appropriate to use.

Table 51 *Descriptive statistics of goals implemented by nurse 5*

	Pre-ASSET Sum (%)	Post-ASSET Sum (%)	3-month follow up Sum (%)
Mastery experience	30 (7.4%)	13 (4.5%)	4 (2.3%)
Self-reflection	14 (3.4%)	9 (3.1%)	1 (0.6%)
Successful trial	2 (0.5%)	0	0
Role modelling	4 (1%)	1 (0.3%)	0
Group solving	1 (0.2%)	0	0
Open-ended questions	98 (24%)	88 (30.7%)	30 (18.9%)
	***M* (*SD*)**	***M* (*SD*)**	***M* (*SD*)**
Length of self-efficacy-based speech utterance	8.96 (10.82)	8.18 (7.51)	17.09 (15.05)

Note. 'Sum' reflects the frequency of speech utterances within the session, '%' stands for percentage in all speech utterances, '---' stands for session not recorded

The nurse set also more generic goals to formulate open-ended and simple questions. The average length of a speech utterance decreased after the intervention suggesting that the nurse was using shorter and simpler questions and statements when running the post-intervention programme. This observation was not found in the 3-month follow up programme.

6.3.6 The impact of nurses' characteristics on nurses' self-efficacy-driven behaviour

6.3.6.1 Relationship between condition, nurse and the use of self-efficacy-based techniques

To assess whether there was an interaction between the condition and the nurse in relation to the use of self-efficacy techniques, a three way loglinear analysis was performed. The assumptions for running the non-parametric test were met. The variables were independent (i.e. each entity fell into one cell of the contingency table) and the expected frequencies were large enough (i.e. 20% of cells had expected frequencies less than 5, and all cells had an expected frequency greater than 1).

Following the procedure described by Field (Field, 2005) the loglinear model was computed. The thee-way loglinear model retained all effects. The likelihood ratio of this model was $\chi2(0) = 0$, p=1. This indicated that the highest order interaction (nurse X condition X self-efficacy) was significant, $\chi 2(8) = 21.79$, $p < .01$. Following Field's (2005) recommendation, in order to break down the effect separate chi-square tests on the condition and self-efficacy variables were performed for each nurse, and on the nurse and self-efficacy for each condition. For each nurse there was a significant association between condition and the use of self-efficacy techniques. Also, in each condition there was a significant association between nurse and the use of self-efficacy. The odds ratio for the nurses was 1.76 (ranged between 1.05 and 2.91), indicating that nurses were more likely to use self-efficacy techniques directly after the ASSET-based intervention than before. A small effect of 1.59 (ranged between .75 and 2.35) was also observed at 3-month follow up.

6.3.6.2 The relationship between nurses' experience prior to the intervention and the use of self-efficacy-based techniques.

To further investigate the relationship between nurses and the use of self-efficacy-based techniques nurses' experience prior to the intervention was included in the analysis. In the present study nurses' experience was measured by a dichotomous variable including additional training and supervision from a senior nurse. The descriptive statistics of nurses' diabetes-related experience are presented in Chapter 5. More analyses with regard to the relationship between nurses' characteristics and the use of self-efficacy-based techniques are presented in Chapter 5. To explore whether the experience prior to the intervention was related to self-efficacy-based behaviour, a loglinear analysis based on Chi-square tests was performed (Field, 2005).

The three-way loglinear model retained all effects. The likelihood ratio of this model was $\chi 2(0) = 0$, p=1. This indicated that the highest order interaction (training X condition X self-efficacy) was significant, $\chi 2(2) = 6.17$, $p = .046$. The results revealed that nurses who attended additional training prior to the study were more likely to use self-efficacy-based techniques at three time points. The effects based on odds ratios were 1.81 for baseline, 1.53 for post-intervention condition and 2.44 for 3-month follow up.

6.3.6.2.1 The relationship between experience gained prior to the training and the self-efficacy-driven behaviour change

Following Field's (2005) recommendation, in order to break down the already presented effect of training onto the use of self-efficacy-based techniques, separate chi-square tests on the condition and self-efficacy variables were performed separately for both groups of nurses: with additional training and without and on training and self-efficacy separately for the three conditions. There was a significant association between condition and the use of self-efficacy techniques in both groups, among nurses without additional training ($\chi2(2) = 48.18$, $p < .001$) and with training prior to the intervention ($\chi2(2) = 40.23$, $p < .001$). The odds ratios for the nurses with additional training were 1.82 for post-intervention condition and 1.74 for 3-month follow up. The odds ratios for nurses without additional training in turn were 2.2 for post-intervention condition and 1.28 for three months follow up. The results indicate that nurses without additional training were more likely to use self-efficacy techniques after the ASSET-based intervention when compared to the pre-condition programme, than nurses with additional training. Figure 28 shows the amount of change in terms of the percentage of self-efficacy-based techniques in overall speech after the intervention broken down by the nurses who had additional experience as opposed to those who had not prior to the intervention. The amount of change is expressed as difference to the baseline data.

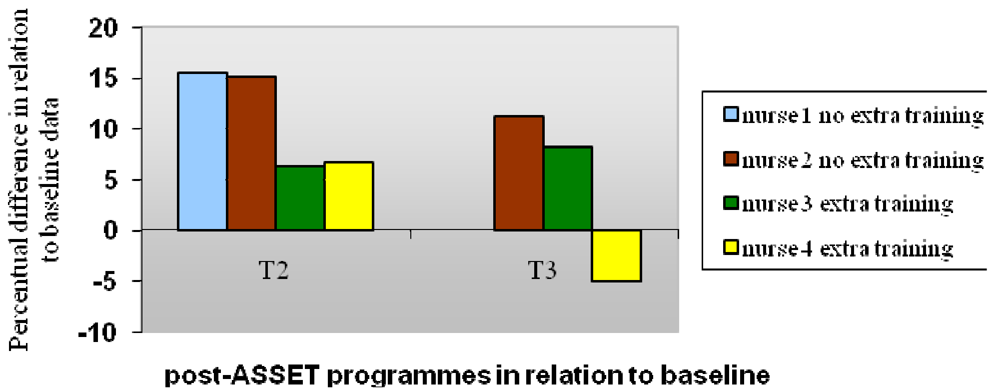


Figure 28 The amount of behaviour change regarding the use of self-efficacy-based techniques among more and less experienced nurses after the intervention and at 3-month follow up

Note. The bars represent percentage scores computed from the difference between post and baseline programmes. The scores are based on relative values considering the percentage of self-efficacy within overall speech.

Figure 28 shows that all nurses, these two who attended training and received supervision prior to the intervention as well as those two without additional training and supervision increased the number of self-efficacy techniques directly after the ASSET-based intervention. The nurses who had no additional training prior to the intervention increased their ratio of self-efficacy-based speech by 15 % when compared with non-self-efficacy speech. The nurses who had had additional training (and already frequently implemented self-efficacy-based techniques at baseline) seem to benefit from the tailored training as well and changed their ratio of self-efficacy and non-self-efficacy talk by 6 %.

6.4 Discussion

In the present study a self-efficacy-driven intervention was delivered to diabetes nurses in order to increase their use of self-efficacy-based techniques when running a group-based starting insulin programme for people with type 2 diabetes. The intervention consisted of an educational training in self-efficacy and ASSET-based tailored feedback. Nurses were video recorded when delivering the starting insulin programmes before, after the ASSET-based intervention and three months later. The present study investigated the feasibility of an instrument for a real world environment. Thus, there are several implications for this in terms of richness of the data, limitations and future directions.

6.4.1 Prevalence of self-efficacy-based techniques

At baseline nurses differed in the frequency of implemented self-efficacy-based techniques. However, the pattern of the implemented self-efficacy-based techniques by all nurses was similar (illustrated by the proportion of each technique and the general use of self-efficacy-based techniques). Verbal persuasion-based techniques were the most prevalent, with mastery experience-based techniques being the second most frequent. Physiological and affective states-based techniques were the third most utilised group of techniques. The least frequently used were techniques based on role modelling. The nurses tended to explore patients' understanding of insulin treatment rather than to explore patients' current experience with insulin in relation to what they were doing (mastery experience-based techniques), and what symptoms they were experiencing and how they were feeling (i.e. physiological and affective states-based techniques). The similar pattern of the delivery of self-efficacy-based techniques may indicate that nurses were following the protocol. They asked questions and guided patients in learning how to use insulin in accordance with the protocol. The similar pattern of self-efficacy-based techniques (i.e. the prevalent use of verbal persuasion-based techniques) could also indicate that nurses were most competent in using those techniques.

Of the verbal persuasion-based techniques used in this study the most prevalent was 'elicitation of knowledge'. Elicitation of knowledge relates to the situation when a nurse asks the group diabetes-related questions to explore patients' understanding of the condition and its management (Zinken et al., 2008). The high prevalence of the elicitation of knowledge technique could be due to the fact that the starting insulin programme aimed to introduce new insulin-based treatment to the patients. Thus, a substantial part of the programme was devoted to discussing or eliciting knowledge based on the patients' general experience with diabetes management. It could be argued that nurses felt obligated to discuss new information in order to make starting insulin treatment as safe as possible. This observation has been suggested elsewhere. Koopman van der Berg and van der Bijl's review of self-efficacy-based interventions showed that verbal persuasion-based techniques were the most often utilised among nurses delivering education for patients with diabetes (2001). In the context of previous studies, the tendency to discuss knowledge by nurses was probably due not to the characteristics of the programme, but mainly to the general method of delivering education (Koopman-van der Berg et al., 2001; Bandura, 1997).

The least used self-efficacy-based techniques were those based on the role modelling principle. Nurses seldom involved the group in solving someone else's problems or used examples from others' to reinforce effective management. The scarce implementation of vicarious experience has been common in previous nurse-led self-efficacy interventions (Koopman-van der Berg et al., 2001; Zinken et al., 2008). This could be due to couple of reasons. First, it may show a lack of group-leading skills. Focusing not on one individual but on a group as a whole is an advanced skill (Yalom, 1995). Second, the lack of engaging others in solving someone else's problem may reflect a general attitude about the role of patients and providers in the consultation. For example, the nurses may feel responsible for giving patients' the recognised knowledge, for example in order to make the insulin use safe. On the other hand, the patients may expect the nurse to deliver knowledge and give advice on how to use it. This pattern is quite often observed in the patient-provider interaction (Pill et al., 1998). Patients, for example by asking about advice, may also stop nurses from implementing the role-modelling based techniques. Thus, it may require not only new skills but a shift in the beliefs regarding the responsibility of the illness management to enhance the use of role-modelling-based techniques.

6.4.2 Behaviour change

Directly after the ASSET-based intervention all nurses increased the frequency of self-efficacy-based techniques. When comparing the sum scores of the self-efficacy-based speech utterances among nurses, the descriptive statistics show that whilst the frequency of self-efficacy-based techniques increased among all nurses, the standard deviation across the nurses decreased. This may suggest that nurses become more consistent in the delivery of the behavioural techniques after specific training. As mentioned in Chapter 4, the number of self-efficacy based techniques does not necessary reflect the quality of the intervention. Potentially, nurses could repeat a question many times or use techniques which do not address patients' issues. These are limitations of the coding tool as the information is not sufficient to conclude on the quality of the intervention. However, the present intervention study was designed to increase the number of self-efficacy techniques among nurses. Thus, the observation regarding the amount of self-efficacy was relevant in light of the research questions. In the future, more attention should be paid to the assessment of the quality of the techniques. In particular, the accuracy of techniques with regard to patients' needs seems to be crucial. As discussed in Chapter 4, the sequences of techniques and coding of patients' speech may give some insight into the quality of the intervention. In addition, other measures of patient-provider interaction could be applied to investigate the link between quality and quantity of self-efficacy based interventions. For example, Conversation Analysis (CA) evaluates interaction in a detailed way (Heritage & Maynard, 2006). Thus, specific self-efficacy based sequences could be analysed with the CA method to better understand in what circumstances techniques succeed in activating patients.

Two of three nurses who delivered a 3-month follow-up starting insulin programme maintained the increased number of techniques. However, there was a small drop when compared to the programme delivered directly after the intervention. The third nurse decreased the number of self-efficacy-based techniques at follow-up when compared to baseline. She talked more than in the two previous programmes leaving only about 20 % of the session time for the patients to talk. The results suggest that she did worse in terms of the use of self-efficacy-based techniques and activating patients' talk at follow-up than before the intervention. The small sample size of five nurses was further reduced to three at the follow up assessment. It has to be acknowledged that the findings are based on a small group of post-intervention sessions. The change could be entirely due to chance.

Previous intervention studies with nurses showed that nurses changed their behaviour but did not maintain the change over time (Pill et al., 1998). Nurses tend to go back to their habitual practice as time progresses. It remains unanswered why nurses, despite the effort and discomfort of being assessed went back to their initial behaviours.

With regard to the results of the present study there may be a number of possible explanations for the decrease in the self-efficacy-driven performance. First, nurses may have got used to the fact that they were observed so they went back to their routine practice. Second, the third (follow-up) groups might have been more difficult. For example, the patients might not have responded to the questions or might not have had any concerns regarding insulin use. In that case, the nurses might have asked fewer questions and provided more knowledge. Third, the short-term behaviour change might have not expressed a change in nurses' beliefs. They might have applied the new techniques without a corresponding change in their beliefs about the responsibility for illness management. Thus, the behavioural change may in fact have not become a part of everyday practice. It would be interesting to further explore the process of relapsing in order to understand what triggers the return of habitual behaviours. This, in turn, may help to identify critical situations which could be used as prompts to implement self-efficacy-based techniques instead of relapsing. Fourth, the nurse who delivered less self-efficacy-based techniques at follow-up had the longest break after the training and feedback and the recorded session. Thus, the decrease in the number of self-efficacy-based techniques used at 3-month follow up could be due to the time span between the intervention and the recorded starting insulin programme.

On the other hand, the fact that the nurses dropped the number of the self-efficacy-based techniques, but still used significantly more techniques than at baseline, excludes a simple learning effect. It can not be argued that the change in nurses' behaviour was entirely due to the fact that nurses gained more practice as the time progressed.

When analysing the change in nurses' verbal behaviour before and after attending the ASSET-based intervention, significant differences were observed. The majority of the nurses talked less when delivering the post-ASSET starting insulin programmes. Nurse 1 who increased the length of speech in the post-intervention programme spent more than half the time delivering self-efficacy-based speech. This suggests that whereas other nurses spoke for shorter periods when delivering a self-efficacy-based technique than a non-self-efficacy-based talk, nurse 1 spoke equally long independently of the technique she was utilising. She benefited from the intervention by increasing the number of self-efficacy-related utterances; however she used more time to deliver the techniques than other nurses. There could be two potential explanations for this. First, she may have avoided providing short-lectures, which made her non-self-efficacy techniques as short as self-efficacy-based techniques. Second, she may have used longer introductions before asking self-efficacy-based questions, which made the coded speech utterance longer. More detailed content analysis of nurses' speech would give more insight in the method of nurses' intervention delivery in relation to the individual working style and the interaction with patients. The different amount of self-efficacy-based techniques delivered by nurses raises the question, what amount of self-efficacy is most beneficial for patients? This issue, however, is beyond the scope of the present study.

6.4.3 The role of nurses' experience prior to the intervention

All nurses increased the number of the self-efficacy-based techniques directly after the ASSET-based intervention. The positive change in behaviour appears to be related to the initial skills presented by a nurse. Nurses who entered the study had different levels of experience. Thus, when analysing the initial number of self-efficacy-based techniques used by nurses substantial differences were observed. The two nurses who were more experienced (i.e. received supervision and attended additional training) used more self-efficacy-based techniques at baseline. Two other nurses, who were less experienced, achieved greater change in their verbal behaviour. After the ASSET-based intervention they used more self-efficacy-based techniques than at baseline when compared to those who were more experienced. This observation suggests that the ASSET-based intervention may address rather basic skills and hence it may be best used as an introductory course for nurses wanting to improve their practice. It has to be stressed, however, that the small number of participants limits the generalisability of the results. The observation could be due to some individual differences, and therefore not so informative regarding general associations. Also, it could be due to chance that the nurses with additional training improved less than those without extra experience prior to the intervention.

Considering the limited validity of the results, we could however hypothesise that the different learning curve for each nurse could indicate a few issues. First, the process of acquiring new skills in terms of the use of self-efficacy-based techniques could be compared to learning a new language. It takes little time to learn basic expressions, but it requires practise to be able to manage a conversation. Thus, the nurses who only used a few self-efficacy-based techniques at baseline, learned basic techniques very quickly. They were able to implement them regardless of the group dynamics. For example, the basic self-efficacy-techniques could relate to the way the session was opened (e.g. one of the opening questions could be: What brought you here?) or exploring patients' queries (e.g. What questions have you got?). Thus, these self-efficacy-based techniques might be easy to implement. On the other hand, using more advanced techniques requires not only group-based skills but also certain beliefs. Nurses who perceive themselves to be in charge of patients' illness management may explore their symptoms using self-efficacy-based techniques. However, in the case of a problem, they may jump into fixing mode, giving knowledge or suggestions instead of guiding patients in finding their own solutions. Thus, more in depth analysis of the patients' and nurse's interaction is needed in order to understand the impact of nurses' beliefs on the use of self-efficacy-based techniques.

The different curve in the use of self-efficacy-based techniques could also be explained by addressing the perspective of the patients. It may be that there was a certain level of self-efficacy which made the programme most effective (i.e. a ceiling level). If there was such a line, nurses who were exercising self-efficacy to a greater extent at baseline, started using just a little bit more as they were already reaching the ceiling. It would be interesting to further explore the self-efficacy ceiling level (i.e. the proportion of self-efficacy-based and other techniques) in order to identify other techniques which are necessary to enhance patients' self-management. It has been discussed previously, whether self-efficacy is always been helpful and whether there are situations in which providing patients with knowledge is a more effective way to support self-management (Krichbaum, 2003; McCaul et al., 1987). For example, within an educational programme there is often a need to provide new knowledge in situations when a knowledge gap is identified.

6.4.4 Feedback-driven behaviour change

All nurses received ASSET-based feedback which summarised the use of self-efficacy after delivering the baseline starting insulin programme. As a part of the feedback session nurses set goals to implement when running the next starting insulin programme. In their goals nurses included all four sources of self-efficacy. They also set themselves more generic goals to speak less, be more focused with their questions, and to leave more time for patients to answer and ask questions, and to interact.

Mastery experience-based and role modelling-based techniques were most often chosen by nurses as goals. The next most frequent goal aimed at using more verbal persuasion-based techniques. Physiological and affective states-based techniques were only chosen by one nurse.

A greater improvement was seen in relation to goals set regarding the verbal persuasion-based techniques. In particular, nurses started eliciting knowledge from patients instead of giving information. Although three of five nurses intended to use more role modelling-based techniques, none of them seemed to implement these techniques. It could be because the programme was designed to introduce new knowledge and practise new skills. Nurses may have felt that the group would not be able to contribute to solving someone else's problem. Thus, the marginal use of role modelling-based techniques could be an indication of nurses' beliefs regarding patients' ability to manage the new insulin treatment. However, the presented data are not sufficient to prove this assumption. It would be interesting to further explore how the use of self-efficacy techniques correspond with nurses' beliefs about patients' self-management skills. The majority of the nurses aimed also to implement mastery experience-based techniques. The changes when comparing the pre and post-intervention use of verbal techniques were minor. This could be due to the fact that mastery experience-based techniques place the patient in the centre. It means that the conversation is built on patients' issues. The patient is guided to act or to reflect on previous behaviour. When delivering verbal persuasion-based techniques, the nurse takes greater charge, for example by eliciting knowledge. Thus, using the patient's agenda to discuss self-management issues may be more challenging than following a well-known pattern of issues which are addressed when discussing self-management in general. Also, mastery experience-techniques relate to patients' previous or current experiences. The struggle with implementing these techniques could be due to the fact that the nurse did not encourage experimenting (i.e. increasing insulin doses in order to reduce blood sugar levels) from the beginning of the programme. This may result in patients not being able to reflect on their previous actions.

Not only self-efficacy techniques but also generic good communications skills like using more silence and open questions became goals as a result of the feedback session. After seeing themselves when running a group, the nurses came up with ideas how to improve their practise targeting generic communication skills. The fact that the nurses realised a need for more generic skills could suggest that the self-efficacy training raised the nurses' self-reflection skills in general. In addition, it is difficult to distinguish to what extent self-efficacy training and self-efficacy techniques target a specific theoretical construct. It remains unanswered to what extend self-efficacy techniques overlap with good communication skills. The fact that the nurses addressed generic skills without being specifically asked and trained in them suggested that there may be an overlap. Thus, when interpreting the results it has to be stressed that the intervention may have targeted not only self-efficacy techniques in particular but also good communication skills in general.

6.4.5 Feasibility of ASSET-based intervention

The feasibility can be evaluated and summarised using Glasgow's RE-AIM framework to evaluate the implementation and dissemination of interventions (Glasgow, McKay, Piette, & Reynolds, 2001). The framework included the following categories: reach, effectiveness, adoption, implementation and maintenance/cost.

Reach addresses the participation rates and representativeness of the sample. The criteria were fulfilled in this study. The present intervention was offered to local diabetes centres. All nurses who worked in the centres had the opportunity to participate in the training session, but only those who ran the starting insulin programme received the feedback.

Effectiveness relates to the effect of primary outcomes of interest. With regard to the effectiveness of the present intervention, the results suggest that nurses benefited from the intervention in the short term. The effect was measured by objective observation of behaviour change. However, follow-up data suggest that the learning was not maintained with time.

In terms of adoption, which includes the participation rates among possible settings and their representativeness, the present study attempted to include all local diabetes centers which provide education for people with poorly controlled type 2 diabetes. As presented in the method section of the validity study, however, two of three approached centers were not able to recruit participants to the starting insulin programmes. Nurses from these two centers attended the training session but did not receive feedback.

The present intervention fulfilled the implementation criteria. As described in the method section, several steps were undertaken to assure that the intervention was delivered as intended including, developing a detailed intervention protocol, videoing the training and assessing selected parts of the training by an independent coder regarding protocol adherence.

The long term effects including the costs of the intervention, labeled as maintenance, were not evaluated in the study. The effects were only evaluated in relation to 3-month follow-up. The costs were substantial in terms of time spent recording and evaluating nurses' practice. As presented in the Method section in Chapter 4, the coding procedure required on average three times as long as the actual length of the recorded material, including training the coders and discussing coding scores after coding of each session. Also, the actual intervention, as presented in the Method section in this chapter, consisted of one educational day and a feedback session. Thus, the amount of time spent to train the nurses and evaluate their behaviour was substantial. As mentioned earlier, the amount of time required to use the coding tool could be a substantial barrier for its use by clinicians. Alternative methods for using ASSET as a coding and training tool have to be explored and developed in the future. For example, in vivo, peer-review-based feedback may be more feasible and cost effective. Also, the analysis could be protocol driven and focus only on specific techniques. Alternatively, selected parts of the intervention could be assessed.

In sum, the presented study had a naturalistic design. The ASSET-based intervention was designed and run for a diabetes centre. First, the underpinning self-efficacy theory was explained by using examples from nurses' own practice. Second, nurses chose ASSET-based self-efficacy techniques as a framework for the feedback. Third, nurses were observed when running a starting insulin programme which is a part of standard care offered within the diabetes centre. The study explored the feasibility of ASSET for a NHS-based diabetes-related setting. The real-world setting, however, created several limitations.

6.4.6 Limitations

A substantial limitation of the study was the small sample size as the study included only five nurses. Thus, the representativeness of the sample could be questioned. Nevertheless, the small number of participants made it possible to analyse the behaviour change separately for each nurse and to compare the nurses in more detail considering individual patterns of change. For example, nurse one started talking more when delivering the post-ASSET intervention, but used more self-efficacy-based techniques. This was in contrast to the other nurses, who when talking less, were using more self-efficacy-based techniques. Also, for nurse one, the length of self-efficacy and non-self-efficacy-based speech did not differ. This showed that when assessing providers' behaviour in terms of delivery of specific intervention techniques, individual patterns of change need to be considered.

The limited sample size impairs the external validity – it cannot be concluded that the results can be applied to other groups. The decreased numbers of post-intervention programmes limits the possibility of conclusions regarding the pattern of change. The pattern could be random. The internal validity was carefully tested. The design and implementation of the intervention rigorously followed a theory. Due to the limited size, some of the results of the study which are based on illustrative and descriptive data can only be considered in the context of clinical significance. The intervention produced a short time change, however, we cannot exclude the chance factors, hence no statistical significance can be claimed (Robson, 1999).

The fact that the reliability of visual analysis could be biased (Busk et al., 1992) has to be taken into consideration. Nevertheless, the study used a reliable (Zinken et al., 2008) and valid (as presented in Chapter 5) coding tool. The coding was done by two independent coders, of whom one was blind to the condition.

Another major limitation of the presented study was the lack of a control condition. Thus, the intervention effect could not be proved against a control condition. The evidence, then, that the behaviour change was due to the intervention was not strong. First, the behaviour change could be due to a learning effect. As time progressed, nurses gained more experience in running groups and hence, may have improved their practice in general. However, because the observed change was not general (e.g. nurses started using more verbal persuasion-based techniques but not role modelling-based techniques), this explanation seems unlikely. Second, there could be an observer effect. The researcher who ran the ASSET-based intervention (i.e. both the training in self-efficacy and feedback) was present when recording the sessions when the nurse was running the starting insulin programme. Thus, the nurse may have put in extra effort to use more self-efficacy techniques than when not being observed. To some extent this does not contradict the intervention effect. It may show that the intervention was effective if nurses were able to use the techniques intentionally. However, the evidence for the self-efficacy-based behaviour change at 3-months follow up was mixed.

Another limitation was that the change in nurses' self-efficacy beliefs in using self-efficacy based techniques when working with patients was not measured. The effectiveness of the ASSET-based intervention was measured by the change in nurses' self-efficacy-based behaviour. Because the study was done in a real-world environment we were conscious of how busy the diabetes centre was and hence stayed focused on the main research questions when choosing the questionnaires. The information about the potential change in the self-efficacy beliefs by nurses may have given some insight into the behaviour change and maintenance process. It could provide some explanation about why nurses tend to reverse to initial behaviours (Pill et al., 1998). In the present study, nurses expressed their desire to incorporate the self-efficacy-based techniques in their practice as soon as possible. This may suggest that nurses enhanced their self-efficacy beliefs with regard to using new techniques.

Another potential criticism of the study is that it is not clear what made the main impact on nurses' self-efficacy behaviour change: was it the training in self-efficacy or the ASSET based feedback. However, the self-efficacy training was necessary for the feedback to be developed and understood by the nurses. First, the nurses were asked during the training, what ASSET-based techniques they would like us to use when providing the feedback. Thus, following self-efficacy principles, nurses were actively involved in developing the feedback protocol. Although two of the nurses had some knowledge about self-efficacy, none of them could name the four sources of self-efficacy. Thus, the training was a substantial part of the feedback, as it introduced the core self-efficacy techniques which were used to evaluate nurses' behaviour. Although the ASSET based feedback could not be provided without the training, it could be argued that the self-efficacy training could be an intervention itself. During the training, nurses not only learned about the techniques underpinning the four main sources of self-efficacy. They also practised recognising self-efficacy-based techniques from examples collected from the starting insulin programme and re-formulating non-self-efficacy utterances into self-efficacy-based techniques. Thus, already during the training nurses were exposed to the self-efficacy techniques, e.g. role modelling as the trainers acted as a role model or verbal persuasion when the self-efficacy techniques were elicited from the nurses. Nevertheless, the ASSET based feedback was mainly based on mastery experience-based techniques. It guided nurses in recognising and practising self-efficacy techniques. Mastery experience-driven techniques, according to Bandura (1997) are the most powerful of the four sources of self-efficacy. A control arm with self-efficacy training only would help to answer the question about to what extent these two parts of the intervention had a separate impact on nurses' behaviour.

In terms of the maintenance of the effect, it is difficult to conclude whether the intervention was successful or not. Two out of three nurses still used more self-efficacy-based techniques at follow-up than at baseline. However, there was a small drop when comparing the number of techniques used directly after the intervention and at follow-up. The third nurse decreased the number of techniques after the intervention. A larger sample size is required to investigate the long-term effect of the intervention.

ASSET focuses on nurses' performance. There is little information about the actual interaction. Thus, it remains unclear to what extent the techniques are appropriate, or address patients' queries etc. This information however, may be crucial when assessing the delivery of a self-efficacy-based intervention. It was also beyond the scope of the study to assess patients' characteristics in relation to the use of self-efficacy-based techniques. Some discussion on patients' characteristics and the nurse-led use of self-efficacy-based techniques can be found in Chapter 5.

With regard to the design, another limitation is the difference in the time span between training and the delivery of the post-intervention programme. Whilst some nurses ran a starting insulin programme within a month after the ASSET-based training, others waited up to three months. To address this limitation, each feedback session, which consistently took place two weeks before the next recorded starting insulin programme, started by recapturing the self-efficacy theory and behavioural techniques.

Finally, the use of ASSET requires a substantial amount of resources in terms of time spent recording, analysing and giving feedback. As previous studies showed a thorough fidelity check takes a vast amount of time (Hardeman et al., 2008; Michie et al., 2008). This is more an observation than a limitation of the study. Therefore, a more efficient ways of using the coding tool needs to be explored.

6.4.7 Summary

In sum, after the intervention nurses changed their self-efficacy-based behaviour. However, the evidence for the maintenance of the change is mixed. All nurses who took part in both, the ASSET-based training and feedback, increased the frequency of self-efficacy-based techniques when delivering the post-ASSET starting insulin programme. Of those, at 3-month follow up, two used more self-efficacy-based techniques than at baseline, whilst one decreased the use of those techniques. All but one nurse started talking less after the intervention. The effect was not maintained at 3-month follow up. This observation is in line with previous studies which showed that health care professionals are highly motivated and change their behaviour in the short term (Rollnick et al., 2002). However, they return to their familiar practice when assessed in the long term (Pill et al., 1998)

At all time points, verbal persuasion-driven techniques were the most prevalent. The least frequently utilised were role modelling-based techniques. Despite the evidence that knowledge is poorly correlated with successful illness management, knowledge is still a major target in nurses-led education (Day, 2000; Knight, Dornan, & Bundy, 2006). Previous studies implied that nurses felt obligated to discuss and elicit knowledge from the patients in order to improve self-management (Adolfsson, Smide, Gregeby, Fernstroem, & Wikblad, 2004; Pill et al., 1998). On the other hand, previous studies showed that using other patients as role models is scarcely used in nurses' practise (Allen, 2004; Koopman-van der Berg et al., 2001; Knight et al., 2006).

Nurses who used more self-efficacy-based techniques at baseline and had some additional training and supervision prior to the study improved less than those who used less self-efficacy-based techniques at baseline and had no experience with additional training and supervision. A review of audit and feedback showed similar results. Little compliance with targeted behaviour at baseline seemed to predict positive intervention effects (Jamtvedt, Young, Kristoffersen, O'Brien, & Oxman, 2007).

The study had several limitations. Due to a limited sample size, the statistical effect of the intervention is limited. Because of a lack of a control condition the results have to be interpreted with caution. For example, the increase in the self-efficacy-based speech utterances could be due to a learning effect. Other discussed limitations include the complexity of the intervention, a lack of assessment of nurses' self-efficacy belief, asymmetry of the coding (i.e. patients' contribution was not coded), the uneven time span between training and recording of the sessions, as well as the time consuming coding.

On the other hand the study had some strengths contributing to existing research. Numerous interventions to change professionals' behaviour provide little evidence that the intervention was theory-based (Knight et al., 2006). The present study explored the effectiveness of a theory-driven tool. It applied several treatment fidelity steps to assure that the intervention is theory-based at each step of the delivery. Second, numerous studies use mock clients to assess and change professionals' behaviour (Lane, Johnson, Rollnick, Edwards, & Lyons, 2003; Uitterhoeve et al., 2007). Only few studies have had a naturalistic design such as the present one (Holmstroem, Larsson, Lindberg, & Rosenquist, 2004). Nurses were observed and trained in the context of their everyday practice. Third, good educators are not only those who effectively use certain techniques to support patients' self-management skills, but also those who are able to reflect on their practice (Fish & Coles, 1998). The present study contributed to nurses' reflective skills by building the intervention on examples from nurses' own practice. This is in line with previous studies which showed that education based on experience-based examples is the most effective form of intervention aiming at professionals' behaviour change (Funnell et al., 2006). Fourth, many studies are run outside the health service, which poses the risk of loosing relevant information on how the intervention reflects the real needs of professionals and patients and how it fits into the standard health practise (Doherty, Hall, James, Roberts, & Simpson, 2000). The present study explored the feasibility of the tool in a real world setting. Fifth, numerous studies base their results on self-reported data (Eccles et al., 2006; Funnell et al., 2006; Grimshaw et al., 2001). As previous studies showed, self-reported and observed data often provide different pictures (Koopman-van der Berg et al., 2001). The present study scrutinised nurses' behaviour giving some insight in the process of behaviour change and maintenance.

Previous studies used mock clients to change nurses' behaviour (Newes-Adeyi, Helitzer, Roter, & Caulfield, 2004; Uitterhoeve et al., 2007). The strength of the present study was that the intervention was developed based on nurses' own practice. For example, nurses reflected on examples retrieved from the starting insulin programme. During the intervention nurses had the opportunity to discuss issues that had arisen from their work and to apply new skills to their every day practice. Thus, nurses were able to relate to their practice when learning new knowledge and practising new skills.

6.4.8 Future directions

It has been shown that the present study had some similarities with previous research contributing to existing knowledge. The real world approach provided some insight into nurses' practise highlighting various issues which could be further explored. Several limitations have been addressed. Therefore, there are numerous questions which could be addressed and numerous methodological issues which could be improved in future research.

A randomised controlled trial would substantially contribute to the validity of the results. Two controlled arms, i.e. no intervention and self-efficacy training without feedback, would help to solve the specific limitations of the presented study. An RCT would help to conclude to what extent the improvement in the use of self-efficacy is due to the intervention in general. The training arm would illuminate the separate impact of training and feedback. Whereas the training was based on verbal persuasion and role modelling, the ASSET-based feedback was mainly based on mastery experience-driven techniques. This in turn could potentially give some insight into the effects of different self-efficacy techniques and contribute to the dispute on the hierarchical order of the four sources of self-efficacy (for further discussion see Chapters 1 and 4).

There was sufficient evidence that self-efficacy was the active component (Michie et al., 2004) of the presented intervention. However, it seems that the intervention was not effective in terms of maintaining of nurses' behaviour change. Whilst there is a large body of evidence showing that self-efficacy is a strong predictor of behaviour change (Bandura, 1997; Maddux et al., 1995; Schwarzer, 1992), little is known about the factors which contribute to the maintenance of behaviour change. It would be interesting to explore these factors and techniques which may help to maintain the new behaviour. For example, exploration of nurses' beliefs regarding their and patients' role in the process of illness management as well as a longitudinal design may give more insight into the behaviour change process. It would be interesting to further explore to what extent the initial behaviour change became a part of nurses' everyday practice and what made the nurses relapse.

The self-efficacy training is based on the assumption that nurses had basic communication skills. However, when considering the goals nurses set for themselves as a result of the ASSET-based feedback it became clear that nurses might need more generic communication training before specific self-efficacy training. It would be interesting to explore whether there is a difference in the impact of a generic communication skills training and an ASSET-based intervention.

In the future, it would be interesting to further investigate the link between length of nurses' speech, content and the techniques used. Getting more insight into the link between the lengths, content and underpinning technique could help to better understand the patterns of nurses' behaviour.

ASSET provided a great deal of information on how nurses deliver a programme and how they changed as a result of training. In the next step, it would be interesting to explore how the ASSET-based information relates to the patient-provider interaction and underlying nurses' beliefs. Conversation analysis could be used to get more insight into the interaction. This could be compared to the ASSET-based data.

CHAPTER 7: CONCLUDING REMARKS

This piece of research has explored the construct of self-efficacy in the context of diabetes self-management. The aims of the thesis were to develop a self-efficacy-based coding tool and to test it in terms of its reliability, validity and clinical utility.

7.1 Conclusions / Implications

7.1.1 ASSET Reliability study

The data presented here introduced a new coding tool: the Analysis System for Self-Efficacy Training based on social cognitive theory (Bandura, 1997). The categories described in ASSET are mutually exclusive. Four sources of self-efficacy (i.e. mastery experience, role modelling, verbal persuasion and physiological and affective states) and outcome expectancies constituted the basis of the coding tool. The theory-driven categories were operationalised into 11 verbal behavioural techniques. These were facilitating pro-active self, self-reflection and successful trial within the mastery experience-based category; successful other, sharing obstacles, and group solving within the role modelling-based category, positive feedback, elicitation of knowledge, and planning for obstacles within the verbal persuasion-based category, and exploring affective states and exploring physiological states within the physiological and affective states-based category.

7.1.2 ASSET Validity study

The results of the validity study revealed that, to some extent, ASSET accurately and comprehensively addresses the four sources of self-efficacy. Independent coders agreed on distinct self-efficacy techniques when coding with ASSET. Whilst one of the coders reached overall agreement with the author of ASSET, the other consistently rated non-self-efficacy-based speech as self-efficacy. This coder included information-giving and summarising into self-efficacy-based techniques. The author, however, made a conscious decision not to incorporate ‘summaries’ and ‘information-giving’ as self-efficacy strategies. The decision was based on theoretical and empirical assumptions. First, according to Bandura (1997), knowledge is necessary but not sufficient for self-efficacy to develop. There is broad research evidence which supports this decision. For example, McCaul and colleagues showed that self-efficacy belief, but not knowledge and skills, predicted diabetes-related self-care behaviours (McCaul et al., 1987). Second, summarising is a necessary skill to facilitate discussion (Yalom, 1995). However, summarising places the individual in a passive role and may not encourage independent problem solving. It shifts the responsibility for processing the information and finding a solution onto the nurse/facilitator.

With regard to discriminant validity, ASSET to some extent appeared to be able to capture individual differences in the use of self-efficacy-based techniques. These differences in the use of self-efficacy-based techniques reflected nurses' experience gained prior to the study. Additional training and supervision from senior nurses were associated with greater amounts of self-efficacy-based techniques used by nurses. There were significant differences in the length of patients' speech after different nurse-led self-efficacy-based techniques and non-self-efficacy-based speech. However, whilst the preliminary results of the reliability study showed that self-efficacy triggered longer response from patients, the results of the validity study showed that patients talked less after self-efficacy-based techniques than after non-self-efficacy speech. These results could indicate that self-efficacy-based techniques do not work for everyone. As a study of aggressive insulin titration showed, for example, directive guidance improved patients' outcomes in that context (Yki-Jaervinen et al., 2007). Alternatively, different levels of self-efficacy, different levels of experience with the targeted behaviour or different emotional states (for example regarding anxiety levels) might have contributed to patients' receptiveness towards self-efficacy-based techniques and might therefore have impacted on the relationship between the techniques used by the nurses and patients' self-efficacy beliefs.

With regard to the predictive validity of ASSET, the nurse-led self-efficacy-based techniques determined patients' intention and titration behaviours but did not predict patients' self-efficacy beliefs. Patients who received more self-efficacy-based techniques were more likely to have the intention to titrate the insulin dose. Also, patients who received a larger amount of self-efficacy techniques during the programme were more likely to titrate than those who received fewer self-efficacy techniques.

No association was observed between the self-efficacy based techniques delivered by nurses and self-reported self-efficacy belief by patients. This lack of a relationship could be interpreted in four different ways. First, assuming that there is a link between self-efficacy-based techniques and patients' self-efficacy beliefs, the coding tool may not have been accurate in identifying the self-efficacy strategies. Second, assuming that the tool identified the techniques accurately, the self-reported self-efficacy scale may not have been valid. However, the self-efficacy beliefs predicted patients' intention to increase the insulin dose, which suggests that the scale might be valid. Third, as discussed previously, one of the limitations of the study was that the self-reported self-efficacy data were collected only after the intervention, and the assumption was made that at baseline all patients were lacking confidence in adjusting. Thus, in fact the change from before to after the intervention could not be assessed. The lack of a change score could potentially be the reason why the results did not reveal any link between patients' self-reported self-efficacy and nurses-led use of self-efficacy techniques. Fourth, assuming that both measures were valid, the self-efficacy techniques may not have been successful in changing the self-efficacy belief. Fifth, the theory could be disputed. The four sources of self-efficacy described by Bandura may not be tailored to influence the change in self-efficacy belief. This, however, seems to be a very tentative argument considering the large body of evidence for the effectiveness of self-efficacy strategies and the predictive strength of self-efficacy for behaviour (Bandura, 1997). However, as shown in the introductory chapters, the evidence regarding the predictive strength of self-efficacy beliefs for health-related outcomes is rather flawed. It is possible that, especially in the context of mastery experience, behaviour enhances self-efficacy beliefs and not the other way around (Peyrot, 1999). The question regarding the direction of this relationship is beyond the scope of the thesis and, in the light of current literature, it remains unsolved.

Taking into account that nurse-led self-efficacy techniques were related to the objective patient behaviour of titrating insulin, the most promising hypothesis seems to be that the self-efficacy scale was not valid. A reliable and valid scale to measure insulin titration-related self-efficacy belief is needed to explore these questions.

7.1.3 ASSET-based intervention for nurses

After the ASSET-based intervention all nurses started using significantly more self-efficacy-based techniques than when delivering the starting insulin programme at baseline. The effect, however, was not sustained over time. Even those nurses who used more self-efficacy-based techniques at 3-month follow up when compared to baseline decreased the number of techniques in comparison to the programme delivered directly after the intervention.

The deterioration in the number of self-efficacy-based techniques at the 3-month follow-up may reflect the general observation that the effect of interventions weakens over time if ongoing support for maintenance is not provided (Pill et al., 1998). With regard to the results of the present study there may be a number of possible explanations for the decrease in the self-efficacy-driven performance. First, nurses may have got used to the fact that they were observed so they went back to their routine practice. Second, the third (follow-up) groups might have been more difficult. For example, the patients might not have responded to the questions or might not have had any concerns regarding insulin use. The nurses might have asked fewer questions and provided more knowledge. Third, the short-term behaviour change found directly after the intervention might not have expressed a change in nurses' beliefs. They might have applied the new techniques, but their beliefs about the responsibility for illness management might not have changed. Thus, the behavioural change may in fact not have become part of everyday practice.

The change in the use of self-efficacy techniques observed directly after the intervention might have been related to nurses' experience prior to the study. These nurses who did not attend additional training and did not receive supervision from a senior colleague increased their use of self-efficacy-based techniques more than those who were more experienced. This finding may suggest that the ASSET-based training addresses basic skills and is less relevant for more experienced nurses. Alternatively, the results could suggest that individuals who did not develop entrenched attitudes and beliefs are more ready to change.

As a part of the intervention, nurses set individual goals to implement when running the next starting insulin programme. Despite the fact that the nurses most often aimed to increase the number of mastery experience and role modelling-based techniques, the greatest improvement was with regard to verbal persuasion-based techniques. In particular, nurses started eliciting knowledge from patients instead of giving information. This confirmed previous studies which showed that verbal persuasion-based techniques are the most prevalent in nurses' practice and the most likely to change (Koopman-van der Berg et al., 2001). The findings are also in line with Bandura's claim that verbal persuasion is the source of self-efficacy that is easiest to implement (Bandura, 1997). When the study finished, nurses asked us to run an additional training for them. This may suggest that the intervention was valued and relevant for the nurses. Alternatively, the intervention might have helped them to realise their inadequacies but did not help them to change. In conclusion, the ASSET-based intervention was effective in enhancing the use of self-efficacy-based techniques among nurses in the short term. The less experienced nurses benefited most from the intervention.

With regard to the feasibility of ASSET as a coding and intervention tool, the results were mixed. This was mainly because the costs in terms of time spent recording and analysing nurses' behaviour were substantial. Despite the fact that the study provided very rich data in terms of individual differences when delivering self-efficacy-based techniques, the substantial amount of time and work involved raises the question whether the intervention delivered in a form like this is feasible. Involving nurses in assessing the intervention and simplifying the coding procedure may contribute to the feasibility of ASSET as an evaluation and training tool. For example, only the four sources of self-efficacy could be used by nurses to self-reflect on their practice.

7.2 Limitations and future directions

The present thesis made some contributions to diabetes and health psychology. First, the research addressed a major gap in the literature by translating self-efficacy theory into practice. Second, it used objective data of nurses' behaviour rather than self-report, frequently criticised for its inaccuracy. Third, the observational data regarding the intervention were related to patients' outcomes. Fourth, patients' objective and self-reported data were compared. Fourth, the research was embedded in a real world setting. Peyrot has criticised research in diabetes for not addressing the reality of what is happening in diabetes care (Peyrot, 1996). The present thesis is an attempt to explore the reality of diabetes care. Fifth, not only cross-sectional but also longitudinal data were used to explore intention and behaviour change as well as to show how interventions change from session to session. Sixth, the research explored and applied the concept of self-efficacy in a new manner. As a consequence, the results are rich and inspiring for further investigation as outlined in the next section. At the same time, however, the research suffered from several limitations.

7.2.1 Limitations

There are numerous issues which limited the thesis as a result of the real world setting. First, there thesis suffered from a small sample size. The development and testing of the reliability of ASSET was based on data from four facilitators. This potentially could have limited the diversity of techniques used and provided inaccurate information regarding their prevalence. This could potentially lead to biased conclusions regarding the ease and difficulty of the implementation of specific techniques. There were also a limited number of participants in the validity and intervention studies. In the validity study, I analysed patients' data clustered into the groups they attended. In the intervention study, there were only three nurses who were recorded at three time points. Thus, the conclusions drawn are based on a limited number of individuals. It has to be stressed that the nurses who took part were the same in both the validity and the intervention study. Thus, the analysis regarding discriminant validity and effectiveness of ASSET-based intervention were based on the same dichotomisation between more and less experienced nurses. Thus, the same potential confound between person and experience was present in both studies. This makes the findings for the effects of experience inconclusive. A larger sample of nurses with greater diversity of experience is needed to test discriminant validity of the coding tool and the experience effect on intervention effectiveness.

The limited number of nurses and patients on the one hand and drop out of two centres on the other reflected the real world conditions.

Second, due to the limited number of participants there was no control group for the intervention study. The intervention effect could not be proven against a control condition and hence the evidence that the behaviour change was due to the intervention was not strong. The behaviour change could be due to a learning effect. As time progressed, nurses gained more experience in running groups and hence might have improved their practice in general. However, the increased number of self-efficacy-based techniques dropped in the follow-up programme, which speaks against a learning effect. In addition, the observed change was not found in all self-efficacy-based techniques. For example, nurses started using more verbal persuasion-based techniques but not role modelling-based techniques. The learning effect, then, seems unlikely. Also, the nurses who maintained the effect at the follow-up slightly decreased the number of self-efficacy-based techniques. If not a learning effect, there could be an observer effect. The researcher who ran the ASSET-based intervention (i.e. both the training in self-efficacy and feedback) was present and recorded the session when the nurse was running the starting insulin programme. Thus, the nurses might have made an extra effort in using more self-efficacy techniques than when not being observed. However, the decrease in the use of self-efficacy-based techniques at follow-up excludes this conclusion. To some extent this does not contradict the intervention effect. It would have shown then that the intervention was effective since nurses were able to use the techniques intentionally.

Third, only 3-month follow-up data were recorded. Glasgow claimed that maintenance of an intervention effect has to be measured at least six months later

(Glasgow et al., 2001). In the validity and intervention study, the data collection was stopped due to two reasons. Three of five nurses stopped running the starting insulin programme and the recorded data was already very rich.

Fourth, due to adjusting the study design to the real world setting, the period between the pre-condition self-efficacy-based training and running a starting insulin programme by a nurse ranged between 2 weeks and 3 months. We tried to address this issue by re-capturing the self-efficacy concept in the feedback session. Also, the analysis of nurses' behaviour change showed no effect of the different time span between training and the use of self-efficacy-based techniques by a nurse.

Fifth, no self-efficacy belief questionnaire was administered at baseline. In the pilot study, patients' response at baseline when asked to fill in the self-efficacy and intention scales was very negative. Most of the approached patients seemed to feel offended by being asked whether they have the confidence and intend to adjust insulin before they had a chance to gain some experience of using insulin. Some patients expressed concerns that they were not sure whether they will start insulin, thus it was impossible for them to answer the questions. Therefore, an assumption was made that patients' confidence in being capable of adjusting insulin was low at baseline.

In addition, there are numerous limitations of the studies with regard to the validity of the coding tool.

First, the results were based on multiple significance tests and used multiple outcome measures. Thus, the results pose a risk of Type 1 error and could be difficult to interpret. When interpreting the results, it has to be remembered that the obtained significant observations could be due to chance (Bland and Altman, 1995).

Second, part of the analysis to assess the validity of the coding tool was based on the assumption that the length of nurses' and patients' speech is associated with specific self-efficacy and non-self-efficacy techniques. Although some relationship between the length of speech and self-efficacy techniques was found, the rationale for this observation is not very strong. It might be more appropriate to assess construct validity in a different way. For example, I could have prepared some structured videos with different self-efficacy interventions and asked new raters to score the videos with ASSET and then compared their rates.

Third, ASSET focuses on nurses' performance and there is little information about the actual interaction. In contrast to established assessment instruments such as RIAS or VR-MICS, ASSET does not code patients' talk. Sequences of interaction and nurses' receptiveness to cues cannot be assessed. It remained unclear to what extent the techniques are appropriate for a specific group of patients, address patients' queries and respond to patients' needs.

Fourth, to date analysis with ASSET requires a substantial amount of time. Whilst it is feasible for a PhD student to spend hours on coding, someone who works as a peer reviewer may not be able to devote so much time to analysing nurses' behaviour.

Fifth, it may be possible that ASSET identifies the use of techniques based on other theoretical constructs. For example, the question "*What would help you to understand it (e.g. hypoglycaemia) better*?" was coded as mastery experience-facilitating pro-active self technique. This speech utterance, however, could be seen as a technique to enhance perceived behavioural control. This concern highlights the fact (as outlined in Chapter 1) that social cognition models overlaps. In addition, ASSET may identify the use of generic intervention techniques such as goal setting or problem solving.

In addition, the coding of nurses' behaviour could have been biased. This might have been because I was the author of ASSET, the camerawoman, the trainer, the coder and the peer-reviewer. There were times when it was difficult for me to stay objective as I was so much involved in the research. This was the case especially when I was coding the post-condition starting insulin programmes. I was aware of the motivation and enthusiasm which the nurses had for the study. To address this potential bias in assessing nurses' behaviour, a second blind coder rated six sessions. The inter-rater agreement was high (ranging between .81-.86).

7.2.2 Future directions

This piece of research has raised several issues which could be further explored. To address the limitations of the present thesis, a more robust design could be applied to replicate the present studies and test their results. The next study could test the effectiveness of an ASSET-based intervention in a randomised controlled trial. The nurses could receive the intervention at the same time intervals. Long-term intervention effects could be measured. A larger group of nurses would be included in the study, to allow a cluster analysis. Also, a multi-centre design would prevent contaminations, as the same intervention would be delivered to each nurse separately at differ time points (i.e. before each nurse runs her/his educational programme). Involving more centres in the study would make it possible to assess the utility of the ASSET-based intervention in a broader context. For example, it would be possible to test not only the reach (i.e. the representativeness of the sample), effectiveness and the implementation (i.e. whether nurses' behaviour changed and whether the intervention was delivered as intended) but also the applicability (i.e. whether the intervention is feasible to be offered in a NHS-based setting), and maintenance (i.e. to what extent not only the effect but also the intervention can be offered over time, cost effectiveness) (Glasgow et al., 2001).

This piece of research provided very rich data. Therefore, at least six theoretical and practical questions have arisen which could be explored in future studies.

First, with regard to the coding tool, a simpler version of ASSET-based categories and most importantly a simpler way of coding could be developed. For example, the analysis could focus on the four sources of self-efficacy only.

Second, potential areas of ASSET application could be explored. For example, ASSET could be applied to other chronic conditions. In order to do so, examples from the specific condition could be collected and incorporated into the coding manual. Also, ASSET could potentially be used as a self-help tool to guide health care professionals in reflection on their practice. This could be done with the help of a web-based programme. The ASSET-training tool (as presented in Appendix H) consists of cards with self-efficacy-based categories and cards with examples of self-efficacy-techniques. Thus, potentially based on the card game "Hearts", ASSET could be developed as a web-based self-help instrument. For example, one of the tasks could be to match examples with definitions of self-efficacy-based techniques.

Third, more emphasis could be put on patient-provider interaction. Results of the intervention study showed that there were nurse and group effects on the use of self-efficacy-based techniques. Therefore, it could be further explored to what extent the interaction influenced the use of self-efficacy techniques. In order to do so, additional categories could be developed. Alternatively, an additional tool could be used such as Conversation Analysis (Schegloff, 2007) or the Roter interaction system (Roter et al., 2002). The results could be compared with ASSET-based findings.

Fourth, it would be interesting to explore what contributes to nurses' behaviour change. It is striking that some nurses maintained the behaviour change (i.e. used an increased number of self-efficacy-based techniques compared to before the intervention), whereas others went back to their previous practice. The use if the verbal behavioural techniques mean indicate not only nurses' skills but also attitudes towards patients and their self-management. Therefore, it would be interesting to explore the predictors and indicators of a self-efficacy-based approach. Two areas could be explored. The first concerns professionals' beliefs regarding patients' and providers' responsibility to manage the chronic condition. The second areas which could be explored concerns professionals' beliefs about the factors which contribute to effective management emphasising the role of knowledge. This might be relevant despite the fact that knowledge has been shown to be a necessary but not sufficient factor in successful management. Many professionals and researchers, nevertheless, still perceive knowledge as a major factor in self-management (Chapman-Novakofski & Karduck, 2005).

Fifth, it could be further explored whether the self-efficacy approach is suitable for a special group of patient and a special form of education. The results of the present thesis may indicate that this is the case. Patients with type 1 diabetes talked longer after a self-efficacy-based technique than after non-self-efficacy-based speech. Patients with type 2 diabetes who were starting insulin, in turn, talked longer after non-self-efficacy-oriented speech than after self-efficacy-based techniques used by nurses. This could be due to the fact that the patients with type 1 diabetes were experienced in their management (i.e. were more confident in their management and had more examples to discuss). The patients with type 2 diabetes, in contrast, did not have any experience with the insulin treatment. We still do not know whether and to what extent self-efficacy-based training works for everyone. There may be various other effective ways of supporting patients' self-management which are worth exploring. For example, direct health professional-led advice regarding the titration of insulin may have a beneficial effect on patients' HbA1c (Yki-Jaervinen et al., 2007). Compliance may depend on the characteristic of the condition which has to be managed (Peveler, personal communication, March 15, 2006). It would be interesting to explore to what extent the desire for being guided by a health care professional is due to the traditional care system with the professional being the expert. It could also be that some patients are more in need for self-efficacy intervention than others.

Finally, a theoretical question has arisen from this piece of research. A large number of studies are based on the assumption that self-efficacy predicts behaviour change. Nevertheless, some authors claim the reverse, that behaviour change may enhance self-efficacy belief, or an interaction between belief and behaviour. Since the majority of the studies have a cross-sectional design it is impossible to conclude the direction of the associations. Peyrot and Rubin claimed that behaviour change is prior to belief change (Peyrot et al., 1990). From this point of view, interventions should address behaviour directly and not via self-efficacy change (Peyrot, 1999). It has also to be mentioned that other factors than beliefs may be more relevant for behaviour change (Lawton, Peel, Parry, & Douglas, 2008). What factors, if not self-efficacy, may contribute to behaviour change? The presented thesis does not answer these questions. The present thesis is based on a theory but did not test it. As Peyrot pointed out "applying and testing a theory is not the same" (Peyrot, 1999, p.69). As far as this piece of research is concerned, it would be interesting to explore the questions about whether behaviour or belief change is easier to achieve and more effective with regard to health-related outcomes.

In sum, this piece of research has raised several questions and issues which can be further explored. Future studies can address the outlined limitations in order to design a methodologically robust study. Theoretical and practical questions can also be further explored.

7.3 Summary of contributions/applications

Numerous studies which tested the effectiveness of theory-based interventions based their conclusions on self-report measures. There is, however, a body of evidence showing that self-reported data may not be accurate in reflecting the measured constructs (Koopman-van der Berg et al., 2001; Eccles et al., 2006). Thus, it remained unclear whether the intervention was delivered as intended and whether the effects are due to the intervention. Researchers who apply a theory in intervention studies can only benefit in full from their effort if they apply a treatment fidelity assessment (Michie et al., 2004). The present study addresses these issues in two ways. First, the study contributed to the fidelity check by developing a theory-based coding tool. ASSET makes it possible to test treatment fidelity of self-efficacy-based interventions. Secondly, the results presented in the thesis are mostly based on observational and objective data. It provided detailed information about what happened during the diabetes programmes. It explored potential associations between nurses' behaviour and objectively evaluated patient outcomes.

The present thesis operationalised theoretical constructs into tangible intervention techniques. These could be used to assess as well as to train health care professionals in the delivery of structured and effective interventions. ASSET is a generic, theory driven tool which potentially can be applied to various patient populations engaged in self-management.

When trained for delivery of self-efficacy enhancing interventions, nurses may experience a conflict with their previous didactic delivery style (Adolfsson et al., 2004).

With ASSET, facilitators can receive a clear training on how to deliver interventions in a systematic way. Furthermore, evaluative feedback on individuals' patterns may help to utilise self-efficacy strategies in situations where a didactic teaching was delivered so far. Thus, operationalisation of self-efficacy-driven techniques explained in training and accompanied by an evaluative feedback may improve nurses' practice.

Studies which explore the effectiveness of interventions rarely combine practitioners' and patients' outcomes (Hakkennes & Green, 2006). Interventions designed to change providers' behaviours focus on providers' behaviour and rarely assess the impact on patients' outcomes. The present thesis investigated both the proximal and distant goals of the intervention. It explored the impact of ASSET-based intervention on nurses' behaviour and the effect of nurses' behaviour on patients' related outcomes.

There is no doubt that there is a need for quality assessment within health service (National Institute for Clinical Excellence, 2003). A less time consuming intervention could be, however, more beneficial and more feasible for the real world setting.

APPENDICES

Appendix A Abstracts

Chapter 1

The chapter begins with describing the theoretical context of social cognition models and highlights the overlapping theoretical constructs including the health belief model, the theory of reasoned action/theory of planned behaviour, protection motivation theory, and the health action process approach. Then, it presents social cognitive theory focusing on the self-efficacy construct. The self-efficacy construct is described in detail and distinguished from the colloquial term confidence and from other theoretical constructs such as unrealistic optimism, self-esteem, autonomous self-regulation or perceived behavioural control. This chapter describes specific techniques which can be used to enhance self-efficacy. Finally, Chapter 1 provides a conceptual framework, based on self-efficacy theory, which was used for the development of the coding tool, ASSET. Within the model the four sources of self-efficacy are considered on two dimensions: actor and behaviour involved in the technique.

Chapter 2

Chapter 2 provides an overview of diabetes as a chronic condition. It discusses the rationale for choosing diabetes as a good example to study self-efficacy-based interventions addressing the role of self-management in diabetes, the complexity of the condition, the role of health care professionals, the prevalence of diabetes, the evidence-based guidelines regarding diabetes care, and the role of self-efficacy in studying diabetes management. Chapter 2 also reviews the studies on the association between self-efficacy beliefs and diabetes related health outcomes including psychological, behavioural and physiological factors among adults with type 1 or type 2 diabetes. Twenty six studies are included in the review. The self-efficacy questionnaires, the measures and size of associations were summarised. The results showed that the majority of the studies provided some evidence that self-efficacy beliefs are associated with psychological well-being, self-care behaviours and blood glucose control. However, there were several weaknesses of these studies which limit the strength of the evidence such as reliance on self-report data, cross-sectional designs or inaccuracy of the measurement of self-efficacy beliefs. These limitations are discussed in the final section of the chapter.

Chapter 3

The aims of this chapter were to identify a compendium of self-efficacy based techniques and to explore their effectiveness regarding patients' diabetes related outcomes including psychological well-being, self-care behaviours, and blood glucose control among adults with type 1 or type 2 diabetes. First, an overview of systematic reviews which explored effectiveness of self-management in diabetes emphasising the role of self-efficacy was presented. Second, MedLine, Embase, and PsychInfo were searched for studies published since 2002 describing self-efficacy based interventions and their impact on patients' diabetes related outcomes. Eight studies met the inclusion criteria. The self-management programmes consistently showed positive effects on patients' diabetes knowledge, self-care behaviours and some evidence regarding improvement in self-efficacy beliefs and HbA1c. The most often utilised techniques included mastery experience based ones, verbal persuasion based evaluative feedback and elicitation of knowledge, role modelling based group problem solving and sharing stories and exploration of physiological and affective states. None of the programmes objectively assessed the delivery of the interventions. In addition, the evidence presented in the reviewed studies concerning protocol adherence (i.e. implementation of self-efficacy), has almost always been based on facilitators' self-report. Therefore, in the final section the chapter discusses the methodological issues with regard to intervention studies highlighting the need for a treatment fidelity checks including issues concerning study design, training of the providers, delivery of treatment, and receipt of treatment.

Chapter 4

The chapter presents the development of a coding tool for self-efficacy orientated interventions in diabetes self-management programmes (Analysis System for Self-Efficacy Training – ASSET) and explores its construct validity and clinical utility.

Method

First, published self-efficacy based interventions for diabetes care were analysed in order to collect a compendium of self-efficacy based verbal behavioural techniques. Second, three self-efficacy based programmes were observed in order to identify further self-efficacy techniques. These programmes aimed to enhance participants' self-efficacy beliefs by guiding them in their identification of their diabetes-related needs and helping them to set individual self-management plans. Third, two 18-hour long self-management programmes for people with type 1 diabetes delivered by 4 health care professionals were recorded and coded by the author of the thesis to develop the first version of ASSET. The author distinguished between self-efficacy and non self-efficacy speech utterances. Three further coders rated the earlier coded self-efficacy speech utterances using ASSET.

Results

The four sources of self-efficacy and outcome expectancies constituted the basis of the coding tool. The theory-driven categories were operationalised into 11 verbal behavioural techniques. The reliability between two coders who used the final version of ASSET was good (*K* =.71). The preliminary analyses of the coding scores revealed that individual patterns of delivery and shifts over time across facilitators can be found. It was observed that self-efficacy utterances were followed by longer patient verbal responses than non self-efficacy utterances.

Discussion

ASSET assesses the number of self-efficacy based techniques. Preliminary analyses indicated that nurse led self-efficacy techniques triggered longer responses in patients than non self-efficacy speech. ASSET can also be used to further explore the sequence of techniques used in an intervention, provide a deeper insight into the delivery process, and ascertain the impact on patients' short-term outcomes (i.e. response length).

Chapter 5

The aim of the study was to establish content, discriminant and predictive validity of the new coding tool – Analysis System for Self-Efficacy Training (ASSET).

Method

Five nurses who run a starting insulin programme for people with type 2 diabetes took part in the study. The nurses who delivered the programmes differed in terms of age (M = 39.61, SD = 8.53), years of working in diabetes (M = 9.11, SD = 6.91) and additional experience measured as hours of extra training prior to the study (M = 1.21, SD = 1.31) and hours of supervision received from a senior nurse (M = 4.61, SD = 1.31). Thirteen programmes delivered in two (two hour long) sessions, two weeks apart, were video recorded. Fifty two patients (73% males) took part in the programmes. The patients were people with type 2 diabetes (age M = 62, SD = 11.48) who were referred to the programme due to their increased blood sugar levels and hence increased risk of cardiovascular problems. The application of self-efficacy based techniques by nurses was measured using a reliable coding tool, ASSET, by at least two coders. The self-reported data regarding insulin beliefs (ITAS) was collected from the patients at baseline and after the starting insulin programme. After finishing the programme and at three-month follow up the patients answered the self-efficacy beliefs, intention and behaviour in relation to insulin adjustment scales. With patients' consent, insulin titration undertaken in the first two weeks after starting insulin and three months after finishing the programme as well as pre and three months post programme HbA1c level (i.e., glycated haemoglobin) were recorded.

Results

Regarding content validity, the results showed that the agreement was satisfactory (K = .72) only between one of the coders and the author of the thesis. There was a pattern of disagreement between the coder and the author. The coder rated 69% of 'summaries' and 'lectures' as self-efficacy techniques. Regarding discriminant validity, the results showed that there was an association between the coding scores gained from ASSET and nurses' experience prior to the training. The nurses who had an additional experience prior to the study used more self-efficacy techniques than those without additional experience. Regarding predictive validity, the results revealed that the more self-efficacy techniques the nurses used, the more likely the patients were to adjust their insulin dose. No association was observed between the use of self-efficacy based techniques by nurses and patients' self-efficacy beliefs.

Discussion

The mixed results regarding content validity may indicate that on the one hand ASSET misses some aspects of self-efficacy-based techniques. On the other hand, the results may show that the nurse coder misinterpreted the notion of self-efficacy. Coding with ASSET distinguished between more and less experienced nurses. The fact that the nurses who received supervision and attended additional training (e.g. communication skills) could indicate that ongoing reflection on their own skills contributes to the use of self-efficacy based techniques by the nurses. The small number of nurses involved in the analysis limits, however, the discriminant validity of ASSET. The predictive validity of ASSET was supported by the observation that the more self-efficacy techniques used by a nurse, the more likely the patients were to adhere to the treatment (i.e. adjust insulin). However, the nurse-led self-efficacy techniques were not associated with patients' self-efficacy beliefs.

A serious limitation of the study was the coding procedure. Only the author of the thesis coded all speech utterances. The other coders only rated preselected speech utterances identified by the author as self efficacy techniques. This potentially biased coding precedure, questions the discriminant and predictive validity of ASSET.

Chapter 6

The study aimed to increase the number of self-efficacy based techniques used by nurses when delivering group education for patients with type 2 diabetes who started insulin treatment.

Method

A single-case, one group pre-post design was applied. Five nurses who delivered a starting insulin programme took part in the intervention study. The self-efficacy based intervention included educational training in self-efficacy and individualised feedback. During the eight hour educational training, the nurses actively learned the four sources of self-efficacy, mastery experience, role modelling, verbal persuasion and physiological and affective states, and practiced the use of self-efficacy techniques. The two hour feedback session consisted of a guided reflection on nurses' video-recorded practice and a goal setting with regard to the use of self-efficacy techniques. Five baseline, four post-intervention and three follow-up 2-hour long starting insulin programmes were recorded and evaluated with regard to the number of self-efficacy techniques using a standardised assessment tool, Analysis System for Self-Efficacy Training, ASSET.

Results

All nurses increased the number of self-efficacy techniques after the intervention. The effect decreased at 3-month follow up. These changes in nurses' behaviour corresponded to a large extent to their individual goals. The greatest improvement was observed with regard to verbal persuasion based techniques (i.e. instead of delivering information, the nurses started eliciting knowledge from the patients). The smallest change was related to role modelling based techniques (e.g. the nurses hardly used the group to solve someone's problems). The less experienced nurses, with no additional training prior to the intervention, improved more than those with additional training.

Discussion

The findings suggest that a self-efficacy based intervention may change nurses' behaviour in the short term. The deterioration in the number of self-efficacy techniques may support the general observation that the effects of interventions weaken if ongoing support is not provided. The intervention might have helped nurses to realise their inadequacies but did not help them to change in the long term. The nurses might have applied new techniques but their beliefs about the responsibility for patients' self-management might not have changed. Thus, the new behaviour did not become a part of everyday practice. The fact that nurses' behaviour change was related to their experience could suggest that the intervention addressed basic skills less relevant for more experienced nurses (e.g. guiding self-reflection and setting goals). Alternatively, the results could suggest that individuals who had not developed entrenched attitudes were more ready to change. Due to the small sample size and the lack of control group the results of the study should be interpreted with caution.

Appendix B Assessment instruments to study doctor-patient communication discussed in the review.

Assessment instrument	**Observational medium**	**Behaviours of interest**	**Classification system for categorising behaviours**	**Operational approach to measure these behaviours**
RIAS	Video, audio material or transcripts	Verbal and non verbal behaviours	34 interaction-based categories including affective, instrumental, non-verbal, and global affect rating categories.	Uninterrupted speech unit 6-point rating scale for affect categories
MIPS	Audio and video material	Verbal and non verbal behaviours	15 content,5 mode of exchange (divided into specific process and function), 7 non-verbal, and 7 global doctor and patient-led affective categories.	Speech utterance (i.e. independent and non-restrictive clause) 10-point rating scale for affect categories, 6-point scale for non-verbal categories.

Appendix B (continued) Assessment instruments to study doctor-patient communication discussed in the review.

Assessment instrument	**Observational medium**	**Behaviours of interest**	**Classification system for categorising behaviours**	**Operational approach to measure these behaviours**
MEDICODE	Audio and video material	Medication related talk	40 content-based categories divided into: general information, knowledge of drug, discussion of prescription and effects of drugs.	Instance of discussion of medication divided into discussions of specific class of medications
MIARS	Video material	Verbal behaviours as a response to cues	Codes divided into 4 levels of patient's cues and nurse cue-responding behaviours including function (e.g. adequate and inadequate responses) and form class (e.g. directive questions)	Uninterrupted unit of speech
VR-MICS	Transcripts	Verbal behaviours as a response to cues	22 doctor-led and 21 patient-led categories divided into formulation and content	Unit of speech i.e. an uninterrupted unit of speech or part of a unit when change in the content or process

Appendix C Summary of the main results of the cross-sectional studies that investigate the association between self-efficacy beliefs and diabetes outcomes that were included in the literature review.

Study ***n* Target population**	**Assessment self-efficacy beliefs**	**Assessment diabetes outcomes**	**Measures of association**	**Size and direction of association**
1.(Aalto,et al., 1997) 385 individuals with type 1 diabetes	Diabetes self care self-efficacy (Aalto et al., 1997)	Perceived physical health Perceived mental health	Standardized coefficient (β)	.24*** .16**
2. (Aljasem et al., 2001) 309 individuals with type 2 diabetes	Diabetes self-care self-efficacy (Grossman, Brink, & Hauser, 1987)	Exercise Diet Skipping medication Blood glucose monitoring Adjusting insulin	Pearson correlation coefficients	Not reported non sig. results .27* -.16* .26** .21*
3. (Bean et al., 2007) 259 type 2 diabetes patients of European, South Asian and Polynesian descent	Diabetes self-care self-efficacy (Talbot, Nouwen, & Gingras, 1997)	Diet Exercise Blood glucose monitoring HbA1c	Pearson correlation coefficient	.68**; .56**; .43** .41**; .60**; .43** .20ns; .21ns; .17ns -.29**; -.16ns; -.30ns[1]
4. (Chao et al., 2005) 445 people with type 2 diabetes	Medication taking self-efficacy (Chao et al., 2005)	Depression Medication adherence	Pearson correlation coefficient	-.19*** .33***

Appendix C (continued) *Summary of the main results of the cross-sectional studies that investigate the association between self-efficacy beliefs and diabetes outcomes that were included in the literature review.*

Study Target population	Assessment self-efficacy beliefs	Assessment diabetes outcomes	Measure of association	Size and direction of association
5. (Chlebowy & Garvin, 2006) 91 individuals with type 2 diabetes (Caucasian and African American)	Diabetes self care self-efficacy Questionnaire, SEQ, (Glasgow et al., 1989)	Diabetes self-care HbA1c	Pearson correlation coefficient	Not reported non significant Pearson correlation coefficients
6. (Glasgow et al., 1989) 127 individuals with type 2 diabetes	Diabetes self-care self-efficacy (McCaul et al., 1987)	Glucose testing Diet Exercise	Pearson correlation coefficient	.09ns .15* .40***
7. (Ikeda, et al., 2003) 113 patients with type 2 diabetes	Self-efficacy (Ikeda et al., 2003)	HbA1c	Pearson correlation coefficient	.20*
8. (Kanbara et al., 2008) 125 adult patients with type 1 and type 2 diabetes	Motivation self-efficacy (Kim et al., 1996)	Depression and anxiety	Pearson correlation coefficient	-.21*; -20*[2]
9. (McCaul et al., 1987) 84 people with type1 diabetes	Diabetes self-care self-efficacy (McCaul et al., 1987)	Insulin injection Glucose testing Diet Exercise	Pearson correlation coefficient	.31** .55** .31** .35**
10. (McKean Skaff et al., 2003) 192 individuals with type 2 diabetes (76 Latinos and 116 European)	Diabetes self-care self-efficacy (Coyne & Smith, 1994)	Diet Exercise HbA1c	Standardized regression coefficient Pearson correlation coefficient	.082ns; -.259** -.112ns; .226* -.05ns; -.33***[3]

Appendix C (continued) *Summary of the main results of the cross-sectional studies that investigate the association between self-efficacy beliefs and diabetes outcomes that were included in the literature review.*

Study **Target population**	**Assessment self-efficacy**	**Assessment diabetes outcomes**	**Measure of association**	**Size and direction of association**
11. (Nakahara et al., 2006) 250 adult patients with type 2 diabetes	Diabetes self-care self-efficacy (Talbot et al., 1997)	Diet Exercise PAID HbA1c [5]	Pearson correlation coefficient	.56** .47** -.34**
12. (Nelson et al., 2007) 717 individuals with poorly controlled type 2 diabetes	Perceived competence in diabetes scale (Williams, Freedman, & Deci, 1998)	Diet Exercise Medication	Mean difference in self-efficacy	70.5 vs 60*** 69.8 vs 53.9*** 74.2 vs 47.8***[4]
13. (Padgett, 1991) 147 type 2 diabetes patients	Diabetes self-care self-efficacy scale (Crabtree, 1986)	Self-rated** diabetes self-care Doctor-rated* diabetes self-care Depression** HbA1c Complications	Pearson correlation coefficient	.40** .20** -.32** .02ns -.07ns
14. (Sacco et al., 2007; Sacco et al., 2005) *The papers present the same data regarding self-efficacy associations*				
99 individuals with type 2 diabetes	Self-efficacy regarding diet, exercise & weight control	Diet and exercise adherence Depression	Pearson correlation coefficient	.74** -.44**
15. (Sarkar, et al., 2006) 408 individuals with type 2 diabetes	Self-efficacy (McKean Skaff et al., 2003)	Diet Exercise Blood glucose monitoring Foot care Medication adherence	Odds ratio (confidence interval)	0.16 (0.075 – 0.24) 0.10 (0.020 – 0.19) 1.14 (1.04 – 1.33) 1.27 (1.13 – 1.45) 1.08 (0.96 – 1.22)

Appendix C (continued) *Summary of the main results of the cross-sectional studies that investigate the association between self-efficacy beliefs and diabetes outcomes that were included in the literature review.*

Study **Target population**	**Assessment self-efficacy**	**Assessment diabetes outcomes**	**Measure of association**	**Size and direction of association**	
16. (Senecal et al., 2000) 638 individuals with both type 1 and type 2 diabetes	Dietary self-efficacy	Diet **	β	.54*	
17. (Skelly et al., 1995) 82 African American individuals with type 2 diabetes	Diabetes self-care self-efficacy (Skyler, 1981)		Pearson correlation coefficient	[6]T1	T2
		Blood glucose monitoring		.42	.42
		Diet		.48	.00
		Medication		.00	.04
		Exercise		.73	.53
18. (Sousa, et al., 2005) 141 adults with type 1 and type 2 diabetes requiring insulin	The Insulin Management Diabetes Self-Efficacy Scale (IMDSES, Hurley et al. 1990)	Diabetes self-care HbA1c	Pearson correlation coefficient	.61** -.24**	
19. (Kneckt et al., 1999; Syrjala et al., 1999; Syrjala et al., 2004) *As the same data have been presented in these papers the more detailed analysis from the most recent publication have been chosen for discussion.*					
149 individuals with type 1 diabetes	Dental self-efficacy (Syrjala et al., 1999). Diabetes self-care self-efficacy (Kneckt et al., 1999).	Oral health habits Diabetes self-care HbA1c	Pearson correlation coefficient Regression coefficent	.44*** .79*** -.03**	
20. (Whittemore, et al., 2005) 53 women with type 2 diabetes	Confidence in diabetes management and support scale (Mulcahy, Peeples, Tomky, & Weaver, 2000)	Diet Physical activity. Problem Areas in Diabetes scale, PAID (Polonsky et al., 1995) HbA1c	Pearson correlation coefficient	.56** .21ns -.51** -.43**	

Appendix C (continued) *Summary of the main results of the cross-sectional studies that investigate the association between self-efficacy beliefs and diabetes outcomes that were included in the literature review.*

Study **Target population**	**Assessment self-efficacy beliefs**	**Assessment diabetes outcomes**	**Measures of association**	**Size and direction of association**
21. (Wu et al., 2007) 145 people with type 2 diabetes	Diabetes Management Self-Efficacy Scale (McDowell et al., 2005) regarding blood sugar, diet and exercise	Diabetes self-care	Pearson correlation coefficient	.54**
22. (Williams & Bond, 2002) 94 individuals with type 1 and type 2 diabetes	Diabetes self-care self-efficacy (Skelly et al., 1995)	Diet Exercise Blood glucose testing	Pearson correlation coefficient	.47** .61** .39*
23. (Williams et al., 2005a) 591 individuals with type 2 diabetes	Perceived competence in terms of managing daily aspects of diabetes (Williams, Feedman and Deci, 1998)	Depression* HbA1c*	Pearson correlation coefficient	-.31** -.20**

Note: All measurements of self-efficacy were based on self-reported questionnaires apart from study by Senecal et al., 2000, where the data was collected in a telephone interview. The description in the box provides information about the specific behaviours which were measured and gives the reference for the scale. Correlation coefficients represent the relationship between self-efficacy beliefs and diabetes outcomes in the corresponding regimen areas. The meaning of the symbols used: HbA1c glycated haemoglobin (indicator of the average metabolic control), * *p*< .05, ** *p*<.01, *** *p*<.001, ns indicates a non significant relationship,

[1] The correlation coefficients are presented separately for the Europeans, South Asians and Pacific Islanders, respectively. Note: [2] Pearson correlation coefficient was presented separately for active coping with the disease and controllability of health, respectively.

[3] Regression and Pearson correlation coefficients were presented separately for Latinos and European Americans, respectively.

[4] Significance level relates to the difference between two independent groups measured with *t* test – showing the difference between low and high self-efficacy level.

[5] HbA1c was measured at 6 and 12 month follow up. Hence, the results are reported in Appendix D.

[6] Significance level not reported.

With regard to measurements used in the studies, due to the focus of the thesis, the specific references are given for the self-efficacy scales only. The self-efficacy scales are discussed in more detail in the last part of this chapter.

Appendix D Summary of the main results of the longitudinal studies that investigate the association between self-efficacy beliefs and diabetes outcomes that were included in the literature review.

Study Target population	Assessment self-efficacy	Follow up (months)	Assessment diabetes outcomes	Measure of association	Seize and direction of association
24. (Hurley & Shea, 1992) 142 individuals with insulin treated diabetes	The Insulin Management Diabetes Self-Efficacy Scale: (Hurley, 1990)	1	Diabetes self-care scale	Pearson correlation coefficient	.578**
25. (Johnston-Brooks et al., 2002) 110 individuals with type 1 diabetes	Diabetes self-care self-efficacy (Kavanagh, Gooley, & Wilson, 1993)	6 9	Diet Exercise Blood glucose monitoring HbA1c	Standardized regression coefficient	.07 .06 .00 .07
11.[1] (Nakahara et al., 2006) 250 adult patients with type 2 diabetes	Diabetes self-care self-efficacy (Talbot et al., 1997)	6, 12	HbA1c	Causal coefficient (SEM)	.89*, .89* (GFI = .94; AGFI = .89)
26. (Plotnikoff, et al., 2000) 46 individuals with type 1 (7) and type 2 diabetes (39)	Physical activity self-efficacy (new scale developed for this study)	6	Exercise	Standardized regression coefficient β	.02 .13*

Note: [1]Nakahara et al., 2006 was presented in Appendix C, hence the number 11. All measurements of self-efficacy were self-reported questionnaires apart from study by Johnston-Brooks et al., 2002 where the follow-up data were collected in a telephone interview. See also Notes to Appendix C.

Appendix E ASSET coding book – desktop version

MASTERY EXPERIENCE

Facilitating pro-active self

Facilitator supports patients in taking responsibility for their learning outcomes, well-being, illness management, and setting benchmarks, e.g.:

F: What questions do you have which may help you to better understand the topic?

Successful trial

Facilitator brings patients to practise new skills, guides through the task, e.g.:

F: Use the instruction provided to set up your pen.

Self-reflection

Facilitator asks questions which bring people to self-reflection and self-learning based on previous and current experiences, e.g.:

F: How did it work for you? What did you learn from this experience?

ROLE MODELLING

Competent other

Facilitator who has personal experience of chronic illness management.

Facilitator provides the opportunity for expression of successful attainment, e.g.:

F: What exactly did you do to avoid having bruises when injecting?

Group solving

Facilitator brings group to solve someone else's problem, asks for strategies to deal with the problem, e.g.:

F: If this was your problem, what would you do, how would you solve this situation?

Sharing obstacles

Facilitator asks the group about the obstacles met and the difficulty of the task, e.g.:

F: Has anyone else in the group ever had a similar problem?

VERBAL PERSUASION

Planning for obstacles

Facilitator guides participants in finding a solution, supports in making a plan, e.g.:

P: I regularly drink a lot of lemon tea. Is it possible that I go high from it?

F: How would you know that your lemon tea raises your blood sugar?

Positive feedback

Facilitator praises success and anticipates future success by targeting skilfulness, e.g.:

F: If you monitor and apply these principles, what you will find with time is that you will be able to make sense of the information.

Elicitation of knowledge

Facilitator elicits knowledge and explores beliefs about diabetes, e.g.:

F: What do you know about monitoring?

PHYSICAL AND AFFECTIVE STATES

Exploration of physiological state

Facilitator guides recognition and correct attribution of illness specific physiological symptoms, e.g.:

F: How do you feel when having a hypo?

Exploration of affective state

Facilitator guides recognition and correct attribution of illness specific emotions, e.g.:

F: When you say you feel burned out, could you describe how it feels for you?

OUTCOME EXPECTANCIES

Facilitator guides the anticipation of outcomes (benefits and costs) resulting from diabetes-related performance, e.g.:

F: If you had some information about food, what difference would it make for you?

Note: F stands for Facilitator, P stands for Participant.

Appendix F Programme protocol for JIGSAW

Session number	
Topic	**Leading questions and tasks**
Session 1	
Goal setting	What frustrates you most about your diabetes? How do you want it to be different? How will you know that you have achieved this?
Monitoring	What is monitoring? How do you do it? Why do you do it? How does it help? Hoe does it link to your goals? What do you need to know?
Homework	Develop a monitoring strategy related to your personal goals and record it on the sheets provided for discussion the next week
Session 2	
Feedback from Session 1	What did you learn from your monitoring? What questions have come up about managing your diabetes as a result of this?
Insulin and food	What is insulin and what does it do? What is Carbohydrate? What effects does it have? What links them together & how? What do you need to know about them to regulate BG levels?
Homework	Monitoring Carbohydrate (CHO) amounts Monitoring Diary related to insulin curves and CHO
Session 3	
Feedback on monitoring process	What did you learn from your monitoring? What questions have come up about managing your diabetes as a result of this?
Insulin and food	What would effect how food is absorbed?
Mars bar challenge	What would cause the insulin to vary? What would affect how insulin is absorbed?
Bolus Dose Calculations	
Corrective Dosing Principles	
Problem Solving Principles	
Basal Insulin / Overnight control	
Homework	Monitoring of meal, doses / practising of correction doses How does this information help you?

Topic	Leading questions and tasks
Session 4	
Feedback from previous session	What did you learn about insulin and food? What questions have come up about managing your diabetes as a result of this?
Hypoglycaemia	What is hypo? What are the symptoms of hypoglycaemia? What are your problems with hypos? What causes hypos? What can you do about them? How can you avoid them?
Homework	When is hypoglycaemia a risk for you? How do you recognise it? What is your 'auto-pilot' immediate treatment? Do you need to develop specific strategies for avoidance? Use symptom questionnaire and worksheet to make an individual plan.
Session 5	
Feedback from previous session	What did you learn from your monitoring? What questions have come up about managing your diabetes as a result of this?
Physical and emotional stress	What is physical stress and how does it affect you? What is emotional stress and how does it affect you? What causes emotional stress? How can you tell, what is getting to you? What can you do about depression? What can you do about stress?
Homework	Monitoring symptoms and blood glucose levels; looking for patterns
Session 6	
Feedback from previous session	What did you learn from your monitoring / or about yourself? What questions have come up about managing your diabetes as a result of this?
Exercise	What are your issues around activity? What are you doing to exercise? What is exercise/activity? What effect does activity have on blood glucose levels? What do you need to know to plan for exercise? What would you do when unplanned activity or adverse events occur?
Homework	Monitor before, after and during activity, to assess what is happening to insulin and food responses Use this information to plan proactively for events or reactively to deal with the unexpected
Revision of goals	1. Revision of the goal sheets and reflection on achievement Reflection on the programme

Appendix G Comprehensive coding manual of ASSET

The Analysis System for Self-Efficacy Training (ASSET) is a coding manual based on self-efficacy theory. Self-efficacy is a crucial construct of social cognitive theory. It represents the beliefs that someone is capable of performing a certain behaviour despite barriers (Bandura, 1997). Figure C1 graphically outlines the conceptual framework of ASSET.

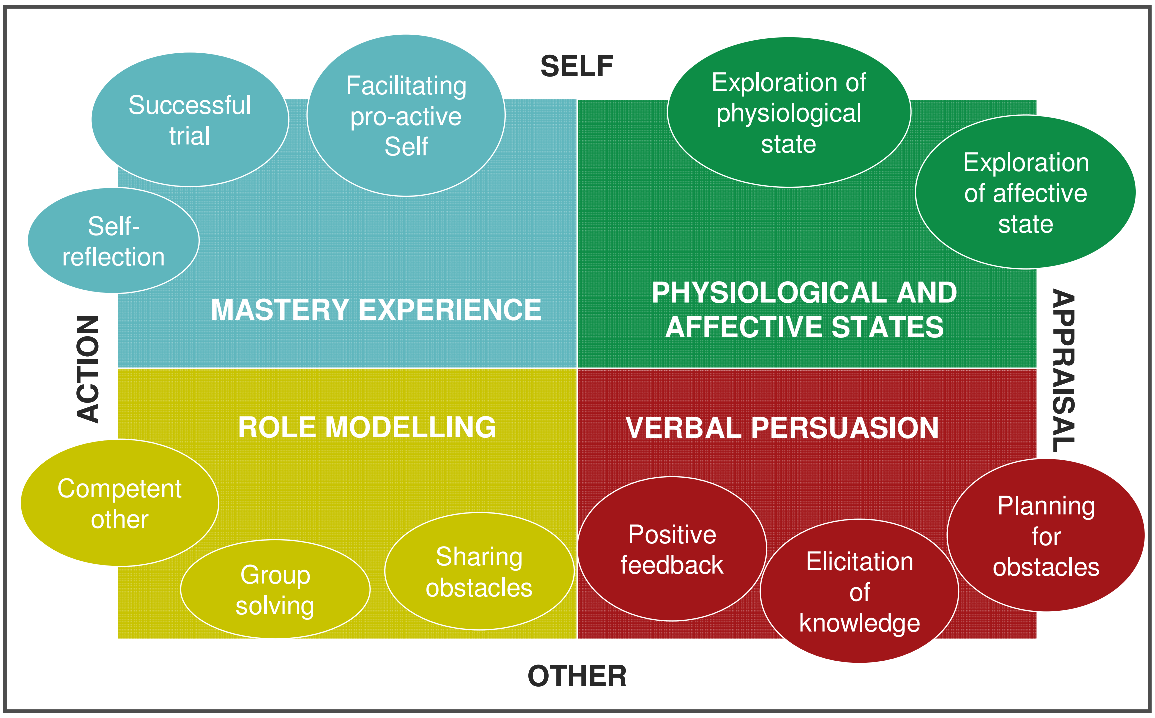


Figure C1 Analysis System for Self-Efficacy Training (ASSET).

Figure C1 shows that the four sources of self-efficacy can be used to address the same information from four different perspectives: by activating the patient (self), by activating the group (other) and by triggering action or appraisal. The four sources of self-efficacy describe the way of delivery leaving the context of the intervention open. In terms of chronic conditions such as diabetes, the self-efficacy-based techniques can be applied to any aspect of the management. For example, if the targeted self-efficacy beliefs concern lowering blood sugar levels, the techniques used in an intervention could be as follows:

1) *Mastery experience*: Analysing graphs of blood sugar levels in order to find an individual pattern;
2) *Role modelling*: Asking others in the group about their management strategies regarding for example high blood sugar levels in the morning;
3) *Verbal persuasion*: Eliciting knowledge from a patient about the way the insulin works in order to understand its impact on blood sugar levels;
4) *Physiological and affective states*: Exploring bodily symptoms associated with high blood sugar levels in order to learn to recognise them and deal with them quicker.

Four sources of self-efficacy and outcome expectancies

The basic categories of the coding tool represent the predictors of behaviour based on social cognitive theory. These are the four sources of self-efficacy and outcome expectancies. Self-efficacy can be enhanced in four ways: by experiencing success (i.e. mastery experience), by observing others experiencing success (i.e. role modelling), by being told by others that one is capable to experience success (i.e. verbal persuasion), and indirectly by understanding one's bodily symptoms (i.e. physiological and affective states). Alongside self-efficacy beliefs the anticipation of positive outcomes of the individual's action contributes to a better performance (i.e. outcome expectancies) (Bandura, 1997). The coding tool also incorporates outcome expectancies.

Table C1 *Baseline categories of ASSET*

Label:	**Mastery experience**
Definition:	Facilitator creates an environment for the experience of successful attainment.
Positive example	F guides individuals in the analysing of blood glucose graphs to identify individual patterns.
Negative example:	F advises, asks closed questions implicating the answer
Label:	**Role Modelling (Vicarious experience)**
Definition:	The influence of the attainment of others Facilitator creates an environment for an observation of others' performance
Positive example	Lay facilitator with personal experience of chronic illness. F gets the group involved in solving of someone else's problem.
Negative example:	F talks about participants' successful experiences.
Label:	**Verbal persuasion**
Definition:	Facilitator verbalises personal skilfulness of the participants and anticipates future successes. Facilitator conveys the belief of participants' ability to identify and manage illness-related issues.
Positive example	F guides participants in the setting of an action plan.
Negative example:	Inaccurate praise; F asks closed questions implicating the answer
Label:	**Physiological and affective states**
Definition:	Facilitator acknowledges and explores emotions expressed by the participants. Facilitator guides participants in the correct attribution of physiological and affective symptoms.
Positive example	F asks participants about their symptoms of hypos.
Negative example:	F recognises the emotion but does not explore it.
Label:	**Outcomes expectancies**
Definition:	Facilitator guides the participants in the anticipation of benefits and costs resulting from their performance.
Positive example	1) F asks what the result of a specific action will be. F: *How would that help you*? F: *Once you achieve your goals* (e.g. less frequent hypos) *what change would that make for you*? 2) F: *You said you have been forgetful. What will happen when you forget to take long insulin*?
Negative example:	F asks about the performance but not the results of it.

Note: F states for a facilitator.

Verbal behavioural techniques

As can be seen in Figure C1, the verbal behavioural techniques include 11 categories. These are: ‘successful trial’, ‘self-reflection’, ‘facilitating pro-active self’, ‘competent other’, ‘group solving’, ‘sharing obstacles’, ‘positive feedback’, ‘planning for obstacles’, ‘elicitation of knowledge’, ‘exploration of physiological state’, and ‘exploration of affective state’. The details of the verbal behavioural techniques, including definition, context and positive and negative examples are presented in Tables C 2- Table C5. ‘Context’ refers to the time and content of the session when the techniques could most likely be used. When the technique was likely to be used throughout the whole session, the box was left blank.

Table C 2 *Mastery-experience-based verbal behavioural techniques*

Label:	**Facilitating pro-active self**
Definition:	Facilitator supports patients in taking responsibility for their learning outcomes, well being, illness management, setting benchmarks (e.g. regarding blood glucose level).
Context	This technique is often used at the beginning of the programme to initiate a new topic e.g. *What issues come up for you, when you think about insulin and food?* This intervention can be followed by a discussion about a specific topic (e.g. problem using ‘self-reflection’, new knowledge using ‘elicitation of knowledge’)
Positive example	F: *What else would you like to discuss? What would you need to know from us that would help you to understand X.* F: *Where would you like your blood sugar to be?* F guides the patient in taking the responsibility for their illness. This question can be followed by specific questions about the future action (‘planning for obstacles’).
Negative example:	*We cannot go into your body; you know what the insulin does for you.* F conveys the message that she/he does not take the responsibility for the participant’s health but does not take things forward.
Label:	**Successful trial**
Definition:	Facilitator guides the patients in practicing new skills so success can be experienced. Participants are practicing new skills, (e.g. learn to understand the graphs about blood glucose fluctuation) or are managing new tasks (e.g. estimating amount of carbohydrates). Facilitator gives participants tools to practice new skills (e.g. Charts of amounts of carbohydrates in food)
Positive example	1. F guides the analysis of graphs within the session. 2. F guides the estimation of carbohydrates in food.
Negative example	F: *You can experiment, start to get things to behave differently. You understand what you are doing.* F is talking about action but does not ask participants to practice new skills. This is a verbal persuasion-based positive feedback technique (i.e. praising patients’ ability to try things out and use new knowledge).
Label:	**Self-reflection**
Definition:	Reflecting on past or current action. Facilitator asks questions which bring people to self-reflect addressing the

	experiences from previous performance and specific events. The question addresses positive effects of an action, learning outcomes.
Positive example	*How did it work for you?* *What did you learn from this experience?*
Negative example:	P: I went low this day although I scrutinised my blood glucose. F: *Has something extraordinary taken place on this day? Physical activity, stress?* P: Not really, I only cut the lawn. HCP: This may be the reason why you went low. P: But it was not exhausting at all… P2: I go low even after hovering. HCP: *Try to do something similar next week and monitor your blood glucose.* Here again although there is a learning/self-reflective outcome, the intervention was from the “professional” level, did not encourage the patient to reflect on his/hers performance.

Table C3 *Role modelling-based verbal behavioural techniques*

Label:	**Competent other**
Definition:	Social comparison regarding ability Facilitator creates a space for spontaneous expression of positive examples through exchange within the group. Person with a chronic condition who actively manages the illness and is similar (age, education, illness history) to the participants.
Positive example	Lay facilitator who has personal experience of managing a chronic condition.
Negative example:	Facilitator brings up the example of five times Olympic medallist, Steve Redgrave who manages his diabetes well. The risk is that the participants may not identify with him.
Label:	**Group solving**
Definition:	When a participant struggles with a problem, facilitator brings group to solve the problem for her/him.
Context	In contrast to “competent other” this intervention is directly guided by the facilitator.
Positive example	*If it was your problem how would you react, how would you know X?*
Negative example:	Participant 1: Is there something you can do about it? Participant 2: Eat something F: *Some of our patients check their blood glucose in the night.* Because the suggestion came from the F, this technique is a verbal persuasion-based technique rather than strategy exemplification.
Label:	**Sharing obstacles**
Definition:	Facilitator asks others about similar obstacles met and difficulty of the task in order to convey the message to an individual that he/she is not the only one experiencing such a problem.
Positive example	P: My diabetes is different when I compare it with the time when I was first diagnosed. HCP: *What about others. Is your diabetes the same now as it was when you were diagnosed?* The group responds that their diabetes is different which gives the individual the feeling of not being alone with the problem.
Negative example:	P: I would like to improve my memory. I constantly forget something. P2: Oh yes. F: *It sounds like you are not alone here* The facilitator speaks about the shared nature of the difficulty and is not facilitating the group to share obstacles.

Table C4 *Verbal persuasion-based verbal behavioural techniques*

Label:	**Planning for obstacles**
Definition:	Facilitator guides participants in finding a solution and making an action plan.
Positive example	F: *How would you know that doing this differently helps?* F: *How would you find out what happened to you after having a different meal?*
Negative example:	1) P: I regularly drink a lot of lemon tea. Is it possible that I go high from it? F: *How many do you usually have?* P: Two cups. F: *How much tea powder do you take?* P: Half a spoon each. F: *How many carbohydrates may it be?* P: About a half each. F: *Does it make any difference to your blood glucose level?* P: No F does not encourage independent problem solving. 2) F: *Tell us, if you were X, how would you cope with this situation?* Although the F asks about the solutions, he/she addresses the other participant and not the individual who experienced the difficulty. Thus, this is a role modeling-based technique (i.e. when an other provides good mastery examples).
Label:	**Positive feedback**
Definition:	Facilitator praises success and anticipates future success by targeting skillfulness, gives feedback about endeavour by looking for positive aspects. Facilitator stresses the ability to implement the new knowledge.
Positive example	F*: If you monitor and apply these principles, what you will find with time is that you will be able to make sense of the information.*
Negative example	P: What I am doing now is not right. F: *You have managed your diabetes for so many years, you must do it right.* This is a contradiction to what the patient said, and also a missed opportunity to explore patients' beliefs.
Label:	**Elicitation of knowledge**
Definition:	Facilitator asks participants about their knowledge and general issues regarding diabetes management. He/she refers to generic issues and explores beliefs about the illness. In contrast mastery experience-based self-reflection technique refers to exploring an experience-based knowledge.
Positive example	F.: *What would your total insulin dose depend on*? P1: Life style, duration of diabetes P2: Weight
Negative Example:	F.: *When you think about hypoglycaemia, what are the issues for you?* This is a mastery experience-based facilitating pro-active self technique (i.e. participants are asked to relate to their past experiences).

As can be seen in Tables C2-C4, mastery experience-based, role modelling-based and verbal persuasion-based techniques address the way in which self-efficacy beliefs can be changed. They can be used for any content. For example, self-reflection which is one of the mastery experience-based techniques can be used to discuss previous attempts to change insulin dose or to follow a diet. It can also be used to help to understand blood glucose levels. In contrast, the physiological and affective states-based techniques relate to specific content. As can be seen in Table C5, physiological and affective states-based techniques address bodily symptoms only. Bandura described physiological and affective states as an indirect source of self-efficacy.

By correct attribution of emotions and bodily symptoms one can feel able to manage a certain obstacle. For example, one of the symptoms associated with low blood sugar levels (i.e. hypoglycaemia) may be irritability. Thus, it is crucial for people with diabetes to learn how to attribute irritability to a decreasing blood sugar level in order to deal with the symptom. The example also shows why physiological and affective states-based techniques are an indirect source of self efficacy. The beliefs in self-efficacy to manage diabetes are expected to increase as a result of a positive experience with treating a hypo. This is turn will be possible if someone learned how to correctly attribute symptoms of decreasing blood sugars. Thus, the recognition of symptoms is necessary but not sufficient for someone to feel confident that they are able to manage a certain obstacle.

Table C 5 *Physiological and affective states-based verbal behavioural techniques*

Label:	**Exploration of physiological state**
Definition:	Facilitator guides exploration and attribution of physiological symptoms. For example, F aims to make people aware of non-diabetes related causes of symptoms such as fatigue. Although this may be a symptom of low blood sugar, it can also be caused by bad eating habits, or a disturbed sleep pattern.
Positive example	P: I have had a hypo for the first time (…) for the last 5 years. F: *What made you have a hypo this time? How did you feel when you were having a hypo?*
Negative example:	F.: *What are the symptoms of a hypo?* This is verbal persuasion-based elicitation of knowledge technique.
Label:	**Exploration of affective state**
Definition:	Facilitator guides recognition and correct attribution of illness specific emotions.
Context	
Positive example	P: I was told to take tablets but my body does not like it; I feel apprehensive about taking more than one. F: *What worries you about taking more than one?* F: *You said you are burned out. How does it feel for you?*
Negative example:	F: *What you said sounds very frustrating.* This is a closed statement, which does not bring things forward.

Appendix H ASSET training materials

MASTERY EXPERIENCE

The personal experience of successful attainment

Facilitating pro-active Self

Facilitator supports patients in taking responsibility for their learning outcomes, well being, illness management, & setting benchmarks (e.g. reg. blood glucose level).

Successful trial

Facilitator guides the individuals through the task, so they can practise new skills.

Self-reflection
Past-oriented

Facilitator asks questions which bring individuals to self-reflection based on experiences from past and course-related task performance.

ROLE MODEL

The observation of successful attainment of others

Competent other

Facilitator creates a space for spontaneous expression of successful illness management within the group.

Group solving

Facilitator asks participants for suggestions on how to solve problems faced by someone else in the group.

Sharing obstacles

Facilitator asks the group if they have met similar obstacles to those which an individual struggles with. This is to convey the message that this person is not the only one who is having this problem.

VERBAL PERSUASION

The appraisal of personal skilfulness from others

Planning for obstacles
Future oriented

Facilitator guides participants in finding a solution, and supports participants in making a detailed plan.

Positive feedback

Facilitator praises success and anticipates future success by targeting skilfulness.

Elicitation of knowledge

Facilitator asks knowledge-related question by referring to general experience with diabetes management, and by exploring beliefs about illness related issues.

PHYSIOLOGIAL & AFFECTIVE STATES

The appraisal of personal skilfulness through attribution of physiological and affective states

Exploration of physiological state

Facilitator guides the exploration and the correct attribution of physiological state.

Exploration of affective state

Facilitator guides the exploration and the correct attribution of affective state.

Figure H1 Definition cards.

MASTERY EXPERIENCE

The personal experience of successful attainment

Facilitator:
"Where would you like your blood sugar to be?"

Facilitator:
"Look at your glucose level pictured on the graph. What made you go high at this point?"

Facilitator:
"How has the last week brought you towards your goals?"

ROLE MODEL

The observation of successful attainment of others

Participant:
"I have now more warnings about the hypos. I found a pattern that I am going low at tea time."

Facilitator:
"If this were your problem, what would you do?"

Participant:
"My diabetes is completely different now and when I first had it. It's completely out of control."
Facilitator asks the group:
"Is your diabetes the same as at the beginning when you were diagnosed?"

VERBAL PERSUASION

The appraisal of personal skilfulness from others

Participant:
"I had a good blood glucose over the day and this morning it was 25."
Facilitator:
"What would you have to do to find out what was going on?"

Facilitator:
"How much carbohydrates are in a glass of milk?

Facilitator:
"If you monitor and apply these principles, what you will find with time is that you will be able to make sense of the information"

PHYSIOLOGIAL & AFFECTIVE STATES

The appraisal of personal skilfulness through attribution of physiological and affective states

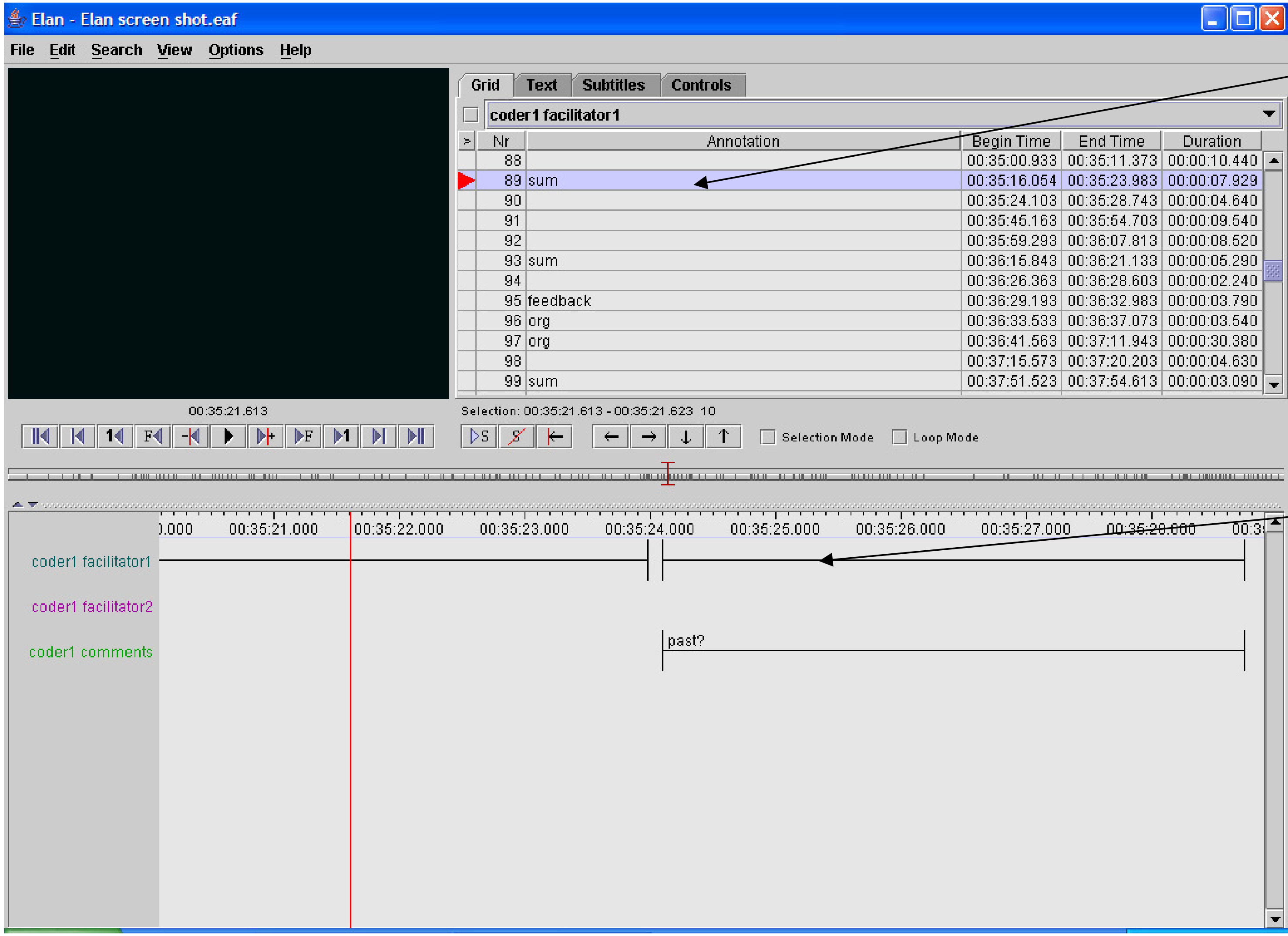
Facilitator:
"How do you feel when you are having a hypo?"

Facilitator:
"You said you are burned out. Could you tell us, how does it feel for you?"

Facilitator:
"What frustrates you most about your diabetes?"

Figure H2 Example cards.

Appendix I Screenshot of ELAN



Pre-marked and pre-coded non-self-efficacy based speech utterances.

Pre-marked self-efficacy based speech utterances to be rated by a coder are left blank.

Appendix J Information sheet for patients - reliability study

Patient Information Sheet 5th of March 2005

Study title: Self-management interventions in training for people with diabetes

What is the purpose of the study?

This study aims to enhance the effectiveness of self-management education for people with diabetes. This will be done by video recording self-management education programs delivered by health care professionals. These videos will then be analyzed by the researchers looking at how the professionals led the program. Following this the professionals will get feedback on the structure of the program and the skills they used to help you. It is thought that this will help the professionals who led the program become more skilled at leading the program for future groups.

Why have I been chosen?

You have been asked to help as the Diabetes Centre at Queen Alexandra Hospital have told us that you are planning to attend the next JIGSAW program for individuals with type 1 diabetes. All individuals who are attending these programs are being asked to help us with this project. It is hoped that we will recruit about 35 people to help us by the time we complete the project.

What will happen to me if I take part?

If you agree to take part we will ask you to fill out short questionnaire about your illness management at the start of the program and shortly afterwards. In addition, at the beginning and end of each of the 6 JIGSAW sessions, we will ask your consent to video tape the sessions. The camera will be set up, so that as much as possible only the professionals face will be seen on the screen. For us to record the session everyone present will have to give their consent to participate. If any one person does not want to be videoed, the recording will not take place. If after the session, or during the session, anyone changes their mind, the video will be switched off, and the tape wiped clean.

As you would be attending the JIGSAW program as part of your diabetes care anyway, we will not be compensating you for travel time or expenses.

Will my taking part in this study be kept confidential?

As everyone attending the program needs to give consent for the video to be switched on, you will know when everyone has given consent. However, if any one individual does not give their consent, the video will not be switched on, and we will make sure that no-one knows who has not given their consent. All information which is collected during the course of the research (the video and voice records as well as the questionnaire) will be kept strictly confidential. Any information about you which leaves the hospital will have your name and address removed so that you cannot be recognized from it.

If you wish your GP will not be notified of your participation in the study.

What are the possible disadvantages and risks of taking part?

We do not feel there are any risks or disadvantages to taking part in this study. It will take about 10 minutes of your time to complete a short questionnaire.

What are the possible benefits of taking part?

As this stud involved observation of the JIGSAW program, and provision of feedback to the professionals, it is unlikely to have immediate benefits to yourself. However, your involvements will enable the professionals to further develop and refine the programme, along with their skills. This may lead to improvements that may benefits individuals with type 1 diabetes who attend future self-management programs run by the diabetes team.

What will happen to the results of the research study?

Once the study is complete, we aim to present the results at conferences for health care professionals and to write them up for publication in scientific journals. We are also hopeful that these results can be used to inform the training of professionals to deliver self-management education programs, and provide them with a clear framework for reflecting on subsequent programs.

Who is organising the research?

The study is organised by T.C. Skinner, a Psychologist from the University of Southampton, with support from the Diabetes Centre at Queen Alexandra Hospital.

Who has reviewed the study?

The study has been reviewed by the Local Research Ethics Committee in Isle of Wight, Portsmouth and South East Hampshire and the Ethics Committee in the School of Psychology at the University of Southampton.

If you have any questions about this study please do not hesitate to contact us:

University of Southampton Department of Psychology Highfield SO17 1BJ

T.Chas Skinner	Katarzyna Michalowska-Zinken
Tel. 0238054 4588	Tel. 0238054 5785
Fax. 0238059 4597	Fax. 0238059 4597
e-mail: T.C.Skinner@soton.ac.uk	e-mail: kzinken@soton.ac.uk

Thank you taking the time to read this letter, and we hope that you will be able to help us with this work!

Appendix K Information sheet for health care professionals – reliability study

15th of March 2005

Health Care Professional Information Sheet

Study title: **Self-management interventions in training for people with diabetes**

What is the purpose of the study?

This study aims to enhance the effectiveness of self-management education for people with diabetes. This will be done by recording self-management education programs, and then analyzing the interactions to identify how to use Social Cognitive Theory more effectively within the program. Through this observation and feedback it is anticipated that professional will become more skilled at facilitating the programs and thereby enhance patient confidence, self-care and quality of life

Why have I been chosen?

You have been chosen as you facilitate the self-management education program for type 1 diabetes in Portsmouth, known as JIGSAW. As we are asking all professionals who facilitate this program we are asking you to help us by participating in this study.

What will happen to me if I take part?

If you agree to take part, we will video tape each of the 6 sessions of the JIGSAW program that you are facilitating. We will ask you to sign a consent form before and after each session, and when completed, we will provide you structured feedback on the results of our analysis of the video if you wish. If after the session, or during the session, anyone changes their mind, the video will be switched off, and the tape wiped clean.

Will my taking part in this study be kept confidential?

As everyone, professionals and patients, who are attending the program need to give their consent, for the video to be switched on, if everyone agrees then only those individuals in the room will know that you have given consent. However, we will keep confidential who does not consent to take part in the study from the group if this should occur.

What are the possible disadvantages and risks of taking part?

We do not feel there are any risks or disadvantages to taking part in this study.

What are the possible benefits of taking part?

Once the analysis of the videos is complete, we will provide structured feedback to the facilitators on the use of Social Cognitive Theory in the JIGSAW program. This will enable you to reflect on the content, structure of the program along side the skills of the facilitators, which may lead to improvements in these areas for future programs.

What will happen to the results of the research study?

Once the study is complete, we aim to present the results at conferences for health care professionals and to write them up for publication in scientific journals. We are also hopeful that these results can be used to inform the training of professionals to deliver self-management education programs, and provide them with a clear framework for reflecting on subsequent programs.

Who is organizing the research?

The study is organized by T. Chas Skinner, a Health Psychologist from the University of Southampton, with support from the Diabetes Centre at Queen Alexandra Hospital.

Who has reviewed the study?

The study has been reviewed by the Local Research Ethics Committee in Isle of Wight, Portsmouth and South East Hampshire and the Ethics Committee in the School of Psychology at the University of Southampton.

Contact for Further Information

If you have any inquiries please do not hesitate to contact us:

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Thank you taking the time to read this letter, and we hope that you will be able to help us with this work!

Appendix L Consent form for patients - reliability study

Centre Number: ....Study Number ....Patient Identification Number for this trial:

CONSENT FORM

Title of Project: **Self-management interventions in training for people with diabetes**

Name of Researchers: T. Chas Skinner & Katarzyna Michalowska-Zinken

Please initial box

1. I confirm that I have read and understand the information sheet dated 15/03/2005 for the above study and have had the opportunity to ask questions.

2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, without my medical care or legal rights being affected. I understand that I have the right to withdrawal of the materials within 4 weeks of the finishing the observation process.

3. I agree that the educational program in which I take part will be video and audio taped. I was informed that the data will be stored in the University of Southampton and destroyed after 10 years (Spring, 2015).

4. I agree to take part in the above study.

Name of Patient	Date	Signature
Name of Person taking consent (if different from researcher)	Date	Signature
Researcher	Date	Signature

Katarzyna Michalowska-Zinken

1 for patient; 1 for researcher; 1 to be kept with hospital notes

Appendix M Consent form for health care professionals – reliability study

Centre Number: ....Study Number ....Health Care Professional Identification Number for this trial:

CONSENT FORM

Title of Project: Self-management interventions in training for people with diabetes

Name of Researchers: T. Chas Skinner & Katarzyna Michalowska-Zinken
Please initial box

1. I confirm that I have read and understand the information sheet dated 15/03/2005 for the above study and have had the opportunity to ask questions.

2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, without my medical care or legal rights being affected. I understand that I have the right to withdrawal of the materials within 4 weeks of the finishing the observation process.

3. I agree that the educational program which I facilitate will be video and audio taped. I was informed that the data will be stored in the University of Southampton and destroyed after 10 years (Spring, 2015).

4. I agree to take part in the above study.

Name of Health Care Professional Date Signature

Name of Person taking consent Date Signature
(if different from researcher)

Researcher Date Signature
Katarzyna Michalowska- Zinken

1 for health care professional; 1 for researcher; 1 to be kept with hospital notes

Appendix N Starting Insulin Programme protocol

Session	Critical elements of the programme	Issues to be covered
1	• Device packs returned • Check chosen device • Discuss insulin regimens • Patient to choose insulin regimen • Provide with initial supplies of insulin, device and needles • Patients to assemble and prime device • Patients to perform a test dose (2 units) • Provide with 'Insulin regimen and dosage adjustment sheet' • Patients to fill in insulin details • Set starting dose and add to form • Indicate in comments section which medications are to be stopped and which to continue • Copy of above given to patient to take to GP • Diabeta 3 completed including medication section • Letter to GP regarding insulin/oral agent changes • Ask patients to read the next section of SWIM	• Storage of insulin • Sharps disposal • Injection technique and timing • Hypoglycaemia • Blood glucose levels may increase temporarily • Monitoring • Obtaining future supplies
2	• Discuss issues for patients in relation to starting insulin • Discuss further steps in adjusting dose • Engage patients in problem solving for potential future issues • Discuss potential lifestyle issues • Highlight back up information available in SWIM	• Driving • Diet – how it relates to blood glucose levels and insulin action • Alcohol • Physical activity – how it relates to blood glucose levels and insulin action • Sick day rules • Travel • The cause of variance in blood glucose levels

Appendix O Titration-related self-efficacy, intention and behaviour scale

After each statement, circle the number which best describes how much you believe you can or cannot do ***as of now*** *what is stated.*

I believe I can:	**Can not do at all**					**Moderately can do**					**Certain can do**
1. Work out how much extra insulin to take when my blood sugar is high.	0	1	2	3	4	5	6	7	8	9	10
2. Work out how much insulin to take when I'm sick.	0	1	2	3	4	5	6	7	8	9	10
3. Work out what to do when my sugar is low.	0	1	2	3	4	5	6	7	8	9	10
4. Work out my usual regimen when I am having lots of low blood sugars / hypos.	0	1	2	3	4	5	6	7	8	9	10

For the following questions, circle the number which best indicates how often you did what the question asks in THE LAST TWO WEEKS. Answer 'not applicable' only if you were never in the situation described.

	Never	**Almost never**	**Sometimes**	**Often**	**Very often**	**Not applicable**
1. When you had low blood sugar how often did you decrease your insulin dose?	0	1	2	3	4	NA
2. When you frequently had high blood sugar how often did you increase your insulin dose?	0	1	2	3	4	NA

3. When you adjusted your medication and the amount of food you ate, did you do it more to avoid low blood sugars/hypos or more to keep your blood sugars as close to normal as possible? (Circle the number on the scale below which best describes why you made adjustments. For example, if you made adjustments <u>exclusively</u> to avoid hypos, circle number 1).

Avoid low blood sugars	1	2	3	4	5	6	**Keep blood sugars normal**

For the following questions, circle the number which best indicates how often you INTEND to do what the question asks over THE NEXT TWO WEEKS.

	Never	**Almost never**	**Sometimes**	**Often**	**Very often**	**Not applicable**
1. When you have low blood sugar how often do you intend to decrease your insulin dose?	0	1	2	3	4	NA
2. When you frequently have high blood sugar how often do you intend to increase your insulin dose?	0	1	2	3	4	NA

3. When you adjust your medication and the amount of food you ate, do you intend to do it more to avoid low blood sugars/hypos or more to keep your blood sugars as close to normal as possible? (Circle the number on the scale below which best describes why you intend to make adjustments. For example, if you expect to make adjustments exclusively to avoid hypos, circle number 1).

Avoid low blood sugars/hypos	1	2	3	4	5	6	**Keep blood sugars normal**

Please give us some information about you

I am

Male	Female

I was born __________________(please give the year).

I have been having diabetes since _________________(please give the year).

At the moment I am injecting insulin __________________times a day.

The dose are____.

Thank you!

Appendix P Insulin Appraisal Treatment Scale

From your own knowledge about insulin treatment, please indicate to what extent you agree or disagree with the following statements. Please tick the box that best describes your own opinion.

		strongly disagree	disagree	agree nor disagree	agree	strongly agree
1.	Taking insulin means I have failed to manage my diabetes with diet and tablets.	☐	☐	☐	☐	☐
2.	Taking insulin means my diabetes has become much worse.	☐	☐	☐	☐	☐
3.	Taking insulin helps to prevent complications of diabetes.	☐	☐	☐	☐	☐
4.	Taking insulin means other people see me as a sicker person.	☐	☐	☐	☐	☐
5.	Taking insulin makes life less flexible.	☐	☐	☐	☐	☐
6.	I’m afraid of injecting myself with a needle.	☐	☐	☐	☐	☐
7.	Taking insulin increases the risk of low blood glucose levels.	☐	☐	☐	☐	☐
8.	Taking insulin helps to improve my health.	☐	☐	☐	☐	☐
9.	Insulin causes weight gain.	☐	☐	☐	☐	☐
10.	Managing insulin injections takes a lot of time and energy.	☐	☐	☐	☐	☐
11.	Taking insulin means I have to give up activities I enjoy.	☐	☐	☐	☐	☐
12.	Taking insulin means my health will deteriorate.	☐	☐	☐	☐	☐
13.	Injecting insulin is embarrassing.	☐	☐	☐	☐	☐
14.	Injecting insulin is painful.	☐	☐	☐	☐	☐
15.	It is difficult to inject the right amount of insulin correctly at the right time every day.	☐	☐	☐	☐	☐
16.	Taking insulin makes it more difficult to fulfil my responsibilities (at work, at home).	☐	☐	☐	☐	☐
17.	Taking insulin helps to maintain good control of blood glucose	☐	☐	☐	☐	☐
18.	Being on insulin causes family and friends to be more concerned about me.	☐	☐	☐	☐	☐
19.	Taking insulin helps to improve my energy level.	☐	☐	☐	☐	☐
20.	Taking insulin makes me more dependent on my doctor.	☐	☐	☐	☐	☐

Appendix Q Information sheet for patients – validity and intervention study

28th June 2006

Patient Information Sheet

Peer Review and Evaluation of Portsmouth Insulin Management Groups for people with type 2 diabetes.

What is the purpose of the project?

This project aims to enhance the effectiveness of self-management education for people with type 2 diabetes. This will be done by video recording self-management education programmes delivered by health care professionals. These videos will then be analyzed by the researchers looking at how the professionals led the programme. Following this the professionals will get feedback on their intervention delivery and their skills they used to help you. It is thought that this will help the professionals who led the programme become more skilled at leading the programme for future groups.

You have been asked to help as you will be taking part in the starting insulin programme in Diabetes Centre at Queen Alexandra Hospital or in the Chronic Disease Centre in St. James Hospital. If you agree to take part we will ask you to fill out short questionnaires each time you come to the session. With your consent we will retrieve the information on your current HbA1c from hospital records. In addition, at the beginning of the programme, we will ask your consent to video tape the sessions. The camera will be set up, so that as much as possible only the professionals face will be seen on the screen.

Confidentiality

All information which is collected during the course of the research (the video as well as the questionnaire) will be kept strictly confidential. Any information about you which leaves the hospital will have your name and address removed so that you cannot be recognized from it.

Project revision

The project is organized by external peer reviewers: Dr Chas Skinner and Katarzyna Zinken. It has been reviewed by the clinical director of the Diabetes Centre: Dr Iain Cranston and the Ethics Committee in the School of Psychology at the University of Southampton. If you have questions about your rights as a participant in this research, or if you feel that you have been placed at risk, you may contact the Chair of the Ethics Committee, Department of Psychology, University of Southampton, Southampton, SO17 1BJ. Phone: (023) 8059 3995.

If you have any questions about this project please do not hesitate to contact us:

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Thank you taking the time to read this letter, and we hope that you will be able to help us with this work.

Appendix R Consent form for patients - validity and intervention study

Peer Review and Evaluation of Portsmouth Insulin Management Groups for people with type 2 diabetes.

CONSENT FORM for Patient

Name of the external peer reviewers: Dr Chas Skinner & Katarzyna Zinken

1. I confirm that I have read and understand the information sheet dated 28/06/2006 for the project titled *Peer Review and Evaluation of Portsmouth Insulin Management Groups for people with type 2 diabetes* and have had the opportunity to ask questions.

2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, without my medical care or legal rights being affected. I understand that I have the right to withdrawal of the materials up to 4 weeks after the finishing of the observation process.

3. I agree that the educational programme in which I take part will be video recorded. I was informed that data will be stored in the Diabetes Centre in the Queen Alexandra Hospital and that the copies will be destroyed after 10 years (Spring, 2016; in accordance with the current NHS guidelines).

4. I agree to take part in the above project.

Patient	Date	Signature
Person taking consent Katarzyna Zinken	Date	Signature

1 for patient; 1 for external peer reviewer; 1 to be kept with hospital notes

Appendix S Information sheet for nurses – validity and intervention study

28th June 2006

Health Care Professional Information Sheet

Peer Review and Evaluation of Portsmouth Insulin Management Groups for people with type 2 diabetes.

What is the purpose of the project?

This project aims to enhance the effectiveness of self-management education for people with type 2 diabetes. This will be done by video recording self-management education programmes delivered by you and other health care professionals. These videos will then be analyzed by the researchers looking at how you and other the professionals led the programme. Following this you and other health professionals will get feedback on the intervention delivery and the skills they used to help participants gain more confidence in self-management. It is thought that this will help you as a programme facilitator to become more skilled at leading the programme for future groups. Furthermore, we aim to present the results at conferences for health care professionals and to write them up for publication in scientific journals.

You have been asked to help as you will be facilitating the Starting Insulin Programme in Portsmouth area. If you agree to take part we will ask your consent to video tape the sessions. The camera will be set up at you, so your intervention delivery can be observed.

Confidentiality

All information which is collected during the course of the research (the video material) will be kept strictly confidential.

Project revision

The project is organized by external peer reviewers: Dr Chas Skinner and Katarzyna Zinken. It has been reviewed by the clinical director of the Diabetes Centre: Dr Iain Cranston, registered by the QA Hospital audit group and approved by the Ethics Committee in the School of Psychology at the University of Southampton. If you have questions about your rights as a participant in this research, or if you feel that you have been placed at risk, you may contact the Chair of the Ethics Committee, Department of Psychology, University of Southampton, Southampton, SO17 1BJ. Phone: (023) 8059 3995.

If you have any questions about this project please do not hesitate to contact us:

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Thank you taking the time to read this letter, and we hope that you will be able to help us with this work.

Appendix T Consent form for nurse – validity and intervention study

Peer Review and Evaluation of Portsmouth Insulin Management Groups for people with type 2 diabetes.

CONSENT FORM for Health Care Professional

Name of the external peer reviewers: Dr Chas Skinner & Katarzyna Zinken

1. I confirm that I have read and understand the information sheet dated 28/06/2006 for the project titled *Peer Review and Evaluation of Portsmouth Insulin Management Groups for people with type 2 diabetes* and have had the opportunity to ask questions.

2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, without my medical care or legal rights being affected. I understand that I have the right to withdrawal of the materials up to 4 weeks after the finishing of the observation process.

3. I agree that the educational programme in which I take part will be video recorded. I was informed that data will be stored in the Diabetes Centre in the Queen Alexandra Hospital and that the copies will be destroyed after 10 years (Spring, 2016; in accordance with the current NHS guidelines).

4. I agree to take part in the above project.

Health care professional	Date	Signature
Person taking consent	Date	Signature

1 for health care professional; 1 for external peer reviewer; 1 to be kept with hospital notes

Appendix U Correlation coefficients between nurse-led self-efficacy techniques and listed patient self-efficacy variables.

Self-efficacy variable	T1	T2
Item 1	$r = .110$, $p = .518$	$r = .118$, $p = .653$
Item 2	$r = .246$, $p = .142$	$r = .193$, $p = .413$
Item 3	$r = .248$, $p = .150$	$r = .140$, $p = .593$
Item 4	$r = .113$, $p = .506$	$r = .403$, $p = .172$
Sum score of self-efficacy scale	$r = .202$, $p = .232$	$r = .118$, $p = .653$

Note: See Appendix O for the self-efficacy scale

Appendix V ASSET-based intervention protocol - educational training

PROTOCOL FOR WORKSHOP 1			
Time	**Activity**	**Facilitators / materials**	**Scenario**
9.00	Introduction Why are we here	Chas	NICE guidelines/structured education principles Patient centred philosophy A structured curriculum Trained educators Be quality assured Be audited
9.30	Reflecting on starting insulin programme Individual work	Chas	Individual work What are your overall goals which you want to achieve in the programme? What are the specific goals for each session?
	Guided group work	Kasia	Working on consensus of individual goals
10.00		coffee	
10.20	PPT Presentation	Kasia	Social cognitive theory, techniques to enhance self-efficacy
	Guided group work		Matching techniques with programme's planned activities (what strategies can be used when performing these activities?)
12.00		lunch	
13.00	Recognition of self-efficacy techniques Small group work	Kasia & Chas	Distinction between self-efficacy and non self-efficacy techniques Reformulating non self-efficacy techniques into self-efficacy techniques
14.30		coffee	
13.15	Guided whole group discussion	Chas	With regard to activities in the programme: How would you know you did what you intended to? Looking at the session goals, how would you know that you have achieved them? Match elicited answers to current plan

PROTOCOL FOR WORKSHOP 1 (continued)			
Time	**Activity**	**Facilitators / materials**	**Scenario**
1400	Guiding nurses in designing the feedback session	Kasia	What do you need feedback on? What self-efficacy techniques shall we use in the feedback session?
1430	Taking home action plan	Chas	Identify one thing you would re-formulate next time to make it more self-efficacy driven. Identify two things you did which promoted self-efficacy
1500	Finish		How would you like the implementation of the goals to be monitored?

Appendix W ASSET-based intervention protocol - feedback session

Action	Facilitator's response/comments
Facilitating Proactive Self	
1. What do you want feedback on?	Compare all facilitators – whether they deliver the same content
2. Which techniques would you like us to use to increase your confidence in running groups?	Self-Reflection Positive Feedback Planning for Obstacles Successful Trial
3. When you look at the verbal techniques, where do you think we are now?	Self-Reflection
Self-Reflection	
1. When you think about the self-efficacy techniques you learned about in the training, which of these do you utilise when running the Starting Insulin Group?	
2. When (in what context) have you implemented the self-efficacy driven techniques?	
Positive Feedback	
Examples from nurses' own practice	
Successful trial	
1. What else could you have said to promote self-efficacy?	
2. How could you respond to this situation in a self-efficacy promoting way?	
3. Which technique could you implement in the given situation?	
Planning for Obstacles	
1. Which techniques from those you are currently utilising would you like to implement to a greater extent when running your next session?	
2. What are potentially good opportunities (context, situation) within the programme to promote self-efficacy?	
3. What could be a potential seatback to implement the technique and how could you cope with it?	

Appendix X ASSET-based intervention protocol - summarising training

PROTOCOL FOR WORKSHOP 2			
Time	**Activity**	**Facilitator / materials**	**Scenario**
9.00	Introduction Why are we here	Sue	Structured education principles Patient centred philosophy A structured curriculum Trained educators Be quality assured Be audited
9.30	Guided self-reflection using excerpts from SIG	Kasia & Sue	Play the chosen excerpt to the group and say what your frustration/challenge was Exploration of the frustration: 1) What made you choose this excerpt? 2) What was the challenge? 3) How did you feel in this situation? 4) What would make the situation easier to be in/cope with? 5) As you review the tape, what thoughts do you have? 6) What do others think? Write the frustration on the flipchart, so we will create a list of issues for later use
12.00	Feedback within the whole group	Kasia	What did you learn from this activity? What was your message to take home? What did you miss? What was it like to be peer-reviewed? What was it like to be a peer reviewer? Reg. ASSET based feedback – the same set of questions.
12.30		LUNCH	
13.15	PPT Presentation Goals of the starting Insulin Programme Implementation of self-efficacy based strategies	Kasia Computer Projector Screen	Social cognitive theory driven ASSET Implementation of goals in the starting insulin programme Results of feedback for the starting insulin programme

PROTOCOL FOR WORKSHOP 2 (continued)			
Time	**Activity**	**Facilitators / materials**	**Scenario**
13.45		Coffee	
14.00	ASSET Introducing and practice implementing self-efficacy based strategies using examples from the starting insulin programme	Kasia & Sue Laptop, projector ASSET card set + programme based examples	Small group work: allocating example cards to appropriate strategies. Specific tasks: 1. Distinction between self-efficacy and non self-efficacy examples 2. Re-formulation of non self-efficacy examples to become self-efficacy orientated
15.00	Feedback within the whole group	Kasia & Sue	What are you getting from the activity? What was new for you?
15.30	SMART Goal setting	Sue	What are the issues/challenges for you now? As a result of today what are you going to do differently? Develop a goal which is: Specific What exactly (when, where, how much) are you going to do? Measurable How will you know you achieved the goal? How confident are you (on a 1-10 scale) that you are able to implement the goal? Action–oriented What are you going to do? Realistic What may stop you from doing it? Time limited When are you going to implement it?
16.00	Finish		How would you like the implementation of the goals to be monitored?

Appendix Y Goals identified during the educational training

PROVIDE EMOTIONAL SUPPORT

- Elicit thought and feelings regarding hypos
- Capturing their outstanding issues
- Allow time to explore/express emotions (allow silence, resist temptation to fix it
- Body language (open, encouraging, nodding, affirming, eye contact, sitting/standing, body posture, warmth)

TO FACILITATE THE GROUP IN A WAY THAT ENCOURAGES PARTICIPANTS TO PROCESS INFO AND INTERACT, SO THEY LEAVE 1ST SESSION HAVING MADE MOST APPROPRIATE CHOICE FOR THEM REGARDING DEVICE AND REGIMEN.

- Check that their needs met – open questions
- Questions open not closed and involve others in the group
- Information giving
- Be honest
- Being perceptive – listening and observing
- Reflection allows them to realize they had answer
- Elicit thoughts and feelings regarding different regimens
- Describe different regimens, pro's and con's
- Draw insulin profiles (directed by patients' reflection)
- Ask questions (e.g. what would push sugars up, what would push them down – generated list of lifestyle issues)
- Capturing feedback (patient story) – go around group and ask "How have you found the last 2 weeks" "what does this mean" "what has changed" Ask partner same questions.
- Use info provided to elicit relevant testing times for the chosen regimen
- Give people an example and get them to discuss what they would do using the insulin adjustment guidelines
- Discuss risk of hypo's and how to manage them
- Confirm understanding of need for insulin

PERSON ABLE TO ADMINISTER INULIN AS PER RECOMMENDATIONS.

- Ask which device they have chosen & Provide supplies
- Patient loads a pen with insulin and puts a needle on & injects 2 units

PATIENTS ARE AWARE OF RISKS AND HOW TO SAFELY MANAGE THESE

- Discuss needle changing
- Discuss insulin storage
- Discuss risks of injecting into same site
- Patient performs test shot (2u) and explain why
- Complete insulin regimen sheet and give to patient
- Provide monitoring diary
- Write GP letter for patient to take
- Look at and discuss blood sugars (discovery sheet/book) to help to identify their chosen regimen

PERSON IS ABLE TO ADJUST DOSES WITH CONFIDENCE AFTER 1ST SESSION

- Explain size of dose and effect of stopping oral medication on blood sugar levels
- Explain initial size of dose in relation to possible future need
- Tell people that insulin is not like other drugs and that they have a responsibility to be pro-active

OVERALL GOAL: TO EDUCATE THE PATIENT ON THE INITIATION OF INSULIN THERAPY AND ONGOING MANAGEMENT

OBJECTIVES:

- NURSES TO BE ABLE TO FACILITATE GROUP IN A WAY THAT ENCOURAGES PARTICIPANTS TO PROCESS INFO AND INTERACT.
- PATIENTS TO BE ABLE TO BE CONFIDENT TO ADJUST/TITRATE INSULIN ACCORDING TO LIFESTYLE NEEDS.
- PEOPLE HAVE KNOWLEDGE AND SKILLS TO MANAGE INSULIN EFFECTIVELY IN RELATION TO LIFE EVENTS
- PROVIDE EMOTIONAL SUPPORT
- GUDIE REFLECTION ON USING INSULIN

Appendix Z Feedback protocols including examples from nurses' practice

Table W1. ***Nurse 1***

Examples from nurse's practice	**Self-efficacy technique used/nurses comments**
Positive Feedback	
How do you think you got on the last two weeks?	ME SR
You are not sure are you? So what do you think is wrong with the readings?	ME ST
Why did you choose to do that?	ME SR
Do you think she needed sugar as well?	RM GS
You are waking up with good blood sugar – so what may these (other) readings indicate?	PAS EPS
Why would you continue having insulin (when sick)?	VP EK
What were your questions?	ME FPS
Successful trial	
Do you think the actual insulin amount you are having is important or unimportant?	
How are we doing? (reg. blood glucose levels)?	
What is the most sensible thing to do – inject at the same time or have injection 20 minutes before the food?	
Nothing is a definite no; all you need to do is to test, have it and to test again 2 hrs later	
Planning for obstacles	
1. Which techniques from those you are currently utilising would you like to implement to a greater extent when running the next session?	*To get the group involved by bringing patients' questions back to the group;* *To explore patients' experiences;* *To use the flipchart*
2. What are potentially good opportunities (context, situation) within the programme to promote self-efficacy?	
3. What could be a potential setback to implement the technique and how could you cope with it?	

Note: The symbols reflect the self-efficacy categories. These are ME – mastery experience, RM – role modelling, VP – verbal persuasion and PAS – psychological and affective states, FPS – facilitating pro-active self, SR – self-reflection, ST – successful trail, CO – competent other, GS – group solving, SO – sharing obstacles, EK – elicitation of knowledge, PF – positive feedback, PO – planning for obstacles, EAS – exploration of affective state, and EPS – exploration of physiological state. Nurses' statements (citations and comments) are in cursive

Table W2. ***Nurse 2***	
Examples from nurse's practice	**Self-efficacy techniques used/nurse's comments**
Positive Feedback	
Anything else that anybody can think of? (Any other symptoms?)	PAS EPS
Which insulin are you going to increase? Both?	VP PO
Which blood sugar is going to have impact on?	VP EK
Really, so you are seeing a change already. Does anybody see any changes already?	PAS EPS
How would you know?	VP PO
What would you do differently next time?	VP PO
What would you do differently if your blood sugar would be (giving the group a scenario of blood glucose level for a day).	VP EK
Successful trial	
Does anybody experience the same… Because you dropped your glycoside didn't you?	*Give time to answer.* *Summarise first and then ask the group whether they experience the same – or what they experience.* *What is glycloside for? What are the consequences of dropping it?*
What caused you to have that and how recent was that?	*Ask one question at a time*
What sort of "what ifs"?	*The patients did not understood this question – what do you ask here?* *How to ask it more specifically?*
Does anybody want to share their experiences over the last two weeks with the group so we can use it as an example for (…)	*How to make it simpler – what are you asking for here?*
Planning for obstacles	
1. Which techniques from these you are currently utilising would you like to implement to a greater extent when running your next session?	*Explore patients' experience (e.g. with hypos) – symptoms and treatment* *Ask simple questions – do not answer yourself (one question at a time)* *Bring group in* *Insulin titration in first session* *Be more specific when asking questions*
2. What are potentially good opportunities (context, situation) within SIG to promote self-efficacy?	
3. What could be a potential setback to implement the technique and how could you cope with it?	*Talkative and silent patients* *Too many issues coming from the group*

Note: See Table W1 for clarification of the symbols

Table W3 ***Nurse 3***

Examples from nurse's practice	**Facilitator's response/comments**
Positive Feedback	
It is two weeks since you have started insulin. How are things going?	SR
I think you have got it, between 4 and 7, in the morning, the waking up one...	PF
What are you going to do about these (high) readings?	PO
Why did you think you blood sugar would go down?	EPS
What would send your blood sugar up? What would send your blood sugar down?	EK
Did the sugar free biscuits affect your blood sugar level?	EPS
Any more questions about food?	FPS
Successful trial	
These are high. It means the injection you had before is not big enough.	*Elicit knowledge from patients. Make sure they understood the principle.*
What sort of blood sugar are you getting? Do you want me to read it for you?	*Guide him in finding the pattern – let him read his levels first.*
What do you do exercise-wise? Nothing… Do you walk? Do you do gardening?	*Ask an open-ended question – so he can find his activity (if he is so negative about it, he will only deny).*
You could try, but I would say, make sure you have something with you at the dinner table – a piece of bread or something you can eat before the meal arrives.	*Guide her in finding solution to the too early injection.*
Planning for obstacles	
1. Which techniques from those you are currently utilising would you like to implement to a greater extent when running your next session?	*Role modelling – getting the group more involved.*
2. What are potentially good opportunities (context, situation) within SIG to promote self-efficacy?	*Open up questions – to start session2 with reflection on previous week – writing up the burning issues on the board and checking by the end of the session that they have been answered.*
3. What could be a potential setback to implement the technique and how could you cope with it?	*Dominant partners, asking not relevant questions – to cope by clear statement that the session is for the patient and her/his issue will be discussed, give opportunity to discuss partners' issues at other occasion.*

Table W4 *Nurse 4*

Examples from nurse's practice	Facilitator's response/comments
Positive Feedback	
What has brought you to this point?	ME SR
How does it make you feel? *Any specific symptoms that you can think of?*	PAS EPS
How can you find out what different foods are doing to your blood sugars?	VP PO
Any specific questions that you want me to answer during the session?	ME FPS
What worries you about getting to seven?	PAS EAS
Has anyone else had the same problem with metformin?	RM SO
What you have just said is absolutely perfect. This is what you will be looking for.	VP PF
What stops you from doing that?	ME SR
Successful trial	
Can I just ask very quickly: Does anybody know what HbA1c is?	VP EK *Closed question*
Has your nurse had the chance to talk about how many injections you could give during the day?	*Potentially FPS or EK*
Sometimes 6 but generally 10 to 17. *You said you cannot control it.* *Does it concern you that they are high?*	*ME: e.g. SR: What may be going on for you in terms of glucose management?* *Nurse: Why may your doctor have referred you to the group?* *Open up to group to discuss late risk of high blood sugars*
Orange juice would do the trick as well.	*Potentially EK or PO*
Planning for obstacles	
1. Which techniques from those you are currently utilising would you like to implement to a greater extent when running your next session?	*Practise silence (ask one question at a time)* *Bringing questions back to group avoiding direct answering* *Open up to group*
2. What are potentially good opportunities (context, situation) within SIG to promote self-efficacy?	
3. What could be a potential setback to implement the technique and how could you cope with it?	

Note: See Table W1 for clarification of the symbols

Table W5 ***Nurse 5***

Examples from nurse's practice	**Self-efficacy techniques used/nurse's comments**
Positive feedback	
How have you managed since the last time?	ME SR
Is there any question you want to answer today?	ME FPS
What have you actually done to crack it?	RM CO
This is what you should be doing. You have already found out that by increasing insulin…what has that done to your blood sugars?	VP PF / PAS EPS
How do you think you can find out?	VP PO
What do you think exercise would do with regard to your diabetes?	VP EK
How does it make you feel?	PAS EAS
Successful trial	
What will the blood sugars tell you? Did they tell you anything?	*Potentially SR but complex closed*
I would leave it and continue monitoring.	*Potentially VP PO but advice*
You could stop the tablets but you will have to stay on metformin.	*PAS EPS or VP EK but advice*
Are you happy monitoring that much?	*ME SR or RM CO but closed*
Monitoring has to be convenient because it's a pain, I know…	*VP PO but negative statement*
Planning for obstacles	
1. Which techniques from those you are currently utilising would you like to implement to a greater extent when running your next session?	*Ask simple open ended questions* *Open up to group* *Help people to self explore*
2. What are potentially good opportunities (context, situation) within SIG to promote self-efficacy?	
3. What could be a potential setback to implement the technique and how could you cope with it?	

Note: See Table W1 for clarification of the symbols

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