UNIVERSITY OF SOUTHAMPTON

FACULTY OF MEDICINE, HEALTH AND BIOLOGICAL SCIENCES

School of Medicine

# An Alternative Approach to Sub-Grouping the Eating Disorder Population: New Potential for Improving Treatment Effectiveness ?

By

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ABSTRACT

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# AN ALTERNATIVE APPROACH TO SUB-GROUPING THE EATING DISORDER POPULATION: NEW POTENTIAL FOR IMPROVING TREATMENT EFFECTIVENESS?

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One of the goals of psychiatry has been to meaningfully classify psychological illness. Within the field of eating disorders there has been a growing unease with the current DSM-IV diagnostic categories: Anorexia Nervosa, Bulimia Nervosa and Eating Disorder Not Otherwise Specified (American Psychiatric Association, 1994)[1]. The extent to which these categories adequately reflect clinical reality has been questioned, as has their ability to usefully inform treatment planning. This thesis aimed to explore whether there are alternative ways of assessing and categorising the eating disorders population that might allow for the more appropriate tailoring of treatment to clinical presentation. The main objective was to explore whether distinct clusters of patients could be identified across the eating disorder population when using eating disorder symptoms and additional clinical characteristics, namely attachment and coping style. Secondary analyses focused on conducting a preliminary assessment of the validity of these sub-groups. Participants were recruited from a Community Eating Disorders Service and data collection was integrated into the service assessment process. Follow-up data relating to treatment intervention and outcome at 6 and 12 months were also collected. One hundred and ninety one participants submitted completed questionnaires and interviews. Following the exclusion of outliers, 165 participants were included in the final cluster analysis, which led to the identification of four sub-groups. Differences were found across the clusters on aspects of general functioning and mood. When compared with DSM-IV diagnoses, clusters accounted for greater variation in key eating disorder symptoms and clinical features. Differences across the clusters in relation to treatment intervention and outcome were identified, although these did not reach statistical significance. Future research might usefully try to replicate these clusters and further assess their external validity, including relationship to treatment outcome. This would further establish whether the cluster solution identified in the present study constitutes a valid and clinically useful means of sub-grouping the eating disorder population.

[1] It is acknowledged that the ICD classification system is widely used in general psychiatry. However this thesis will focus on the DSM system as its criteria are most commonly used in eating disorders research.

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**List of commonly used abbreviations**

| | |
|---|---|
| AN | Anorexia nervosa |
| ASQ | The attachment style questionnaire |
| BDI | Beck depression inventory |
| BED | Binge eating disorder |
| BMI | Body mass index |
| BN | Bulimia nervosa |
| CBT-BN | Cognitive behavioural therapy for bulimia nervosa |
| DAPP | Dimensional assessment of personality pathology – basic questionnaire |
| DSM | Diagnostic and statistical manual of mental disorders |
| EDE | Eating disorder examination |
| EDNOS | Eating disorder not otherwise specified |
| ICD | International classification of diseases |
| IPQ | inter-quartile range |
| MRC | Medical research council |
| n | Number of subjects |
| NES | Night eating syndrome |
| % | Percent |
| PD | Purging disorder |
| SF-36 | The medical outcome survey short-form |
| SD | Standard deviation |
| UCL | The utrecht coping list |
| WSAS | Work and social adjustment scale |

# CHAPTER 1

## The classification of illness and disease

### 1.0 Background

Since the beginning of civilisation humans have attempted to make sense of the world around them and in doing so have produced numerous classification systems aimed towards organising knowledge, the ultimate goal being to provide reliable beliefs about the nature of reality. Whether any of these systems amount to genuine knowledge about the world continues to pose a challenge and forms the basis of epistemology. This branch of philosophy attempts to provide an accurate account of how we perceive and conceptualise the world and debate abounds as to whether knowledge can only be acquired though experience (empiricism) or whether things exist independent of our minds (rationalism). Generating empirical evidence through testing hypotheses using observation and experiment is central to the scientific study of psychological disorders and is of paramount importance if we are to develop a reliable diagnostic system. However, whilst many view diagnosis as a scientific, value-free process, others would argue that social judgments are already implicit in our attempts to classify psychological disorders (Fulford et al., 2005). Conceptual questions such as these are important to consider when thinking about the classification of mental health and the differences between terms such as "disease", "illness" and "syndrome", as unlike other areas of medicine, psychological symptoms are not open to testing by objectifiable means. For the purpose of this thesis a disease is taken as representing something that is objectifiable (e.g. is proven to exist by the presence of objective data), an illness represents the subjective experience reported by the patient, and a syndrome refers to a cluster of clinical features that co-occur and are postulated to represent the presence of some underlying pathological mechanism.

### 1.1 Historical overview

Attempts to understand and classify mental illness can be traced back to the work of philosophers such as Hippocrates and Plato. Whilst Hippocrates believed that thoughts and feelings occurred in the brain, Plato proposed a view of the soul as struggling to balance two conflicting impulses; one noble, the other driven by base desires. Although these and other attempts were made to conceptualise mental states, efforts to develop a systematic approach to eliciting a person's state of mind came

much later. Cicero (c110BC) developed the first assessment tool which contained questions related to temperament, significant life events and working history. This interview format was used throughout the Roman Empire and continued in widespread use in Celtic monasteries until their dissolution in the sixteenth century. Following the emergence of madhouses and asylums in the seventeenth and eighteenth centuries, the early nineteenth century saw renewed interest in the study of insanity. Of particular note is the work of German psychiatrist Emil Kraepelin (1855-1927) who proposed that psychiatric disorders should be grouped according to common *patterns* of symptoms rather than the presence of a particular symptom(s). Kraepelin's views, alongside those of Adolf Meyer (1866 – 1950), a prominent psychiatrist who claimed that 'psychological disorders stemmed from *reactions* of one's personality to social, psychological, and biological factors' (APA, 1952), heavily influenced the development of modern day psychiatric classification systems (Darton, 2004). Primarily reading as a glossary of descriptions of diagnostic terms, The Diagnostic and Statistical Manual (DSM-I) published by the American Psychiatric Association in 1952, represents one of the first uniform systems aimed towards guiding diagnosis and research in the field of mental health (American Psychiatric Association, 1952).

Despite the standardisation achieved by DSM-I and DSM-II (American Psychiatric Association, 1968) the reliability of clinical diagnosis remained poor and attempts were made to address these issues in DSM-III (American Psychiatric Association, 1980). Facilitated by the dominance of psychiatry and the emergence of behavior therapy and psychotropic medications, DSM-III signified a major change in diagnostic taxonomy that was characterised by a move away from psychoanalytic conceptualisations towards a biomedical model of mental illness. Concepts such as neurosis were replaced by symptom focused operational definitions, and diagnoses were based on groups of symptoms that were found to have treatment, prognostic and/or familial significance. DSM-III also saw the introduction of a multi-axial approach, whereby individuals could be rated on the following five axes: Axis I, which is concerned with the diagnosis of clinical disorders, such as anxiety and depression; Axis II, used for reporting long standing personality disorders and mental retardation; Axis III, used for reporting any medical conditions that may be relevant to the treatment of a mental disorder, such as a brain injury or HIV; Axis IV, which

is concerned with psychosocial and environmental factors, such as problems with primary social support or housing; and Axis V, which is concerned with a global assessment of overall level of functioning. The aim of this approach was to give a more complete picture of the patient, rather than just a simple diagnosis. DSM-III was replaced by DSM-III-R in1987 (American Psychiatric Association, 1987). The most recent version, DSM-IV (American Psychiatric Association, 1994), has retained the multi-axial approach and represents an atheoretical classification system. The next version, DSM-V, is now in development and is due to be published in 2012.

## 1.2 The purpose of classification

The benefits of introducing explicit classification systems into the health care field are potentially wide ranging. Such systems may assist clinicians and other users in conceptualising diagnostic entities, thus providing a working concept within which to organise and understand clinical experiences, derive inferences regarding outcome, and guide the treatment decision-making process. Researchers have also commented upon the potential for enhanced diagnostic agreement between clinicians as well as the potential for improved communication of clinical information, whether verbally between clinicians or for the purposes of statistical reporting on treatment outcome and psychiatric morbidity (Kendell & Jablensky, 2003). Advantages are also found in the research arena, where the use of standardised diagnostic instruments has become the norm and clinical diagnoses, although largely provisional, can be evaluated using empirical means. Finally, improvements have been noted in broader areas such as teaching, which is now based on an internationally recognised language; a language that can also be used to facilitate communication with patients, caregivers and wider society (First et al., 2004).

## 1.3 Problematic aspects of classification

### 1.3.1 Clinical validity

There is a substantial literature concerned with the classification of psychological disorders and despite increased reliability, the validity and clinical utility of the current DSM system continues to be widely debated (McCarthy & Gerring, 1994; First et al., 2004). Kendell outlined six strategies researchers could use to evaluate a syndrome's clinical validity (Table 1).

**Table 1: Strategies for evaluating the validity of clinical syndromes (from Kendell, 1989)**

1. Identification and description of the syndrome by cluster analysis or 'clinical intuition'
2. Demonstration of points of rarity between syndromes by discriminant function analysis or latent class analysis
3. Follow-up studies establishing a distinctive course of outcome
4. Therapeutic trials establishing a distinctive treatment response
5. Family studies establishing that the syndrome 'breeds true'
6. Association with more fundamental abnormality – histological, psychological, biochemical or molecular

Although many studies have used these strategies over the past 15 years, there remains a lack of empirical evidence to support the clinical validity of most major psychological disorders (Kendell, 1989). Consequently the 'lumping or splitting' debate concerning whether psychological disorders should be grouped according to similarity or divided on the basis of difference continues, and questions relating to whether psychological disorders represent discrete entities or are simply located on a continuum also remain unanswered.

Many of the difficulties associated with classifying psychological disorders are concerned with the level at which a diagnosis is made and the procedure by which this is done. Disease entities in other branches of medicine are nearly always described at a level more fundamental than their syndrome (i.e. set of clinical features) and are distinguished from one another by differences in pathological mechanism. The process of diagnosis is often facilitated by the availability of objective data in the form of 'test results'. In contrast, psychological disorders are rarely linked to a specific underlying abnormality but are instead thought to result from multiple interacting aetiological factors such as genetics, personality characteristics and environmental factors. Symptoms primarily manifest in behavioral and emotional disturbances, and many are arguably variations or extremes of normal behaviour/experience. The process of making a diagnosis relies heavily on the subjective experience of the patient as well as the clinician's ability to elicit clinical information. Although the advent of structured clinical interviews has gone some way to addressing the latter problem, these instruments are based on strict operational definitions. This highlights a potential conflict of purpose between the researcher and clinician. Whilst researchers tend to focus on clarifying diagnostic constructs through developing strict definitions based on symptom frequency and/or

severity, there is a risk that this will lead to a larger percentage of the clinical population in question being ruled out of the diagnostic category because they do not fulfil *all* of the criteria. This subsequently reduces the diagnostic construct's clinical usefulness as it captures only a small percentage of the variety of presentations seen in routine clinical practice. Reliability is therefore increased at the cost of reducing validity.

Additional problems relate to how clinical diagnoses were originally developed. The diagnostic constructs identified in the early versions of the DSM system were primarily drawn together by psychiatrists working in specialist practice (McCarthy & Gerring, 1994), and are therefore likely to represent a narrow range of presentations rather than the broad range of psychopathology seen in the general population and in primary care. It can also be argued that, in North America in particular, the emergence of new disorders has been driven by drug companies seeking to develop markets by expanding the indications for medications, and by clinicians needing to label a wide range of presentations seen in clinical practice in order to bill insurance companies. Furthermore, once a diagnostic construct has come into general use and its specific features listed in an official nomenclature, it becomes "reified" - that is, people assume that it represents a valid construct simply because it is in a classification system.

### 1.3.2 Clinical utility

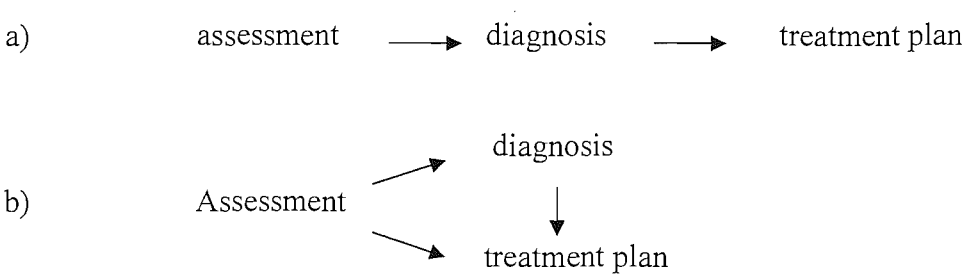
Despite the problems outlined above, diagnostic concepts can still be of great clinical *utility* (Kendell & Jablensky, 2003). First and colleagues define the clinical utility of a classification system as the extent to which it assists clinicians in the following tasks: conceptualising diagnostic entities; communicating clinical information to patients, carers and other health care professionals; choosing effective interventions; and predicting future clinical management needs (First et al., 2004). In their overview of some of the problematic aspects of the DSM system, Widiger & Clark highlight the following questions as being useful to consider when evaluating the clinical utility of a psychological disorder: do those with the disorder meaningfully differ from those without the disorder?; does the disorder cause significant distress or impairment in social, academic, or occupational functions?; are those with the disorder distinguishable from those with other similar disorders?; what is the course

of the disorder (i.e. does it have a distinctive course)?; and does the diagnosis advance clinical treatment decision-making or treatment planning? (Widiger & Clark, 2000). Such questions go some way to helping us establish the clinical usefulness of diagnostic constructs used in day-to-day clinical practice.

### 1.4 A wider psychological perspective

When used in the context of treating a physical disease, a diagnosis can often provide a useful link between assessment and treatment planning (see Figure 1a). This is primarily because physical diseases tend to be either identified as discrete syndromes (i.e. identified by presence of a discrete set of clinical features) and/or defined at a more fundamental level by physical tests of, for example, histology or genetics. Consequently a 'tick box' system identifying whether or not a particular set of features is present represents a useful approach to diagnosis. However it is argued that this system works less well when applied to mental health. In relation to the use of the DSM system, it is clear that the diagnosis of psychological disorders has come to rely almost exclusively on the use of axis I (and to a lesser extent axis II), symptom presentation often being the sole factor informing treatment planning. However this is problematic given that these symptoms often constitute behavioural and emotional disturbances that are subjective, and lie on a continuum with normality. It is also argued that axis I diagnoses simply reflect constructs defined by lists of *distinctive* clinical features which although in theory should be mutually exclusive, in practice often are not. They also tend not to be exhaustive as they do not include all potentially relevant clinical features, some of which may present across a range of disorders. From a psychological perspective it can be argued that assessment of wider aspects of the clinical picture, such as those identified by the other DSM axes, may also usefully inform treatment planning alongside syndromal diagnosis (see Figure 1b). For example, although perfectionism is not a defining feature of AN, it is commonly seen in those presenting with the disorder and therefore constitutes an aspect of psychopathology that when assessed might usefully inform treatment planning.

Figure 1: Summary of assessment pathways




**1.5 Summary**

The development of contemporary classification systems in mental health can be traced back to the early twentieth century. Since this time two systems have evolved and constitute those most commonly employed in contemporary psychiatry, namely DSM and ICD. However despite their refinement, the reliability, validity and utility of these systems continues to be questioned. Whilst psychiatry has traditionally looked to define psychological disorders by the presence of a discrete set of clinical features, this process is beset with difficulties. Consequently there has been a move away from classifying illness towards focusing on how clinical features cluster in people; the aim being to assess whether or not our current way of grouping such features is optimal. However regardless of whether this work leads us to conclude that our diagnostic categories are adequate, further work is required in order to explore whether these systems can adequately guide clinical decision making and the direction of future research, particularly the development of more effective clinical interventions. Further thought should also be given to whether assessment of wider aspects of the clinical presentations could more usefully inform treatment planning and research.

# CHAPTER 2

## The classification of eating disorders

### 2.1 Historical overview

Early accounts of signs and symptoms that are now widely recognised as central features of an eating disorder date back many centuries and have been subject to a range of interpretations over time, including religious and medical. Since the latter part of the twentieth century the emphasis has been on understanding these disorders from a psychological perspective, leading to the conceptualisation of eating disorders as 'psychological illnesses' and their subsequent inclusion in psychiatric classification systems.

#### 2.1.1 Anorexia nervosa (AN)

For centuries food abstinence has been associated with aspects of religious practice. However by the end of the 1700s extreme forms of self-imposed food restraint and emaciation had become synonymous with mental disorder (Lasegue, 1873; Gull, 1874; Morton, 1695) and this view remained unchallenged until the early 1900s, when a pathologist found lesions in the pituitary gland of some emaciated patients (Simmonds, 1914). For the next twenty years AN, which became known a Simmonds' disease, was widely regarded as a disorder of the pituitary gland and was treated as a physical disease. This view remained largely unchanged until the late 1930s and the work of (Ryle, 1936) and (Waller et al., 1940), who were among the first to re-establish AN as a psychological disorder.

In the 1960s the pioneering work of Hilda Bruch led to further refinements in the psychological understanding of AN, as well as the identification of a number of key clinical features (Bruch, 1962). Focusing on distorted body image and low self-esteem, Bruch viewed self-starvation as a representation of the patient's struggle for autonomy, competence, control, and self-respect. Set within a psychoanalytic framework, she suggested that a mother's failure to recognise and confirm her child's needs led to internal confusion within the child in the following three areas: a tendency to overestimate body size; an inability to identify internal sensations such as hunger and affective states; and a sense of ineffectiveness characterised by feelings of loss of control. Bruch's work culminated in the following features being

widely regarded as central to AN: a characteristic disturbance in body image whereby one views oneself as fat when not, and the relentless pursuit of thinness.

2.1.2 Bulimia nervosa (BN)

Historical accounts of some of the key features of the modern day understanding of BN date back to Antiquity and the Middle Ages. During this time the term 'kynorexia' (Ziolko, 1996), which literally translated means 'insatiable hunger like that of dogs', was commonly used to describe episodes during which individuals lost control of their eating and ate excessive amounts of food, before vomiting in order to avoid physical harm. This presentation was also viewed as having a physical cause, primarily related to gastric dysfunction. During the late eighteenth century the term 'kynorexia' fell out of favour and was replaced by the identification of several different eating-related disorders, including 'bulimia helluonum' (excess hunger), 'bulimia syncopalis' (fainting from hunger) and 'bulimia emetica' (overeating with vomiting), the latter being referred to in a small number of case reports (Parry-Jones & Parry-Jones, 1995). However it remains unclear from these early reports as to whether vomiting associated with over-eating was spontaneous or self-induced and little indication is given to the presence of any psychological concerns. Consequently, it is difficult to establish whether these reports are of any relevance to the modern day concept of BN.

By the late nineteenth and early twentieth century weight and shape concerns were beginning to be associated with binge-eating (Stunkard, 1990). Fear of weight gain was commonly reported, with vomiting and laxatives being used as methods of weight control (Binswanger, 1944). Although a number of case reports describing this cluster of symptoms were published in the 1960s and 1970s, it is the psychiatrist Gerald Russell who is widely regarded as responsible for the identification of the modern day syndrome. In 1979 he published a case series of 30 patients presenting with what he described as 'bulimia nervosa'(Russell, 1979), the key features of which are listed in Table 2.

| Table 2: The key features of BN identified by Russell (Russell, 1979) |
|---|
| Powerful and intractable urges to overeat |
| Morbid fear of becoming fat |
| Avoidance of fattening effects of food by inducing vomiting or abusing purgatives or both |

## 2.2 The evolution of eating disorder classification

The classification of eating disorders has evolved significantly in a relatively brief period of time. Although there is a tendency to regard eating disorders as consisting of AN and BN, in the past 10 years it has become increasingly recognised that a significant proportion of those presenting to clinical services with eating difficulties do not fulfil all the criteria currently required for either of these diagnoses.

### 2.2.1 Anorexia nervosa

In 1970 Gerald Russell proposed the following three criteria for AN: a behavioural disturbance (leading to marked weight loss); a characteristic psychopathology (characterised by a morbid fear of getting fat); and an endocrine disorder (manifesting as amenorrhoea in females and loss of sexual potency/sexual interest in males). AN first appeared as a syndrome in DSM-III (1980) (American Psychiatric Association, 1980) and was identified in ICD 9 under the section 'special symptoms and syndromes not elsewhere classified (World Health Organisation, 1977). Within DSM-III a morbid fear of fatness was defined in terms of 'body image disturbance', however subsequent studies have indicated that in general patients with AN do not over estimate their size and so this criterion has since been modified to focus on the attitudinal and affective dimensions of body image.

### 2.2.2 Bulimia nervosa

The term 'bulimia' appeared in early versions of the ICD system as a symptom. For example it was defined in ICD-9 as 'polyphagia, excessive eating or hyperalimentation'. BN appeared for the first time as a syndrome in ICD-10 (World Health Organisation, 1992) and DSM-III (American Psychiatric Association, 1980), initially being termed 'bulimia' in the DSM classification system. DSM-III defined bulimia as recurrent episodes of binge eating and required the presence of three out of five features, including the termination of binge-eating episodes by abdominal pain, sleep, social interruption or self-induced vomiting. Other features included a

fear of not being able to stop eating voluntarily, awareness that the eating pattern was abnormal, and depression or self-deprecating thoughts following binges. Diagnosis excluded those with AN, and compensatory behaviours were not an essential feature. In DSM-III-R the name of the syndrome changed to BN. Recurrent episodes of binge-eating remained a core feature, but had to be accompanied by a loss of control over eating. The frequency and duration of these episodes were specified (minimum average of at least two binge-eating episodes a week for at least two months), and the presence of compensatory behaviour and a persistent over concern with weight and shape were also identified as key features.

2.2.3 'Eating Disorder Not Otherwise Specified' (EDNOS)

EDNOS is the category within the DSM system used for eating disorders of clinical severity that do not meet all the diagnostic criteria for either AN or BN. As such, this category is intended to be 'residual', i.e. for the *few* cases that are *mild*, relative to the two primary diagnoses described above. This category was first included in DSM-III (American Psychiatric Association, 1980) as 'atypical' but was later renamed 'not otherwise specified' in DSM-III-R (American Psychiatric Association, 1987) and DSM-IV (American Psychiatric Association, 1994).

## 2.3 Current diagnostic criteria

The DSM scheme is the most commonly used classification system in eating disorders research (American Psychiatric Association, 1994). DSM-IV includes two main eating disorder diagnoses, AN and BN, as well as the residual category of EDNOS. Within EDNOS, Binge Eating Disorder (BED) has been identified as a provisional subgroup. However, before describing the main eating disorder diagnoses it is necessary to define an eating disorder.

2.3.1 What is an 'eating disorder'?

Surprisingly few attempts have been made at defining an eating disorder, although one definition has been given by Fairburn and Walsh. They suggest that an eating disorder be defined as *'a persistent disturbance of eating behaviour or behaviour intended to control weight which significantly impairs physical health or psychosocial functioning. This disturbance should not be secondary to any recognised general medical disorder (e.g., a hypothalamic tumour) or any other*

*psychiatric disorder (e.g., an anxiety disorder)'*. They define atypical eating disorders as *'those conditions that meet the definition of an eating disorder but not the criteria for AN or BN'* suggesting that by definition atypical eating disorders are associated with a significant level of impairment (Fairburn & Walsh, 2002). Although this definition is consistent with the DSM-IV definition of a mental disorder, which requires that there be 'clinically significant impairment', further work is needed in order to establish which eating disorder features (and at what level) result in clinically significant impairment (Fairburn & Cooper, 2007).

### 2.3.2 Diagnostic criteria for anorexia nervosa

The key features of AN echo much of Hilda Bruch's early work, the 'relentless drive for thinness' continuing to be a central diagnostic feature. Those with AN fall into one of two sub-types defined by the presence or absence of binge-eating or purging. See Table 3 for a summary of the diagnostic criteria for AN (American Psychiatric Association, 1994).

**Table 3. DSM-IV criteria for AN**

1. Refusal to maintain body weight at or above a minimally normal weight for age and height (e.g. weight loss leading to maintenance of body weight at less that 85% of that expected; or failure to make expected weight gain during period of growth, leading to body weight less than 85% of that expected)
2. Intense fear of gaining weight or becoming fat, even though underweight
3. Disturbance in the way in which one's body weight or shape is experienced, undue influence of body weight or shape on self-evaluation, or denial of the seriousness of the current low body weight
4. In postmenarchael females, amenorrhea, i.e., the absence of at least three consecutive menstrual cycles (a women considered to have amenorrhea if her periods occur only following hormone, e.g., estrogen administration)

**Specific type:**
**Restricting Type**: during the current episode of AN, the person has not regularly engaged in binge-eating or purging behaviour (i.e., self-induced vomiting or the misuse of laxatives, diuretics or enemas)
**Binge-eating/purging Type**: during the current episode of AN, the person has regularly engaged in binge-eating or purging behaviours (i.e., self-induced vomiting or the misuse of laxatives, diuretics or enemas)

2.3.3 Diagnostic criteria for bulimia nervosa

The diagnostic criteria for BN have undergone considerable revisions over the years. The criteria for a DSM-IV (American Psychiatric Association, 1994) diagnosis of BN are set out in Table 4.

**Table 4. DSM-IV criteria for BN**

1. Recurrent episodes of binge eating. An episode of binge eating is characterised by both of the following:

A. eating, in a discrete period of time (e.g., within any 2 hour period), an amount of food that is definitely larger than most people would eat during a similar period of time and under similar circumstances

B. a sense of lack of control over eating during the episode (e.g., a feeling that one cannot stop eating or control what or how much one is eating)

2. Recurrent, inappropriate compensatory behaviours in order to prevent weight gain, such as self-induced vomiting, misuse of laxatives, diuretics or other medications, fasting, or excessive exercise
3. The binge eating and inappropriate compensatory behaviours both occur, on average, at least twice a week for 3 months
4. Self evaluation is unduly influenced by body weight and shape
5. The disturbance does not occur exclusively during episodes of AN

**Sub-types:**
**Purging type**: during the current episodes of BN, the person has regularly engaged in self-induced vomiting or the misuse of laxatives, diuretics or enemas
**Nonpurging type**: during the current episodes of BN, the person has used other compensatory behaviours, such as fasting, excessive exercise, but has not regularly engage in self-induced vomiting or the misuse of laxatives, diuretics or enemas

One of the key issues relating to the current criteria is concerned with the frequency of binge eating required for a diagnosis. Although setting a threshold is useful in terms of providing a uniform requirement, the figure of two episodes a week is arbitrary and it has been suggested that those who binge eat once a week may not differ in their underlying psychopathology compared to those who binge eat more often (Sullivan et al., 1998).

2.3.4 Diagnostic criteria for Eating Disorder Not Otherwise Specified

Six different types of eating disorder presentation are given as examples within EDNOS and to date the most recognised subgroup is that of binge-eating disorder (BED) (Fairburn et al., 1993b; Spitzer et al., 1992; Spitzer et al., 1993). A summary of the six examples and the current research diagnostic criteria for BED are shown in Tables 5 and 6 respectively.

**Table 5. DSM-IV criteria for EDNOS**

- For females, all the criteria for AN are met except that, despite significant weight loss, the individual has regular menses
- All of the criteria for AN are met except that despite significant weight loss, the individual's current weight is in the normal range
- All of the criteria for BN are met except that, the binge eating and inappropriate compensatory mechanisms occur at a frequency of less that twice a week for a duration of less than 3 months
- The regular use of inappropriate compensatory behaviour by an individual of normal body weight after eating small amounts of food (e.g., self-induced vomiting after the consumption of two cookies)
- Repeatedly chewing and spitting out, but not swallowing, large amounts of food.
- Binge eating disorder: recurrent episodes of binge eating in the absence of the regular use of inappropriate compensatory behaviours characteristic of BN

**Table 6. DSM-IV research criteria for BED**

1. Recurrent episodes of binge eating. An episode of binge eating is characterised by both of the following:

A. eating, in a discrete period of time (e.g., within any 2 hour period), an amount of food that is definitely larger than most peoples would eat during a similar period of time and under similar circumstances

B. a sense of lack of control over eating during the episode (e.g., a feeling that one cannot stop eating or control what or how much one is eating)

2. The binge-eating episodes are associated with three (or more) of the following:
    - Eating much more rapidly than normal
    - Eating until feeling uncomfortably full
    - Eating large amounts of food when not feeling physically hungry
    - Eating alone because of feeling embarrassed by how much one is eating
    - Feeling disgusted with oneself, depressed, or very guilty after overeating
3. Marked distress regarding binge eating is present
4. The binge eating occurs, on average at least 2 days a week for 6 months
5. The binge eating is not associated with the regular use of inappropriate compensatory behaviours (e.g., purging, fasting, excessive exercise) and does not occur exclusively during the course of AN or BN

Two criteria must be met before a diagnosis of EDNOS can be given: firstly, it must be established that the eating disorder is of clinical severity; and secondly, it must be established that the clinical presentation does not fulfil the criteria for either AN or BN. Thus the diagnosis of EDNOS is arrived at through a process of exclusion rather than inclusion, as aside from the provisional criteria for BED there are currently no positive criteria for its diagnosis. Although DSM-IV identifies six individual categories, it has been suggested that a wide range of clinical presentations can be found within this category (Fairburn et al., 2007). However, in light of its 'residual' status EDNOS has been rarely studied - little is known about its key clinical features and the boundary between disorder and normality remains to be defined.

## 2.4 Other proposed syndromes

The two following disorders have also been described in the literature but have yet to be included within formal classification systems.

### 2.4.1 Night eating syndrome

Night eating syndrome (NES) was first described in 1955 by Stunkard and colleagues (Stunkard et al., 1955). Although the criteria for NES are still evolving, symptoms typically include morning anorexia, overeating during the evening, and awakenings at least once a night with consumption of snacks during these times (Birketvedt et al., 1999). NES was originally investigated within obese populations (de Zwaan et al., 2003), however it has also been identified within normal weight populations. In their comparison of obese and non-obese persons, Marshall and colleagues found few differences between the two groups on the Night Eating Questionnaire, the exception being age; normal weight night eating subjects being considerably younger than obese night eating subjects (Marshall et al., 2004). Despite fresh interest in the concept of NES much work remains to be done before conclusions can be drawn as to whether this constitutes a clinically useful diagnostic construct.

### 2.4.2 Purging disorder

Identified by some as a possible subgroup of EDNOS, purging disorder (PD) has been defined as the occurrence of recurrent purging in the absence of objectively large binge episodes among normal-weight individuals (Keel et al., 2005). Although originally referred to as 'subjective BN', it has since been argued that PD is not a sub threshold disorder. In their study comparing BN and PD, Keel and colleagues (Keel et al., 2001) found no significant between group differences on measures of dietary restraint, body image disturbance and general psychopathology. However women with BN reported significantly more impulsivity compared with women with PD. Keel and colleagues have recently reported further evidence for the clinical significance of PD. In their study comparing women with PD, women with BN and female controls, they found that women with PD were more significantly impaired on measures of eating pathology, general psychopathology and impulsiveness compared with female controls. They also reported that whilst the BN and PD groups did not differ significantly in relation to eating severity, dietary restraint or body image disturbance, those with BN did report greater disinhibition around food compared to those with PD, suggesting some differences in clinical presentation (Keel et al., 2005). However, as with NES, further research is required before conclusions can be drawn as to the clinical validity of PD as a diagnostic syndrome.

## 2.5 Summary

Whilst accounts of the clinical features now widely regarded as central features of AN and BN date back many centuries, it is only within the last 30 years that eating disorders have been formally included in psychiatric classification systems. Since this time it has also been widely acknowledged that the two main diagnostic categories, AN and BN, do not reflect the wide range of presentations seen in clinical practice. Consequently a residual category of EDNOS was included in DSM-III-R and researchers have since identified other potential subgroups, such as NES and PD. However despite their preliminary description within the literature, the validity and clinical utility of these latter groups has yet to be firmly established.

# CHAPTER 3

## Controversies in the classification of eating disorders

As with classification systems as a whole, there are a number of difficulties relating to the classification of eating disorders within the DSM and other diagnostic systems. These include: how best to classify the wide range of eating disorder presentations seen in routine clinical practice; identifying the boundary between a clinically significant eating disorder and a lesser, non-clinical eating problem; the diagnostic criteria for AN and BN; and the lack of evidence to support a distinctive clinical course or treatment response for current diagnostic categories.

### 3.1 EDNOS: a commonly occurring mixed bag?

Over recent years it has been shown that between 47% and 67% of patients seen in primary care and secondary specialist services are given a diagnosis of the residual category of EDNOS, and this has been documented in five well defined case series (see Table 7).

**Table 7: Diagnostic breakdown of five community case series**

| Article (author/date) | N | AN | BN | EDNOS |
|---|---|---|---|---|
| Miller (1998) | 510 | 14 % | 40% | 47% |
| Martin et al (2000) | 175 | 19.4% | 22.9% | 57% |
| Ricca et al (2001) | 189 | 24.9% | 24.9% | 50% |
| Turner & Bryant-Waugh (2004) | 190 | 5.5% | 22% | 67% |
| Fairburn et al (2007) | 170 | 4.7% | 35.3% | 60% |

Whilst early studies concluded that those with atypical presentations, including 'partial' syndromes (where some but not all of the key features are present) and 'subthreshold' cases (where a low level of all features are present), were simply less severe forms of those meeting full diagnostic criteria (Beumont et al., 1993), recent findings have questioned this observation. In their study exploring the distinction between full syndrome and subthreshold diagnoses, Crow and colleagues found that patients with full and partial AN did not differ in relation to aspects of eating disorder psychopathology, such as restraint, weight concern and hunger, or general psychopathology, such as the presence of a personality disorder or current and lifetime history of depression. Full and partial BED groups were also found to be similar in relation to eating disorder and general psychopathology, the only

significant difference being found in relation to degree of shape concern (Crow et al., 2002). It has also been reported that a proportion of EDNOS patients present with the core cognitive psychopathology but fail to fulfill the frequency of behavioural symptoms or the weight criteria necessary for a full clinical diagnosis of BN or AN (Andersen et al., 2001; Turner & Bryant-Waugh, 2004; Martin et al., 2000; Williamson et al., 1992). In their recent multi-site study Fairburn and colleagues concluded that whilst relaxing the current diagnostic criteria led to a small number of patients being reallocated to either AN or BN, the prevalence of EDNOS remained at 50% or more and this group presented with severe and persistent psychopathology that was distinctive from AN, BN or BED (Fairburn et al., 2007). These studies support the notion that atypical eating disorders should not be viewed as 'subclinical' in severity, as by definition they are associated with a significant level of impairment (Fairburn & Walsh, 2002).

In an attempt to generate clearer descriptions a number of studies have tried to identify sub-groups within EDNOS. The most recognised sub-group to date is that of BED. Following an initial proposal by Spitzer and colleagues (Spitzer et al., 1992; Spitzer et al., 1993), provisional research diagnostic criteria were developed and included in DSM-IV (see Table 6). Evidence to support the existence of BED as a distinct syndrome can be drawn from Williamson and colleagues, who used cluster analysis to identify sub-groups in a sample of EDNOS patients. They identified a BED group characterised by recurrent binge eating, morbid obesity and the absence of weight control behaviours (Williamson et al., 1992). Mizes and Sloan also found evidence for a distinct BED cluster, characterised by recurrent binge eating, high BMI and large weight fluctuations. However these patients reported some compensatory behaviors aimed towards preventing weight gain (such as vomiting) which are inconsistent with the provisional BED criteria (Mizes & Sloan, 1998). A sub-group reflecting BED was also identified by Mitchell et al (2007). Using latent class analysis they identified 5 clusters in their sample of 403 EDNOS patients, including a sub-group of overweight patients presenting with high levels of body dissatisfaction and binge eating. However, as with the BED cluster identified by Mizes and Sloan (1998), this group also reported low levels of purging. In their recent review of the BED literature Wilfley and colleagues highlight strong evidence to suggest that individuals with BED are distinct from those with AN or BN, and

meaningfully different from those without an eating disorder. Studies comparing BED individuals with BN patient have found that those with BED report significantly less dietary restraint and much higher rates of obesity (Striegel-Moore et al., 2001). In comparison with BN, binge eating among those with BED also tends to be part of a more general pattern of chaotic eating and overeating (Wilfley et al., 2000). Studies have also demonstrated that obese participants with BED display more chaotic eating habits, exhibit higher levels of eating disinhibition and report significantly higher levels of eating disorder psychopathology compared with obese individuals without BED (Hsu et al., 2002; Wilfley et al., 2000). Wilfley and colleagues also highlight studies associating BED with impaired quality of life and social functioning, concluding that the existing research supports the concept of BED as a clinically significant diagnosis (Wilfley et al., 2003).

Despite attempts to clarify the status of EDNOS a number of problematic issues remain. Firstly, EDNOS is the 'residual' category yet it is clearly the most commonly used diagnosis in clinical practice. Secondly, although BED has been highlighted as a potentially discrete syndrome, current evidence suggests that EDNOS is likely to include a variety of clinically significant presentations, only a small percentage of which are likely to closely resemble AN or BN.

### 3.2 The issue of 'caseness'

Alongside the search for subgroups within EDNOS, a small number of researchers have begun to take a closer look at the issue of 'caseness'; that is the boundary between an eating disorder of clinical significance and a lesser, non-clinical eating problem. Redefined by Fairburn and Bohn as a task of defining the 'outer edges' of EDNOS, they suggest taking a broad approach to this task, involving identification of the type and level of eating disorder psychopathology associated with a clinically significant degree of secondary distress or disability (Fairburn & Bohn, 2005). As part of this process, the authors suggest measuring the degree of functional impairment caused by the eating disorder in domains such as mood, cognition, relationships, work, and physical health. Although a small number of researchers in the field have begun to investigate functional impairment and quality of life (Hay, 2003; Mond et al., 2005), few attempts have been made to explore which eating disorder features (and at what level) cause significant functional impairment. It is

possible that findings from such research could be used to delineate the outer edges of EDNOS, providing an operational definition of what constitutes an 'eating disorder'.

### 3.3 Diagnostic criteria for anorexia nervosa

The utility of the current criteria for AN continues to be questioned and the debate is largely driven by evidence that a proportion of patients present with some but not all of the clinical features, whilst others present with all the features but not to the required severity. For example, Strober and colleagues identified a group of 'atypical' AN patients who presented with all the core features, but who denied a fear of weight gain and body size distortion, elements that are currently required for a DSM-IV diagnosis of AN (Strober et al., 1999). Similarly, in their review of 176 patients, Ramacciotti and colleagues (Ramacciotti et al., 2002) found that 15-20% reported a low drive for thinness. These finding are congruent with clinical accounts from non-Western countries, where symptoms of weight phobia and body image disturbance are typically absent in those presenting with sustained low body weight (Hsu & Lee, 1993; Tareen et al., 2005). Taken together, these findings raise questions about the importance placed upon weight phobia and body size distortion as central diagnostic indicators of AN. Amenorrhea and the weight criterion necessary for a diagnosis have also come under scrutiny. In relation to amenorrhea, Cachelin and Maher found little difference in level of psychopathology when comparing non-amenorrheic women with those who met full diagnostic criteria (Cachelin & Maher, 1998). Watson and Anderson report similar findings. When comparing in-patients who met the full criteria for restricting AN with those who failed to fulfill the amenorrhea or weight criterion (22.6%), they found few significant differences in relation to demographics, illness history, psychopathology or response to treatment (Watson & Andersen, 2003).

Based on current empirical evidence, there is clearly a lack of homogeneity within the AN type presentation: many patients present with some but not all of the key features, and others present with all the features but fail to fulfill an arbitrary criterion, such as maintenance of body weight at less than 85% of that expected for age and height. The extent to which the current criteria for AN reflect a syndrome

defined by a discrete cluster of symptoms (in type and severity) has therefore been questioned.

### 3.4 Diagnostic criteria for bulimia nervosa

As briefly touched upon in Section 2.3.3, the current criteria for a diagnosis of BN have also been questioned, particularly the frequency of binge eating and purging behaviours required for a full diagnosis. The figure of two episodes a week is arbitrary and it has been suggested that those who binge eat once a week may not differ in their underlying psychopathology compared with those who binge eat more often (Mond et al., 2006; Sullivan et al., 1998). In their recent study comparing BN patients with a group of subthreshold BN patients who had binged 4 - 7 times per month, (Rockert et al., 2007) found that whilst subthreshold BN patients scored significantly lower on scales of psychological disturbance, including self-esteem, they still scored within the clinically severe range on these instruments. In light of these findings, the extent to which the current criteria for BN represent a disorder that is meaningfully different from that seen in those presenting with all the features but not to the required frequency can also be questioned.

### 3.5 Clinical course and outcome

Follow-up data are an important source of potential evidence when exploring the validity and utility of eating disorder diagnoses. Three sources of outcome data can be identified: natural history, which is concerned with the natural course of an illness when it is left untreated; clinical course; and treatment trials. Whilst variability in outcome does not necessarily mean a diagnosis is invalid, a distinctive clinical course has been highlighted as an indicator of clinical validity (Kendell, 1989)

Reports of the natural history of eating disorders are rare, as most individuals included in studies will have had some treatment. Studies exploring clinical course are the most common and in eating disorders these have been conducted using community samples as well as groups of patients seeking treatment. Fairburn and colleagues conducted a 5 year prospective study exploring the clinical course of 102 participants with BN and 48 with BED. All were female, and eating disorder features, general psychiatric symptoms and social functioning were assessed at 15-month intervals. They found that of the 102 participants initially presenting with BN,

at 5 year follow-up 15% presented with BN, 34% with EDNOS, 2% with AN and 8% with BED, suggesting considerable variability in outcome (Fairburn et al., 2000; Fairburn et al., 2000). In their prospective study exploring the long term course and outcome of 167 females patients initially diagnosed with BN (purging sub-type), Fitcher & Quadflieg reported that at 12 year follow-up, 117 had no DSM-IV eating disorder diagnosis, one had restricting AN, two had purging type AN, 17 had purging type BN, one had non-purging BN, three had BED and 22 had EDNOS (Fichter & Quadflieg, 2004). This study also suggests that whilst a significant percentage recover, there is considerable variability in those who remain symptomatic at long term follow-up. A similar pattern of variation in clinical course is seen in AN. In a review of 168 treatment studies Steinhausen found that 43 % recovered, 36% improved, 20 % developed a chronic course and 5% died (Steinhausen, 1995). Variation in clinical course has also been highlighted by a recent review of this literature (National Collaborating Centre for Mental Health, 2004), and it has been suggested that whilst current diagnoses do not reliably predict a distinctive course of outcome, other more general clinical variables may have some predictive value (Bell, 2002).

### 3.6 Data from treatment trials

Therapeutic trials establishing a distinct treatment response can also be used to validate a clinical syndrome, and a number of such trials have been conducted in eating disorders. However, these data lend little support to the clinical validity of the current classification system, primarily due to the wide variability in treatment outcome. For example, a review of the effectiveness of a specific form of cognitive behavioural therapy for BN (CBT-BN) found that at best only 50% of patients make a full and lasting recovery. Of the remainder, 20% are likely to continue with the full form of the disorder, and 30% will have a course of illness characterised by remissions, relapses or persistent but sub-diagnostic bulimia (National Collaborating Centre for Mental Health, 2004). In relation to AN, a number of trials evaluating the efficacy of a small range of interventions have been conducted. These include family interventions for adolescents (Eisler et al., 2000) and individual psychotherapies, such as cognitive behavioural therapy and interpersonal therapy, for adults. As with BN, treatment trial data for AN indicate variability in outcome (McIntosh et al., 2005; Dare et al., 2001) suggesting no distinct treatment response.

### 3.7 Alternative way of conceptualising the classification of eating disorders

A number of studies have been conducted investigating how best to classify eating disorders. Some have explored whether eating disorders occur on a continuum or represent discrete entities, whilst others have attempted to identify whether eating disorder patients can be divided into discrete sub-groups using a broad range of features.

#### 3.7.1 Continuous versus discontinuous models of eating disorders

Researchers have long debated whether eating disorders represent discrete diagnostic entities or whether they fall along one or more continua ranging from normal to severely disturbed in areas such as body weight, eating behaviours and concerns about weight and shape. Proponents of the continuous model suggest that eating disorders occur when people display extreme forms of weight and dieting concerns that are common to many – for example some women may reduce their intake to differing degrees when dieting. Nylander was perhaps the first to propose that eating disorders occur on a continuum (Nylander, 1971). In his study of 1,231 female school children, he found that nearly 10% reported at least 3 symptoms of AN, and it was from these data that he argued that prolonged and/or intense dieting can lead to AN or a milder variant of the disorder, at the time referred to as a sub-clinical syndrome (Button & Whitehouse, 1981). Since this initial work, the majority of studies exploring the continuity / discontinuity hypothesis have focused on comparing those with clinical eating disorders (most commonly BN), with dieters and non dieting female controls, the aim being to establish whether these groups are equally spaced along a continuum of severity (i.e. do variables that discriminate those with BN from sub-clinical cases/dieters also discriminate the latter from non-dieting individuals?). As shown by the review in Table 8, the research to date yields mixed findings with some authors interpreting their findings as supporting the continuity model and others providing evidence for both continuity and discontinuity.

These mixed findings are likely to be the result of difficulties related to the initial formulation of the concepts and the resulting methodologies used to explore them. For example, how many dimensions are required to adequately describe an eating disorder? And what is the relative position of eating disorders within a dimensional

scheme - is AN more severe than BN? Studies also vary in their sampling procedure. Although some draw upon clinical samples as well as control groups, others use general population samples that are divided into high, medium and low levels of psychopathology, most often on the basis of non-diagnostically linked self-report instruments. It is often unclear as to whether these 'high' psychopathology groups are the same or qualitatively different from those with a clinically diagnosable eating disorder.

**Table 8: Summary of main studies exploring continuity/discontinuity models of eating disorders**

| Article (author/date) | Sample | Measures and analyses | Key findings |
|---|---|---|---|
| Franko & Omori (1999) | 207 female college students (bulimics/dieters, intensive dieters, casual dieters & non-dieters) | Measures of bulimic psychopathology, depression and impulsivity<br><br>MANOVA | Higher levels of depression, disordered eating attitudes and dysfunctional cognitions associated with more eating psychopathology.<br><br>Support for continuity model |
| Tylka & Subich (1999) | Study 1 - 169 college students (asymptomatic, symptomatic and eating disorders)<br>Study 2 135 college students | Measure of neuroticism, trend analysis<br>Measure of psychological and behavioural traits common to AN and BN (EDI-II), MANCOVA | Eating disordered individual scored higher than symptomatic dieters, who scored higher than non-symptomatic dieters<br>Groups differed from each other in relation to variables measured<br>Support for continuity model |
| Hay & Fairburn (1998) | 250 women with recurrent binge eating (divided into purging type BN, purging BN less frequently, non purging type) | Eating habits and associated psychopathology assessed through interview and at 1 year follow-up<br><br>ANOVAs and chi-square tests | Clinical severity decreased linearly from purging type BN (most severe) to non-purging type BN (intermediate severity) to BED (least severe)<br><br>Support for continuity model |
| Lowe et al (1996) | 21 BN, 14 dieters, 15 restrained non-dieters and 23 unrestrained non-dieters | Measured eating disordered psychopathology (restraint, weight concern and binge eating ) & overall psychopathology<br>Trend analysis | Restraint/weight concern and overall psychopathology showed gradual linear trend in scores across groups<br>Binge eating showed non linear trend only present in BN group<br>Partial support for continuity model |
| Stice, Ziemba, Margolis & Flick (1996) | BN, sub clinical BN and non eating disordered controls | Measures of eating related psychopathology including: body mass, body dissatisfaction and dietary restraint<br>Discriminant function analysis | Pressure to be thin, internalisation of thin idea, body dissatisfaction, weight obsession, dietary restraint and negative affect differentiated control, sub-threshold bulimic and bulimic individuals<br>Support for continuity model |
| Ruderman & Besbeas (1992) | Study 1: 21 dieters, 19 BN and 33 non dieting controls<br><br>Study 2 89 undergraduate students | Measured psychological functioning, restraint and BN<br>Multivariate analyses<br><br>Same self report measures as in study 1<br>Regression analyses | Number, size and pattern of differences between dieters and non dieters was different to that found between dieters and BN<br>Higher psychopathology factor and lower defensive factor predicted BN and dieting; low self concept predicted BN<br>Both continuity and discontinuity characterise relationship between dieting and BN |

BN = bulimia nervosa; BED = binge eating disorder; AN = anorexia nervosa

3.7.2 Taxometric analyses

In light of the many limitations associated with previously employed research designs (Gleaves et al., 2004), a number of researchers have turned to alternative methodologies in an attempt to address the question of how best to conceptualise eating disorders. One method is taxometrics; a group of procedures that aim to distinguish nonarbitrary classes from continua (Waller & Meehl, 1998). To date, four studies (Gleaves et al., 2000a; Gleaves et al., 2000b; Williamson et al., 2002; Tylka & Subich, 2003) have used taxometric analysis to assess whether eating disorder symptoms are best described as discrete syndromes or as dimensional constructs occurring along a continuum of degree amongst individuals.

It is clear from the summary shown in Table 9 that current findings are again somewhat mixed. For example Tylka and Subich (Tylka & Subich, 2003) appear to support a dimensional model of eating pathology, whereas the work of Gleaves and colleagues suggests that whilst eating disorders that don't involve binge eating might be continuous with normalcy, those that do involve binge eating are likely to represent discrete entities. However these latter studies have been criticised on methodological grounds, particularly for their use of mixed groups of clinical and non-clinical participants and their focus on behavioural symptoms. Tylka and colleagues argue that a false taxonomy may be likely when the criteria used to separate participants into clinical and non-clinical groups (i.e. bulimic criteria) are similar to the behavioural indicators used in the analyses (i.e. binging and purging) (Tylka & Subich, 2003). Given that studies focusing on bingeing and purging behaviours tend to support the discontinuity hypothesis whilst those focusing on psychological and/or sociocultural indicators support the dimensionality of eating disorders, it could be that differences in study outcomes are an artefact of the use of varying indicators of eating disorder psychopathology.

However despite these limitations this work has helped to move the classification debate forward. Rather than exploring whether eating disorders are simply continuous *or* discontinuous, recent studies have begun to investigate whether a latent eating disorder taxon exists that is identified by symptoms that are dimensional in nature (Doll & Fairburn, 2005).

**Table 9: Summary of taxometric studies of eating disorders**

| Article/authors | n | Sample | Key findings |
|---|---|---|---|
| Tylka and Subich (2003) | 532 | Non-clinical | Evidence that non behavioural symptoms, such as body dissatisfaction, exist on a continuum |
| Williams et al (2002) | 341 | 201 clinical participants<br><br>24 obese with no eating disorder<br><br>116 normal weight controls | Eating disorders as defined by DSM-IV were conceptualised as having 3 latent features: binge eating, fear of fatness/compensatory behaviour, and drive for thinness<br><br>Discrete syndromes: bulimic disorders (BN and BED)<br><br>AN may occur on a continuum with normalcy |
| Gleaves, Lowe, Snow, Green & Murphy-Eberenz (2000) | 613 | 201 women with BN<br><br>412 non clinical controls | BN found to exist as a discrete taxon |
| Gleaves, Lowe, Green, Cororve & Williams (2000) | 959 | 745 eating disorder women<br><br>214 non clinical students | Subtypes of BN (purging and non-purging) were both qualitatively different from normative eating<br><br>Bulimic type AN fell on a continuum with both subtypes of BN, but was qualitatively distinct from restricting AN |

BN = bulimia nervosa; BED = binge eating disorder; AN = anorexia nervosa

In view of this and as highlighted by Waller and Meehl (Waller & Meehl, 1998), it could be argued that the distinction between continuity and discontinuity might be more helpfully described as a distinction between dimensional (i.e. occurring on a continuum), and taxonic-dimensional (i.e. where the construct is discrete but the indicators/symptoms representing that taxon might be continuous in nature).

3.7.3 Symptom patterns across the eating disorder spectrum

Another approach has employed statistical techniques such as latent class analysis (LCA) and cluster analysis to explore whether the eating disorder population can be divided into naturally occurring sub-groups (see Table 10 for a summary of studies). Drawing on a sample of 2,162 Caucasian female twins from a population based-registry, Bulik and colleagues used LCA to identify a six-class solution. Three classes broadly reflected the DSM-IV diagnoses of AN, BN and BED, whilst the other 3 classes included: low weight individuals without the psychological features of AN; individuals who reported preoccupation with weight and shape but were not of low weight; and low weight individuals who reported some bingeing but who presented with no other symptoms of AN or BN (Bulik et al., 2000). Although this study benefits from a large community-based sample, the symptoms entered into the LCA were restricted by the design of the clinical interview, such that those who didn't report binge eating were not questioned about the presence of any compensatory behaviours. As a result the clusters are likely to reflect the current conceptualisation of eating disorders.

Also using LCA, Keel et al (2004) identified the presence of the following four sub-groups: those with AN and BN who use multiple methods of purging, including laxatives, diuretics and appetite suppressants; those who resemble BN with self-induced vomiting as the sole form of purging; and two distinct sub-groups of restricting AN. Through drawing upon data relating to personality factors, the authors differentiated the two AN groups on the basis of the presence or absence of obsessive-compulsive features. Although this work benefits from the inclusion of variables other than eating disorder symptoms, the study's findings should be interpreted in the context of its methodological limitations. For example, use of retrospective recall may introduce bias, and exclusion of those with a lifetime presentation of EDNOS is likely to have led to the exclusion of a significant

proportion of the spectrum of eating disorder presentations, limiting the extent to which the findings might reflect groupings found in the general population.

More recently researchers have drawn on cluster analysis to identify clinically distinct sub-groups within samples of treatment seeking patients diagnosed with AN, BN and EDNOS. Turner & Bryant-Waugh (2004) entered nine variables reflecting key eating disorder features into a cluster analysis and identified a four cluster solution. Three of the four groups presented with similarly high levels of cognitive psychopathology but differed in relation to behavioural presentation: cluster 1 presented with the highest levels of bingeing and self-induced vomiting; cluster 2 presented with low levels of bingeing and vomiting and the highest levels of dietary restraint; and cluster 3 presented with the highest levels of excessive exercise. Those in the forth cluster reported lower levels of concern about eating, weight and shape, and also reported fewer eating disorder behaviours compared with the other three groups. However this group also presented with the lowest mean BMI, 35% presenting with a BMI of 17.5 or less. Although this study benefits from the use of the Eating Disorders Examination (Cooper & Fairburn, 1987), a robust instrument for assessing eating disorder features, it has a number of weaknesses related to sample selection, particularly the screening out of BED patients prior to assessment and the small number of AN patients included in the sample.

Similar cluster based studies have also been conducted by other researchers. Based on 10 key diagnostic eating disorder items, Clinton et al (2004) identified the following three groups in two independent samples of eating disorder patients: an 'anorexic' cluster characterised by low weight and amenorrhea; an 'overeaters' group characterised by high BMI and moderate levels of binge eating; and a 'generalised eating disorder' group characterised by high levels of food avoidance, binge eating and compensatory behaviours. Although this study benefits from a large sample size, a relatively high percentage of each group (34% and 47%) were omitted due to missing data, something that could have affected the representative nature of each sample. Also using cluster analysis, Sloan et al (2005) identified the following four sub-groups in a sample of 159 eating disorder patients: those presenting with low current body weight and few reported episodes of bingeing and purging; those presenting with high body weight, high body dissatisfaction and a high number of

self reported binges; those presenting with moderate body shape dissatisfaction and high levels of bingeing and purging; and those presenting with high body and weight dissatisfaction coupled with relatively low levels of bingeing and purging. Whilst these studies benefit from using treatment-seeking patients, it is important to note that samples were recruited through secondary care services and may not therefore be representative of a community-based sample.

Although methodological variation in sampling, measurement and data analysis limit the extent to which the findings can be compared, a number of tentative groups can be suggested. For example, some have identified 3 sub-groups that broadly reflect the current diagnostic groups; AN, BN and BED (Clinton et al., 2004; Bulik et al., 2000; Sloan et al., 2005). However, it is important to note that in the study conducted by Bulik et al (2000), the AN class did not fully support the amenorhoea or the 'feeling fat even when thin' criteria, and those who resembled BED did not always report feeling out of control, indicating variation even within the groups most closely resembling the present DSM categories. In contrast to these findings, a BED group was not identified by Turner & Bryant-Waugh (2004). However it is likely that this is related to methodological constraints concerning service referral criteria at the time of the study. Similarities in cluster identification can also be drawn between the smallest cluster identified by Turner & Bryant-Waugh (2004) and the group of 'atypical' anorexic patients identified by (Strober et al., 1999), suggesting the possible presence of a sub-group who do not experience weight phobia.

**Table 10: Review of studies using cluster analytic/latent class analysis across eating disorder diagnoses**

| Article (Author/date) | Sample | Measures | Clustering method | No clusters | Description |
|---|---|---|---|---|---|
| * Sloan, Mizes & Epstein (2005) | 159 patients presenting at 4 eating disorder clinics and 1 psychology clinic | EDI, weight dissatisfaction ideal weight, average no of binges and purges per week, highest and lowest adult BMI | Hierarchical cluster analysis - ward's method | 4 | gp1: low body weight, few reported binges and purges - resemble restricting AN<br>gp 2: high wt dissatisfaction, relative high BMI, low bingeing & purging – EDNOS type<br>gp 3: high bingeing and purging, resemble BN<br>gp 4: high reported BMI, high number of binges – resemble BED |
| *Turner & Bryant-Waugh (2004) | 190 patients referred to a community eating disorders service | EDE | Hierarchical cluster analysis - ward's method | 4 | gp 1: high concern re: eating, weight and shape, high levels of bingeing & vomiting<br>gp 2: high levels of concern re: eating, weight and shape, high levels of dietary restraint & laxative misuse, lowest levels of bingeing and vomiting<br>gp 3: high levels of concern re: eating, weight and shape, highest levels of exercise<br>gp 4: low levels of concern re: eating, weight and shape, low levels of behaviours, low BMI |
| *Clinton, Button, Norring & Palmer (2004). | 631 females recruited from 15 specialist centres in Sweden & 472 referred to a specialist ED service in the UK | Rating of anorexia and bulimia interview. Clinical eating disorders rating instrument | Hierarchical cluster analysis - ward's method | 3 | gp 1 : generalised eating disorder; high levels of food avoidance, binge-eating & compensatory behaviours<br>gp 2: anorexics; low weight amenorrhea, absence of binge eating<br>gp 3: overeaters; high weight, moderate levels of bingeing & compensatory behaviours |
| Keel et al (2004) | 1179 patients – multinational – varying txt settings | Questions relating to 15 eating disorder symptoms | Latent class analysis | 4 | gp 1: restricting AN; gp 2: AN and BN with multiple methods of purging<br>gp 3: restrictive AN without eating and body-related compulsive features<br>gp 4: BN with self-induced vomiting |
| Bulik, Sullivan, & Kendler, (2000) | 2163 Caucasian female twins from a population-based registry | Questions relating to 9 eating disorder symptoms | Latent class analysis | 6 | gp 1: weight & shape preoccupied; gp 2: low weight with bingeing<br>gp 3: low weight without bingeing<br>†gp 4: anorexic class – low body weight , infrequent purging<br>†gp 5: bulimic class - binge eating, compensatory behaviours, excessive concern about weight and shape<br>†gp 6: binge-eating class - binge eating, purging uncommon, concerns about weight and shape uncommon, higher rates of obesity |

EDE = Eating Disorders Examination version 12; AN = anorexia nervosa; BED = binge eating disorder; BN = bulimia nervosa

* Participant were referred to a specialist eating disorders service for assessment and treatment; † = clinically significant eating disorders resembling AN, BN and BED

3.7.4 Sub-grouping on the basis of personality trait

Whilst some have chosen to focus on sub-grouping individuals on the basis of eating disorder symptoms, other researchers have adopted a broader approach, attempting to identify more clinically relevant groupings that may cut across the traditional symptom-based diagnostic categories. One area that has received increased attention over recent years is that of personality traits, with a number of studies taking a multi-axial approach exploring whether axis II personality features might meaningfully account for variation in axis I eating disorder diagnoses. A summary of relevant studies is shown in Table 11.

Goldner et al (1999) investigated personality pathology in a sample of 136 eating disorder patients using the Dimensional Assessment of Personality Pathology – Basic Questionnaire (DAPP), a 282 item self-report measure developed to measure 18 personality patterns. Using cluster analysis they identified the following three sub-groups within their eating disorder sample: a 'rigid' cluster that was characterised by compulsivity, restricted expression, intimacy problems and low stimulus seeking; a 'severe' group that presented with the highest scores on measures of psychopathology, neuroticism and behavioural disturbance; and a 'mild' group who were relatively free from personality pathology but scored higher on anxiousness, insecure attachment and narcissism compared with normal controls. Whilst this study benefits from the use of a clinical sample, the authors fail to assess the external validity of the cluster solution using clinical measures other than those included in the original cluster analysis. These clusters therefore require further investigation before any firm conclusions regarding their clinical robustness can be drawn.

Westen and Harnden-Fischer (2001) also used a cluster-based approach to assess the utility of dividing the eating disorders population on the basis of personality patterns. They asked 103 psychiatrists and psychologists to describe a patient with AN or BN that they had treated in the previous 6 months, using the SWAP-200, an instrument that consists of 200 descriptive personality statements. Based on their knowledge of the patient, clinicians were asked to sort the statements into categories ranging from inapplicable to highly descriptive and these data were subsequently entered into a cluster based analysis. The results led to the identification of the following 3 groups: a high functioning/perfectionistic cluster who function well interpersonally and

occupationally, but are chronically perfectionistic and self-critical; a constricted/ overcontrolled cluster characterised by restriction in areas such as needs, emotions, relationships and self reflection; and an emotionally dysregulated/undercontrolled group, whose experiences are characterised by intense emotions and impulsive behavours. Whilst patients in cluster 1 were not limited to any one eating disorder diagnosis, those in the constricted/ overcontrolled cluster were more likely to present with prominent anorexic symptoms and those in the emotionally dysregulated/ undercontrolled group were more likely to present with bulimic symptoms. Although this study highlights three clinically distinct groups whose features may have relevance to effective treatment planning, these findings must be set within the context of the study's limitations - the reliability of the eating disorder diagnosis is unclear given that patients were not formally diagnosed using a structured instrument, and it could also be argued that what has been clustered are clinicians' beliefs and biases as opposed to clinical features of the patient.

More recently Wonderlich et al (2005) have used latent profile analysis in their attempt to identify sub-groups of bulimic patients based on personality and psychiatric co-morbidity. In their study of 178 female eating disorder patients, they identified the following three clusters: an affective – perfectionistic cluster, characterised by high levels of perfectionism, obsessive-compulsive symptoms, anxiety and depression; an impulsive cluster, characterised by the highest levels of impulsive/self-destructive behaviours; and a low co-morbid psychopathology cluster presenting with the lowest levels of co-morbid psychopathology, personality pathology and eating disorder psychopathlogy. Whilst this study further supports the potential for sub-grouping on the basis of personality traits it relies solely on the use of self-report measures of pathology and personality, which may have implications for the reliability and validity of the study findings. The lack of a control group also means it is not possible to assess the findings in relation to normality. In light of these methodological limitations it will be important for future studies to not only replicate these findings using interview-based instruments, but to also include a non-clinical control group.

To date cluster analytic studies of personality profiles in eating disorders have focused primarily on individuals with bulimic symptoms, as opposed to more restrictive presentations (Goldner et al., 1999; Wonderlich et al., 2005; Westen & Harnden-Fischer, 2001). In attempt to address this imbalance, Holliday and colleagues (Holliday et al., 2006) recently used the DAPP (a self-report questionnaire measuring 18 personality dimensions) to explore whether personality sub-groups exist among a group of 153 females with a lifetime diagnosis of AN. They identified three personality clusters. The first was characterised by high scores on a wide range of DAPP subscales, including those measuring social avoidance, identity problems, submissiveness, affective lability, insecure attachment, intimacy problems and self-harm. Relative to the other two clusters, this group presented with the widest range of personality psychopathology, suggestive of a dysregulated and disorganized personality profile and the group was therefore labelled 'severe/broad PD' cluster. The second cluster was characterised by relatively high scores on subscales measuring social avoidance, identity problems, cognitive distortion and intimacy problems, suggesting that members of this group may have particular difficulty with social interactions and forming close relationships. This cluster was therefore labelled 'moderate/avoidant'. Those in the third cluster had fewer extreme personality traits, but had z scores above 1 on intimacy problems, restricted expression and compulsivity. This group was therefore labelled the 'mild/compulsive' group. This group also distinguished from the other two clusters on family history, with participants reporting a significantly higher incidence of eating pathology in first and second degree relatives. The authors suggest that patients in this group, whilst presenting with core AN related personality features of high compulsivity and restricted expression, may develop AN in the absence of other personality problems. Although this study's originality lies in its use of a sample of patients with a lifetime history of AN, assessment of eating psychopathology was based on behavioural rather than cognitive features of AN, and the response rate was low (52%), both of which may have affected the representative nature of the sample. Finally, information relating to family history of eating pathology was reported by the participant rather than being independently verified by a relative, which again could potentially impact the reliability of the findings.

**Table 11: Summary of studies investigating personality traits in eating disorders**

| Article (authors/date) | n | Measures | Analysis | Key findings |
|---|---|---|---|---|
| Holliday et al (2006) | 153 females with a lifetime history of AN | The dimensional Assessment of Personality Pathology | K means cluster analysis | Gp 1: Severe/Broad Personality disorder group – extreme scores on subscales measuring emotional deregulation; disorganised behavioural patterns<br>Gp 2: Moderate/Avoidant group – high scores on intimacy problems, social avoidance, identity problems & cognitive distortion<br>Gp 3: Mild/Inhibited/Compulsive group - fewer extreme personality traits, but higher scores on intimacy problems, restricted expression and compulsivity |
| Wonderlich et al (2005) | 178 women with BN or sub clinical variant | EDE-Q<br>Series of self-report questionnaires including:<br>The dimensional Assessment of Personality Pathology – Basic Questionnaire (DAPP-BQ)<br>Frost multi-dimensional Perfectionism scale<br>Maudsley Obsessive-Compulsive Inventory<br>Spielberger Strait-Trait Anxiety Inventory | Latent profile analysis | gp 1: affective –perfectionistic cluster – obsessional, compulsive, perfectionist, highest ED pathology<br>gp 2: impulsive cluster – dissocial behaviour, low compulsivity<br>gp 3: low co-morbid psychopathology – severe BN symptoms with no co-morbid personality presentation |
| Westen and Harnden-Fischer (2001) | 103 * | Q-sort procedure, using the SWAPP-200 | Cluster analysis (Q-analysis) | gp 1: high functioning/perfectionistic - function well interpersonally & occupationally; chronically perfectionistic and self-critical. Patients in this group were more likely to be bulimic anorexic or bulimic.<br>gp 2: constricted/overcontrolled – predominantly present with anorexic symptoms, profile characterised by restriction in areas such as needs, emotions, relationships and self reflection.<br>gp 3: emotionally dysregulated/undercontrolled – predominantly likely to present with emotional dysregulation and impulsivity |
| Price Foundation Collaborative Group (2001) | 348** | Structured interview of anorexia nervosa and bulimic syndromes (SIAB)<br>Yale-Brown Obsessive Compulsive Scale (Y-BOCS)<br>Yale-Brown-Cornell Eating Disorder Scale (YBC-EDS)<br>State-Trait Anxiety inventory (STAI)<br>Multidimensional Perfectionism Scale (MPS)<br>Temperament and Character Inventory (TCI) | Principle component factor analysis; exploratory factor analysis and discriminant factor analysis | Trait anxiety, harm avoidance, perfectionism, obsessive-compulsive behaviour, and diminished self-directedness may represent parts of a single construct among individuals with EDs, particularly AN |

| Article (authors/date) | n | Measures | Analysis | Key findings |
|---|---|---|---|---|
| Goldner et al (1999) | 136 clinical | The dimensional Assessment of Personality Pathology – Basic Questionnaire (DAPP-BQ) | Factor analysis and cluster analysis | gp 1(rigid): compulsivity, restricted expression, intimacy problems and low stimulus seeking; 78% AN and 42% of BN<br>gp 2 (severe): behavioural disturbance, neuroticism, synonymous with borderline personality disorder; 18.4% of sample<br>gp 3: (mild): relatively free form personality pathology but scored higher on anxiousness, insecure attachment and narcissism than did control |

* clinicians; ** affective relative pairs

Although much remains to be done before firm conclusions regarding the potential usefulness of personality-based clusters can be drawn, findings from the studies conducted to date suggest the presence of three replicable personality-based clusters both within, and between, ED diagnoses. The first represents a group of patients that appear to function relatively well. Although they present with higher levels of anxiety and lower self-esteem compared with the general population, they represent the 'mild' group in terms of personality pathology and may represent a mix of people with anorexic and bulimic presentations. In contrast, the two remaining groups are characterised by more severe psychopathology; one by avoidant, compulsive, rigid and overcontrolled traits, the other by emotional deregulation, impulsivity and chronic dysphoria. These latter groups appear to reflect those identified by Keel et al (Keel et al., 2004) and also correspond to sub-groups identified by Wonderlich and Mitchell in their review of the role of personality in the development of eating disorders (Wonderlich & Mitchell, 2001). In light of these findings it has been suggested that eating disorder sub-types may be more clearly determined on the basis of personality trait rather than overt eating behaviour. This is an interesting area for future research, which would benefit from further studies addressing some of the methodological limitations outlined above. In particular, it is suggested that future studies would benefit from including patients diagnosed with EDNOS, given that this represents a significant percentage of eating disorder patients seen in routine clinical practice.

3.7.5 A biopsychosocial approach to diagnostic classification

Building on the personality literature, researchers have also attempted to draw together the varying strands of research into biological, social, psychological and developmental pathways, to inform a multidimensional understanding of eating disorder pathology. Much of the biological aspect of this work has focused on the role of serotonin (5-HT), a neurotransmitter identified as having a role in regulating eating behavior and mood. It is well recognised that dieting can lead to reduced brain 5-HT synthesis through a reduction in the availability of tryptophan, the dietary precursor to 5-HT (Goodwin et al., 1987). Animal and human studies also indicate that increased 5-HT activity has been linked to reduced eating behavior, whilst decreased 5-HT activity has been associated with increased binge eating (Blundell, 1986). This work led researchers to investigate the role of 5-HT in eating disorders, and whilst initial findings appeared to support a role for *reduced* 5-HT functioning in those actively ill with AN (Weizman et al., 1986; Monteleone et al., 1998), more recent studies conducted on those who have recovered from AN, indicate elevated levels of CSF 5-hydroxyindoleacetic acid and elevated 5-HT1a receptor binding (Kaye et al., 1991), suggesting a possible primary status of elevated 5-HT in AN. Similarly, some studies on BN indicate a role for a reduction in 5-HT activity (Jimerson et al., 1992; Steiger et al., 2000) although again studies are far from consistent in their findings (Jacobi et al., 2004).

Work within this field has also indicated a relationship between 5-HT and personality traits. More specifically, reduced 5-HT has been linked with impulsive aggression (Kantak et al., 1980; Valzelli, 1984) and features of borderline personality disorder in humans (New et al., 1997; Coccaro et al., 1989), whilst compulsive traits, such as those seen in obsessive-compulsive disorder, have been associated with increased 5-HT (Swedo et al., 1992). Studies exploring the genetic basis of these anomalies have also been conducted, and there is preliminary evidence to suggest links between a short (s) allele in the promoter region of the 5-HT transporter gene (5HTTLPR) and clinical presentations including impulsivity and insecure attachment (Steiger et al., 2005). In line with possible connections between 5-HT and clinical features such as insecure attachment, there is also a growing body of evidence that supports a link between developmental stress and reduced 5-HT. For example, reduced 5-HT tone has been found in those presenting with bulimic type syndromes

and a history of child sexual abuse (Steiger et al., 2001; Steiger et al., 2004). Thus it would seem that early trauma may lead to long lasting sensitivities in the 5-HT systems of those affected, and this has led some to argue for a potential convergence of 'state', 'trait' and 'developmental' influences on 5-HT systems in eating disordered women. For example, Steiger argues that some individuals may have a pre-determined vulnerability to eating disorders that is determined by 'trait' and 'developmental' influences, but which in turn is triggered by changes in 'state' (i.e. dieting) (Steiger, 2004). Although such a complex model requires further investigation, the notion that the eating disorders population might be more appropriately sub-grouped on the basis of such variables has important implications for the diagnostic/treatment interface. It should also be noted that current neurobiological findings can not determine whether disturbances in serotonergic function predate the onset of eating disorder symptoms. Thus future research might usefully focus on examining changes in 5-HT functioning in high-risk individuals prior to the development of an eating disorder. The work conducted to date has also focused primarily on BN and future research might usefully incorporate those presenting with other types of eating disorder psychopathology.

### 3.8 The move towards a transdiagnostic perspective

In contrast to the drive towards further sub-dividing the eating disorders, some researchers have responded to the problem of classification by adopting a transdignostic approach to classification and treatment. In his recent review of the usefulness of diagnosis in eating disorders, (Waller, 2005) argued that rather than focusing on developing distinct eating disorder diagnoses, the field should consider viewing the eating disorders as a single 'fuzzy set', defined by core features such as eating concerns and the belief that eating must be rigidly controlled in order to prevent weight gain. He goes on to suggest that adopting such an approach would allow for treatment to focus more usefully on understanding the functional role of the patient's presenting behavioural symptoms. In a similar vein, Fairburn and colleagues (Fairburn et al., 2003) have also argued for a transdiagnostic approach to eating disorder theory and treatment. Based on the view that the current eating disorder diagnoses share the same core psychopathology (i.e. the over-evaluation of eating, weight and shape and their control), Fairburn and colleagues argue that rather than being diagnosis led, treatment content could be more usefully informed by the

psychopathological features identified by the patient and the processes that appear to maintain them. More specifically, the authors suggest that whilst the core psychopathology identified above is likely to be present in the majority of cases, a sub-group of patients will also present with one or more of the following additional maintaining mechanisms: mood intolerance, core low self-esteem, perfectionism and interpersonal difficulties, which may need to be addressed during treatment (Fairburn et al., 2003). A transdiagnostic approach to the assessment and treatment of eating disorders is appealing for two reasons: firstly, it can be applied to the broad range of clinical presentation seen in clinical practice, including EDNOS; and secondly, its individual focus on each patient's clinical presentation offers the potential for treatment to be formulation-driven rather than diagnosis led, thereby allowing for relevant aspects of a clinical presentation to be focused upon in treatment.

However there is also evidence to suggest that AN and BN are distinct disorders in relation to aspects of psychopathology, risk factor profile and epidemiology. For example, (Anderluh et al., 2003) highlight higher rates of lifetime perfectionism and rigidity in AN compared with BN. Furthermore, in their recent review of the literature (Jacobi et al., 2004) concluded that whilst premature birth trauma, perfectionism and OCD traits during adolescence were identified as risk factors for AN, complications in pregnancy and negative self-evaluation in adolescence were identified as specific risk factors for BN. Differences between AN and BN can also be seen in epidemiological trends. In a recent review of the incidence of eating disorders in primary care, Currin and colleagues identified distinct differences in the incidence of AN and BN between 1988 and 2000; whilst the incidence of AN remained reasonably steady, there was a notable increase in the reported incidence of BN in 1995-1996 (Currin et al., 2005). These studies support the argument that AN and BN are at some level fundamentally different disorders and thus the idea of merging them into one diagnostic group, although appealing, might risk masking clinically relevant differences in psychopathology.

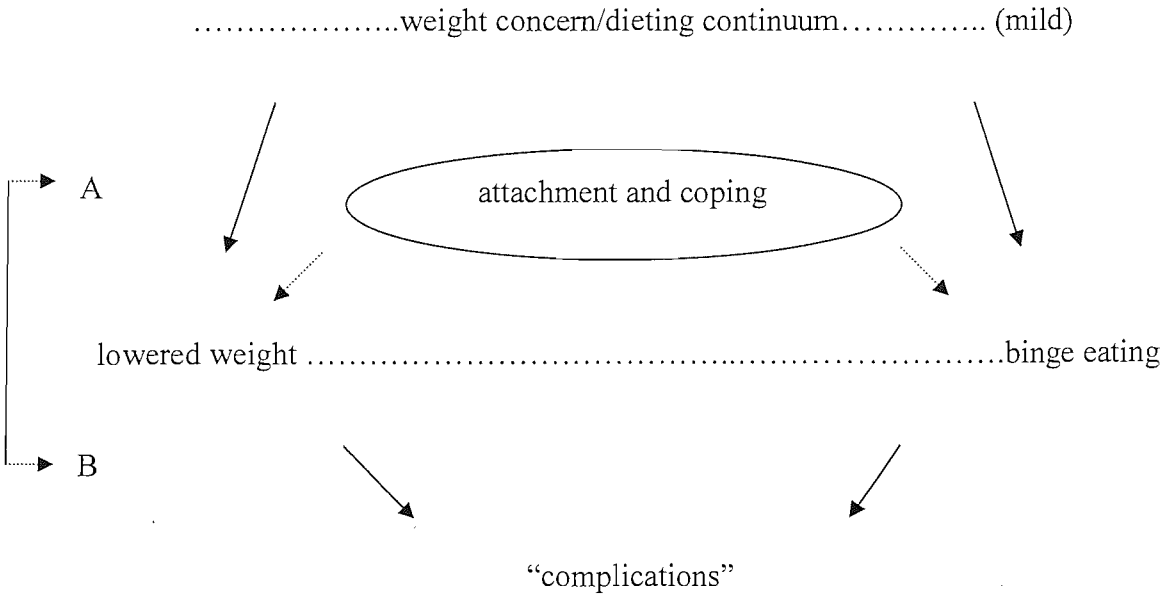
### 3.9 Classification within wider psychiatry

Similar discussions regarding classification are under way in other areas of psychiatry and consideration of how others are tackling these issues can usefully inform the eating disorders debate. For example, within the field of depression, (Parker & Manicavasagar, 2005) argue against adopting a purely dimensional or categorical approach, instead proposing a hierarchical model that not only moves from definition by 'clinical feature' to definition by 'aetiology', but also assumes both categorical and dimensional elements. Their model of the depressive disorders assumes three classes: psychotic depression, melancholic depression and a residual class of non-melancholic disorders. Whilst all groups have a mood disorder component, they argue that melancholic depression is distinguished from non-melancholic disorders by the observable presence of psychomotor disturbance (PMD), which acts as an observable marker for an underlying neuropathological process. As one proceeds from melancholic to psychotic depression, PMD is regarded as more severe and there is the addition of a further class specific clinical marker (in this case psychotic features, such as delusions). However, in the absence of specific defining clinical features for non-melancholic depression, the authors suggest a spectrum model in which aetiological factors and risk factors interact with various personality styles to cause episodes of non-melancholic depression. This part of the model suggests that an episode of non-melancholic depression is experienced when two factors, namely life event stress and personality, serve to lower an individual's self-esteem. This approach, which has the potential to clarify cause and pathogenesis, also has the advantage of allowing treatment to be tailored towards elements of the clinical presentation that if addressed in treatment are likely to lead to both alleviation of symptoms and relapse prevention.

If a similar model were to be applied to eating disorders (see Figure 2) it could be suggested that weight concern and dieting occur on a continuum and represent the features of the mild end of the clinical population. However, when these features lead to lowered weight and binge eating, and occur in conjunction with problematic attachment and coping styles, these together could lead to the development of a clinically significant eating disorder (line A), defined by the presence of physical complications associated with behavioural symptoms (eg: low potassium, amenorrhoea). Alternatively it could be argued that cases presenting with clinical

features such as lowered weight and binge eating alone, are within the clinically significant range (line B).

**Figure 2: A potential means of conceptualising eating disorders**




### 3.10 Summary

Debate continues as to what constitutes a clinical eating disorder and how this might best be defined. The classification of different types of eating disorder also remains problematic: the current system lacks evidence for clinical validity and utility, and community studies suggest that the most common category is the 'residual' one. Researchers have attempted to address these issues by exploring the characteristics of EDNOS and assessing whether sub-groups exist within this group as well as across diagnostic categories as a whole. Although generating a number of interesting findings, these studies must be set within the context of their limitations. Few explore whether eating disorder symptoms cause significant impairment in day-to-day functioning, an important indicator of clinical significance, and a significant number are circular in nature: by focusing on eating disorder symptoms alone they do little to inform the wider clinical picture or the treatment decision-making process. It is also not necessarily the case that classifications based on epidemiology and on outcomes will converge, since factors other than symptoms may affect treatment outcome.

In this thesis it is argued that assessment of wider aspects of the clinical picture, including those identified by the other DSM axes, could enhance our clinical descriptions in a way that would usefully inform treatment planning. This type of approach, which essentially involves sub-grouping on the basis of wider psychological features has been adopted in other areas of psychiatry and highlights the potential for more effective matching of treatment to clinical presentation. Although recent work on personality traits represents an attempt at this within the eating disorders field, narrow sample selection limits the extent to which existing findings can be generalised to the wide range of eating disorder presentations. It is also argued that this work does little to facilitate the treatment of those who present with an eating disorder but who do not have co-morbid personality difficulties. Research has yet to explore the potential usefulness of sub-grouping the eating disorder population on the basis of both eating disorder symptoms *and* wider clinical characteristics. The following question therefore remains - how can we best describe the broad spectrum of eating disorder presentations in a way that will be meaningful to the patient and informative for the clinician?

# CHAPTER 4

## Alternative approaches to sub-grouping: a potential role for other clinical variables?

### 4.1 Overview

As outlined in chapter 3 the diagnosis of eating disorders remains problematic, partly because of the current focus on axis I syndromes. Although axis I syndromes are a useful component, they represent only *one* part of a comprehensive process of assessment and classification. As previously discussed (section 1.3.2), it can be helpful to consider a number of questions when evaluating the clinical utility of a psychological disorder. For example, does the diagnosis distinguish those who have the disorder from those who don't have it? Does it identify those who are significantly impaired by their symptoms? And does the diagnosis identify aspects of the presentation that will impact clinical outcome if addressed in treatment ? (Wilfley et al., 2003).

When considering whether there are additional aspects of clinical assessment which might lead to more clinically informative sub-group descriptions within eating disorders, a range of variables can be considered as possible candidates. These include symptoms of mood disturbance, perceived locus of control, readiness to change, self-esteem, personality features such as perfectionism and impulsivity, family functioning and a history of parental alcohol or substance misuse, many of which have been found to correlate with treatment outcome (Bell, 2002). During the development of this thesis careful consideration was given to which variable or combination of variables might be usefully investigated in relation to their potential for enhancing sub-group descriptors; a process that drew upon a thorough review of the relevant empirical and theoretical literature as well as clinical experience.

A number of variables were excluded for various reasons. Personality, a construct widely investigated within the psychological literature, was carefully considered as a potential variable for inclusion. This has been the focus of much research within the field (Wonderlich & Mitchell, 2001; Klump et al., 2004; Tozzi et al., 2005) and many measures exist offering readily available tools with which to measure the various personality traits described within the literature. However these instruments

are often long and time consuming to complete, and therefore unsuitable for use in routine clinical practice. Evidence also suggests that not all eating disorder patients present with personality difficulties (Wonderlich et al., 2005). It was therefore decided not to include personality as a variable in the current study as one of the aims of this thesis was to identify sub-group descriptors that hold relevance to treatment planning across the eating disorder spectrum. Other variables, such as history of parental alcohol abuse and childhood sexual abuse were also not selected as they do not affect everyone and are difficult to measure accurately.

Self-efficacy and readiness to change were also considered for inclusion and have previously been investigated for their relevance to treatment adherence and clinical outcome. To date a small number of studies have found that readiness to change predicts treatment drop-out and symptom change in both AN and BN (Geller et al., 2004; Treasure et al., 1999). However, whilst acknowledging the clinical importance of understanding the relationship between readiness to change and engagement in treatment, it is argued that taking a step back and considering the factors that might influence readiness to change may provide information that holds more relevance to treatment planning. One area that has been investigated in relation to this is illness representation and the beliefs an individual holds about their illness. Therefore, whilst readiness to change was not included per se, the potential usefulness of assessing patients' illness-related beliefs was considered and is discussed in further detail below.

### 4.2 Illness representations

Research into how patients perceive their illness was initially developed within the field of chronic physical illness and much of this work has been set within Leventhal and colleagues' self-regulatory model of illness perception (SRM) (Leventhal et al., 1980). The SRM proposes that individuals create internal models about their illness. This helps them to make sense of their experience and guides coping efforts. Within a self-regulatory framework, an individual becomes an active processor of information; outcome of the responses/coping strategies selected are evaluated and this information is then used to shape future responses. Within the SRM framework, illness representations involve five principal dimensions: identity (the label the individual assigns to the illness and symptoms viewed as part of the illness); time-

line (how long the individual expects the illness will last; whether it will be acute/chronic or cyclical); cause (the individual's ideas about the aetiology of the illness/problem); consequences (the individual's beliefs regarding the effects and outcome of the illness across a range of domains (physical, social, economic and emotional); and cure/control (beliefs the individual holds regarding the responsiveness of the illness/symptoms to treatment (based on perceived resources, either personally or through seeking medical care) (Baumann et al., 1989; Lau et al., 1989; Meyer et al., 1985). The model also proposes a parallel emotional representation that is concerned with the emotional impact of the illness (e.g. fear, distress) (Leventhal et al., 1992). To date, much of the research investigating illness perception has supported the model by showing that across a wide range of physical illnesses, illness-related beliefs are important in influencing levels of illness distress and are predictive of treatment outcome. For example, belief in longer illness duration has been associated with increased anxiety and depression in individuals with rheumatoid arthritis and psoriasis (Moss-Morris et al., 1996; Scharloo et al., 1998), whilst stronger pre-operative belief in perceived control has been associated with increased depression following surgery for osteoarthritis (Orbell et al., 1998). This approach has also been used in the study of mental illness. For example, in their study of patients' understanding of their depressive symptoms, Brown and colleagues found that individuals' beliefs about their illness (e.g. perceived cause, consequences and controllability) were associated with current and past treatment seeking behaviour, medication adherence and coping strategies (Brown et al., 2001).

To date only a small number of studies have been conducted exploring illness representation in patients with eating disorders. In their study of illness perception in patients and lay persons, Holliday and colleagues found that patients with AN viewed their illness as chronic, highly distressing and associated with negative consequences (Holliday et al., 2005). Similar findings were reported by Stockford and colleagues, and they also concluded that certain illness-related cognitions (such as beliefs concerning the negative impact of the illness) may have a significant impact upon motivation to change (Stockford et al., 2007). It could also be argued that illness-related beliefs may be especially pertinent in relation to eating disorders given that patients often deny the seriousness of their condition (Treasure & Schmidt, 2001) and drop-out rates from treatment are high (Mahon, 2000). However,

following a detailed review of this literature it was decided not to include illness-related beliefs, primarily because of a current lack of evidence supporting the usefulness of addressing these beliefs in treatment.

### 4.3 Attachment

Attachment was considered as a variable for inclusion because of evidence suggesting differences in attachment style between eating disorder and non eating disorder populations, and its potential relevance for treatment. In his early theories Bowlby argued that children learn about and respond to the emotional and physical availability of their primary care-givers, attachment being a feature of this relationship rather than a characteristic of the child (Bowlby, 1977b; Bowlby, 1977a). Responsive parenting that is sensitive to the child's needs is thought to have an important impact upon the child's developing sense of self-efficacy, whereby children who experience this are more likely to see themselves as loveable and worthy, and others as trustworthy and caring. In contrast, those whose needs are not met learn to see themselves as unlovable and unworthy, and others as uncaring and unreliable. Building on this initial formulation, Bowlby proposed that children internalise their experience with attachment figures, forming *internal working models* of their relationships between themselves and others in their world. Thus it is proposed that early attachment relationships have a significant and lasting effect on cognitive, emotional and social development, including personality development and related psychological functioning, such as emotional coping, self-identity and the capacity to form strong and stable relationships (Fonagy, 2000).

Following on from Bowlby's work and through her observations of mother-child interactions, Ainsworth identified three distinct types of attachment bond. The most common was the 'secure' attachment. In this instance a child would show signs of distress when the mother left him/her alone and on her return would seek out the mother before returning to exploration and play. Ainsworth also identified two types of insecure attachment; the 'avoidant' style and the 'ambivalent' style (Ainsworth et al., 1978). The 'insecure-avoidant' style was characterised by few overt signs of distress on separation and a lack of acknowledgement of the attachment figure during reunion, whilst the 'insecure-ambivalent' style was characterised by high levels of distress during separation and a mixed response on reunion that alternated between

seeking contact and clinging to the mother, and resisting contact through kicking and turning away. This three category model has since been adopted by researchers exploring attachment style in adults and has been modified in a number of ways. For example, (Bartholomew & Horowitz, 1991) argue that adult attachment styles are defined by two underlying dimensions: models of the self (positive – negative; worthy or not worthy of love and support) and models of others (positive- negative; reliable and accessible or unreliable and rejecting) which translate into four possible attachment styles: secure, preoccupied, dismissing and fearful (see Figure 3 for descriptive detail of each attachment style).

**Figure 3: Bartholomew's four-category model of attachment**

| | Model of self (dependence) | |
|---|---|---|
| Model of other (avoidance) | Positive view of self (low) | Negative view of self (high) |
| Positive view of others (low) | **Secure**<br>Self esteem, comfort with closeness, trust, healthy dependence | **Preoccupied**<br>Over dependence<br>Interpersonal anxiety<br>Desire for approval<br>Lack of confidence<br>Preoccupation with relationship |
| Negative view of others (high) | **Dismissing**<br>Avoidance of intimacy<br>Lack of trust<br>Value on independence<br>Compulsive self-reliance<br>Emphasis on achievement | **Fearful**<br>Low self esteem<br>Lack of trust<br>Interpersonal anxiety<br>Desire for contact and intimacy<br>Need for approval<br>Anger/hostility |

An increasing number of studies have investigated attachment in eating disorders and the findings suggest that these patients have less secure attachment patterns than controls (Ward et al., 2000; Troisi et al., 2005). Whilst it has been suggested that patients with restricting AN tend to be dismissing (i.e. might have a negative view of others and a positive view of self) and those with bulimic behaviours are more likely to be preoccupied (i.e. have a negative view of self and a positive view of others) (Candelori & Ciocca, 1998), other studies have not found these differences in attachment styles across diagnoses. For example, in their recent study exploring attachment and interpersonal difficulties in 18-24 year old eating disorder patients, Broberg and colleagues found no significant differences in attachment style when comparing patients with AN and BN. However they did find that EDNOS patients were more similar to normal controls in their self reported attachment patterns,

leading them to suggest that severity rather than type of symptom may be more directly related to attachment style (Broberg et al., 2001). This requires further investigation.

There is also preliminary evidence to suggest that information relating to attachment might impact clinical outcome through informing the content and process of treatment. For example, Dallos recently reported on the potential usefulness of focusing on attachment issues in the treatment of adolescents with eating disorders (Dallos, 2003). Research focusing on how attachment might usefully inform the process of therapy is discussed further below.

### 4.3.1 Attachment, the therapeutic alliance and treatment outcome

Evidence suggests that patients' attachment styles will impact their ability to form a productive therapeutic alliance in therapy. Mallinckrodt and colleagues (Mallinckrodt et al., 1995) found that fear of abandonment in close relationships was associated with a poor working alliance whilst a willingness to form close emotional attachments was found to predict a positive alliance. In turn, the therapeutic alliance has been linked with therapeutic outcome and a strong alliance has been associated with improved outcome in the psychological treatment of a number of disorders, including depression (Castonguay et al., 1996), addictive disorders (Luborsky et al., 1985) and personality disorders (Hellerstein et al., 1998). Thus it would seem that attachment style impacts therapeutic alliance, which may in turn influence treatment outcome.

Given that a small but growing literature has identified the therapeutic alliance as a predictor of treatment outcome, a number of studies have explored whether therapists might be able to foster the development of the therapeutic alliance through modifying their interpersonal stance to 'fit' the patient's attachment style. For example, (Dolan et al., 1993) suggest that therapists might usefully alter behaviours such as expression of empathy, activity level, pace of work, affect and emotional depth. When working with patients with anxious attachments, the authors highlight the potential importance of mirroring the patients' words rather than reflecting affect during the early stages of treatment. Similarly, when working with avoidant attachment patterns, the authors suggest that rather than being friendly, interpretative

or challenging, the patient might benefit more from a style that although empathic, involves a more distant style of reflection and interest.

### 4.4 Coping style

Based upon the work of Lazarus and Folkman, 'coping' can be defined as 'the process of managing external and internal demands that are perceived as taxing or exceeding a person's resources'(Lazarus & Folkman, 1984). Coping response is important in determining the impact of life events and research findings consistently indicate that patients with AN and BN use higher levels of avoidant coping relative to controls (Troop et al., 1994; Troop et al., 1998). It has also been found that people with eating disorders are less likely to respond to stressful situations by actively attempting to solve or rethink the problem or change the situation (Soukup et al., 1990) and it has been suggested that an eating disorder may in itself represent a form of coping strategy (Heatherton & Baumeister, 1991).

The evidence that eating disorder patients and non-clinical controls differ in their coping styles has led this area to come under the spotlight as a potential target for treatment. In their study exploring changes in coping style in patients who received in-patient treatment for AN or BN, Bloks and colleagues reported that treatment led to a reduction in the use of avoidant coping strategies and an increase in the use of more favorable coping strategies, such as increased active tackling and seeking social support. They also found that increased use of reassuring thoughts at the end of treatment predicted better status at six month follow-up (Bloks et al., 2001). Data from a two and a half year follow-up of the same cohort builds on these findings, indicating that recovered patients engage in higher levels of active tackling and social support seeking, and lower levels of avoidance and passive reacting; these being close to those of a control group (Bloks et al., 2004). Increased social support seeking and less passive reacting were also identified as significant predictors of improved overall functioning and lower levels of anorectic and bulimic symptomatology at long term follow-up. In view of the above it is argued that sub-group descriptions that incorporate information relating to coping style may provide clinically relevant information that could facilitate the process of planning an effective treatment intervention.

### 4.5 External validators

It has been suggested that diagnostic categories should only be considered valid if they are found to be different on several key variables, including clinical descriptions, family studies and follow-up studies (Robins & Guze, 1970). More recently (Kendler, 1980) extended this line of thinking by organising possible diagnostic indicators into antecedent (e.g. familial aggregation and premorbid personality), concurrent (e.g. psychological tests) and predictive validators (e.g. diagnostic stability and response to treatment). To this end, if a classification system is valid and clinically relevant, the sub-groups should differ in relation to aspects of psychopathology not included in the original cluster. In order to make a preliminary assessment of the validity of the sub-groups identified in the present study, data relating to aspects of general functioning and mood were collected, alongside broad measures of treatment intensity and outcome.

### 4.6 Summary

It is argued that the classification of eating disorders may be enhanced through the assessment of wider aspects of the clinical picture. When considering how best to describe the eating disorder population it is suggested that attachment and coping style represent variables that might be usefully considered alongside key eating disorder symptoms. There is mounting evidence to suggest that eating disorder patients and non-clinical controls can be distinguished on the basis of information relating to attachment and coping style, aspects of the clinical presentation that if focused upon in treatment may enhance clinical outcome. One method for assessing the external validity of any classification system is to explore whether the clusters differ significantly in relation to aspects of psychopathology not included in the original cluster analysis. Data related to mood and general functioning were therefore collected, alongside broad measures of treatment intensity and outcome.

# CHAPTER 5

## Method

### 5.1 Justification for the current study

As shown above, the classification of eating disorders remains problematic: the boundary between an eating disorder of clinical significance and a lesser, non-clinical eating problem, remains unclear, and the current diagnostic system lacks empirical support for clinical validity and utility. Recent research conducted closer to primary care and the point of service entry has consistently highlighted the broad range of presentations seen in the community population, particularly the frequent occurrence of EDNOS. Previous studies that have attempted to address these issues can be criticised on methodological grounds. Those that focus specifically on eating disorder symptoms do little to inform the wider clinical picture, whilst those that have focused on a broader range of potentially clinical relevant variables are restricted by their focus on bulimic type presentations. Researchers have also yet to fully explore whether the assessment of functional impairment might facilitate the delineation of a more meaningful boundary of clinical significance.

The overall aim of this thesis was to explore whether there are alternative ways of assessing and categorising the eating disorders population that might allow for the more appropriate tailoring of interventions to presenting features. More specifically, it was hypothesised that the clinical utility of sub-group descriptions based on traditional eating disorder behaviours may be further enhanced through the inclusion of information relating to wider aspects of the clinical picture. Following a careful review of the candidate variables discussed in Chapter 4, it was decided to include attachment and coping style as the additional clinical features, primarily because of empirical evidence supporting their potential role in influencing clinical outcome. A preliminary assessment of the external validity of the final sub-groups was conducted through exploring potential differences across the clusters on aspects of general functioning and mood. The validity of the clusters was further tested by investigating associations of clusters with broad measures of treatment intensity and outcome.

### 5.2 Study design

A systematic cross-sectional design was employed based on the collection of data from a consecutive sample of patients presenting for assessment. A longitudinal follow-up study exploring the relationship between the clusters and treatment intensity and outcome was then conducted. This involved a detailed retrospective case note audit of the participants included in the final sub-groups to determine treatment received and outcome.

### 5.3 Objectives of the study

The following aims were identified for the cross-sectional study:

The primary aim was to:

Explore whether distinct clusters of patients could be identified across the wide range of eating disorder presentations seen in clinical practice, when using traditional eating disorder features and additional clinical characteristics (attachment and coping style)

The secondary aims were to:

1. Determine how these clusters differed in relation to eating disorder features, attachment and coping style
2. Establish whether these clusters differed in relation to general functioning and mood
3. Assess the comparative profiles of the clusters and the DSM-IV diagnoses on eating disorder features and wider aspects of the clinical presentation

The aims of the follow-up study were to:

1. Establish whether the clusters differed in relation to treatment intervention and outcome at 6 and 12 months
3. Establish whether DSM-IV diagnoses differed in relation to treatment intensity and outcome at 6 and 12 months
4. Compare cluster findings with those found for DSM-IV diagnoses

### 5.4 Setting

Given that this study aimed to identify sub-groups across the whole range of eating disorders seen in clinical practice, it was decided that the study would be conducted at an adult community eating disorder service. The Hampshire Partnership NHS Trust Eating Disorders Service provided a unique opportunity as it receives referrals

from GPs in primary care as well as from secondary mental health services. This service serves a population of seven hundred and fifty thousand adults living in Southampton, Winchester, Andover, and the New Forest areas, and has an annual referral rate in the region of two hundred patients per year. As research conducted at the point of clinical service entry is most likely to capture the true variety of eating disorder presentations in the wider population it was decided that data would be collected at assessment.

### 5.5 Participants

All patients who attended the service for an initial assessment of their eating difficulties between May 2004 and December 2005 were eligible for inclusion in the study. However any patient who fulfilled one or more of the following exclusion criteria was excluded from the study:

1. Expressed a wish not to participate and/or was unable to give informed consent
2. Presented with a primary acute psychiatric disorder (e.g. psychosis)
3. Presented as actively suicidal

All eligible participants included in the initial study were also eligible for inclusion in the longitudinal follow-up study.

### 5.6 Sample size

Sample size was considered prior to the start of data collection. In order to guide decisions regarding sample size, a series of cluster analyses were conducted on data from 190 patients used in a previous relevant paper (Turner & Bryant-Waugh, 2004). This involved running 20 cluster analyses; 10 were conducted on randomly selected sets of 100 subjects and a further 10 were conducted using randomly selected sets of 130 subjects. The overall aim of this exercise was to provide information concerning the sample size required in order to replicate the findings of the whole sample. Following statistical advice it was decided that the cluster patterns could not be reliably replicated in a sample of 100, but were reasonably likely to be replicated in a sample of at least 130. Results from this exercise, coupled with a review of the

sample sizes used in previously published research using cluster analysis, led to the decision to recruit a consecutive sample of at least 150 participants.

## 5.7 Measures

In line with the study aims, the following key areas of measurement were identified: socio-demographic characteristics; eating disorder psychopathology; psychological characteristics relating to attachment and coping style; general functioning; and mood. Broad measures of treatment intensity and outcome were also identified. Information concerned with eating disorder history, and where relevant, perceived usefulness of previous treatment episodes, was also collected.

The following procedure was followed when considering the most appropriate measure of each variable: a literature search was conducted using Medline and Psychinfo databases. Key words used included 'measurement', 'assessment' and relevant variable descriptors, such as eating disorders, psychopathology, attachment, and coping style. Key texts relating to eating disorders were also reviewed and lead researchers in the fields of attachment and coping were contacted for their advice regarding measurement selection. Potential measures for each variable were then systematically reviewed and assessed according to the following criteria: psychometric quality, prior use within the eating disorder field, relevance of subscales, language, length, and whether the measure was deemed practical for use within a clinical setting (See Appendix A for a sample systematic review record). Where relevant, both structured interview schedules and self-report measures were reviewed for possible inclusion in the study.

Following this procedure the following measures were selected for use in the study:

### 5.7.1 Socio-demographic information

Information relating to age, gender, martial status, ethnicity and occupation were taken from information collected as part of the routine clinical assessment. Occupation was classified using the Standard Occupational Classification System (Office of Population Censuses and Surveys (OPCS), 2000). Weight was measured to the nearest 0.1kg using digital scales that were calibrated every 6 months. Height was measured to the nearest centimeter using a stadiometer. This involved taking the

maximum distance from the floor to the highest point on the head, when the patient was facing directly ahead. These measurements were used to calculate Body Mass Index (BMI; weight (kgs)/ height ($m^2$).

5.7.2 Eating psychopathology

***The Eating Disorder Examination*** *(EDE-15, Fairburn & Cooper, updated version of the published EDE 12).* The EDE was used to measure eating disorder psychopathology. This is an investigator-led interview widely used in the assessment of eating disorder psychopathology. This instrument generates frequency and severity ratings for key behavioural and attitudinal aspects of eating disorders. Ratings consist of frequency scores (0-6), severity scores (0-6) and frequency of behaviour scores. The EDE can also be used to generate operationally defined DSM-IV eating disorder diagnoses. This interview has been refined over the years in order to maximise its reliability and validity. The psychometric properties of the EDE 12 have been assessed in a number of studies. It has been reported that the alpha coefficients of individual EDE items only dropped below .9 for three items, two of which were subsequently removed from the instrument (Cooper & Fairburn, 1987). Alpha coefficients for subscale scores have been reported as ranging from .97 and .99 (Wilson & Smith, 1989). The EDE also has good discriminant (Wilson & Smith, 1989) and concurrent validity (Rosen et al., 1990). This measure was chosen as the primary measure of eating disorder psychopathology as it is widely regarded as the diagnostic 'gold standard' in eating disorders research and is suitable for use in community and clinical populations. The most recent version of this instrument, EDE 15, was selected for use in the present study. The EDE was administered as part of routine assessment by clinicians trained in its use (see Section 5.10).

5.7.3 Candidate variables

***The Attachment Style Questionnaire, ASQ****, (Feeney et al., 1994).*

Following an extensive review of the attachment measures available in the literature, the ASQ (Feeney et al., 1994) was selected (see Appendix B). The ASQ reflects the constructs central to both Hazan & Shaver's (1987) three factor conceptualization of attachment (secure, anxious and avoidant) (Hazan & Shaver, 1987) and Bartholomew's four category model (Bartholomew & Horowitz, 1991) (see Section 4.3 for further detail). The ASQ measures the following 5 factors; *confidence in*

*relationship with self and others, need for approval, preoccupation with relationships, discomfort with closeness and relationships as secondary.* Whilst *confidence in relationships with self and others* represents secure attachment, each of the other four subscales represents a particular aspect of insecure attachment. *Need for approval* characterises both fearful and preoccupied aspects of attachment, reflecting an individual's need for others' acceptance and approval. *Preoccupation with relationships* reflects an anxious reaching out to others in order to fulfil dependency needs, which is central to the conceptualisation of anxious/ambivalent attachment. In contrast, *discomfort with closeness* is central to avoidant attachment, whilst *relationships as secondary* reflects a dismissing style, in which individuals are viewed as protecting themselves against vulnerability and hurt by emphasising achievements and independence. Each item is rated on a 6 point Likert scale ranging from 1 = totally disagree to 6 = totally agree. Higher scores on confidence indicate more secure attachments, whilst higher scores on the other four subscales indicate insecure attachments. The ASQ has good psychometric properties, including internal consistency (alpha coefficients ranging from .76 to .80), and test re-test reliability over 10 weeks (.74 - .67) (Feeney et al, 1994). The ASQ was selected for a number of reasons: it is a well validated questionnaire that measures attachment on dimensional scales; it is suitable for use with individuals who have little or no experience of romantic relationship; and it has previously been used within the eating disorders field (Troisi et al., 2005).

***The Utrecht Coping List, UCL**, (Schreurs et al., 1993).*

The UCL is a Dutch measure that aims to assess 7 coping styles; *active tackling* (reflects a tendency to look at a situation from different angles; being goal-orientated and making efforts to solve a problem), *seeking social support,* (seeking comfort and comprehension from others; telling someone one's concerns or asking for help), *palliative reacting,* (seeking distraction and trying to feel more comfortable by smoking, drinking or by trying to relax), *avoiding* (letting things take their own course, avoiding the situation or waiting to see what will happen), *passive reacting* (letting oneself be completely preoccupied by the situation, taking a gloomy view of the situation, not being able to do anything about the situation, worrying about the past), *reassuring thoughts* (reassuring oneself with the thought that after rain their will be sunshine, that other people also have their difficulties or that even worse

things can happen) and *expression of emotions*.(venting of anger and annoyance, abreaction of tension) (see Appendix C). Unlike other measures of coping, the UCL is relatively short (44 items) and doesn't include a religious subscale, which is unlikely to be relevant to all. It can also be used to assess coping as a trait or as a preferred coping state over a specified period of time. In view of these advantages it was decided to use the UCL to assess coping style. In the absence of an English version the original Dutch version was translated into English and a validation study conducted (see Chapter 6 for further detail). Given the weaker psychometric properties of the *expression of emotion* subscale and following consultation with the original author, it was decided to omit this subscale from the analyses.

5.7.4 General functioning

Level of general functioning was measured using the following two questionnaires:

***The Medical Outcome Survey Short-Form,*** *SF-36, (Ware & Sherbourne, 1992)*

The SF-36 (see Appendix D) is a widely used self-report measure of physical and emotional health. Although originally developed for use in America, the SF-36 has been modified and validated for use in the United Kingdom (Ware & Sherbourne, 1992). This questionnaire contains 36 items measuring the following 8 health dimensions: *physical functioning, social functioning, role limitations due to poor physical health, bodily pain, general mental health, general health perception, role limitations due to poor emotional health, vitality* and an *overall rating of health.* Items are scored such that a higher score indicates better health status. The SF-36 has good internal reliability ($\alpha$ is above .79 on all scales and above .85 on all but two subscales) (Jenkinson et al., 1993) and good test re-test reliability (Brazier et al., 1992).

The SF-36 was chosen as it is a short measure that is acceptable to patients (Garratt et al., 1993). It also provides a profile of health status on a range of dimensions and is sensitive to change in health status over time. Normative data for a British sample are available (Jenkinson et al., 1993) and this measure has been used in patients with eating disorders (Masheb & Grilo, 2004).

***Work and Social Adjustment Scale,*** *WSAS, (Marks, 1986)*

The WSAS (see Appendix E) is a brief self-report questionnaire that aims to measure functional impairment attributed to a defined problem. In the current study the defined problem was described as 'eating difficulties' and the wording on the questionnaire amended accordingly. The measure has 5 questions that aim to assess the extent to which the identified problem impairs an individuals' ability to engage in a range of work and social tasks. These include home management tasks (e.g., cooking, paying bills and cleaning), social leisure activities with other people (e.g., going to parties or pubs) and private leisure activities (e.g., reading or going for a walk alone). Each item is rated on an 8-point Likert scale, with higher scores indicating a more severe degree of functional impairment. The WSAS has strong internal consistency (.70-.94) and good test re-test reliability (.73) (Mundt et al., 2002). This measure was selected as it is a brief, well validated measure of functional impairment.

5.7.5 Mood

***Beck Depression Inventory, BDI-II,*** *(Beck, Steer and Brown, 1996)*

The BDI-II is a 21-item questionnaire that provides a global score of depressive symptomatology. Each item is rated on a 4-point Likert scale, with higher scores indicating a more severe level of depression. The psychometric properties of the BDI-II are well established, with good internal consistency (alpha values .91) (Beck et al, 1996). The BDI-II is positively correlated with the Hamilton Depression Rating Scale (pearson r = 0.71) and has high one week test-retest reliability (pearson r = 0.93) (Beck et al, 1996). The BDI was chosen as it is a well validated measure of depression widely used in psychological research.

5.7.6 Treatment intensity

Treatment intensity was rated according to the type of treatment received. Patients receiving more than one type of intervention were rated according to the most intensive intervention received. Information relating to the following questions was collected from participants' clinical case notes:

1. Type of treatment input - out-patient / day-patient / in-patient
2. For those receiving out-patient treatment – total number of sessions attended
3. For those attending day care - number of weeks attended
4. For those receiving in-patient treatment - length of stay in weeks

5.7.7 Treatment outcome

Data relating to treatment outcome were taken from those collected as part of routine service audit. This involves therapists rating outcome in relation to the following categories: not offered treatment / satisfactory / lost (e.g.: lapsed, moved away) / poor (e.g.: closed at patient request, died, referred to other services).

## 5.8 Procedure

5.8.1 Recruitment of participants

An invitation letter (see Appendix F) and information sheet (see Appendix G) were sent to all potential participants along with their initial clinic appointment letter. On arrival all patients were met by the principal investigator or a research assistant psychologist, who gave an overview of the assessment process. Patients were reminded about the study, its aims and what participation would involve. At this point potential participants were given the opportunity to ask questions and it was made clear that a decision not to take part in the study would not affect access to the service or treatment received. Those who wished to take part in the study were asked to complete questions 1 - 4 of the consent form (see Appendix H for consent form). At this time, written permission to audiotape the part of the assessment concerned with participants' eating difficulties was also sought. It was made clear that audiotaping the EDE was conducted for the purposes of quality control and that patients could decline to have their interview audiotaped and still participate in the study. Those who agreed to audiotaping of the EDE were asked to complete question 5 on the consent form.

5.8.2 Data collection and the assessment process

Following consent participants were given the additional research questionnaires (ASQ, UCL, WSAS & SF-36) to complete alongside the routinely administered questionnaire (SEDS and BDI-II). At the time of the study the assessment process consisted of 3 one hour parts: an initial introduction and questionnaire session,

during which patients completed the routine questionnaires, and the additional research questionnaires if they chose to participate in the study; an introductory session, during which information relating to current personal circumstances, personal history and mental state was collected; and a final session during which the EDE was completed. Those who were unable to complete all questionnaires during the assessment were given a stamped addressed envelope in which to return the remaining questionnaires by post.

5.8.3 Collection of longitudinal data

Follow-up data relating to treatment intensity were collected from participants' clinical case notes. For those who received treatment, data were collected in 6 month blocks, starting when the patient commenced treatment. Data relating to treatment outcome were taken from those collected as part of routine service audit between July and August 2006.

## 5.9 Ethics approval

Ethics approval for the cross-sectional study was granted from the Southampton and South West Hampshire Local Research Ethics Committees. This study was also approved by the Hampshire Partnership NHS Trust Research and Development Unit. Following consultation with the Hampshire Partnership NHS Trust Research and Development Department, it was agreed that the follow-up analyses were based on routinely collected data and therefore did not require ethics approval

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## 5.10 Pilot work and quality control

The draft questionnaires, information sheet and consent forms were completed by an undergraduate research assistant and a member of the general public to ensure items in the measures and the content of the forms could be understood by lay persons. Prior to the start of data collection the research assistant psychologist was trained by the principal investigator in how to administer the questionnaires. Supervision sessions were also conducted at the end of each assessment morning, during which questionnaires and audiotapes were checked and filed, and any related issues addressed. The EDE was administered by clinicians experienced in its use. All those administering the EDE were trained by an approved trainer (Dr Rachel Bryant-Waugh). Throughout data collection, refresher sessions and trouble shooting

meetings were held fortnightly by Dr Bryant-Waugh. The aim of these sessions was to clarify rating queries and maintain standards. As part of the formal monitoring of consistency and quality standards, thirty EDE audiotapes were randomly selected for re-coding by a second rater. Fifteen were re-rated at the beginning of data collection and results were fed back to clinicians. A further fifteen were re-rated during the latter stages of data collection in order to ensure that standards of interview administration were being maintained (see Appendix I for results).

### 5.11 Cluster analysis

Given that this study aimed to identify naturally occurring groups of patients that were similar to each other and different to other identified groups, cluster analysis was chosen as the initial statistical methodology[2]. Cluster analysis refers to a range of numerical methods for examining multivariate data, the main aim being to identify groups/clusters of homogenous observations that resemble each other in some way and are different in some respects to other objects in other clusters (Everitt et al., 2001). Milligan and Cooper (Milligan & Cooper, 1987) identify the following seven steps in the clustering process (Table 12):

**Table 12: Steps in the clustering process**

1. The entities to be clustered must be selected
2. The variables to be clustered need to be selected
3. Researchers must decide whether to standardise the data
4. A similarity or dissimilarity measure must be decided
5. A clustering method must be selected – hierarchical, partitioning, overlapping and ordination methods
6. The number of clusters must be determined
7. Interpret, test and replicate the resulting cluster analysis

#### 5.11.1 Selecting the entities to be clustered

Milligan and Cooper (1987) suggest that the entities to be clustered should be collected from a systematic rather than a random sample, thus ensuring they are representative of the population being studied. In the present study 'entities' were individuals referred for assessment at a community eating disorders service. Given that this study aimed to identify naturally occurring sub-groups across the broad

[2] It is acknowledged that other studies have used latent class analysis or latent profile analysis when exploring classification. These techniques were not used in the present study as the aim was to explore whether participants naturally divide into distinct sub-groups, rather than to explore whether associations between the variables represented one or more unobservable latent class(es).

range of eating disorder presentations referred for assessment in a community setting, all those who chose to opt in to the study were initially included.

5.11.2 Selecting the variables to be used in the cluster analysis

Consideration must be given to the number and type of variables to be included in the analysis and variables must be relevant to the type of classification being sought (Everitt & Dunn, 1991). For example, given that this study was designed to classify eating disorders in a way that would inform treatment, it wouldn't be helpful to include variables such as gender, as this might cause the resulting clusters to be divided into simply 'male' or 'female'. There is no sound theoretical base for determining the number of variables to enter into a cluster analysis. Some argue for the inclusion of as many variables as are available, however the inclusion of irrelevant variables should be avoided given the potential for these to significantly influence the clustering process. In contrast, others recommend the use of dimension-reduction tools such as principal component analysis (PCA) or factors analysis to transform multiple original variables into new, smaller sets of variables that are uncorrelated with each other (Everitt et al., 2001).

The present study aimed to explore whether sub-groups of patients can be identified across the wide range of eating disorder patients seen in clinical practice, when using traditional eating disorder symptoms and additional clinical characteristics, specifically attachment and coping style. The following variables were therefore selected for use in the analysis: eating disorder behaviours and cognitions as identified by the EDE; BMI; ASQ subscales; and UCL subscales. Eating disorder cognitions were assessed using the eating concern, weight concern and shape concern subscales of the EDE, whilst eating disorder behaviours were assessed using the EDE questions concerned with the mean frequency of the following key diagnostic behaviours during each of the three months prior to assessment: objective bulimic episodes, laxative misuse, excessive exercise and self-induced vomiting. Dietary restraint was measured using the restraint subscale. However it was also decided to include BMI as a proxy for successful weight loss as the EDE restraint subscale measures attempted dietary restraint, rather than actual dietary restraint.

5.11.3 Deciding whether to standardise and if so, which procedure to use

Cluster analysis is essentially based on the similarity or dissimilarity of the variables to be clustered and the distance measure is therefore critical (Everitt & Dunn, 1991). In cases where variables have similar means and variances, standardisation may not be necessary. However variables used in cluster analysis may vary widely in their range of values. Within the present study eating disorder behaviours measured on a frequency scale were more wide ranging than questions rated on a fixed 7 point likert scale. Thus a decision had to be made as to whether to retain this inherent distance imbalance or whether to make each variable equally represented (weighted) in the distance measure by standardising the data. One method for standardisation involves replacing all variables with their z score, which takes into consideration the distribution of the variables rather than just their range. Although (Fleiss & Zubin, 1969) warn against the potential for this procedure to dilute differences between groups, it was decided to transform the data in the present study given the wide range of potential responses.

5.11.4 Choosing a similarity or dissimilarity measure

Clustering involves grouping entities (individuals) on the basis of their similarity/distance on the chosen variables. There are many methods of assessing similarity but two predominate in the social sciences: correlations coefficients (Pearson's Correlation) and distance measures (Squared Euclidean Distance) (Clatworthy et al., 2005). The method chosen is determined by whether classification is based solely on the pattern of people's scores on variables of interest (Pearson's Correlation) or whether severity of scores is also taken into account (Squared Euclidean Distance). It was decided that when exploring how best to sub-group a clinical population severity as well as pattern of symptom presentation should be considered as both may serve to usefully inform the identification of clinically relevant sub-groups. Squared Euclidean Distance was therefore chosen as the measure of similarity.

5.11.5 Selecting a clustering method

Four major categories of clustering method can be identified: hierarchical methods, iterative partitioning alogorithms, overlapping clustering procedures and ordination techniques.

*Hierarchical methods*

Hierarchical cluster analysis is the most widely used clustering method (Milligan & Cooper, 1987). This agglomerative method begins with each entity being considered as a separate cluster. At each stage, two of the clusters are merged, a process that repeats until only one cluster containing all the entities exists. This process will generate a 'hierarchy' of *n* partitions, and clusters that are all non-overlapping. The researcher can then either use the whole hierarchy as the solution, or select the number of clusters of interest. Also falling under the umbrella of hierarchical methods are divisive clustering methods. These methods reverse the agglomerative process, beginning with one cluster containing all elements and ending with *n* clusters containing individual entities from the data set. Hierarchical classifications can be represented by a two-dimensional diagram, known as a dendrogram, which highlights the divisions made at each stage of the analysis – joins between objects indicate the clusters formed and the height of the join from the base of the tree indicates the measure of distance.

When using hierarchical cluster analyses it is necessary to select a method for sorting cases into clusters. There are four main types of sorting strategy (linkage rules): single linkage, complete linkage, average linkage and Ward's method. These are each briefly discussed below.

1. Single linkage (nearest neighbour)

Single linkage begins the clustering process by searching for the two most similar entities in the matrix. A new candidate for cluster membership can then join the group on the basis of the highest level of similarity with any one member of the existing group (i.e. a single link). Consequently this process often forms elongated clusters.

2. Complete linkage (Furthest neighbour)

In contrast to single linkage, when using complete linkage all candidates for inclusion into an existing cluster must be within a certain limit of similarity to ALL members of the cluster. This method therefore tends to find compact, hyperspherical clusters composed of highly similar cases.

3. Average linkage

Although there are a number of variants of this method, each essentially computes an average of the similarity of a case under consideration to all cases in the existing cluster and joins the case to that cluster if a given level of similarity is achieved using this average value.

4. Ward's method

This method is designed to optimise the minimum variance within each cluster. Ward's method uses the Squared Euclidean Distance to determine the similarity between subject profiles on the variables used in the clustering process. This is an iterative process that works by joining cases or clusters that result in minimum increases in the within-cluster error sum of squares whilst maximising the between group sum of squares. The error sum of squares is the sum of the distances from each individual's profile to the center of its parent cluster. Subjects whose profiles have similar patterns and elevations are therefore grouped together. This method tends to find clusters of equal size and shape and is heavily influenced by severity scores. This and complete linkage are space-dilating, that is new smaller clusters are formed in the space between larger clusters.

*Iterative partitioning alogorithms*

Partitioning methods (referred to as k-means cluster analysis) produce non-overlapping clusters and most require research to identify the number of clusters to be formed. Having decided on the number of clusters, partitioning methods require a starting partition or 'seed point' which can be specified by the researcher or randomly selected. Data elements are then assigned to clusters. Some make a single pass – where each point is assigned in turn to the nearest cluster centroid, whilst others make multiple passes and update the centroids after each point assignment. Data points may be assigned to clusters on the nearest Euclidean distance between the point and the cluster centroid, or on more complex statistical criteria. Data points may be relocated from one cluster to another until the solution converges and no more reallocation is required. Outliers are usually forced to join one of the clusters.

*Ordination techniques*

These methods aim to provide a dimensional representation of the data and include methods such as factor analysis and multi-dimensional scaling. However rather than providing a final cluster solution these methods provide a spatial representation of the entities in the dataset, decisions regarding cluster membership being left to the subjective judgment of the researcher. These methods are often regarded as dimension finding tools as opposed to cluster finding tools and will therefore not be discussed further here.

*Overlapping clustering procedures*

Compared with the hierarchical and partitioning methods, far fewer algorithms exist allowing for overlapping clusters. Although a method for identifying overlapping clusters by graphical representations of extended trees has been developed (Corter & Tversky, 1986), none have been rigorously validated on stimulated data sets (Milligan & Cooper, 1987) and thus this clustering method will not be discussed further.

5.11.6 Determining the number of clusters

Determining the optimal cluster solution is an empirical process guided by formal statistical procedures and clinical interpretability of the cluster solutions. It is therefore recommended that a number of different cluster solutions be computed with subsequent decisions regarding the optimal cluster solution being informed, in part, by the following procedures:

1. Visual examination of the dendrogram – an idea as to the number of clusters to extract can be drawn from examining the dendrogram and visually judging the distances between clusters in each solution (Blashfield & Aldenderfer, 1988).
2. Examination of the explained Error Sum of Squares (ESS) – clusters are characterised by their centroids (i.e. averages of individuals included in the cluster analysis across the variables in the analysis). The ESS is the sum of the squared deviations between the individuals' scores and the centroids. The explained ESS is the percentage of this total explained by each solution between the two extremes of zero, when each individual is his/her own cluster, and a maximum when there is a single centroid. Given that cluster analysis aims to find the fewest number of clusters that adequately describe the data, the relative error in each cluster solution can be

examined and compared. The change in ESS from solution to solution is often minor, but a sharp increase in ESS indicates the merging of cases or clusters with dissimilar characteristics. Thus, the optimal number of clusters is reached at the stage of the clustering process preceding the substantial increase in the ESS (Lorr, 1983).

3. Variance ratio criterion, VRC (Calinski & Harabasz, 1974). This is computed by calculating a ratio of the total between group sum of squares (BGSS) to the total within group sum of squares (WGSS) in relation to number of clusters ($k$) and sample size ($n$). The following formula is used:

$$VRC = (BGSS/k\text{-}1)/(WGSS/n\text{-}k)$$

When graphed, the optimal cluster solution is determined by the point at which the VRC peaks.

Within the present study all of the above procedures were employed when determining the optimal cluster solution.

5.11.7 Interpretation, testing and replication of the resulting cluster analysis

In the final step of the clustering process a non-hierarchical cluster analysis can be conducted in order to determine the final optimal classification. During this process cases are moved from one cluster to another if this leads to a reduction in the total error sum of squares of the cluster solution. This process therefore leads to more homogenous clusters.

A number of validation techniques can be employed when assessing the robustness of the final cluster solution. These include replicating the findings on a further representative data set, splitting a data set and repeating the analyses on the two half samples, and assessing the external validity of the clusters through comparing the clusters on additional variables (Everitt et al., 2001). In the present study clusters were compared in relation to general functioning and mood. They were also compared in relation to broad measures of treatment intensity and outcome.

**5.12 Statistical methods**

Given that the optimal cluster solution for the present study was not known, it was decided to conduct an exploratory hierarchical cluster analysis. It was decided to use the Ward's method as, unlike the other types of sorting strategy, this method takes

into consideration both the pattern and severity of a subject's scores on the variables entered into the analysis. In relation to the present study this method is the one most likely to produce homogeneous clusters of patients that are similar to each other in both type and severity of clinical presentation.

Data were analysed using the Statistical Package for the Social Sciences, version 14 (SPSS Inc, 2004) and the SLEIPNER 2.0 cluster analysis package (Bergman & El-khouri, 1998). The SLEIPNER cluster analysis package was chosen above that offered by SPSS as it has the ability to identify statistically significant outliers prior to clustering. Given the risk that statistical outliers can obscure normative patterns in data (Milligan & Cooper, 1987) this was regarded as an important pre-clustering step. The SLEIPNER package also offers the opportunity to conduct a non-hierarchical cluster analysis on the final solution which, as explained in section 5.11.7, serves to potentially further reduce the total error sum of squares of the cluster solution.

Multivariate analysis of variance tests (MANOVA) were conducted to explore differences between the clusters on eating disorder features and wider clinical variables. The significance of the MANOVA effect was assessed by means of the F test in association with Wilks' Lambda. Wilks' Lambda ranges from 0 to 1, with values close to 0 indicating the group means are different and values close to 1 indicating the group means are not different. Where significant differences were identified, follow-up one way ANOVAs were conducted to identify which dependent variables were significantly different across the clusters. Post hoc bonferonni tests were conducted in order to identify the direction of difference. Bonferonni tests were also selected in order to minimise the likelihood of a Type I error; that is the risk of concluding that there is a significant effect when in fact the means differ due to chance. Where data were categorical (i.e. some descriptive data and follow-up data) Pearson's chi square tests were used to assess differences across groups, and due to sparseness of data in some cells, exact $p$ values were calculated and reported. Where data failed to meet the assumptions of normality, as examined using the Kolgomorov-Smirnov test, non-parametric equivalents were also applied.

When comparing the cluster solution with current DSM-IV diagnoses, effect size (the partial eta squared statistic) was calculated in order to give an indication of how well the two approaches performed in their ability to account for variation in symptoms. The effect size represents the proportion of variation accounted for by the differences among the clusters or diagnosis, and is based upon the ratio of the variation accounted for by the effect (e.g. the cluster solution) to the sum of the variation accounted for by the effect and the variation left to error (i.e. total variation). Larger effect sizes indicate a greater amount of variation accounted for by the model effect (e.g. cluster solution or diagnoses) to a maximum of 1.

### 5.13 Data management

All data were entered onto a database using the Statistical Package for the Social Sciences, version 14 (SPSS Inc, 2004). The first 43 (22%) completed cases were double entered in order to check for systematic errors in data entry. Error rates for all questionnaires were acceptable at less than 0.5%. A higher error rate (0.9%) was found for the EDE. Although this was likely to reflect technical errors in coding item responses, a further 50 were double entered to ensure quality standards. The error rate within this second sample was acceptable at 0.1%, suggesting an improvement due to experience and quality monitoring

### 5.14 Missing values

Upon completion questionnaires were checked for missing data and where possible participants were asked to complete any missing questions. Where missing items did exist in subscales, values were imputed by using means of available data, so long as there were < 20% missing, otherwise missing items were coded 'missing'.

# CHAPTER 6

## A psychometric evaluation of an English version of the Utrecht Coping List

### 6.0 Overview

In relation to the measurement of coping style, the literature review revealed two types of coping scale. Firstly, there are those based on the notion that coping style is situation specific; that is to say that aspects of a specific situation will significantly influence coping cognitions and behaviours. Questionnaires based on this viewpoint (e.g.: the Ways of Coping Questionnaire Revised; Folkman & Lazarus, 1988) tend to ask participants to recall a stressful life event they have experienced and rate the extent to which they drew upon various coping styles. The alternative perspective is to view coping style as a general disposition; that is, to view people's coping behaviours and cognitions as being relatively stable over the course of time and across different situations. Questionnaires assessing coping as a dispositional style generally ask participants to indicate the degree to which they employ various coping strategies when faced with stressful life events. In contrast to state measures, which tend to be used idiosyncratically across different studies, trait measures allow for greater comparison of coping styles across different samples and situations. Given that the present study aimed to assess general coping styles, only dispositional measures were short listed for inclusion and the most commonly used questionnaires of this type are the Coping Orientation to Problems Experienced Scale (COPE; Carver et al, 1989) and the Utrecht Coping List (UCL; Schreurs et al, 1993), a Dutch coping measure. Following comparison of the two measures it was decided to develop and validate an English version of the UCL for use in the present study. This measure was selected as it is relatively short, has been previously used in the eating disorders field, and can be used to assess preferred coping state over a specified period of time, thus allowing for comparison of coping styles over time.

### 6.1 Study aims

This study had three aims: firstly, to develop an English version of the UCL; secondly, to evaluate its psychometric properties in an UK population; and finally, to generate a preliminary set of UK norms. Psychometric analyses include assessment of the measure's internal consistency, concurrent validity (through comparison with the COPE; Carver et al, 1989) and test-retest reliability.

## 6.2 Participants

Participation in this study was open to all University undergraduates who had access to the University research webpage. An initial study invitation letter was also emailed to a further 350 colleagues and acquaintances of the investigators. All potential participants were aged 18 years and over.

## 6.3 Measures

### 6.3.1 Demographic data

Data relating to gender, age, years in full time education, ethnic origin and socio-economic status were collected.

### 6.3.2 Coping measures

***Utrecht Coping List**, UCL (Schreurs et al, 1993)*

The UCL (Appendix C) was translated into English. It was back translated into Dutch by a second translator and then re-translated into English by a third translator. Discrepancies were discussed in correspondence with the instrument's author and consensus used to finalise wording. All translators were fluent in both languages and were blind to the other translated versions. The UCL consists of 44 items that measure seven empirically derived subscales: active tackling (7 items; e.g. 'looked at a problem from every angle'), seeking social support (6 items; e.g. 'shared your worries with someone'), palliative reacting (8 items; e.g. 'tried to relax'), avoiding (8 items; e.g. 'avoided difficult situations as much as possible'), passive reacting (7 items; e.g. 'escaped into fantasies'), reassuring thoughts (5 items; e.g. 'told yourself that other people also have their problems from time to time'), and expression of emotions (3 items; 'shown your irritation'). Each item was rated on a 4 point scale (1= seldom/never, 2 = sometimes, 3 = often, 4 = very often).

***Coping Orientation to Problems Experienced Scale**, COPE ( Carver et al, 1989)*

The COPE (Appendix J) is a 60 item self-report questionnaire that measures three broad coping styles: problem-focused coping, emotion-focused coping, and dysfunctional coping. Problem-focused coping is assessed with the following subscales: active coping, planning, restraint coping, seeking social support for instrumental reasons, and suppression of competing activities. Emotion-focused coping includes: positive reinterpretation and growth, religion, humour, acceptance,

and seeking social support for emotional reasons. Dysfunctional coping covers: focus on and venting of emotions, denial, behavioural disengagement, mental disengagement, and alcohol/drug use. Alpha reliabilities are reported as ≥.60 for all scales except mental disengagement (.45; Carver et al, 1989).

### 6.4 Procedure

Potential participants included University undergraduate students, as well as those recruited through the researchers' local community contacts. The study was advertised to undergraduate students through a webpage that details projects in which students can participate. Potential participants were able to access a web-link from which they submitted their responses on-line. Following this, participants were asked if they would be willing to complete the UCL again in 6 weeks' time. Those who consented were asked for an email address, to which a cover letter and the web-link were sent 6 weeks following initial submission. The web-link was also emailed, along with a brief cover letter, to friends and colleagues of the investigators, who then followed the procedure as outlined.

### 6.5 Ethics

This study was approved by the University Psychology Ethics Committee.

### 6.6 Data analysis

Analyses were performed using SPSS version 14 (SPSS, 2004). Differences between genders were assessed using Mann-Whitney U tests. The distribution of the data within each subscale was assessed by gender using one sample Kolmogorov-Smirnov tests. Given that some subscales were not normally distributed, non-parametric analyses were conducted where possible. The internal consistency of the UCL subscales was analysed using Cronbach's alpha coefficients. Test re-test reliability and concurrent validity were both assessed using Spearman's rho.

### 6.7 Results

#### 6.7.1 Response rate

Three hundred and eighteen people submitted data, but three questionnaires were incomplete (more than 10% missing data). These were omitted from subsequent analysis, leaving 315 participants at Time 1. Two hundred and fifty six participants

(80.5%) were sent the UCL 6 weeks' later of whom 126 (49.2%) submitted responses. Two participants submitted incomplete data sets, leaving 124 (39.4% of Time 1) at Time 2.

### 6.7.2 Sample characteristics

Two hundred and thirty five females (74.6%) and 79 males (25.1%) completed the questionnaires at time point 1. One participant failed to indicate their gender (0.3%). Two hundred and ninety five (93.7%) were Caucasian and nineteen (6.0%) were from other ethnic groups (4 Pakistani; 5 Indian; 1 Other Asian; 1 Black Caribbean; 4 Chinese; and 4 mixed). One participant (0.3%) failed to identify his or her ethnic origin. Mean age of this group was 26.1 years (*SD* 10.2, range 18-71 years) and mean number of years in education was 16.1 (*SD* 2.1, range 12-23).

### 6.7.3 Comparison by gender

Differences between men and women in age, years in education and UCL subscale scores are shown in Table 13. Gender differences were found for age and four of the seven subscales. In light of these differences, the remaining analyses were conducted by gender.

**Table 13: Comparisons across gender for age, years in education and UCL subscales**

| | Male (*N* = 79) Median (*IQR*) | Female (*N* = 235) Median (*IQR*) | U | *p* |
|---|---|---|---|---|
| Age | 28 (19-36) | 20 (19-30) | 7275 | .01 |
| Years in education | 16 (15-18) | 16 (14-17) | 8960 | .64 |
| **UCL subscales** | | | | |
| Active tackling | 19 (17-22) | 17 (15-20) | 6359 | .01 |
| Palliative reacting | 20 (16-21) | 20 (18-23) | 6980 | .01 |
| Avoidance | 17 (15-19) | 17 (15-19) | 9262 | .97 |
| Seeking social support | 14 (11-16) | 17 (14-19) | 5452 | .01 |
| Passive reacting | 12 (10-15) | 13 (11-16) | 7655 | .01 |
| Expression of emotion | 7 (6-8) | 7 (6-8) | 8791 | .47 |
| Reassuring thoughts | 13 (11-15) | 13 (11-15) | 9282 | .99 |

IQR = Inter quartile range

6.7.4 Psychometric properties of the UCL

*Internal consistency*

Within the male group, five of the seven subscales demonstrated high internal consistency (α .70 to .84) and two, moderate internal consistency (α .52 & .60). In the female group, four of the seven subscales demonstrated high internal consistency (α .73 to .86), three showed good internal consistency (α .64 to .69; Table 14) (Altman, 1991).

*Test re-test reliability*

Test-re-test reliability was assessed over the 6 week period. Within the male group ($n$ = 28) test re-test coefficients were good for three of the seven subscales ($r_s$ .67 to .89); moderate for two ($r_s$ .57 & .59); and fair for two($r_s$ .29 & . 44) (Altman, 1991). In the female group ($n$ = 95), test re-test reliability was good for six subscales ($r_s$ .64 to .74) and moderate for one ($r_s$ .60; Table 14) (Altman, 1991).

**Table 14: Internal consistency and test re-test reliability**

| | | Internal consistency A | | Test re-test reliability $r_s$ | |
|---|---|---|---|---|---|
| | No items | Male | Female | Male | Female |
| Active tackling | 7 | .84 | .79 | .59‡ | .70‡ |
| Palliative reacting | 8 | .70 | .69 | .76‡ | .74‡ |
| Avoidance | 8 | .60 | .68 | .29 | .68‡ |
| Seeking social support | 6 | .83 | .86 | .67‡ | .73‡ |
| Passive reacting | 7 | .72 | .73 | .89‡ | .84‡ |
| Expression of emotion | 3 | .52* | .64 | .44† | .60‡ |
| Reassuring thoughts | 5 | .76 | .74 | .57‡ | .64‡ |

*Note.* † $p$<.05, ‡ $p$ <.01; * deletion of item 27 increased α to .59.

*Concurrent validity*

With the exception of the expression of emotion subscale in the male group, concurrent validity between the relevant UCL and COPE subscales was generally good (Table 15).

| Table 15: Correlations between the relevant UCL and COPE subscales | | | |
|---|---|---|---|
| UCL subscale | COPE subscale | $r_s$ | |
| | | Male | Female |
| Active tackling | Active coping | .68‡ | .70‡ |
| Active tackling | Planning | .71‡ | .65‡ |
| Palliative reacting | Mental disengagement | .58‡ | .53‡ |
| Avoidance | Behavioural disengagement | .41‡ | .42‡ |
| Seeking social support | Emotional social support | .76‡ | .76‡ |
| Seeking social support | Use of instrumental social support | .60‡ | .58‡ |
| Seeking social support | Focus on and venting of emotions | .41‡ | .64‡ |
| Passive reacting | Behavioural disengagement | .59‡ | .47‡ |
| Expression of emotion | Focus on and venting of emotions | .24† | .43‡ |
| Reassuring thoughts | Mental disengagement | .43‡ | .62‡ |

*Note.* † $p<.05$; ‡ $p<.01$.

*Correlations with age and years in education*

Although some correlations between age, years in education and subscale scores for gender were significant, actual $r_s$ values were small, suggesting that coping styles were not greatly influenced by age or educational level (Table 16).

| Table 16: Correlations ($r_s$) with age and years in education | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Active tackling | Palliative reacting | Avoidance | Seeking social support | Passive reacting | Expression of emotion | Reassuring thoughts |
| **Female** (n=235) | | | | | | | |
| Education (Yrs) | .18‡ | -.08 | -.10 | .03 | -.19‡ | -.12 | .07 |
| Age (Yrs) | .37‡ | -.28‡ | -.13† | -.12 | -.32‡ | -.17‡ | .09 |
| **Males** (n=79) | | | | | | | |
| Education (Yrs) | .158 | -.58 | .05 | -.15 | -.07 | -.06 | .02 |
| Age (yrs) | .31‡ | -.28† | -.24 | .02 | -.38‡ | -.06 | .02 |

*Note.* † $p<.05$; ‡ $p<.01$.

6.7.5 Median (IQR) and mean (SD) subscale scores for UK and Dutch samples

Median (*IQR*) and mean (*SD*) subscale scores, by gender, for the UK sample and, where available, for the Dutch sample are shown in Table 17. There appears to be consistency in the way the UK and Dutch samples responded in terms of active tackling, passive reacting, expression of emotion and reassuring thoughts subscales. However, there was a modest difference in the use of the palliative reacting and avoidance strategies across gender; with these being less common coping responses in the Dutch samples. Females also varied in how they responded to seeking social support; likewise, the Dutch sample reported this less often.

**Table 17: Median (*IQR*) and mean (*SD*) subscale scores**

| | UK | | | | Dutch[1] | |
|---|---|---|---|---|---|---|
| | Male | | Female | | Male | Female |
| | Median (*IQR*) | *M (SD)* | Median (IQR) | *M (SD)* | *M* | *M* |
| Active tackling | 19 (17-22) | 19.5 (3.9) | 17 (15-20) | 17.3 (3.4) | 18.4 | 17.7 |
| Palliative reacting | 20 (16-21) | 18.9 (3.9) | 20 (18-23) | 20.5 (3.6) | 15.3 | 16.3 |
| Avoidance | 17 (15-19) | 17.1 (3.3) | 17 (15-19) | 17.0 (3.2) | 14.7 | 14.9 |
| Seeking social support | 14 (11-16) | 13.9 (3.6) | 17 (14-19) | 16.8 (3.6) | 11.0 | 12.9 |
| Passive reacting†‡ | 12 (10-15) | 12.6 (3.8) | 13 (11-16) | 13.5 (3.7) | 10.5 | 11.2 |
| Expression of emotion‡ | 7 (6-8) | 6.6 (1.6) | 7 (6-8) | 6.8 (1.7) | 6.2 | 7.07 |
| Reassuring thoughts‡ | 13 (11-15) | 13.0 (3.0) | 13 (11-15) | 13.0 (2.8) | 11.5 | 12.4 |

*Note.* † not normally distributed in the male group; ‡ not normally distributed in the female group; *IQR* inter-quartile range; *SD* standard deviation; Information relating to the distribution of the Dutch subscales was not available and thus statistical comparisons between the groups were not made.
[1] Data obtained from Schreurs, P.J.G., Willige, G. van de, Tellegen, B., Brosschot, J.F. (1993). *Herziene handleiding Utrechtse Coping Lijst (UCL)*. Lisse: Swets & Zeitlinger B.V. *M* and *SD* are provided for the UK UCL sample for comparison purposes.

## 6.8 Conclusion

This validation study had three aims: to develop an English version of the UCL; to assess its basic psychometric properties in an UK population; and to generate a preliminary set of UK norms. Given that men and women scored significantly differently on 4 of the 7 UCL subscales, analyses were conducted by gender. With the exception of the expression of emotion and avoidance subscales in men, this English version of the UCL appears to be a reliable measure; both in terms of internal consistency and test re-test reliability. Comparison with the COPE (Carver et al., 1989) suggests that, again with the exception of the expression of emotion subscale in men, this measure demonstrates strong concurrent validity and appears to be a valid measure of coping style. As previously mentioned, the full COPE is relatively lengthy and assesses a wide range of coping responses which may not be relevant to all, such as religious coping. The English version of the UCL developed in the present study represents a useful alternative to the COPE, which could be incorporated into studies assessing coping as a dispositional style or measuring change in coping style over time.

However a number of areas for future research can be highlighted and these include further independent validation by other research groups. The modest reliability and validity of the expression of emotion and avoidance subscales in men may relate to difficulties with the internal structure of these subscales, or it may be that these styles of coping are less familiar to men. This issue requires further investigation. Although current findings suggest that coping style is not greatly influenced by age or educational level, this also requires further investigation through studies conducted on larger samples that reflect a wider age range. Whilst this study has generated initial data relating to mean (*SD*) and median (*IQR*) scores for an heterogeneous UK sample, further work establishing a set of UK norms could usefully be conducted. Although the emotional expression and avoidance subscales should be interpreted with caution when used with men, the present findings indicate that this English version of the UCL represents a valid and reliable measure of coping style in women. It was therefore decided to use this newly developed English version in the present series of studies.

# CHAPTER 7

## Results: cross-sectional study

### 7.0 Overview

The findings from the cross-sectional study are presented below. This includes descriptive data relating to the sample, the results of the cluster analyses, and further detail relating to the final cluster solution. A preliminary assessment of the external validity of the final cluster solution is given and comparisons between these sub-groups and the DSM-IV diagnoses are also reported.

### 7.1 Descriptive data

#### 7.1.1 Participation rates

During the period of recruitment (May 2004 – December 2005) 242 patients referred to the Hampshire Partnership NHS Trust Eating Disorder Service were eligible for and invited to take part in the study. Of these, 211 (87%) agreed to participate and 31 (13%) declined. Of the 211 who took part, 191 (91%) completed all questionnaires. The 20 (9%) who submitted partially completed questionnaires were excluded from further analysis. Thus, of the 242 invited to take part, the 191 who submitted completed questionnaires (79%) formed the study population.

#### 7.1.2 Sample characteristics

Of the 191 participants 184 (96%) were female and 7 (4%) male. Median age was 23.7 years (IQR 20.9 – 30.7). One hundred and thirty one (69%) were single, 47 (24%) were married or living with their partner, 8 (4%) were divorced/separated, and 5 (3%) were in a relationship/engaged. Ethnic breakdown and occupational status (Office of Population Censuses and Surveys (OPCS), 2000) are shown in Table 18.

| Table 18: Ethnic breakdown and occupational status | n | % |
|---|---|---|
| **Ethnic breakdown** | | |
| White British | 181 | 95 |
| White other | 7 | 3.5 |
| African | 1 | 0.5 |
| Pakistani | 1 | 0.5 |
| Asian other | 1 | 0.5 |
| **Total** | 191 | 100 |
| **Occupational status** | | |
| 1.Managers and Senior Officials | 4 | 2 |
| 2. Professional Occupations | 14 | 7 |
| 3. Associate Professional and Technical Occupations | 25 | 13 |
| 4. Administrative & Secretarial Occupations | 21 | 11 |
| 5. Skilled Trades Occupations | 0 | 0 |
| 6. Personal Service Occupations | 30 | 16 |
| 7. Sales and Customer Service Occupations | 13 | 7 |
| 8. Process, Plant and Machine Operatives | 0 | 0 |
| 9. Elementary Occupations | 3 | 1 |
| Student | 68 | 36 |
| Unemployed | 11 | 6 |
| Retired | 2 | 1 |
| **Total** | 191 | 100 |

One hundred and twenty one (63%) reported a past history of an eating disorder, of whom 85 (70%) reported seeking previous treatment. Median rating of perceived helpfulness of previous treatment was 2.5 (IQR 2-3) (1 = not at all helpful; 5 = extremely helpful).

### 7.1.3 Diagnostic breakdown

According to current DSM-IV diagnostic criteria, 14 (7%) had a current diagnosis of AN, 66 (35%) had BN and 98 (51%) had EDNOS. Thirteen (7%) did not meet criteria for a clinical eating disorder diagnosis at the time of assessment.

### 7.1.4 Eating psychopathology

Mean subscale scores for the whole sample on the EDE subscales and BMI are shown in Table 19.

**Table 19: Mean scores for EDE subscale scores and BMI**

| | AN N =14 | BN N =66 | EDNOS N = 98 | No ED n = 13 |
|---|---|---|---|---|
| | M (SD) Median (*IQR*) | M (SD) Median (*IQR*) | M (SD) Median (*IQR*) | M (SD) Median (*IQR*) |
| Restraint | 4.6 (0.7) | 3.5 (1.3) | 3.1 (1.6) | 1.4 (1.5) |
| Eating concern | 3.7 (1.1) | 3.1 (1.2) | 2.8 (1.4) | 1.1 (1.5) |
| Weight concern | 3.9 (1.6) | 4.2 (1.4) | 3.8 (1.7) | 1.8 (2.1) |
| Shape concern | 4.9 (0.9) | 4.6 (1.2) | 4.1 (1.5) 5 (3-5)† | 1.7 (2.0) |
| BMI | 15.4 (1.2) | 23.8 (5.5) 22 (20-25)† | 21.7 (6.4) 20(18-23) † | 25.1 (11.1) |

AN = anorexia nervosa; BN = bulimia nervosa, EDNOS = eating disorder not otherwise specified; no ED = no eating disorder; M = mean; SD = standard deviation; BMI = body mass index
† = where data not normally distributed median and inter quartile range (IQR) are also given

### 7.1.5 General functioning and mood

Mean subscale scores on measures of general functioning and mood are shown in Table 20.

**Table 20: Mean scores on measures of general functioning and mood**

| | AN N =14 | BN n =66 | EDNOS* n = 98 | No ED n = 13 |
|---|---|---|---|---|
| | M (SD) Median (*IQR*) | M (SD) Median (*IQR*) | M (SD) Median (*IQR*) | M (SD) Median (*IQR*) |
| **Short-Form 36** | | | | |
| Physical functioning | 68.9 (21.4) | 79.6 (25.3) 90 (70-100) † | 82.9 (21.8) 90 (75-100) † | 73.4 (31.5) |
| Social functioning | 36.6 (28.0) | 55.3 (34.5) | 58.7 (30.0) | 56.7 (34.0) |
| Role limitations due to physical health | 14.3 (25.4) | 57.1 (44.0) 75 (0-100) † | 61.0 (38.7) 75 (25-100) † | 42.3 (42.5) |
| Bodily pain | 42.0 (22.0) | 60.7 (24.7) | 68.4 (24.6) | 54.0 (33.1) |
| General mental health | 30.8 (22.0) | 34.2 (17.8) | 40.3 (18.8) | 43.6 (24.6) |
| Role limitations due to emotional health | 21.4 (28.0) 16.6 (0-33.3) † | 30.8 (37.9) 0 (0-67) † | 28.9 (36.8) 0 (0-67) † | 46.1 (44.1) |
| Vitality | 18.2 (14.9) | 27.1 (17.1) | 33.0 (21.4) 30 (20-45) † | 36.9 (30.1) |
| General health perception | 35 (18.8) | 42.9 (22.1) | 48.5 (24.2) | 38.0 (23.6) |
| Health change | 23.2 (20.7) | 41.3(25.4) | 39.5 (22.9) | 44.2 (29.1) |
| **WSAS score** | 5.6 (1.6) | 4.4 (2.0) | 4.2 (1.8) | 3.9 (2.3) |
| **BDI** | 39.2 (11.7) | 32.0 (11.0) | 31.3 (12.6) | 29 (17.1) |

* 4 participants submitted incomplete SF-36 questionnaires
AN = anorexia nervosa; BN = bulimia nervosa, EDNOS = eating disorder not otherwise specified; no ED = no eating disorder; M = mean; SD = standard deviation
† = where data not normally distributed median and inter quartile range (IQR) are also given

7.1.6 Psychological variables

Mean subscale scores on measures of attachment and coping are shown in Table 21.

**Table 21: Mean subscale scores on psychological measures**

| | AN<br>n = 14 | BN<br>N = 66 | EDNOS<br>n = 98 | No ED<br>N = 13 |
|---|---|---|---|---|
| | M (SD)<br>Median (*IQR*) | M (SD)<br>Median (*IQR*) | M (SD)<br>Median (*IQR*) | M (SD)<br>Median (*IQR*) |
| **Attachment Style Questionnaire** | | | | |
| Confidence | 2.9 (0.9) | 3.2 (0.8) | 3.2 (1.1) | 3.5(1.1) |
| Discomfort with closeness | 4.6 (0.9) | 4.3 (0.8) | 4.2 (1.0) | 3.9 (1.0) |
| Need for approval | 5.1 (0.6) | 4.8 (0.7) | 4.7 (0.9)<br>5 (4-5) † | 3.8(1.3) |
| Preoccupation with relationships | 4.2 (0.8) | 4.2 (0.7) | 4.0 (1.1) | 3.7 (1.3) |
| Relationships as secondary | 3.1 (0.8) | 2.8 (0.6) | 2.7 (0.8) | 2.7 (0.9) |
| **Utrecht Coping List** | | | | |
| Active tackling | 1.9 (0.4) | 1.8 (0.4) | 1.9 (0.5) | 2.4 (0.6) |
| Palliative reacting | 2.5 (0.3) | 2.4 (0.3) | 2.3 (0.4) | 2.4 (0.6) |
| Avoiding | 2.4 (0.5) | 2.3 (0.4) | 2.2 (0.6) | 2.1 (0.6) |
| Seeking social support | 2.4 (0.7) | 2.2 (0.6) | 2.2 (0.6) | 2.4 (0.8) |
| Passive reacting | 2.7 (0.6) | 2.7 (0.5) | 2.5 (0.6) | 2.3 (0.9) |
| Reassuring thought | 1.9 (0.5) | 1.9 (0.4) | 2.1 (0.5) | 2.3 (0.7) |

AN = anorexia nervosa; BN = bulimia nervosa, EDNOS = eating disorder not otherwise specified; no ED = no eating disorder; M = mean; SD = standard deviation
† = where data not normally distributed median and inter quartile range (IQR) are also given

## 7.2 Decisions regarding "non-clinical" participants

Following inspection of the 13 participants who were not given a DSM-IV clinical eating disorder diagnosis, it was clear that nine were referred for assessment to exclude an eating disorder. These patients presented with depression and physical health problems, such as irritable bowel syndrome, and were therefore omitted from further analysis. The remaining four participants presented with features of an eating disorder which were insufficient to warrant a diagnosis according to DSM-IV. However given that there is currently no clear boundary between an eating disorder of clinical significance, and a lesser, non-clinical eating problem (see Section 3.2),

these participants were included in the final sample. One hundred and eighty two participants were therefore included in the main analyses.

### 7.3 Comparison with those who declined to participate

There were no significant differences between those who were included in the main analyses (n = 182) and those who chose not to participate (n = 31), in relation to age ($U = 2669.00$, $N_1 = 182$, $N_2 = 31$, $p = 0.63$, two-tailed) and BMI ($U = 2246.00$, $N_1 = 182$, $N_2 = 31$, $p = 0.07$, two-tailed). There was a relationship between decision to opt-in and diagnosis ($\chi^2 = 37.49$, df = 3, exact $p = 0.000$). Adjusted standardised residuals indicated that those who didn't have a clinical eating disorder were more likely to have chosen not to participate in the study.

### 7.4 Cluster analysis

To explore whether distinct sub-groups of patients could be identified across the whole eating disorder population when using eating disorder features and wider clinical features, three exploratory cluster analyses were conducted following the procedures outlined in Section 5.11. For each analysis hierarchical cluster analysis was computed using Ward's method and the following variables were selected for each cluster analysis:

*Cluster analysis A:*

In line with work previously reported in the literature (Clinton et al., 2004), the first analysis focused on clustering eating disorder features. The following key diagnostic features were selected for inclusion: laxative misuse, self-induced vomiting, objective binge eating, exercise, body mass index (BMI; weight (kgs)/height ($m^2$)), and EDE subscales relating to eating concern, shape concern, weight concern and dietary restraint.

*Cluster analysis B:*

The second analysis aimed to cluster the same participants on wider aspects of the clinical presentation. As reported in Section 5.1, it was decided to focus on attachment and coping style in the present study. The ASQ subscales (confidence in relationships with self and others, discomfort with closeness, need for approval, preoccupation with relationships, relationships as secondary) and UCL subscales

(active tackling, palliative reacting, avoidance, social support, passive reacting and reassuring thought) were therefore selected for inclusion in the second analysis.

*Cluster analysis C*:

Given that exploring the combination of eating disorder symptoms and wider aspects of the clinical presentation seems the most relevant for clinical practice, the final analysis aimed to explore whether sub-groups could be identified when clustering on both eating disorder features, and attachment and coping styles. Therefore all the variables included in analyses 1 and 2 were included in this final analysis: laxative misuse, self-induced vomiting, objective binge eating, exercise, BMI, EDE subscales relating to eating concern, shape concern, weight concern and dietary restraint, and the ASQ and UCL subscales.

### 7.4.1 Cluster analysis A: using eating disorder features

The following variables were entered into the cluster analysis: laxative misuse, self induced vomiting, binge eating, exercise, BMI, and EDE subscales relating to eating concern, shape concern, weight concern and dietary restraint.

*Step 1: Identification of outliers*

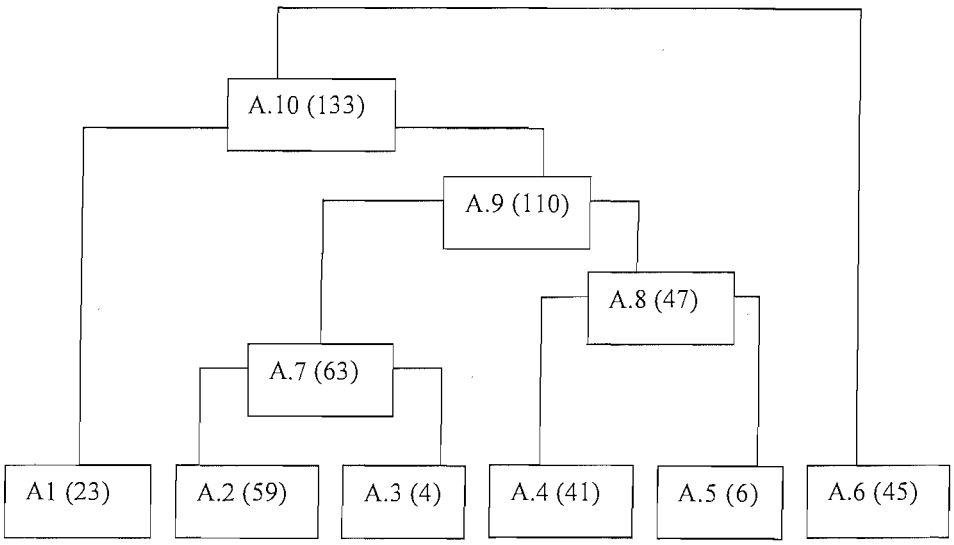
A residual analysis using SLEIPNER'S RESIDUE module was initially conducted to identify statistical "outliers". This procedure was conducted on standardised data and four of the 182 participants were identified as statistical "outliers". The "outliers" presented with a range of features, including very high frequencies of binge eating and extreme levels of vomiting. These cases were omitted from further analysis in line with the use of SLEIPNER. One hundred and seventy eight cases were therefore entered into the cluster analysis

.

*Step 2: Hierarchical cluster analysis*

Standardised scores for the above variables were entered into SLEIPNER'S CLUSTER module and analysed using the Ward's clustering algorithm. Cluster solutions of more than 6 groups resulted in very small sample sizes, and thus from a clinical perspective the most interesting solutions were those ranging from 6 clusters down to 2 clusters. Figure 4 shows a graphical presentation of the cluster solutions and summary statistics are given in Table 22.

**Figure 4: Dendrogram showing eating disorder clusters (analysis A)**




( ) = n

**Table 22: Standard scores on clinical variables in relation to specific eating disorder cluster solutions**

| | N | BMI | restraint | eating concern | weight concern | shape concern | vomiting | laxative misuse | OBEs | exercise |
|---|---|---|---|---|---|---|---|---|---|---|
| **Six cluster solution** | | | | | | | | | | |
| Cluster A.1 | 23 | 0.29 | -0.17 | 0.41 | -0.08 | -0.07 | 1.08 | -0.23 | 1.15 | -0.20 |
| Cluster A.2 | 59 | 0.25 | 0.20 | 0.26 | 0.56 | 0.60 | -0.23 | -0.16 | -0.16 | -0.61 |
| Cluster A.3 | 4 | 3.88 | -1.87 | -0.62 | 0.20 | -0.26 | -0.43 | -0.40 | -0.37 | -0.74 |
| Cluster A.4 | 41 | -0.39 | 0.48 | 0.12 | 0.34 | 0.35 | -0.23 | -0.22 | -0.36 | 1.28 |
| Cluster A.5 | 6 | -0.30 | 0.53 | 1.41 | 0.68 | 0.29 | 0.07 | 4.13 | -0.36 | 0.83 |
| Cluster A.6 | 45 | -0.40 | -0.51 | -0.76 | -1.13 | -1.08 | -0.32 | 0.02 | -0.31 | -0.29 |
| **Five cluster solution** | | | | | | | | | | |
| Cluster A.1 | 23 | 0.29 | -0.17 | 0.41 | -0.08 | -0.07 | 1.08 | -0.23 | 1.15 | -0.20 |
| Cluster A.4 | 41 | -0.39 | 0.48 | 0.12 | 0.34 | 0.35 | -0.23 | -0.22 | -0.36 | 1.28 |
| Cluster A.5 | 6 | -0.30 | 0.53 | 1.41 | 0.68 | 0.29 | 0.07 | 4.13 | -0.36 | 0.83 |
| Cluster A.6 | 45 | -0.40 | -0.51 | -0.76 | -1.13 | -1.08 | -0.32 | 0.02 | -0.31 | -0.29 |
| Cluster A.7 | 63 | 0.48 | 0.07 | 0.21 | 0.53 | 0.54 | -0.25 | -0.17 | -0.18 | -0.62 |
| **Four cluster solution** | | | | | | | | | | |
| Cluster A.1 | 23 | 0.29 | -0.17 | 0.41 | -0.08 | -0.07 | 1.08 | -0.23 | 1.15 | -0.20 |
| Cluster A.6 | 45 | -0.40 | -0.51 | -0.76 | -1.13 | -1.08 | -0.32 | 0.02 | -0.31 | -0.29 |
| Cluster A.7 | 63 | 0.48 | 0.07 | 0.21 | 0.53 | 0.54 | -0.25 | -0.17 | -0.18 | -0.62 |
| Cluster A.8 | 47 | -0.38 | 0.48 | 0.28 | 0.38 | 0.34 | -0.19 | 0.33 | -0.36 | 1.22 |
| **Three cluster solution** | | | | | | | | | | |
| Cluster A.1 | 23 | 0.29 | -0.17 | 0.41 | -0.08 | -0.07 | 1.08 | -0.23 | 1.15 | -0.20 |
| Cluster A.6 | 45 | -0.40 | -0.51 | -0.76 | -1.13 | -1.08 | -0.32 | 0.02 | -0.31 | -0.29 |
| Cluster A.9 | 110 | 0.11 | 0.25 | 0.24 | 0.47 | 0.46 | -0.22 | 0.44 | -0.25 | 0.17 |
| **Two-cluster solution** | | | | | | | | | | |
| Cluster A.6 | 45 | -0.40 | -0.51 | -0.76 | -1.13 | -1.08 | -0.32 | 0.02 | -0.31 | -0.29 |
| Cluster A.10 | 133 | 0.15 | 0.21 | 0.28 | 0.39 | 0.39 | 0.01 | -0.002 | -0.02 | 0.11 |

OBEs = objective bulimic episodes; BMI = body mass index

In relation to the 6 cluster solution and relative to the other clusters, those in cluster A.1 (n = 23) presented with above average BMI and relatively frequent levels of bingeing and vomiting. Those in cluster A.2 (n = 59) scored below average on laxative misuse, exercise and vomiting, and above average on BMI, dietary restraint and concern about eating, weight and shape. Those in cluster A.3 (n = 4) were characterised by markedly high BMI and relatively low frequency of bingeing and compensatory behaviours. Cluster A.4 (n = 41) was characterised by relatively high levels of exercise and dietary restraint coupled with lower BMI. Participants in cluster A.5 (n = 6) reported markedly high levels of laxative misuse, low BMI and relatively high levels of dietary restraint and eating concern. Those in cluster A.6 (n = 45) presented with below average scores on all cognitive and behavioural variables, with the exception of laxative misuse. When the two closest clusters were agglomerated at the five-cluster level, clusters A.2 and A.3 merged to form a group of patients characterised by above average BMI and concern about eating, weight, shape, and below average levels of eating disorders behaviours (A.7; n = 63). When the two closest clusters were agglomerated at the four-cluster level, clusters A.4 and A.5 merged to form a group of participants (A.8; n= 47) characterised by relatively low BMI and high levels of dietary restraint, laxative misuse, exercise and concern related to eating, weight and shape. When the two closest clusters were agglomerated at the three-cluster level clusters A.7 and A.8 merged to form a group (A.9; n =110) presenting with above average levels of dietary restraint and exercise, as well as above average levels of concern relating to eating, weight and shape. Finally, when the two closet clusters were agglomerated at the two-cluster level, clusters A.1 and A.9 merged to form a group (A.10; n = 133) presenting with relatively high levels of cognitive and behavioural psychopathology.

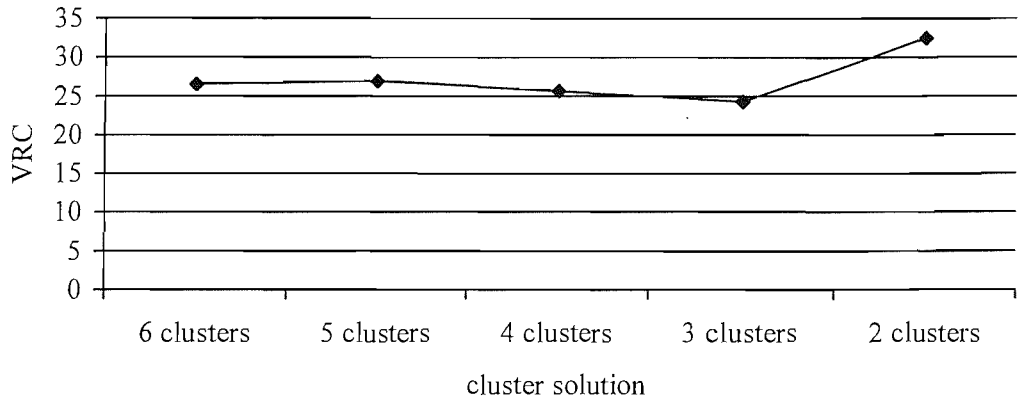
*Step 3: Determination of the optimal number of clusters (Analysis A)*

As discussed in Section 5.11.6, decisions regarding the optimal number of clusters were mainly based on interpretability of the cluster solution. However examination of the variance ratio criterion (VRC) and the increase in error sum of squares (ESS) are an alternative quantitative statistical approach which can also indicate likely optimal cluster solutions.

Variance Ratio Criterion

When the VRC is plotted against each cluster solution, the optimal solution is determined by the point at which the graph peaks. As shown in Figure 5, according to this method the optimal solution for the analysis based on eating disorder features alone appeared to be either a five or two cluster solution.

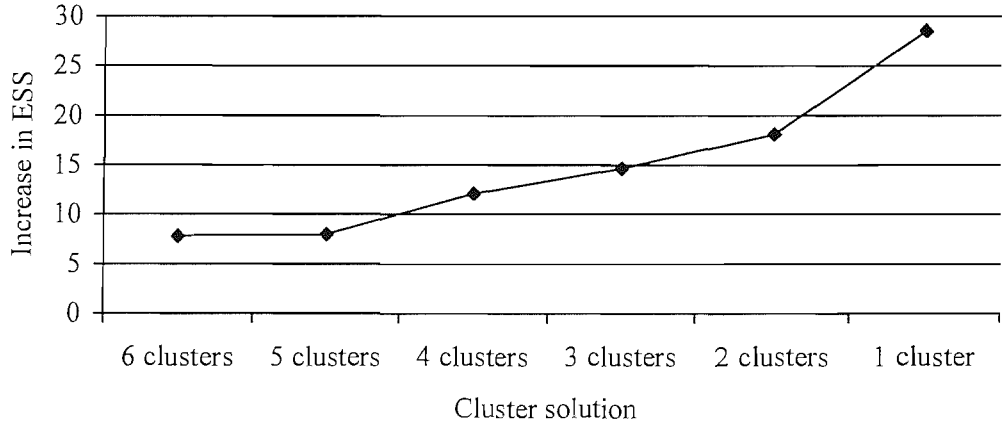
**Figure 5: VRC for clusters based on eating disorder features**




Increase in Error Sum of Squares

When using ESS to determine the optimal cluster solution it is useful to plot increase in ESS against each cluster solution. The optimal solution is indicated by the cluster solution that occurs prior to a sharp increase in ESS. As shown in Figure 6, the increase in ESS suggests that the optimal cluster solution when grouping on eating disorder features alone appeared to be either five or two clusters.

**Figure 6: Increase in ESS for clusters based on eating disorder features**



7.4.2 Cluster analysis B: using attachment and coping

The second analysis aimed to cluster participants on wider aspects of the clinical presentation and the following variables were selected for entry into the cluster analysis: ASQ subscales relating to confidence in relationships with self and others, discomfort with closeness, need for approval, preoccupation with relationships and relationships as secondary; and UCL subscales relating to active tackling, palliative reacting, avoidance, social support, passive reacting and reassuring thought.

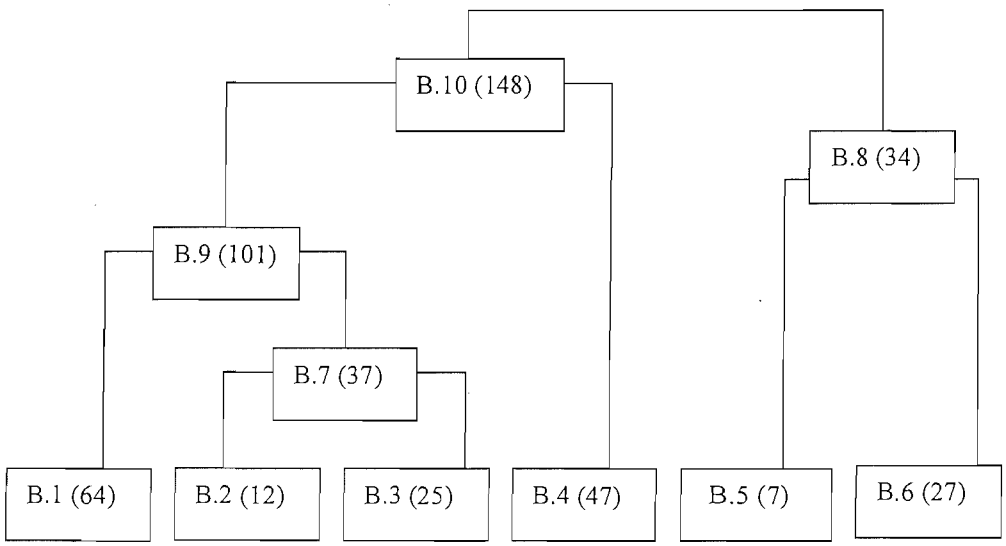
*Step 1: Identification of outliers*

None of the 182 participants were identified as statistical "outliers" and thus all were entered into the cluster analysis.

*Step 2: Hierarchical cluster analysis*

Standardised scores for the ASQ and UCL subscales were entered into SLEIPNER'S CLUSTER module and analysed using the Ward's clustering algorithm. In line with the previous analysis, the most clinically interesting solutions were those from six clusters down to two clusters. Figure 7 shows a graphical presentation of the cluster solutions and summary statistics are given in Tables 23a and 23b

**Figure 7: Dendrogram showing attachment and coping clusters (analysis B)**




( ) = n

In relation to the 6 cluster solution and relative to the other clusters in this analysis, those in cluster B.1, the largest group (n = 64), presented with below average levels of active tackling and relatively low confidence, Those in cluster B.2 (n = 12) presented with the highest levels of active tackling, whilst those in cluster B.3 (n = 25) presented with the highest levels of avoidance. Those in cluster B.4 (n = 47) presented with the highest levels of passive reacting, and those in cluster B.5 (n = 7) presented with the highest confidence and lowest need for approval and preoccupation with relationships. Those in cluster B.6 (n = 27) presented with the highest levels of social support seeking behaviour. When the two closest clusters were agglomerated at the five-cluster level, clusters B.2 and B.3 merged to form a group (B.7; n = 37) of patients who scored relatively high on avoidance and palliative reacting. When the two closest clusters were agglomerated at the four-cluster level, clusters B.5 and B.6 merged to form a group of patients (B8; n = 34) presenting with relatively low levels of attachment and coping psychopathology. When the two closest clusters were agglomerated at the three-cluster level, clusters B.1 and B.7 merged to form a group (B9; n = 101) presenting with above average levels of psychopathology. In line with the previous analysis, the two-cluster level was characterised by a small group of patients presenting with relatively low levels of psychopathology and a larger group presenting with more problematic attachment and coping styles (B.4 and B.9 merged to form B.10; n = 148).

| Table 23a: Standard scores on UCL subscales in relation to specific (UCL and ASQ) cluster solutions | | | | | | | |
|---|---|---|---|---|---|---|---|
| | N | Active tackling | Palliative reacting | Avoidance | Social support | Passive reacting | Reassuring thought |
| **Six cluster solution** | | | | | | | |
| Cluster B.1 | 64 | -0.16 | -0.35 | -0.05 | -0.44 | -0.34 | -0.07 |
| Cluster B.2 | 12 | 1.72 | 0.86 | 0.24 | 0.48 | -0.31 | 1.69 |
| Cluster B.3 | 25 | 0.18 | 0.79 | 1.23 | 0.04 | 0.60 | 0.19 |
| Cluster B.4 | 47 | -0.74 | -0.34 | -0.22 | -0.31 | 0.83 | -0.86 |
| Cluster B.5 | 7 | 1.38 | 0.41 | -0.10 | 0.63 | -1.84 | 1.89 |
| Cluster B.6 | 27 | 0.42 | 0.18 | -0.71 | 1.15 | -0.58 | 0.26 |
| **Five cluster solution** | | | | | | | |
| Cluster B.1 | 64 | -0.16 | -0.35 | -0.05 | -0.44 | -0.34 | -0.07 |
| Cluster B.4 | 47 | -0.74 | -0.34 | -0.22 | -0.31 | 0.83 | -0.86 |
| Cluster B.5 | 7 | 1.38 | 0.41 | -0.10 | 0.63 | -1.84 | 1.89 |
| Cluster B.6 | 27 | 0.42 | 0.18 | -0.71 | 1.15 | -0.58 | 0.26 |
| Cluster B.7 | 37 | 0.68 | 0.81 | 0.91 | 0.19 | 0.30 | 0.68 |
| **Four cluster solution** | | | | | | | |
| Cluster B.1 | 64 | -0.16 | -0.35 | -0.05 | -0.44 | -0.34 | -0.07 |
| Cluster B.4 | 47 | -0.74 | -0.34 | -0.22 | -0.31 | 0.83 | -0.86 |
| Cluster B.7 | 37 | 0.68 | 0.81 | 0.91 | 0.19 | 0.30 | 0.68 |
| Cluster B.8 | 34 | 0.62 | 0.23 | -0.58 | 1.05 | -0.84 | 0.60 |
| **Three cluster solution** | | | | | | | |
| Cluster B.4 | 47 | -0.74 | -0.34 | -0.22 | -0.31 | 0.83 | -0.86 |
| Cluster B.8 | 34 | 0.62 | 0.23 | -0.58 | 1.05 | -0.84 | 0.60 |
| Cluster B.9 | 101 | 0.14 | 0.08 | 0.30 | -0.21 | -0.10 | 0.20 |
| **Two cluster solution** | | | | | | | |
| Cluster B.8 | 34 | 0.62 | 0.23 | -0.58 | 1.05 | -0.84 | 0.60 |
| Cluster B.10 | 148 | -0.14 | -0.05 | 0.13 | -0.24 | 0.19 | -0.13 |

Table 23b: Standard scores on ASQ subscales in relation to specific (ASQ and UCL) cluster solutions

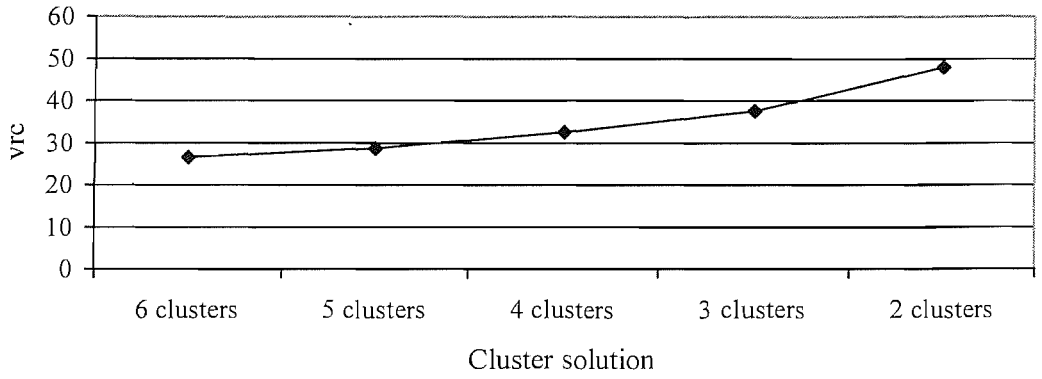
| | N | Confidence | Discomfort with closeness | Need for approval | Preoccupation with relationships | Relationships as secondary |
|---|---|---|---|---|---|---|
| **Six cluster solution** | | | | | | |
| Cluster B.1 | 64 | -0.13 | 0.10 | -0.04 | -0.22 | -0.10 |
| Cluster B.2 | 12 | 0.51 | -0.18 | -0.27 | 0.00 | -0.01 |
| Cluster B.3 | 25 | -0.16 | 0.45 | 0.58 | 0.57 | 0.69 |
| Cluster B.4 | 47 | -0.88 | 0.70 | 0.66 | 0.54 | 0.63 |
| Cluster B.5 | 7 | 1.80 | -1.72 | -2.57 | -2.33 | -1.80 |
| Cluster B.6 | 27 | 1.29 | -1.32 | -0.77 | -0.33 | -1.03 |
| **Five cluster solution** | | | | | | |
| Cluster B.1 | 64 | -0.13 | 0.10 | -0.04 | -0.22 | -0.10 |
| Cluster B.4 | 47 | -0.88 | 0.70 | 0.66 | 0.54 | 0.63 |
| Cluster B.5 | 7 | 1.80 | -1.72 | -2.57 | -2.33 | -1.80 |
| Cluster B.6 | 27 | 1.29 | -1.32 | -0.77 | -0.33 | -1.03 |
| Cluster B.7 | 37 | 0.06 | 0.25 | 0.30 | 0.39 | 0.46 |
| **Four cluster solution** | | | | | | |
| Cluster B.1 | 64 | -0.13 | 0.10 | -0.04 | -0.22 | -0.10 |
| Cluster B.4 | 47 | -0.88 | 0.70 | 0.66 | 0.54 | 0.63 |
| Cluster B.7 | 37 | 0.06 | 0.25 | 0.30 | 0.39 | 0.46 |
| Cluster B.8 | 34 | 1.39 | -1.40 | -1.14 | -0.75 | -1.19 |
| **Three cluster solution** | | | | | | |
| Cluster B.4 | 47 | -0.88 | 0.70 | 0.66 | 0.54 | 0.63 |
| Cluster B.8 | 34 | 1.39 | -1.40 | -1.14 | -0.75 | -1.19 |
| Cluster B.9 | 101 | -0.06 | 0.15 | 0.09 | 0.005 | 0.10 |
| **Two cluster solution** | | | | | | |
| Cluster B.8 | 34 | 1.39 | -1.40 | -1.14 | -0.75 | -1.19 |
| Cluster B.10 | 148 | -0.32 | 0.33 | 0.27 | 0.17 | 0.27 |

*Step 3: Determination of the optimal number of clusters (analysis B)*

Variance Ratio Criterion

As shown in Figure 8, the VRC graph peaks at the two cluster solution suggesting this as the optimal solution.

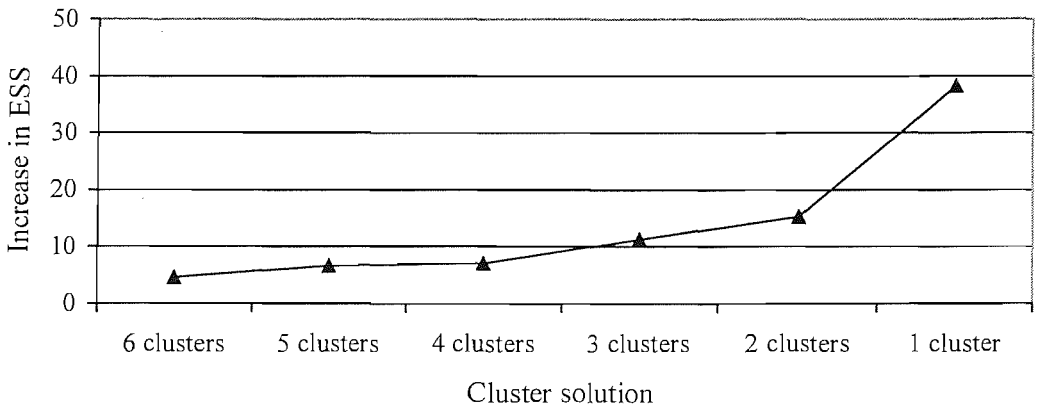
**Figure 8: VRC for clusters based on attachment and coping styles**




Increase in Error Sum of Squares

As shown in Figure 9 the graph increases sharply following the two cluster solution, indicating an optimal solution of two clusters.

**Figure 9: Increase in ESS for clusters based on attachment and coping styles**



7.4.3 Cluster analysis C: using eating disorder features with attachment and coping

The final analysis aimed to explore whether sub-groups could be identified when clustering on both eating disorder features and aspects of the wider clinical presentation. All of the variables entered into the initial two cluster analyses were therefore entered into this final analysis.

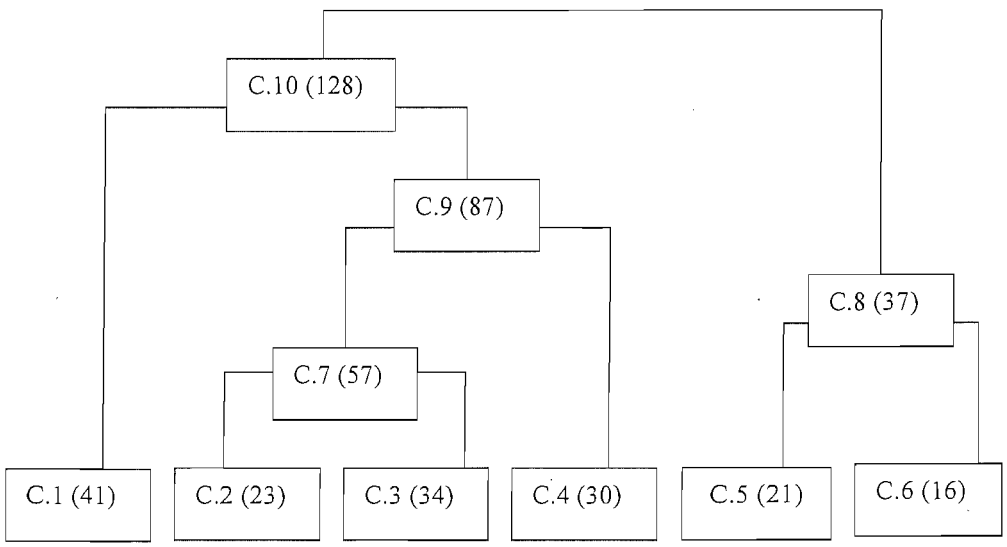
*Step 1: Identification of outliers*

In this analysis, 17 of the 182 participants were identified as statistical "outliers". These patients presented with extremely high frequencies of binge eating and extreme vomiting, as well as significantly lower scores on some aspects of attachment and coping. These cases were omitted from further analysis leaving 165 cases to be entered into the cluster analysis.

*Step 2: Hierarchical cluster analysis*

Standardised scores for the above variables were entered into SLEIPNER'S CLUSTER module and analysed using the Ward's clustering algorithm. Again, the most interesting cluster solutions were those from 6 down to 2 clusters. See Figure 10 for a graphical presentation of the cluster solutions and Tables 24a- 24c for a summary of the statistics.

**Figure 10: Dendrogram for eating disorder and wider clinical features (analysis C)**



| Table 24a: Standard scores on clinical variables in relation to specific (eating disorder & wider clinical features) cluster solutions | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | N | BMI | restraint | eating concern | weight concern | shape concern | vomiting | laxative misuse | OBEs | exercise |
| **Six cluster solution** | | | | | | | | | | |
| Cluster C.1 | 41 | 0.35 | -0.14 | -0.07 | 0.16 | 0.22 | -0.31 | -0.27 | -0.19 | -0.37 |
| Cluster C.2 | 23 | -0.47 | 0.99 | 0.94 | 0.60 | 0.57 | -0.27 | 0.06 | -0.15 | 0.76 |
| Cluster C.3 | 34 | -0.47 | 0.37 | -0.18 | 0.09 | 0.15 | -0.34 | 0.20 | -0.39 | 0.44 |
| Cluster C.4 | 30 | 0.52 | -0.07 | 0.22 | 0.25 | 0.25 | 0.52 | -0.20 | 0.51 | -0.35 |
| Cluster C.5 | 21 | 0.27 | -0.52 | -0.59 | -0.45 | -0.34 | -0.29 | -0.38 | -0.12 | -0.37 |
| Cluster C.6 | 16 | -0.45 | -1.03 | -0.74 | -1.21 | -1.48 | -0.25 | -0.32 | -0.43 | 0.16 |
| **Five cluster solution** | | | | | | | | | | |
| Cluster C.1 | 41 | 0.35 | -0.14 | -0.07 | 0.16 | 0.22 | -0.31 | -0.27 | -0.19 | -0.37 |
| Cluster C.4 | 30 | 0.52 | -0.07 | 0.22 | 0.25 | 0.25 | 0.52 | -0.20 | 0.51 | -0.35 |
| Cluster C.5 | 21 | 0.27 | -0.52 | -0.59 | -0.45 | -0.34 | -0.29 | -0.38 | -0.12 | -0.37 |
| Cluster C.6 | 16 | -0.45 | -1.03 | -0.74 | -1.21 | -1.48 | -0.25 | -0.32 | -0.43 | 0.16 |
| Cluster C.7 | 57 | -0.47 | 0.62 | 0.27 | 0.30 | 0.32 | -0.31 | 0.15 | -0.29 | 0.57 |
| **Four cluster solution** | | | | | | | | | | |
| Cluster C.1 | 41 | 0.35 | -0.14 | -0.07 | 0.16 | 0.22 | -0.31 | -0.27 | -0.19 | -0.37 |
| Cluster C.4 | 30 | 0.52 | -0.07 | 0.22 | 0.25 | 0.25 | 0.52 | -0.20 | 0.51 | -0.35 |
| Cluster C.7 | 57 | -0.47 | 0.62 | 0.27 | 0.30 | 0.32 | -0.31 | 0.15 | -0.29 | 0.57 |
| Cluster C.8 | 37 | -0.04 | -0.74 | -0.66 | -0.78 | -0.83 | -0.27 | -0.35 | -0.25 | -0.14 |
| **Three cluster solution** | | | | | | | | | | |
| Cluster C.1 | 41 | 0.35 | -0.14 | -0.07 | 0.16 | 0.22 | -0.31 | -0.27 | -0.19 | -0.37 |
| Cluster C.8 | 37 | -0.04 | -0.74 | -0.66 | -0.78 | -0.83 | -0.27 | -0.35 | -0.25 | -0.14 |
| Cluster C.9 | 87 | -0.13 | 0.38 | 0.25 | 0.28 | 0.30 | -0.025 | 0.03 | -0.01 | 0.25 |
| **Two cluster solution** | | | | | | | | | | |
| Cluster C.8 | 37 | -0.04 | -0.74 | -0.66 | -0.78 | -0.83 | -0.27 | -0.35 | -0.25 | -0.14 |
| Cluster C.10 | 128 | 0.025 | 0.215 | 0.15 | 0.24 | 0.27 | -0.12 | -0.07 | -0.07 | 0.05 |

OBEs = objective bulimic episodes

| Table 24b: Standard scores on UCL subscales in relation to specific (eating disorder & wider clinical features) cluster solutions | | | | | | | |
|---|---|---|---|---|---|---|---|
| | N | Active tackling | Palliative reacting | Avoidance | Social support | Passive reacting | Reassuring thought |
| **Six cluster solution** | | | | | | | |
| Cluster C.1 | 41 | -0.84 | -0.41 | 0.17 | -0.48 | 0.68 | -0.78 |
| Cluster C.2 | 23 | 0.25 | 0.56 | 0.61 | -0.03 | 0.56 | -0.05 |
| Cluster C.3 | 34 | -0.02 | -0.44 | -0.41 | -0.09 | -0.29 | -0.21 |
| Cluster C.4 | 30 | -0.04 | 0.09 | 0.04 | -0.33 | -0.25 | 0.15 |
| Cluster C.5 | 21 | 0.33 | 0.26 | -0.82 | 1.23 | -0.72 | 0.53 |
| Cluster C.6 | 16 | 0.82 | -0.09 | 0.13 | 0.34 | -0.63 | 0.61 |
| **Five cluster solution** | | | | | | | |
| Cluster C.1 | 41 | -0.84 | -0.41 | 0.17 | -0.48 | 0.68 | -0.78 |
| Cluster C.4 | 30 | -0.04 | 0.09 | 0.04 | -0.33 | -0.25 | 0.15 |
| Cluster C.5 | 21 | 0.33 | 0.26 | -0.82 | 1.23 | -0.72 | 0.53 |
| Cluster C.6 | 16 | 0.82 | -0.09 | 0.13 | 0.34 | -0.63 | 0.61 |
| Cluster C.7 | 57 | 0.09 | -0.04 | -0.001 | -0.06 | 0.05 | -0.15 |
| **Four-cluster solution** | | | | | | | |
| Cluster C.1 | 41 | -0.84 | -0.41 | 0.17 | -0.48 | 0.68 | -0.78 |
| Cluster C.4 | 30 | -0.04 | 0.09 | 0.04 | -0.33 | -0.25 | 0.15 |
| Cluster C.7 | 57 | 0.09 | -0.04 | -0.001 | -0.06 | 0.05 | -0.15 |
| Cluster C.8 | 37 | 0.54 | 0.11 | -0.41 | 0.85 | -0.68 | 0.56 |
| **Three cluster solution** | | | | | | | |
| Cluster C.1 | 41 | -0.84 | -0.41 | 0.17 | -0.48 | 0.68 | -0.78 |
| Cluster C.8 | 37 | 0.54 | 0.11 | -0.41 | 0.85 | -0.68 | 0.56 |
| Cluster C.9 | 87 | 0.04 | 0.01 | 0.01 | -0.16 | -0.05 | -0.04 |
| **Two cluster solution** | | | | | | | |
| Cluster C.8 | 37 | 0.54 | 0.11 | -0.41 | 0.85 | -0.68 | 0.56 |
| Cluster C.10 | 128 | -0.24 | -0.13 | 0.06 | -0.26 | 0.18 | -0.28 |

| Table 24c: Standard scores on ASQ subscales in relation to specific (eating disorder & wider clinical features) cluster solutions | | | | | | |
|---|---|---|---|---|---|---|
| | N | Confidence | Discomfort with closeness | Need for approval | Preoccupation with relationships | Relationships as secondary |
| **Six cluster solution** | | | | | | |
| Cluster C.1 | 41 | -0.83 | 0.68 | 0.56 | 0.60 | 0.62 |
| Cluster C.2 | 23 | -0.5 | 0.69 | 0.82 | 0.46 | 0.50 |
| Cluster C.3 | 34 | 0.06 | -0.12 | -0.10 | -0.22 | 0.11 |
| Cluster C.4 | 30 | -0.08 | 0.05 | -0.10 | -0.10 | -0.25 |
| Cluster C.5 | 21 | 1.44 | -1.65 | -0.91 | -0.68 | -1.39 |
| Cluster C.6 | 16 | 0.53 | -0.18 | -0.43 | -0.31 | 0.16 |
| **Five cluster solution** | | | | | | |
| Cluster C.1 | 41 | -0.83 | 0.68 | 0.56 | 0.60 | 0.62 |
| Cluster C.4 | 30 | -0.08 | 0.05 | -0.10 | -0.10 | -0.25 |
| Cluster C.5 | 21 | 1.44 | -1.65 | -0.91 | -0.68 | -1.39 |
| Cluster C.6 | 16 | 0.53 | -0.18 | -0.43 | -0.31 | 0.16 |
| Cluster C.7 | 57 | -0.18 | 0.20 | 0.27 | 0.05 | 0.27 |
| **Four-cluster solution** | | | | | | |
| Cluster C.1 | 41 | -0.83 | 0.68 | 0.56 | 0.60 | 0.62 |
| Cluster C.4 | 30 | -0.08 | 0.05 | -0.10 | -0.10 | -0.25 |
| Cluster C.7 | 57 | -0.18 | 0.20 | 0.27 | 0.05 | 0.27 |
| Cluster C.8 | 37 | 1.05 | -1.01 | -0.71 | -0.52 | -0.72 |
| **Three cluster solution** | | | | | | |
| Cluster C.1 | 41 | -0.83 | 0.68 | 0.56 | 0.60 | 0.62 |
| Cluster C.8 | 37 | 1.05 | -1.01 | -0.71 | -0.52 | -0.72 |
| Cluster C.9 | 87 | -0.15 | 0.15 | 0.14 | 0.002 | 0.09 |
| **Two cluster solution** | | | | | | |
| Cluster C.8 | 37 | 1.05 | -1.01 | -0.71 | -0.52 | -0.72 |
| Cluster C.10 | 128 | -0.37 | 0.32 | 0.28 | 0.19 | 0.26 |

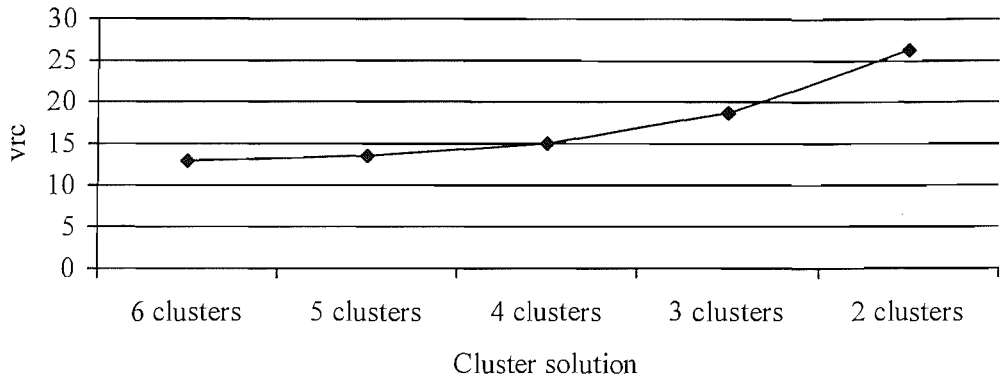
Looking at the six cluster solution and in comparison with the five other clusters in this solution, those in cluster C.1 (n = 41) were characterised by above average BMI and below average levels of eating disorder behaviours, as well as relatively high levels of discomfort with closeness and preoccupation with relationships. Those in cluster C.2 (n = 23) presented with the highest levels of exercise and dietary restraint. This group also scored above average on a range of negative attachment and coping styles. Participants in cluster C.3 (n = 34) presented with relatively high levels of exercise and dietary restraint, and above average levels of weight and shape related concern, as well as below average levels of discomfort with closeness and need for approval. Those in cluster C.4 (n =30) presented with the highest BMI, the highest frequency of bingeing and vomiting, and above average concern related to eating, weight and shape. They also reported below average levels of need for approval and preoccupation with relationships. Those in cluster C.5 (n = 21) presented with relatively low levels of eating disorder psychopathology and relatively adaptive attachment and coping styles, whilst those in cluster C.6 (n = 16) presented with below average levels of eating disorder behaviours, such as dietary restriction, self-induced vomiting and laxative misuse, and below average levels of concern related to eating, weight and shape. They also presented with above average levels of active tackling and confidence in relationships. When the two closest clusters were agglomerated at the five-cluster level, clusters C.2 and C.3 merged to form a group of patients (C.7; n = 57) presenting with below average BMI, above average levels of laxative misuse, exercise and dietary restraint, and a range of maladaptive coping and attachment styles, including below average levels of confidence in relationships. When the two closest clusters were agglomerated at the four-cluster level, the two low psychopathology groups (clusters C.5 and C.6) merged to form one group of average weight patients presenting with relatively low levels of psychopathology (C.8; n = 37). When the two closest clusters were agglomerated at the three-cluster level, clusters C.4 and C.7 merged to form a (n = C.9; n = 87) group presenting with above average levels of dietary restraint and exercise, relatively high levels of eating, weight and shape concerns, as well as above average avoidance. Finally, at the two-cluster level, clusters C.1 and C.9 merged to form a group (C.10; n = 128) presenting with above average levels of eating disorder psychopathology as well as relatively problematic attachment and coping styles.

*Step 3: Determination of the optimal number of clusters (analysis C)*

Variance Ratio Criterion

As shown by the peak of the graph in Figure 11, the VRC indicates a two cluster solution.

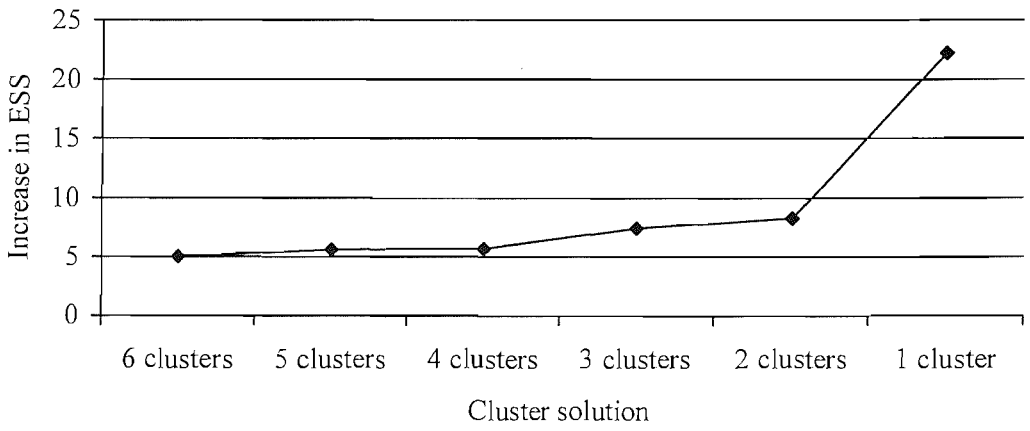
**Figure 11: VRC for clusters based on eating disorder and wider clinical features**




Increase in Error Sum of Squares

As indicated in Figure 12 the ESS also indicates a 2 cluster solution. However a slight increase in the gradient of the line can also be seen at the 4 cluster solution.

**Figure 12: Increase in ESS for clusters based on eating disorder and wider clinical features**



### 7.5 The optimal cluster series and cluster solution

The cluster analyses based on eating disorder features (series A) and attachment and coping styles (series B) served as interesting preliminary analyses. Analyses based on eating disorder features alone indicated an optimal solution of either five or two clusters. Whilst the two cluster solution appeared to divide the sample by symptom severity, identifying a high and a low level psychopathology group, the five cluster solution generated sub-groups that reflect those identified in previous studies. Cluster A.1 presented with above average BMI and the highest levels of binge eating and self-induced vomiting, and appear to reflect a group of bulimic patients. Those in cluster A.7 presented with the highest BMI, below average levels of compensatory behaviours, such as self-induced vomiting, laxative misuse or excessive exercise and high levels of weight and shape concern, and resemble overeaters. The next two groups (A.4 and A.5) reflected more restrictive presentations, both presenting with below average BMI and relatively high levels of dietary restraint; those in A.4 also presented with the most extreme levels of exercise, whilst those in A.5 presented with the highest level of laxative abuse and eating concern. When compared with the existing literature these clusters appear to reflect those identified in previous studies (Turner & Bryant-Waugh, 2004; Clinton et al, 2004; and Sloan et al, 2005). The final group (A.6) presented with relatively low levels of cognitive and behavioural psychopathology but also presented with below average BMI. This group may reflect the low BMI/low psychopathology cluster identified by Turner & Bryant-Waugh (2004).

Results from the cluster analysis based on attachment and coping styles indicated an optimal two cluster solution; a smaller group presenting with a relatively mild clinical presentation and a larger group presenting with more severe attachment and coping difficulties. In view of the literature review (see Section 3.7.4) it is also interesting to reflect on the 3 cluster solution, which appeared to identify three groups. The first (B.4) was characterised by relatively insecure attachment patterns reflecting discomfort with closeness to others, need for approval from others, and the view that relationships are secondary to independence and achievement. Participants in this group also reported relatively low levels of reassuring thought and active tackling, and high levels of passive reacting. This cluster represents a group of patients with relatively problematic attachment and coping difficulties, and may

resemble the broad PD group identified by Holliday et al (2006) or the impulsive /emotionally dysregulated groups identified by Wonderlich et al (2005) and Western & Harnden-Fischer (2001). The second cluster (B.8) constituted a relatively mild group in terms of problematic attachment and coping styles. Members of this group reported the highest levels of confidence in their relationships with others; they actively seek social support and tend to adopt an active coping style. This group may reflect the mild psychopathology group identified in other studies (Goldner et al, 1999; Wonderlich et al, 2005; Western & Harnden-Fischer, 2001). The third cluster (B.9) presented with the highest levels of avoidance and also reported above average levels of discomfort with closeness and need for approval from others. Again, it is possible that this group reflects the avoidant group identified by Holliday et al (2006).

Given that the overarching aim of the present study was to explore whether clinically useful sub-groups could be identified on the basis of both eating disorder symptoms and wider clinical features it was decided to focus the remaining analyses on the third (C) cluster series. As previously mentioned, determining the optimal cluster solution is an empirical process guided by statistical tests, such as the VRC and the ESS, and the clinical interpretability of each cluster solution (i.e.: how clinically meaningful each appears). Although the VRC and ESS clearly demonstrated a two cluster solution in series C, these clusters appeared to represent a larger high psychopathology group and a smaller, less clinically severe group. When compared with the other cluster solutions, it was decided that this grouping might not be the most clinically informative. Similarly, when looking at the six and five cluster levels, it is argued that it makes clinical sense to join clusters C.2 and C.3 as there is little that clinically differentiates these two groups. Similarly, it also makes clinical sense to join the two low level psychopathology groups (cluster C.5 and C.6) when moving from the five to the four cluster solution. However, when considering the four and three cluster solutions it might be clinically important to distinguish patients presenting with high frequencies of bingeing and vomiting, above average levels of avoidance but otherwise relatively adaptive attachment styles, from those presenting with a more restrictive eating disorder presentation, including high levels of laxative misuse and exercise coupled with more problematic attachment and coping styles. Such a distinction might have important implications for treatment planning and

outcome that would be masked by the merging of these groups in the three cluster solution. This clustering solution also provides an important indication that severity of the eating disorder symptoms is not necessarily paralleled by severity of wider psychopathology, which may have a greater impact on engagement in treatment and outcome. In view of the above it was decided to take forward the four cluster solution identified in series C.

### 7.6 Non hierarchical cluster analysis

In the final step, non-hierarchical cluster analysis using SLEIPNER'S RELOCATE module was used to determine the final optimal classification. As described in Section 5.11.7, this process moves cases from one cluster to another, if this leads to a reduction in the total error sum of squares of the cluster solution, thus resulting in the identification of more distinct, homogenous clusters. The four cluster solution previously identified using Ward's method was therefore entered into this analysis. Results of this process, which can be regarded as the final cluster solution, are shown in Table 25 and in Figures 13 - 15. Although this analysis yielded four groups that were similar to those identified in the initial Ward's analysis, a number of features were more pronounced.

Those in cluster D.1 presented with relatively low levels of eating disorder symptoms such as dietary restriction, laxative misuse and vomiting, but showed the strongest passive-avoidant coping style. This group also showed the most insecure attachment patterns, scoring higher than the other clusters on ASQ subscales measuring need for approval, discomfort with closeness and relationships as secondary. In contrast, Cluster D.2 was characterised by participants presenting with the highest levels of dietary restraint, as well as the highest levels of exercise and laxative misuse. They also reported the most severe concerns about eating, weight and shape. Participants in this group also showed an insecure attachment style characterised by below average levels of confidence in relationships with self and others, and above average levels of discomfort with closeness and relationships as secondary. In relation to coping styles, participants in this group reported relatively high levels of passive and palliative reacting. Those in cluster D.3 showed relatively secure attachment and coping styles, compared with those in clusters D.1 and D.2. However in contrast to those identified in cluster D.4, they also presented with significant eating disorder

symptoms, including the highest frequency of objective bulimic episodes and self-induced vomiting. Those in cluster D.4 presented with relatively low levels of eating disorder symptoms relating to eating, weight and shape concern, dietary restraint, binge eating and self-induced vomiting. Participants in this group also appeared relatively secure in relation to underlying attachment and coping styles, showing the highest levels of confidence, active tackling and social support seeking.

Standardised scores for each cluster on EDE subscales and key diagnostic variables are shown in Figures 13. Standardised, or Z scores, are shown as this allows for the clusters to be compared across clinical features. Raw scores are transformed such that the mean becomes zero and the standard deviation 1; the z scores quantifies the original scores in terms of the number of standard deviations that the score is from the mean of the distribution. A negative Z-score means that the original score was below the mean and a positive Z-score means that the original score was above the mean. Similar standardised scores for subscales on the ASQ and the UCL are shown in Figures 14 and 15 respectively.

**Figure 13: Comparison of clusters on EDE subscales and key diagnostic variables**

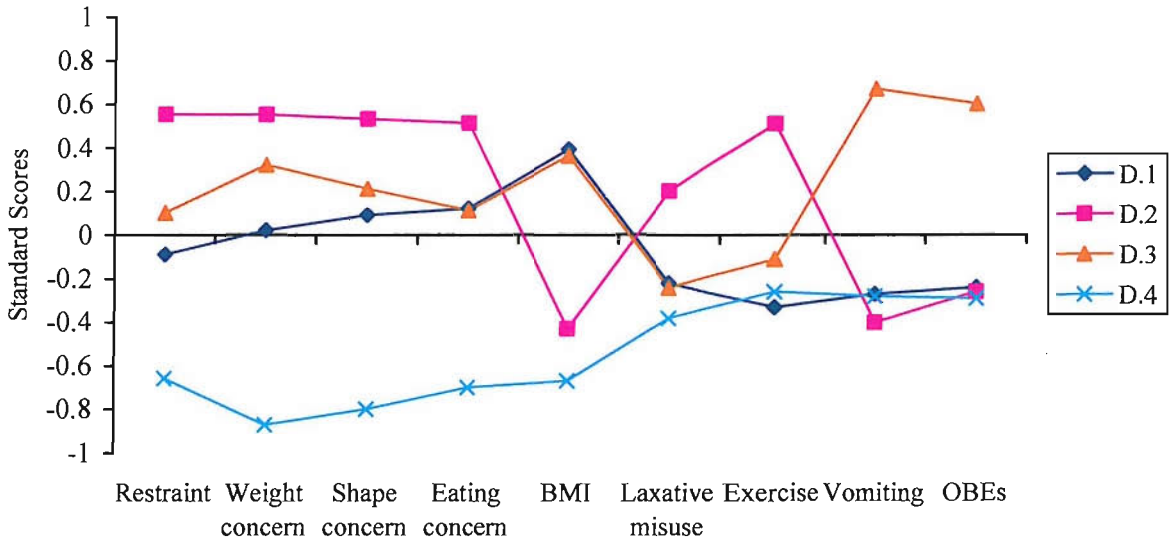


**Figure 14: Comparison of clusters on ASQ subscales**

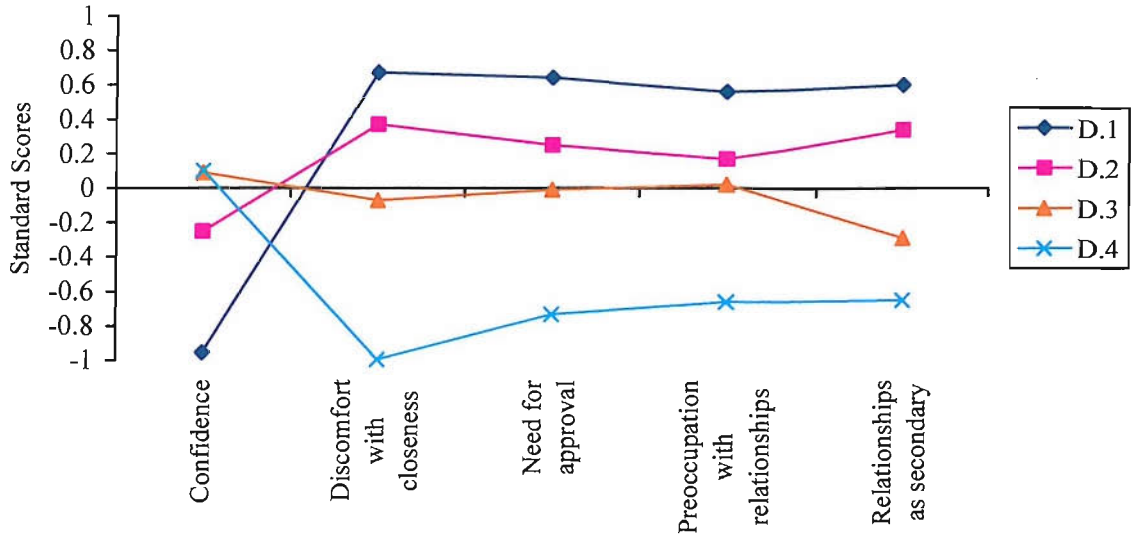
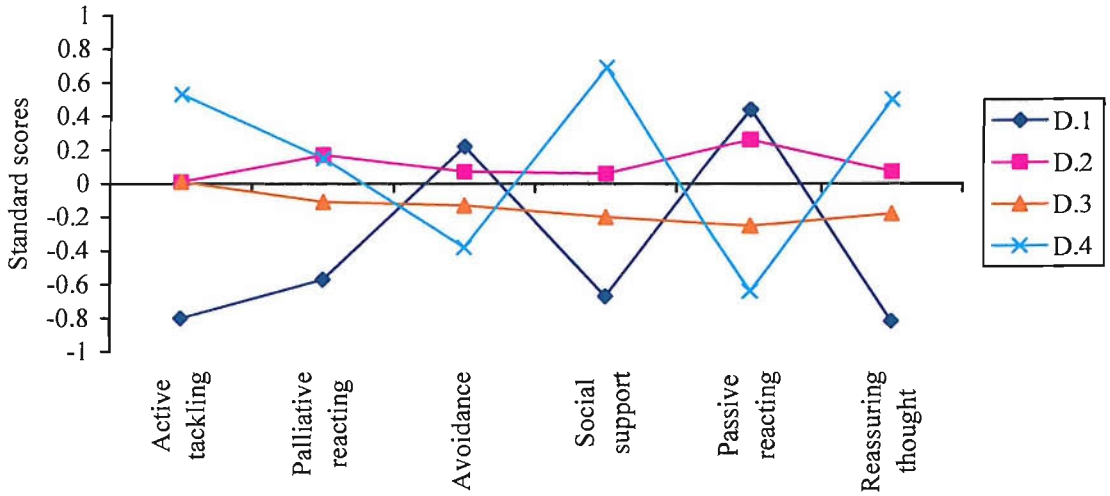



**Figure 15: Comparison of clusters on UCL subscales**




### 7.7 Comparison of clusters on data collected at assessment

In order to assess the validity of the cluster solution, multivariate analysis of variance tests (MANOVA) were conducted to explore differences across the clusters on descriptive variables, eating disorder features and wider clinical variables. Where data were categorical Pearson's Chi-square tests were applied.

**Table 25: Standard scores on clinical variables in relation to the four cluster solution generated using eating disorder features and wider clinical variables**

| | Clusters | | | |
|---|---|---|---|---|
| **Clinical variable** | **Cluster D.1 N = 42** | **Cluster D.2 N = 52** | **Cluster D.3 N = 29** | **Cluster D.4 N = 42** |
| **Eating disorder features** | | | | |
| Restraint | -0.09 | 0.55 | 0.10 | -0.66 |
| Weight concern | 0.02 | 0.55 | 0.32 | -0.87 |
| Shape concern | 0.09 | 0.53 | 0.21 | -0.80 |
| Eating concern | 0.12 | 0.51 | 0.11 | -0.70 |
| BMI | 0.39 | -0.43 | 0.36 | -0.67 |
| Laxative misuse | -0.22 | 0.20 | -0.24 | -0.38 |
| Exercise | -0.33 | 0.51 | -0.11 | -0.26 |
| Vomiting | -0.27 | -0.40 | 0.67 | -0.28 |
| OBEs | -0.24 | -0.26 | 0.60 | -0.29 |
| **Attachment** | | | | |
| Confidence | -0.95 | -0.25 | 0.09 | 0.10 |
| Discomfort with closeness | 0.67 | 0.37 | -0.07 | -0.99 |
| Need for approval | 0.64 | 0.25 | -0.01 | -0.73 |
| Preoccupation with relationships | 0.56 | 0.17 | 0.02 | -0.66 |
| Relationships as secondary | 0.60 | 0.34 | -0.29 | -0.65 |
| **Coping style** | | | | |
| Active tackling | -0.80 | 0.01 | 0.01 | 0.53 |
| Palliative reacting | -0.57 | 0.17 | -0.11 | 0.15 |
| Avoidance | 0.22 | 0.07 | -0.13 | -0.38 |
| Social support | -0.67 | 0.06 | -0.20 | 0.69 |
| Passive reacting | 0.44 | 0.26 | -0.25 | -0.64 |
| Reassuring thought | -0.82 | 0.07 | -0.18 | 0.50 |

BMI = body mass index; OBEs = objective bulimic episodes

7.7.1 Descriptive variables

There was no significant difference across the clusters for age ($\chi^2$ = 4.59, df = 3, $p$ = 0.204) previous treatment ($\chi^2$ = 1.79, df = 3, exact $p$ = 0.616) or history of an eating disorder ($\chi^2$ = 6.244, df = 3, exact $p$ = 0.100).

7.7.2 DSM-IV diagnoses

There was a significant difference across the clusters for diagnosis ($\chi^2$ = 43.9, df = 9, exact $p$ = 0.000). Adjusted standardised residuals indicated that those given a DSM-IV diagnosis of AN at assessment were more likely to be allocated to cluster D.2, whilst those given a DSM-IV diagnosis of BN were more likely to be allocated to cluster D.3. Patients diagnosed with EDNOS were more likely to be allocated to cluster D.4 and less likely to be in cluster D.3. Patients with this diagnosis were also found in clusters D.1 and D.2. Those with no clinical diagnosis were more likely to be allocated to cluster D.1. (see Table 26).

**Table 26: Comparison of clusters and DSM-IV diagnoses**

| | DSM-IV diagnosis | | | | |
|---|---|---|---|---|---|
| | Anorexia nervosa | Bulimia nervosa | EDNOS | No ED | Total |
| Cluster label | N | n | n | N | n |
| Cluster D.1 | 1 | 12 | 26 | 3 | 42 |
| Cluster D.2 | 10 | 16 | 26 | 0 | 52 |
| Cluster D.3 | 0 | 22 | 7 | 0 | 29 |
| Cluster D.4 | 3 | 9 | 30 | 0 | 42 |
| Total | 14 | 59 | 89 | 3 | |

EDNOS = eating disorder not otherwise specified; No ED = no eating disorder

7.7.3 Eating disorder features

As might be expected, due to the variables being included in the cluster analysis, there was a significant effect of cluster on the combined dependent variable eating disorder features ($F_{(27, 447)}$ = 11.20, $p$<0.0005; Wilks' Lambda = .22; partial eta squared = .39).The following variables were included as eating disorder features: EDE subscales relating to eating concern, shape concern, weight concern and dietary restraint, laxative misuse, self-induced vomiting, objective binge eating, exercise and BMI. Analysis of each individual dependent variable showed that clusters differed in relation to all eating disorder variables (see Table 27 and 29 for a summary of cluster differences).

**Table 27: Descriptive statistics for eating disorder features and wider clinical variables**

| | **Cluster D.1 N = 42** | **Cluster D.2 N = 52** | **Cluster D.3 N = 29** | **Cluster D.4 N = 42** | **Post hoc (p<0.05)** |
|---|---|---|---|---|---|
| | M (SD)<br>Median (*IQR*) | M (SD)<br>Median (*IQR*) | M (SD)<br>Median (*IQR*) | M (SD)<br>Median (*IQR*) | |
| **Eating disorder features** | | | | | |
| Restraint | 3.2 (1.4) | 4.2 (1.1) | 3.5 (1.2) | 2.4 (1.4) | 4<2, 4<3, 4<1,1<2 |
| Weight concern | 4.0 (1.5)<br>4.3 (3.0 – 5.2) | 4.8 (0.9)<br>4.9 (4.2 – 5.6) | 4.9 (1.1)<br>4.8 (3.9 – 5.5) | 2.6 (1.5)<br>2.6 (1.2 – 3.9) | 4<1, 4<2, 4<3, 1<2 |
| Shape concern | 4.4 (1.3)<br>4.9 (3.8 – 5.5) | 5.1 (0.7)<br>5.2 (4.6 – 5.6) | 4.7 (0.9)<br>4.9 (4.3 – 5.4) | 3.3 (1.5)<br>3.1 (2.3 – 4.6) | 4<1, 4<2, 4<3 |
| Eating concern | 2.8 (1.3) | 3.6 (1.2) | 3.1 (1.0) | 2.0 (1.0) | 4<1, 4<2, 4<3, 1<2 |
| BMI | 24.9 (9.1) | 19.4 (3.9)<br>18.6 (16.6 – 21.9) | 24.7 (5.4) | 21.8 (4.9) | 2<1, 2<3, 2<4 |
| Laxative misuse | 1.7 (8.6)<br>0.0 (0 – 0) | 5.8 (8.6)<br>0.0 (0 – 9) | 1.6 (3.8)<br>0.0 (0 – 0.3) | 0.2 (0.9)<br>0.0 (0 – 0) | 2>1, 2>3, 2>4 |
| Exercise | 4.6 (8.5)<br>0.0 (0 – 5.8) | 14.1 (11.9)<br>16.0 (0 – 28) | 8.3 (10.4)<br>0.0 (0 – 16.5) | 5.4 (10.4)<br>0.0 (0 – 2.7) | 2>1, 2>4 |
| Vomiting | 8.3 (11.0)<br>1.3 (0 – 16.2) | 4.6 (7.9)<br>0.3 (0 – 5) | 34.1 (18.9) | 7.9 (12.7)<br>1.0 (0 – 12.3) | 3>1, 3>2, 3>4 |
| OBEs | 6.6 (8.5)<br>3.5 (0 – 11.8) | 6.1 (8.8)<br>0.00 (0 – 11.7) | 20.9 (14.0) | 5.7 (7.6)<br>2.0 (0 – 11) | 3>1, 3>2, 3>4 |
| **Attachment** | | | | | |
| Confidence | 2.2 (0.7) | 2.9 (0.6) | 3.2 (0.7) | 4.1 (0.8) | 1<2, 1<3, 1<4 ,4>2, 4>3 |
| Discomfort with closeness | 4.9 (0.6) | 4.6 (0.7) | 4.2 (0.6) | 3.3 (0.9) | 4<1, 4<2, 4<3, 1>3 |
| Need for approval | 5.3 (0.5) | 5.0 (0.7) | 4.8 (0.6) | 4.1 (0.9) | 4<1, 4<2, 4<3, 1>3 |
| Preoccupation with relationships | 4.6 (0.6) | 4.3 (0.8) | 4.2 (0.7) | 3.5 (1.0) | 4<1, 4<2, 4<3 |
| Relationships as secondary | 3.3 (0.6) | 3.0 (0.6) | 2.6 (0.6) | 2.3 (0.8) | 4<1, 4<2, 1>3, 2>3 |

| | Cluster D.1<br>N = 42 | Cluster D.2<br>N = 52 | Cluster D.3<br>N = 29 | Cluster D.4<br>N = 42 | Post hoc<br>(p<0.05) |
|---|---|---|---|---|---|
| **Coping style** | | | | | |
| Active tackling | 1.6 (0.3) | 1.9 (0.4) | 1.9 (0.3) | 2.1 (0.4) | 1<2, 1<3, 1<4, 2<4 |
| Palliative reacting | 2.2 (0.4) | 2.5 (0.4) | 2.4 (0.3) | 2.4 (0.5) | 1<2, 1<4 |
| Avoidance | 2.4 (0.5) | 2.3 (0.5) | 2.1 (0.3) | 2.0 (0.4) | 1>4 |
| Social support | 1.8 (0.4) | 2.3 (0.6)<br>2.2 (1.8 – 2.8) | 2.1 (0.6) | 2.7 (0.6) | 1<2, 1<4, 4>2, 4>3 |
| Passive reacting | 2.9 (0.5) | 2.8 (0.6) | 2.4 (0.4) | 2.2 (0.6) | 1>3, 1>4, 2>4 |
| Reassuring thought | 1.6 (0.4) | 2.0 (0.4) | 1.9 (0.4) | 2.3 (0.5) | 1<2, 1<4, 3<4 |
| **SF-36** | | | | | |
| Physical functioning | 80 (25.3)<br>95 (67 – 100) | 78.4 (20.0) † | 88.4 (13.6) | 84.8 (20.6)<br>95 (75 – 100) | n/s |
| Roll limitations due to physical health | 53.5 (44.7)<br>62.5 (0 – 100) | 45.6 (39.9) ‡ | 69.8 (39.1)<br>100 (37 – 100) | 61.9 (39.1)<br>75 (25-100) | n/s |
| Social functioning | 40.9 (25.7) | 43.7 (25.5) ‡ | 61.1 (23.1) | 63.4 (27) | 1<3, 1<4, 2<3, 2<4 |
| Pain | 65.5 (24.2) | 56.8 (26.2) ‡ | 63.9 (21) | 71 (26.1) | 2<4 |
| General mental health | 27.4 (15.3) | 32.4 (15.9) ‡ | 39.2 (16.7) | 48.4 (19.8) | 1<3, 1<4, 2<4 |
| Roll limitations due to emotional health | 23 (34.1)<br>(0-33) | 22.8 (32.3) ‡<br>0 (0 – 33) | 32.2 (40.3)<br>0 (0 – 67) | 40.4 (40)<br>33.3 (0 – 75) | n/s |
| Vitality | 24.1 (14.4) | 24.7 (15.5) ‡ | 32.1 (16.6) | 38.9 (25.1) | 2<4, 1<4 |
| General health perception | 44.3 (24.7) | 44 (22.7) ‡ | 45.1 (16.8) | 51.2 (25.1) | n/s |
| **WSAS** | 4.9 (1.9) | 4.6 (1.9) ‡ | 4 (1.6) | 3.6 (1.8) | 1>4 |
| **BDI** | 37.5 (10.7) | 37 (8.9)+ | 26 (10.5) | 23.7 (11.9) | 1>3, 1>4, 2>3, 2>4 |

BMI = body mass index; OBEs = objective bulimic episodes; WSAS = work and social adjustment scale; BDI = beck depression inventory
NB: where data not normally distributed median and inter quartile range (IQR) are also given
† n = 50; ‡ n = 51; + n = 48

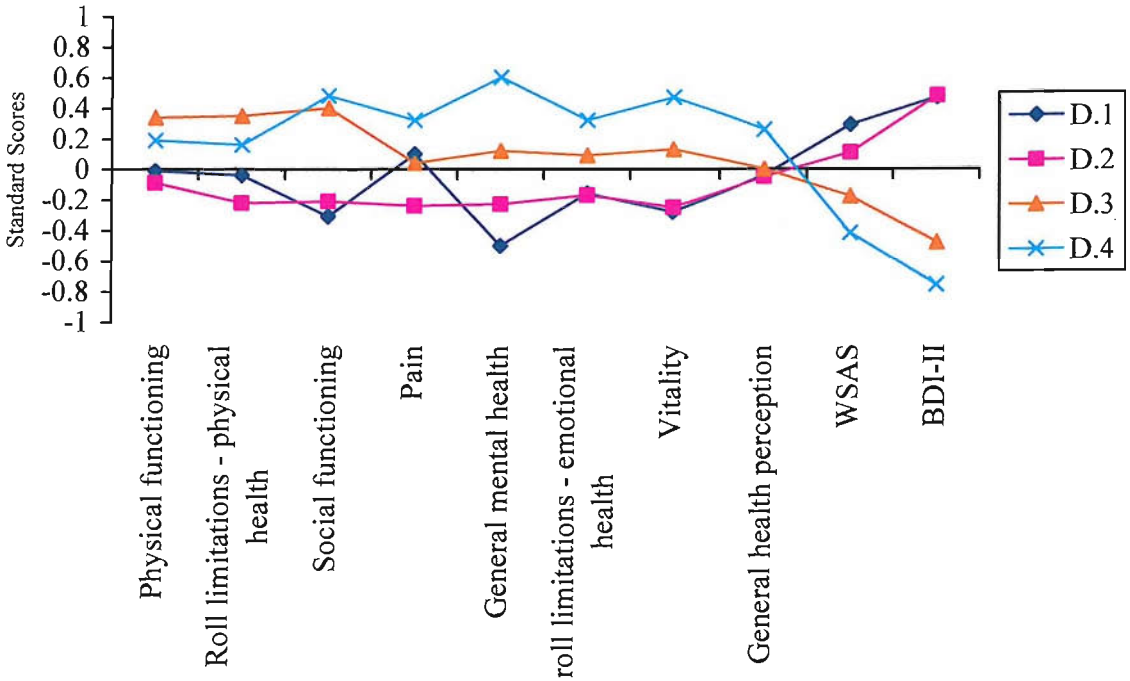
7.7.4 Attachment and coping styles

There was a significant effect of cluster on the combined dependent variables attachment ($F_{(15, 433)} = 11.4$ $p<0.000$; Wilks' Lambda = .3; partial eta squared = .26) and coping ($F_{(18, 441)} = 8.5$ $p<0.000$; Wilks' Lambda = .4; partial eta squared = .24). The combined dependent variable attachment included all subscales of the ASQ, whilst the combined dependent variable UCL included all UCL subscales used in the cluster analysis. Follow-up ANOVAs indicated that the clusters differed in relation to all attachment subscales. Cluster also differed in relation to all UCL subscales (see Tables 27 and 29 for a summary).

7.7.5 General functioning and mood

There was a significant effect of cluster on the combined dependent variable general functioning ($F_{(27, 424)} = 2.0$, $p<0.002$; Wilks' Lambda = .70; partial eta squared = .11). This variable included the WSAS and the SF-36 subscales. Follow-up ANOVAs showed that the clusters differed in relation to the WSAS and the SF-36 subscales relating to social functioning, vitality, pain and general mental health. There was also a significant difference across the clusters for mood ($F = _{(3, 161)}$ 24.1, $p$ <0.000) (see Figure 16 and Tables 27 and 29 for summary statistics).

**Figure 16: Comparison of clusters on measures of general functioning and mood**



## 7.8 Comparison of DSM-IV diagnoses on assessment data

As part of the analyses comparing the comparative profiles of the clusters and DSM-IV diagnoses, multivariate analysis of variance tests (MANOVA) were conducted to explore differences across DSM-IV diagnoses on descriptive variables, eating disorder features and wider clinical variables.

### 7.8.1 Descriptive variables

There was no significant difference across diagnoses for age ($\chi^2$ = 1.84, df = 2, $p$ = 0.398) previous treatment ($\chi^2$ = 1.25, df = 2, exact $p$ = 0.540) or history of an eating disorder ($\chi^2$ = 1.82, df = 2, exact $p$ = 0.427).

### 7.8.2 Eating disorder features

There was a significant effect of diagnosis on the combined dependent variable eating disorder features ($F_{(18, 334)}$ = 7.4 $p$<0.0000; Wilks' Lambda = .51; partial eta squared = .28). Follow-up ANOVAs indicated that whilst BMI, restraint, vomiting, exercise and OBEs differed significantly across diagnosis (as might be expected given that these are key diagnostic variables), the groups did not differ significantly in relation to the other eating disorder features (see Tables 28 and 29).

### 7.8.3 Attachment and coping styles

There was no significant effect of diagnosis on the combined dependent variables attachment ($F_{(10, 344)}$ = .72 $p$ < 0.703; Wilks' Lambda = .9; partial eta squared = .02) or coping style ($F_{(12, 342)}$ = 1.6 $p$ < 0.08; Wilks' Lambda = .8; partial eta squared = .05) (see Table 29).

### 7.8.4 General functioning and mood

There was a significant effect of diagnosis on the combined dependent variable general functioning ($F_{(18, 292)}$ = 0.772, $p$<0.004; Wilks' Lambda = .7; partial eta squared = .12). Follow-up ANOVAs indicated that DSM-IV diagnoses differed in relation to the WSAS and SF-36 subscales measuring role limitations due to physical health, pain, vitality and social functioning. No significant difference was found for BDI ($F_{(2, 175)}$ = 2.7, $p$<0.06) (see Tables 28 and 29 for further detail regarding sources of difference).

**Table 28: Descriptive statistics across DSMI-IV diagnoses for eating disorder features and wider clinical variables**

| | Anorexia nervosa | Bulimia nervosa | EDNOS | Post hoc ($p<0.05$) |
|---|---|---|---|---|
| | M (SD)<br>Median (*IQR*) | M (SD)<br>Median (*IQR*) | M (SD)<br>Median (*IQR*) | |
| **Eating disorder features** | | | | |
| Restraint | 4.5 (0.8) | 3.5 (1.3) | 3.2 (1.5) | AN>BN, AN>EDNOS |
| Weight concern | 3.9 (1.6) | 4.2 (1.4) | 3.8 (1.7) | n/s |
| Shape concern | 4.9 (1.0) | 4.6 (1.2) | 4.1 (1.5) | n/s |
| Eating concern | 3.7 (1.1) | 3.1 (1.2) | 2.8 (1.4) | n/s |
| BMI | 15.4 (1.2)<br>15 (14 – 17) | 23.9 (5.6) | 21.6 (6.4) | AN<BN, AN<EDNOS |
| Laxative misuse | 1.7 (3.3)<br>0.0 (0 – 2) | 2.8 (5.7)<br>0 (0 – 4) | 5.0 (12.1)<br>0 (0 – 2) | n/s |
| Exercise | 17.1 (11.7) | 7.4 (10.5)<br>0 (0 – 16) | 8.1 (11.4)<br>0 (0-20) | AN>BN, AN>EDNOS |
| Vomiting | 0.9 (1.6)<br>0 (0 – 1) | 28.2 (37.5)<br>19 (5 – 33) | 10.0 (17.2)<br>2 (0 – 11) | BN>AN, BN>EDNOS |
| OBEs | 0.1(0.5)<br>0 (0 – 0) | 23.5 (21.8)<br>18 (13-28) | 3.8 (7.8)<br>0 (0-4) | BN>AN, BN>EDNOS |
| **Attachment** | | | | |
| Confidence | 2.9 (0.9) | 3.2 (0.8) | 3.2 (1.1) | n/s |
| Discomfort with closeness | 4.6 (0.9) | 4.3 (0.8) | 4.2 (1.0) | n/s |
| Need for approval | 5.1 (0.6) | 4.9 (0.7) | 4.7 (0.9) | n/s |
| Preoccupation with relationships | 4.2 (0.8) | 4.2 (0.7) | 4.0 (1.0) | n/s |
| Relationships as secondary | 3.1 (0.8) | 2.8 (0.6) | 2.8 (0.8) | n/s |

| | Anorexia nervosa | Bulimia nervosa | EDNOS | Post hoc ($p<0.05$) |
|---|---|---|---|---|
| **Coping** | | | | |
| Active tackling | 2.0 (0.4) | 1.8 (0.4) | 2.0 (0.5) | n/s |
| Palliative reacting | 2.5 (0.3) | 2.5 (0.4) | 2.4 (0.5) | n/s |
| Avoidance | 2.5 (0.5) | 2.3 (0.5) | 2.2 (0.5) | n/s |
| Social support | 2.4 (0.7) | 2.2 (0.6) | 2.3 (0.7) | n/s |
| Passive reacting | 2.8 (0.6) | 2.7 (0.5) | 2.5 (0.6) | n/s |
| Reassuring thought | 2.0 (0.5) | 2.0 (0.5) | 2.1 (0.6) | n/s |
| **SF-36** | | | | |
| Physical functioning | 68.9 (21.5)<br>73 (54-90) | 80.0 (25.4)<br>73 (54 – 90) | 83.2 (21.7)<br>95 (75 – 100) | n/s |
| Roll limitations due to physical health | 14.3 (25.4)<br>0 (0 – 31) | 57.1 (44.0)<br>0 (0 – 31) | 70.0 (38.5)<br>75 (25 – 100) | AN<BN, AN<EDNOS |
| Social functioning | 32.5 (24.8) | 49.1 (30.6) | 52.6 (26.9) | AN<EDNOS |
| Pain | 42.0 (22.0) | 60.8 ( 24.7) | 68.0 (25.5)<br>72 (51 – 84) | AN<BN, AN<EDNOS |
| General mental health | 30.9 (22.0) | 34.2 (17.8) | 40.0 (19.1) | n/s |
| Roll limitations due to emotional health | 21.4 (28.0) | 30.8 (37.9)<br>17 (0 – 33) | 28.6 (36.8)<br>0 (0 – 67) | n/s |
| Vitality | 18.2 (14.9) | 27.4 (17.1) | 33.2 (21.2) | AN<EDNOS |
| General health perception | 35 (18.8) | 42.9 (22.0) | 48.7 (24.0) | n/s |
| **WSAS** | 5.6 (1.6) | 4.4 (2.0) | 4.1 (1.8) | AN>EDNOS |
| **BDI** | 39.3 (11.7) | 32.0 (10.9) | 31.3 (12.6) | n/s |

BMI = body mass index; OBEs = objective bulimic episodes; WSAS = work and social adjustment scale; BDI = beck depression inventory
NB: where data not normally distributed median and inter quartile range are also given

### 7.9 Comparison of clusters and DSM-IV diagnoses on assessment data

Comparisons between clusters and diagnoses were made on key eating disorder features, attachment (ASQ) and coping styles (UCL), as well as on general functioning (SF-36, WSAS) and mood (BDI) (see Table 29). As explained in section 5.12 comparison of the effect sizes of these variables in relation to clusters and diagnoses gives an indication of how well the two methods perform in their ability to account for variation across symptoms.

When the eating disorder features were examined in relation to DSM-IV diagnoses, moderate effect sizes were found for BMI, vomiting and particularly OBEs, suggesting this system relies heavily on these behaviours to explain the variance in diagnostic categories. This might be expected given the importance of these features as key diagnostic features in DSMI-IV. In contrast, effect sizes tended to be higher and more evenly distributed across all eating disorder variables for clusters, suggesting that variability across the clusters is accounted for by a wider range of eating disorder features. The only instance where diagnoses achieved a higher effect size compared with the clusters was for OBEs. Clusters were also distinguished by higher effect sizes in relation to attachment and coping, as well as important aspects of general functioning and mood.

**Table 29: Comparison of clusters and diagnoses at initial assessment**

| | Clusters | | | DSM diagnoses | | |
|---|---|---|---|---|---|---|
| | F | *P* | $h^2$ | F | *p* | $h^2$ |
| **Eating disorder features** | | | | | | |
| BMI* | 8.1 | 0.000 | .13 | 12.6 | 0.000 | .12 |
| Restraint | 14.1 | 0.000 | .20 | 6.5 | 0.002 | .06 |
| Eating concern | 15.1 | 0.000 | .22 | 2.6 | 0.07 | .03 |
| Weight concern* | 16.6 | 0.000 | .31 | 1.4 | 0.24 | .01 |
| Shape concern* | 14.4 | 0.000 | .27 | 3.2 | 0.04 | .03 |
| Vomiting* | 39.8 | 0.000 | .43 | 11.9 | 0.00 | .12 |
| Laxative misuse* | 8.9 | 0.000 | .14 | 1.5 | 0.22 | .01 |
| Exercise* | 8.0 | 0.000 | .13 | 4.5 | 0.01 | .04 |
| OBEs* | 18.8 | 0.000 | .26 | 40.2 | 0.00 | .31 |
| **ASQ** | | | | | | |
| Confidence | 54.8 | 0.000 | .50 | 0.3 | 0.7 | .00 |
| Discomfort with closeness | 38.1 | 0.000 | .42 | 0.9 | 0.4 | .01 |
| Need for approval* | 20.0 | 0.000 | .27 | 1.5 | 0.2 | .02 |
| Preoccupation with relationships | 14.4 | 0.000 | .21 | 1.3 | 0.3 | .02 |
| Relationship as secondary | 18.8 | 0.000 | .26 | 0.8 | 0.5 | .01 |
| **UCL** | | | | | | |
| Active tackling | 19.5 | 0.000 | .27 | 1.8 | 0.17 | .02 |
| Palliative reacting | 6.1 | 0.001 | .10 | 1.8 | 0.16 | .02 |
| Avoidance | 3.1 | 0.025 | .06 | 2.3 | 0.10 | .02 |
| Social support* | 18.2 | 0.000 | .25 | 0.8 | 0.44 | .01 |
| Passive reacting | 13.5 | 0.000 | .20 | 2.1 | 0.13 | .02 |
| Reassuring thought* | 19.1 | 0.000 | .26 | 1.1 | 0.32 | .01 |
| **SF-36** | | | | | | |
| Physical functioning* | 2.1 | 0.09 | .04 | 2.4 | 0.08 | .02 |
| Roll limitations due to physical health * | 2.5 | 0.05 | .04 | 8.0 | 0.00 | .08 |
| Social functioning | 8.4 | 0.000 | .14 | 3.1 | 0.04 | .03 |
| Pain* | 2.8 | 0.04 | .05 | 6.3 | 0.002 | .07 |
| General mental health | 12.0 | 0.000 | .19 | 3.3 | 0.04 | .03 |
| Roll limitations due to emotional health * | 2.8 | 0.03 | .05 | 0.4 | 0.6 | .005 |
| Vitality* | 6.5 | 0.000 | .11 | 4.6 | 0.01 | .05 |
| General health perception | 1.1 | 0.32 | .02 | 2.4 | 0.08 | .02 |
| **WSAS** | 3.8 | 0.01 | .07 | 3.6 | 0.02 | .04 |
| **BDI** | 24.1 | 0.000 | .31 | 2.7 | 0.06 | .03 |

WSAS = work and social adjustment scale; BDI = beck depression inventory

* = non normally distributed; kruskal-wallis tests produced same results (only variables no longer significant was SF-36, vitality, across clusters)

## 7.10 Comparison of clusters with non-clinical samples for attachment and coping

In order to establish whether cluster scores on attachment and coping styles differed from non clinical norms, subscale means were compared with published data from non-clinical controls. As can be seen from Table 30, those in clusters D.1 and D.2 scored consistently higher than controls on all subscales of the ASQ measuring aspects of insecure attachment. It is interesting to note that those presenting in cluster D.4 do not appear to differ greatly from non clinical controls, the only exception being their greater need for approval from others. Those in cluster D.3 appear to present with slightly more concerns regarding aspects of attachment compared with controls and those in cluster D.4, but again these concerns appear to be less clinically severe than those reported by clusters D.1 and D.2. Clusters D.1, D.2 and D.3 reported lower levels of active tackling and social support seeking, and higher levels of passive reacting, compared with controls. Those in cluster D.4 appear to report similar scores on most subscales of the UCL compared with controls.

**Table 30: Total mean scores and standard deviations**

| | **Cluster D.1 N = 42** | **Cluster D.2 N = 52** | **Cluster D.3 N = 29** | **Cluster D.4 N = 42** | **Controls[1] N = 64** |
|---|---|---|---|---|---|
| | M (SD) | M (SD) | M (SD) | M (SD) | M (SD) |
| Confidence | 17.8 (5.7) | 23.3 (4.8) | 25.8 (5.2) | 32.8 (6.1) | 31.6 (4.79) |
| Discomfort with closeness | 49.1 (5.9) | 46.3 (7.4) | 42.1 (5.8) | 33.3 (9.0) | 34.08 (6.17) |
| Need for approval | 37.2 (3.2) | 34.9 (5.1) | 33.4 (4.3) | 29.0 (6.6) | 20.55 (5.51) |
| Preoccupation with relationships | 37.2 (4.9) | 34.3 (6.3) | 33.2 (5.2) | 28.3 (8.1) | 28.89 (7.19) |
| Relationships as secondary | 22.9 (4.3) | 21.5 (4.2) | 18.2 (3.9) | 16.2 (5.6) | 15.64 (4.54) |
| **Coping style** | | | | | **Controls[2]** |
| Active tackling | 10.9 (2) | 13.5 (2.8) | 13.5 (2.3) | 15 (2.8) | 17.3 (3.4) |
| Palliative reacting | 17.4 (2.9) | 20 (3.2) | 19 (2.2) | 19.9 (3.9) | 20.5 (3.6) |
| Avoidance | 18 (3.7) | 17.6 (3.4) | 17 (2.7) | 16.3 (3.3) | 17.0 (3.2) |
| Social support | 10.8 (2.7) | 13.7 (3.6) | 12.7 (3.7) | 16.3 (3.6) | 16.8 (3.6) |
| Passive reacting | 20.1 (3.5) | 19.4 (3.9) | 17.2 (2.9) | 15.5 (4.0) | 13.5 (3.7) |
| Reassuring thought | 8 (2) | 10.4 (1.9) | 9.7 (1.9) | 11.6 (2.7) | 13.0 (2.8) |

[1] data obtained from Troisi et al (2005) [2] data obtained from UCL validation study (see Chapter 6); M = mean; SD standard deviation; NB: All controls were female.

### 7.11 Re-run of the final cluster analysis without BMI

Given the debate in the literature regarding the usefulness of BMI as a diagnostic indicator for AN (Andersen et al., 2001; Wilfley et al., 2007), it was decided to re-run the final cluster analysis omitting BMI as a candidate variable. The aim was to explore whether this led to a significant change in the cluster solution. This analysis followed the procedure outlined in Section 5.11 and the results are detailed in full in Appendix K. As can be seen from these findings, omitting BMI did not lead to the identification of more distinctive clinical groups. Examination of effect sizes indicated that this cluster solution did not perform better than the cluster solution including BMI, accounting for less variation across some aspects of co-morbidity, such as depression and social functioning. This solution was only marginally better that the current DSM-IV diagnoses. The remaining analyses will therefore continue to focus on the cluster solutions identified in Section 7.6.

### 7.12 Re-run of the cluster comparisons including depression as a covariate

Given that a high percentage of patients with eating disorders present with co-morbid depression (Milos et al., 2003), comparisons across the clusters were re-run including depression as a covariate. These additional analyses aimed to establish whether the differences found across the clusters were attributable to an underlying depression. Result of the MANCOVAs, using BDI scores as a covariate, indicated a significant effect of cluster on the combined dependent variable eating disorder features ($F_{(27, 444)} = 9.7$, $p<0.0001$; Wilks' Lambda = .257; partial eta squared = .364). There was also a significant effect of cluster on the combined dependent variables attachment ($F_{(15, 431)} = 7.5$ $p<0.000$; Wilks' Lambda = .5; partial eta squared = .19) and coping ($F_{(18, 438)} = 6.2$ $p<0.000$; Wilks' Lambda = .5; partial eta squared = .19). Follow-up ANOVAs are reported in Table 31. These findings indicate that when accounting for the potential role of depression, only differences across the clusters for the two UCL subscales relating to 'avoidance' and 'passive reacting' become non-significant. This suggests that differences across the clusters tend not to be attributable to co-morbid depression.

| Table 31: Follow-up ANOVAs exploring differences across clusters | | |
|---|---|---|
| | F | *P* |
| **Eating Disorder Features** | | |
| BMI | 7.9 | 0.000 |
| Restraint | 9.2 | 0.000 |
| Eating concern | 9.0 | 0.000 |
| Weight concern | 16.7 | 0.000 |
| Shape concern | 11.9 | 0.000 |
| Vomiting | 41.6 | 0.000 |
| Laxative misuse | 6.2 | 0.001 |
| Exercise | 8.4 | 0.000 |
| OBEs | 17.6 | 0.000 |
| **Attachment Style Questionnaire** | | |
| Confidence | 31.1 | 0.000 |
| Discomfort with closeness | 20.3 | 0.000 |
| Need for approval | 8.0 | 0.000 |
| Preoccupation with relationships | 6.8 | 0.000 |
| Relationship as secondary | 6.9 | 0.000 |
| **Utrecht Coping List** | | |
| Active tackling | 13.7 | 0.000 |
| Palliative reacting | 5.4 | 0.001 |
| Avoidance | 0.9 | 0.425 |
| Social support | 14.0 | 0.000 |
| Passive reacting | 1.9 | 0.121 |
| Reassuring thought | 13.0 | 0.000 |

### 7.13 Further sub-group analysis of EDNOS patients

Additional analyses were conducted on those patients included in the final cluster solution who were given a DSM-IV diagnosis of EDNOS at assessment. The aim was to explore potential differences across EDNOS patients reporting high and low levels of functional impairment. This sample (n = 87 (89-2 WSAS missing data) was divided into high (n = 45) and low (n = 42) functionally impaired groups based on a median split of total WSAS score (Table 32). When tested statistically, pearson's chi squared analyses indicated no significant difference across the clusters ($\chi^2 = 6.98$, df = 3, exact $p = 0.07$). However, adjusted standardised residuals indicated that those highly impaired by their eating difficulties were more likely to be found in cluster D.1 whilst those experiencing low levels of functional impairment were more likely to be found in Cluster D.4. Thus it can be argued that the clusters are predictive of severity of functional impairment.

| Table 32: Distribution of EDNOS patients across cluster | | | | | |
|---|---|---|---|---|---|
| | | Cluster | | | |
| | | D.1 | D.2 | D.3 | D.4 |
| WSAS | High | 17 | 14 | 4 | 10 |
| | Low | 8 | 11 | 3 | 20 |
| | Total | 25 | 25 | 7 | 30 |

### 7.14 Summary of the final clusters

The four clusters identified in the final cluster solution can be described as follows (see Table 33 for a summary). Cluster D.1 was characterised by average levels of concern related to eating, weight and shape, and relatively low levels of eating disorder symptoms such as dietary restraint, laxative misuse, self-induced vomiting and objective bulimic episodes. However this group presented with more severe attachment difficulties, characterised by a relatively strong anxious/ambivalent attachment style. Participants in this cluster may have a tendency to develop overly dependant relationships and may fear that others do not value the relationship as much as they do, or may protect themselves from hurt and vulnerability by actively avoiding relationships, instead focusing on achievement and independence. In line with this style of interacting, participants in this group reported a relatively strong passive-avoidant coping style. This cluster was therefore provisionally labeled 'insecure generalised eating disorder'. Participants in this group reported relatively high levels of depression and functional impairment caused by their eating disorder. Sixty two percent of this group was diagnosed with EDNOS at assessment.

Cluster D.2 was characterised by relatively high levels of concern related to eating, weight and shape, as well as the highest levels of dietary restraint, exercise and laxative misuse, and the lowest BMI. Relative to those in clusters D.3 and D.4, participants in this group reported a fearful/avoidant attachment style and a predominantly passive coping style. Whilst participants in this cluster may wish for close and trusting relationships and may experience a strong desire to be accepted and liked by others, they may also find it difficult to develop these relationships for fear of being rejected by others. Participants in this group may also receive relatively high levels of social support and it is possible that rather than actively seeking support, their symptoms serve to draw others in to a caring role. In view of these key characteristics, this cluster was provisionally labelled 'passive/avoidant restrictors'. Participants in this group also reported relatively high levels of depression and

functional impairment. Seventy one percent of those given a DSM-IV diagnosis of AN and 30% of those diagnosed with EDNOS were allocated to this group.

In contrast, those in cluster D.3 reported fewer attachment and coping difficulties compared with those in clusters D.1 and D.2. However they did report some low level anxiety about their interpersonal relationships. This group was also characterised by a relatively high frequency of objective bulimic episodes and self-induced vomiting. In view of their key presenting features, this group was labeled 'bulimic'. Participants in this group reported lower levels of depression and better social functioning compared with the previous two clusters. Seventy five percent of this group was diagnosed with BN at assessment.

Finally, those in cluster D.4 presented with relatively low levels of eating, weight and shape related concern, a well as relatively low levels of laxative misuse, exercise, self-induced vomiting and binge eating. Participants in this group also appeared relatively secure in their attachment and coping styles, closely resembling non-clinical controls. Also in line with controls, individuals in this group appeared to take a proactive approach to managing problems and reported having relatively good social support systems. Participants in this group reported lower levels of depression and lower levels of functional impairment compared with the initial two clusters. Given their relatively low level of symptoms this group was labeled 'mild eating disorder'. Interestingly, 71% of this group was diagnosed with EDNOS at assessment.

**Table 33: Summary of final clusters**

| | Cluster | | | |
|---|---|---|---|---|
| | **Insecure generalised eating disorder** | **Passive/avoidant restrictors** | **Bulimic** | **Mild eating disorder** |
| Eating disorder cognitions | Average levels of concern related to eating, weight and shape | Highest levels of concern related to eating, weight and shape | Above average levels of concern related to eating, weight and shape | Lowest levels of concern related to eating, weight and shape |
| Eating disorder behaviours | Below average levels of dietary restraint, laxative misuse, self-induced vomiting and OBEs | Highest levels of dietary restriction, exercise and laxative misuse | Highest levels of self-induced vomiting and OBEs | Lowest levels of OBEs, laxative misuse, exercise and self-induced vomiting |
| Attachment | Severe difficulties across all aspects of attachment | Fearful/avoidant attachment difficulties | Mild attachment difficulties - low level preoccupation with relationships | Secure attachment patterns |
| Coping | Strong passive-avoidant coping style | Passive coping style | Lower levels of avoidance and passive reacting , but below average social support seeking | Proactive coping style, highest levels of social support seeking |
| General functioning and mood | Poor general functioning, higher levels of functional impairment and depression | Poor general functioning, higher levels of functional impairment and depression | Above average social functioning, lower levels of depression | Lowest levels of functional impairment and lowest levels of depression |

# CHAPTER 8

## Results: follow-up study

### 8.0 Overview

To investigate further the validity of clustering using both eating disorder and wider clinical features, preliminary analyses investigating the relationship between the clusters and treatment intensity and outcome were undertaken using clinical outcome data collected routinely by the Eating Disorder Service, and are reported below. For comparison, associations between DSM-IV diagnoses and treatment intensity and outcome were also conducted (see Section 5.3 for the aims of the follow-up study).

### 8.1 Comparison of clusters on treatment intensity & outcome at 6 & 12 months

Differences across clusters on treatment intensity and outcome were analysed at both 6 and 12 months. When tested statistically, pearson's chi squared analyses indicated no significant difference across the clusters for treatment intensity (out-patient, day-patient and in-patient) at 6 months ($\chi^2$ = 7.688, df = 6, exact $p$ = 0.256) or 12 months ($\chi^2$ = 1.60, df = 3, exact $p$ = 0.867). However a number of trends suggestive of difference were observed. As shown in Table 34, 67% of those not offered treatment were from the 'insecure generalised eating disorder' and 'mild eating disorder' groups. It was clear that during the first 6 months, the most common treatment offered across the groups was out-patient treatment. All of those who received day treatment and 75% of those who received in-patient care were from the 'passive/avoidant restrictors' cluster. A similar pattern emerged at 12 months: 67% of those who received in-patient treatment had been allocated to the 'passive/avoidant restrictors' cluster. Of those who continued in treatment beyond 6 months, 64% were from the 'insecure generalised eating disorder' and 'passive/avoidant restrictors' groups and this trend continued through to on-going treatment beyond 12 months, with 68% of those in on-going treatment being from these two clusters.

No significant differences were found across the clusters for treatment outcome (satisfactory, poor, lost, on-going) at 6 months ($\chi^2$ = 5.87, df = 9, exact $p$ = 0.767) or 12 months ($\chi^2$ = 7.68, df = 9, exact $p$ = 0.590). However a number of interesting possible associations were observed (see Table 35). A third of those who were lost to treatment during the first 6 months were from the 'bulimic' group, whilst the

**Table 34: Comparisons of clusters on treatment intensity at 6 and 12 months**

| | Treatment intensity in the first 6 months | | | | Treatment intensity in the second 6 months | | | |
|---|---|---|---|---|---|---|---|---|
| | no treatment | out-patient | day -patient | in-patient | no treatment | out-patient | day -patient | in-patient |
| Insecure generalised eating disorder | 12 | 29 | 0 | 1 | 29 | 12 | 0 | 1 |
| Passive/avoidant restrictors | 7 | 40 | 2 | 3 | 29 | 21 | 0 | 2 |
| Bulimic | 5 | 24 | 0 | 0 | 22 | 7 | 0 | 0 |
| Mild eating disorder | 12 | 30 | 0 | 0 | 31 | 11 | 0 | 0 |

**Table 35: Comparisons of clusters on outcome at 6 and 12 months**

| | Outcome at 6 months | | | | | Outcome at 12 months | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | no treatment | satisfactory | lost | poor | on-going | Not in tx | satisfactory | lost | poor | on-going |
| Insecure generalised eating disorder | 11 | 7 | 5 | 3 | 16 | 26 | 5 | 1 | 2 | 8 |
| Passive/avoidant restrictors | 7 | 9 | 8 | 3 | 25 | 27 | 8 | 1 | 1 | 15 |
| Bulimic | 4 | 4 | 9 | 2 | 10 | 19 | 3 | 0 | 0 | 7 |
| Mild eating disorder | 12 | 9 | 6 | 2 | 13 | 29 | 8 | 0 | 1 | 4 |

tx = treatment

majority of those either lost to treatment or identified as having a poor outcome at 12 months were from the 'insecure generalised eating disorder' and 'passive/avoidant restrictors' clusters. About two thirds of those identified as having a satisfactory outcome at 6 and 12 months were from the 'passive/avoidant restrictors' or the 'mild eating disorder' groups.

### 8.2 Comparison of DSM-IV diagnoses on treatment intensity and outcome at 6 and 12 months

Comparison of treatment intensity and outcome at both 6 and 12 months were also made across DSM-IV diagnoses. Pearson's chi squared analyses indicated significant difference across DSM-IV diagnoses for treatment intensity (in-patient, out-patient, day-patient) at 6 months ($\chi^2 = 20.76$, df = 4, exact $p = 0.002$) but not 12 months ($\chi^2 = 1.709$, df = 2, exact $p = 0.393$). Adjusted standardised residuals indicated that at 6 months, those with a diagnosis of AN were less likely to have been in out-patient treatment and more likely to have received in-patient care. Those diagnosed with BN were more likely to have received out-patient treatment alone. As can be seen in Tables 36 and 35, 92% of those offered out-patient treatment in the first 6 months were given a DSM-IV diagnosis of BN or EDNOS at assessment. Of those who attended day patient treatment, 66% were diagnosed with EDNOS and 33% with AN at assessment. In relation to in-patient treatment, 60% were diagnosed with AN, and 40% with EDNOS at assessment. In contrast, during the second 6 months of treatment, 75% of those who received in-patient care had been diagnosed with EDNOS at assessment. Fifty four percent of those who remained in treatment longer than 6 months were given an initial diagnosis of EDNOS, and a similar pattern emerged at 12 months, with 53% of those remaining in treatment longer than 12 months having been diagnosed as EDNOS at assessment.

In relation to treatment outcome, pearson's chi squared analyses indicated no significant difference across DSM-IV diagnoses for outcome (satisfactory, lost, poor, on-going) at 6 months ($\chi^2 = 12.12$, df = 6, exact $p = 0.057$) or 12 months ($\chi^2 = 7.41$, df = 6, exact $p = 0.285$). However, again a number of interesting trends can be observed (see Table 37). Outcome data indicated that 50% of those identified as having done well in treatment at 6 months had been diagnosed with BN, and 50% with EDNOS at assessment. Similarly, at 12 month follow-up, 53% of those

**Table 36: Comparisons of DSMI-IV diagnoses on treatment intensity at 6 and 12 months**

| | Treatment intensity in the first 6 months | | | | Treatment intensity in the second 6 months | | | |
|---|---|---|---|---|---|---|---|---|
| | no treatment | out-patient | day -patient | in-patient | no treatment | out-patient | day -patient | in-patient |
| Anorexia nervosa | 1 | 9 | 1 | 3 | 3 | 10 | 0 | 1 |
| Bulimia nervosa | 8 | 58 | 0 | 0 | 48 | 18 | 0 | 0 |
| EDNOS | 27 | 68 | 2 | 2 | 65 | 31 | 0 | 3 |

**Table 37: Comparisons of DSM-IV diagnoses on outcome at 6 and 12 months**

| | Outcome at 6 months | | | | | Outcome at 12 months | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | no treatment | satisfactory | lost | poor | on-going | not in treatment | satisfactory | lost | poor | on-going |
| Anorexia nervosa | 1 | 0 | 1 | 1 | 11 | 3 | 3 | 1 | 0 | 7 |
| Bulimia nervosa | 8 | 15 | 17 | 3 | 23 | 43 | 9 | 2 | 0 | 12 |
| EDNOS | 26 | 15 | 12 | 6 | 40 | 59 | 14 | 0 | 4 | 22 |

identified as satisfactory at outcome had been given a diagnosis of EDNOS at assessment. Thus it would seem that whilst a significant percentage of those doing well in treatment were diagnosed with BN or EDNOS, a significant percentage of those who received intensive treatment interventions and/or remained in treatment for longer than 12 months were also diagnosed with EDNOS at presentation.

### 8.3 Comparison between clusters and DSM-IV diagnoses

When considering treatment intensity and outcome, and in comparison with the clusters, a DSM-IV diagnosis of AN was better able to identify who went on to receive in-patient treatment. However patients given a diagnosis of EDNOS received a wide range of interventions over a varied period of time, suggesting this diagnosis is unable to predict which patients were offered which treatment. A similar pattern of variability was found in relation to treatment outcome at 6 and 12 months; whilst some EDNOS patients reported good outcomes at 6 months, others remained in treatment longer than 12 months.

### 8.4 Further sub-group analysis of EDNOS patients

Additional analyses were conducted on EDNOS patients included in the final cluster solution who (a) received treatment in the first 6 months and (b) received treatment in the second 6 months (see Tables 38). Analyses were also carried out on data related to treatment outcome at 6 and 12 months (see Table 39). The aim was to explore potential differences in treatment intensity and outcome across EDNOS patients reporting high and low levels of functional impairment.

**Table 38: Distribution of EDNOS patients across treatment intensity**

| | | Treatment intensity | | | | | |
|---|---|---|---|---|---|---|---|
| | | 1st 6 months | | | 2nd 6 months | | |
| | | out/pt | day/pt | In-pt | out/pt | day/pt | in-pt |
| WSAS | High | 31 | 0 | 1 | 13 | 0 | 1 |
| | Low | 31 | 1 | 0 | 14 | 0 | 1 |

NB: WSAS = work and social adjustment scale; out/pt = out-patient; day/pt = day-patient; in-pt = in-patient

**Table 39: Distribution of EDNOS patients across treatment outcome**

| | | Treatment outcome | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 1st 6 months | | | | 2nd 6 months | | | |
| | | satisfactory | lost | Poor | on-going | satisfactory | poor | lost | on-going |
| WSAS | High | 7 | 7 | 3 | 16 | 4 | 1 | 0 | 11 |
| | Low | 7 | 3 | 3 | 19 | 9 | 3 | 0 | 7 |

The sample was divided based on a median split of total WSAS score and pearson's chi squared analyses were conducted to explore differences across these groups. No significant difference across the EDNOS patients was found for treatment intensity (out-patient, day-patient and in-patient) at 6 months ($\chi^2 = 2.00$, df = 2, exact $p$ = 1.000) or 12 months ($\chi^2 = 0.003$, df = 1, exact $p = 1.00$). A pearson's chi squared analysis was also conducted to explore differences across these groups in relation to treatment outcome at 6 and 12 months. No significant difference across the EDNOS patients was found for treatment outcome at 6 months (satisfactory, lost, poor, on-going) ($\chi^2 = 1.84$, df = 3, exact $p = 0.61$) or 12 months ($\chi^2 = 3.58$, df = 2, exact $p$ = .207). These results suggest that patients presenting with EDNOS are likely to receive out-patient treatment regardless of degree of functional impairment, and that treatment outcome at 6 and 12 months is not distinguished on the basis of degree of functional impairment within this group.

# CHAPTER 9

## Discussion

### 9.0 Overview

The discussion will begin with a brief overview of the main findings of this thesis and the demographics of the study sample will also be commented upon. Given that the present findings should be interpreted in light of the study's methodological limitations, the strengths and weaknesses of this piece of work will be discussed in relation to study design, measurement selection and the nature of the follow-up data. The key findings from the study will then be discussed in relation to relevant literature, and clinical implications will be discussed. Finally, key areas for future research will be highlighted.

This study used a cross-sectional design to investigate whether distinct sub-groups of patients could be identified across the whole eating disorder population when using conventional eating disorder symptoms and additional clinical characteristics. The main results related to the clustering of key cognitive and behavioural eating disorder symptoms along with features of attachment and coping. A combination of statistical analyses and clinical interpretation led to a four cluster solution being identified as the optimal cluster solution. Each of the clusters were clinically distinct. The first group presented with relatively high levels of attachment and coping difficulties, and was thus labeled 'insecure generalised eating disorder'. The second group presented with many of the features associated with AN along with strong passive/avoidant traits and was thus labeled 'passive/avoidant restrictors'; The third group displayed many of the key features of BN with lower levels of attachment and coping and was thus labeled 'bulimic'. The fourth group presented with low levels of psychopathology both in relation to eating disorder symptoms, attachment and coping style, and was thus labeled 'mild eating disorder'.

Initial analyses related to assessing external validity found significant differences across the clusters on aspects of co-morbidity. Those in the 'mild eating disorder' group reported significantly lower levels of functional impairment compared with those in the 'insecure generalised eating disorder' group. They also reported significantly higher levels of social functioning, vitality and general mental health compared with both those in the 'passive/avoidant restrictors' and 'insecure

generalised eating disorder' groups. Patients in these latter two groups also reported significantly higher levels of depression compared with those in the 'bulimic' and 'mild eating disorder' groups.

A preliminary analysis of longitudinal follow-up date exploring differences across these groups in relation to treatment intervention and outcome was also conducted. Although no statistically supported conclusions could be drawn, a number of broad patterns relating to treatment intensity and outcome were identified across the clusters. Data suggested that compared with the other clusters, a greater percentage of those in the 'passive/avoidant restrictors' group received an intensive intervention, such as day-patient treatment. Patients in this cluster and the 'insecure generalised eating disorder' group were also more likely to have remained in treatment for 12 months or longer. In contrast, those presenting in the 'mild eating disorder' cluster were more likely to have either not received treatment or to have engaged in a less intensive out-patient treatment. The majority of those in the 'bulimic' cluster received out-patient treatment. However participants in this group were among those most likely to be lost to treatment within the first 6 months.

When compared with current DSM-IV diagnoses it was found that whilst the DSM system places greater emphasis on a few key eating disorder features, the clusters were differentiated on a wider range of cognitive and behavioural features. The clusters were also more clearly distinguished on the basis of information relating to attachment and coping as well as important aspects of general functioning and mood.

Additional analysis of the EDNOS group found that those highly impaired by their eating difficulties were more likely to be found in the 'insecure generalised eating disorder' group, whilst those experiencing low levels of functional impairment were more likely to be found in the 'mild eating disorder' group. However these findings were not supported statistically and no distinct patterns were found in relation to treatment intervention and outcome.

### 9.1 Is the sample used in the main study representative of patients with eating disorders?

Participants were recruited from a community eating disorders service. Consistent with the demographic characteristics of people with eating disorders (Striegel-Moore et al., 2003) the majority of participants were female (96%), white (95%), single (69%) and had a median age of 23.7 years (IQR = 22.9-30.7). Occupational status indicated a high percentage of students, as well as a relatively even distribution across the professional, administrative, personal and sales occupations. This breakdown reflects that previously reported in the literature (Fairburn & Harrison, 2003). The percentage of those who didn't have a clinical eating disorder (7%) at assessment reflects that reported in previous work (Turner & Bryant-Waugh, 2004). The diagnostic breakdown of the clinical group was also comparable to that reported in previous studies of those presenting for treatment in the community, the largest group being EDNOS (51%), followed by BN (35%) and AN (7%) (Fairburn & Harrison, 2003). EDE subscale scores were also consistent with previous clinical samples (Turner & Bryant-Waugh, 2004) and higher than non clinical norms (Fairburn & Cooper, 1993).

Clinical diagnoses were associated with functional impairment in a range of personal domains including work, social and leisure activities, as well as ability to form and maintain close relationships. Perceptions of overall general physical and mental health were lower than population norms (Brazier et al, 1992). Scores on the ASQ indicated low levels of confidence in relationships with self and others, high levels of preoccupation with relationships and need for approval from others, and high levels of discomfort with closeness. Scores were similar across diagnoses and reflect that reported in earlier studies (Troisi et al., 2005). Scores on the UCL subscales indicated high levels of avoidance and passive reacting coupled with lower levels of active tackling and social support seeking across the clinical groups. This also reflects previous findings (Bloks et al., 2001).

## 9.2 Strengths and weaknesses of the methodology

### 9.2.1 Collecting data as an integrated part of the assessment process at a specialist community eating disorder service

This study aimed to capture the wide range of eating disorder presentations seen in routine clinical practice, and one of the strengths of the study design relates to the procedure for data collection. The integration of data collection within the assessment process of a specialist community eating disorders service allowed all those referred the opportunity to participate in the study. It is likely that this procedure also served to maximise the participation and completion rates, as patients could take part in the study without having to commit extra time or attend additional appointments. This is reflected in the high study participation (87%) and completion (79%) rates.

However there are also a number of resource issues and limitations with this design. It is unclear whether 18 months of data collection was sufficient to allow a large enough representative sample to be collected. Although time to participate in the study was integrated into the assessment process, 20 did not complete all questionnaires in the allocated time and did not return them by post. A further 31 chose not to take part. Although comparisons of those who did and did not participate revealed no difference in age or BMI, comparison of diagnostic breakdown within each group revealed that a greater percentage of those who chose not to participate did not meet the criteria for a diagnosable eating disorder at the time of assessment. It is possible that these patients felt the study was not relevant to them and thus were more likely to choose not to participate. It remains unclear as to whether there were any defining clinical characteristics that differentiated those who did from those who didn't participate. If a self-selection bias has occurred and a particular sub-group of patients were more likely not to have taken part, then it is possible that the final sample are not representative of those presenting for treatment in a community setting.

### 9.2.2 Adopting broad inclusion criteria

A broad set of inclusion criteria were adopted for the present study. Whilst this served to maximise the range of patients included it also led to the inclusion of 13 patients who did not present with a clinical eating disorder. Thought was given as to

whether to include this group in the analyses. It was decided that whilst excluding them could be deemed to artificially manipulate the sample, their inclusion could also be viewed as contravening the study's main aim, which was to sub-group *patients with eating disorders*. It was therefore decided to consider each on a case by case basis; the four presenting with clear physical difficulties (such as irritable bowel syndrome) or depression were excluded whilst the nine presenting with borderline eating disturbances were included in the analyses. However given that those who did not meet criteria for a diagnosable eating disorder at the time of assessment were less likely to participate in the study, this latter group may be under-represented in the final sample.

9.2.3 Use of the EDE to assess eating disorder presentation

The use of the EDE to assess eating psychopathology was a major strength. The EDE is widely regarded as the 'gold standard' in eating disorder diagnosis, giving a comprehensive picture of key eating disorder features. It is also used extensively in the research field and the EDE 15 used in the present study is currently being used in a large multi-site treatment trial. This may allow for sample comparisons in the future. Although for reliability purposes it would have been optimal to have had only one person administering the EDE, this was not feasible within routine clinical practice. A small number of clinicians trained in administering the EDE were therefore involved in data collection and procedures for measuring quality standards were implemented. This involved EDE interviews being audiotaped and 30 interviews being re-rated by a second rater. Results of the inter-rater reliability analyses (see Appendix I) indicated a consistently high level of inter-rater agreement for subscale scores at time points 1 and 2. These questions require a likert rating that is determined by the number of days on which a patient has experienced a specific cognition. Although this type of rating provides a means of assessing level of agreement in scoring, it does not assess the extent to which two raters are consistent in the degree to which they use prompt questions to clarify the existence of the cognitions prior to rating. Thus it is important to view this analysis as one aspect of quality monitoring. With the exception of laxative use at time point 1, questions aimed towards eliciting frequency of behaviours were also highly correlated, although did show more variability. Items that correlated perfectly were those concerned with less frequently occurring behaviours (e.g. diuretic abuse) whilst those

that required the clinician to make a calculation or judgment (e.g. what constitutes an objectively *large* amount of food) were more variable. Such variations are likely to be due to differences in clinical judgment, as well as the impact of rating from a tape and not having access to the EDE rating calendar or the patient's non verbal cues. It is possible that poor correlation for laxative misuse at time point 1 was connected to varied knowledge levels across clinicians as to what constitutes a true laxative. This was addressed in a troubleshooting meeting during which information relating to various types of laxative was distributed and discussed. In view of this, it is possible that data related to laxative use during the early phase of data collection may be less reliable.

9.2.4 Measurement of psychological variables

This study benefited from the use of standardised self-report questionnaires. With the exception of the WSAS and the English version of the UCL, all questionnaires have previously been used in eating disorders research. All have good psychometric properties and are of a reasonable length, such that they are feasible for use in routine clinical practice. This was an important consideration given that this study was concerned with improving the assessment and classification of eating disorder patients seen in routine NHS services.

9.2.5 Measurement of dietary restraint and the use of BMI as a proxy for weight loss

One area of potential weakness is concerned with the measurement of dietary restraint. Although the restraint subscale of the EDE was used as a measure of dietary restraint it is noted that this subscale measures intended dietary restraint rather than *actual* dietary restraint. It was therefore decided to also include BMI as a proxy indicator of weight loss and therefore actual restraint. However it is acknowledged that this is a weakness of the current study, as BMI does not give an actual measure of weight loss. In retrospect it may have been more appropriate to have included either a measure of actual dietary restraint, such as the Dietary Restraint subscale of the Eating Inventory (Stunkard & Messick, 1985) or to have collected data relating to rate of weight loss and actual weight loss in the 3 months prior to assessment.

### 9.2.6 The potential impact of mood as a covariate

Given that a high percentage of patients with eating disorders present with co-morbid depression (Milos, 2003) it could be argued that mood should have been included in the analyses as a covariate. In view of this, the cluster comparisons were re-run including mood (BDI) as a covariate. Results indicated that only two of the UCL subscales ('avoidance' and 'passive reacting') became non-significant, suggesting that differences across the clusters tend not to be related to underlying depression. It remains unclear as to why these two coping styles are particularly influenced by depression.

### 9.2.7 Collection and use of treatment and outcome data

As previously documented, one method of establishing clinical validity is to assess a diagnostic system's ability to predict clinical course and outcome. It is argued that the inclusion of preliminary analyses relating to differences in treatment intensity and outcome across the clusters marks an initial step in this longer term process. However the extent to which any firm conclusions can be drawn is limited by the reliability of the data collected. Outcome data were collected from routine clinical audit, a process that involves therapists coding their patients' outcome at discharge. Although it can be argued that therapists are experienced clinical observers who are well versed in picking up changes in psychopathology, this must be counter-balanced against the possibility for bias in clinical judgement (Western & Weinberger, 2004). Within the present study it must also be remembered that within the eating disorders service no formal guidance is given to staff as to how to rate outcome and no definition is given as to what constitutes a satisfactory as opposed to a poor outcome. Consequently there is likely to be wide variability within a number of the outcome categories, particularly those related to satisfactory and poor outcomes.

In retrospect it may have been more appropriate to have formalised the outcome procedure and trained staff in rating outcome, or to have included a follow-up design in the original study, with participants being sent follow-up questionnaires at 6 and 12 months post the end of active treatment. However this latter design would itself have posed a number of logistical difficulties. For example the relatively large percentage of students in the sample may have hampered achieving a reasonable

return rate, and given the time frame available it would not have been possible to collect data from those who remained in treatment for an extensive period of time.

9.2.8 Selection of candidate variables

This study made a novel attempt to sub-group the whole eating disorders population on the basis of eating disorder features *and* wider aspects of the clinical picture believed to have an impact on treatment engagement and outcome. To date previous studies have classified cases on the basis of eating disorders features alone (Clinton et al., 2004) or have used wider clinical measures but with only a sub-group of this clinical population (Wonderlich et al., 2005).

In line with the work of Parker and colleagues (Parker & Manicavasagar, 2005) the present study aimed to begin the process of developing a sub-grouping model based on eating disorder features and wider clinical characteristics, information that together may serve to enhance the match between treatment and intervention. Whilst an initial list of candidate variables was identified and outlined in chapter 4, attachment and coping style were selected for inclusion in the cluster analysis along with key eating disorder features. These two variables were chosen over and above the other candidate variables as there is stronger evidence for their possible role in influencing clinical outcome if focused upon in treatment. However the process by which the psychological variables were selected could be seen as a weakness of the present study. It could be argued that this process was too arbitrary as the variables selected do not represent aspects of a single theory of eating disorder development or maintenance. However it could also be argued that there is sufficient theoretical, empirical and clinical evidence to suggest that the constructs selected might be usefully integrated into a coherent model.

## 9.4 Discussion of clusters in relation to existing sub-grouping literature

The optimal cluster solution identified four relatively homogenous clusters and as previously described (see Section 7.14), each cluster has a distinct clinical profile. These clusters will now be compared with sub-groups previously identified in the literature (see Table 40 for an overview of comparisons).

**Table 40: Comparison of clusters with those previously identified in the literature**

| | Cluster | | | |
|---|---|---|---|---|
| **Previous research** | **Insecure generalised eating disorder** | **Passive/avoidant restrictors** | **Bulimic** | **Mild eating disorder** |
| Holliday et al (2006) | gp 1: severe/broad Personality disorder group – extreme scores on subscales measuring emotional deregulation; disorganised behavioural patterns | gp 2: moderate/avoidant group – high scores on intimacy problems, social avoidance, identity problems & cognitive distortion | | gp 3: mild/inhibited - fewer extreme personality traits, but higher scores on intimacy problems, restricted expression and compulsivity |
| Sloan et al (2005) | | gp1: low body weight, few reported binges and purges | gp 3: high bingeing and purging | |
| Turner & Bryant-Waugh (2004) | | gp 2: high levels of eating, weight and shape concern, high dietary restraint & laxative misuse, low bingeing and vomiting | gp 1: high eating, weight and shape concern, high bingeing & vomiting | gp 4: low eating, weight and shape concern, low levels of behaviours, low BMI |
| Clinton et al (2004) | | gp 2: anorexics; low weight amenorrhea, absence of binge eating | | |
| Keel et al (2004) | | gp 1: restricting AN | gp 4: BN with self-induced vomiting | |
| Bulik et al (2000) | | gp 4: anorexic class – low body weight , infrequent purging | gp 5: binge eating, compensatory behaviours, excessive concern about weight and shape | |
| Wonderlich et al (2005) | gp 2: impulsive cluster – dissocial behaviour, low compulsivity | gp 1: affective –perfectionistic cluster – obsessional, compulsive, perfectionist, highest ED pathology | gp 3: severe BN symptoms with no co-morbid personality presentation | |
| Westen and Harnden-Fischer (2001) | . gp 3: emotionally dysregulated /undercontrolled – predominantly likely to present with emotional dysregulation and impulsivity | gp 2: constricted/overcontrolled – predominantly present with anorexic symptoms, profile characterised by restriction in areas such as needs, emotions, relationships and self reflection | gp 1: high functioning/perfectionistic - function well interpersonally & occupationally; perfectionistic & self-critical. Patients more likely to be bulimic anorexic or bulimic | |

| Previous research | Insecure generalised eating disorder | Passive/avoidant restrictors | Bulimic | Mild eating disorder |
|---|---|---|---|---|
| Goldner et al (1999) | gp 2 (severe): behavioural disturbance, neuroticism, synonymous with borderline personality disorder | gp 1(rigid): compulsivity, restricted expression, intimacy problems and low stimulus seeking; 78% AN and 42% of BN | | gp 3: (mild): relatively free from personality pathology |

9.4.1 'Insecure generalised eating disorder' cluster

The 'insecure generalised eating disorder' group were characterised by the most severe difficulties related to attachment and coping. Participants in this cluster may have a tendency to develop overly dependant relationships, or protect themselves from hurt and vulnerability by actively avoiding relationships, instead focusing on achievement and independence. When compared with sub-groups previously identified in the literature, this cluster appears to parallel the 'severe' group identified by Goldner et al (1999), a significant percentage of whom presented with impulsive behaviour and poor interpersonal relationships. Comparisons can also be made with Holliday et al's (2006) severe/broad personality disorder cluster, which was predominantly characterised by features of emotional dysregulation, including insecure attachments, intimacy problems and social avoidance.

Whilst previous studies exploring personality traits have explored eating disorder features only in terms of diagnostic breakdown across clusters, the present study benefits from including both a range of eating disorder symptoms and DSM-IV diagnoses, allowing for the emergence of a more detailed clinical picture. Alongside clinical features related to attachment and coping, those in the 'insecure generalised eating disorder' group were also characterised by average levels of concern related to eating, weight and shape, and relatively low levels of eating disorder symptoms, such as dietary restraint, laxative misuse, and excessive exercise. Thus is would seem that whilst participants in this group presented with significant eating disorder concerns, they didn't present with a specific profile of eating disorder behaviours, instead reporting below average levels of a range of behaviours. This pattern was also reflected in the diagnostic breakdown, with 61% of this cluster being given a diagnosis of EDNOS at assessment. It is also interesting to note that the three participants who were not given a clinical eating disorder diagnosis at assessment were each allocated to this cluster. Although Wonderlich et al (2005) did not explore eating disorder features in as much detail as the present study, the EDE-Q subscale means reported for their 'impulsive' cluster, particularly those measuring shape and weight concern, parallel those of the 'insecure generalised eating disorder' group ('impulsive' vs 'insecure generalised eating disorder'; restraint 3.8 vs 3.2; eating concern 3.7 vs 2.8; shape concern 4.5 vs 4.4; weight concern 4.0 vs 4.0), suggesting some similarity in eating disorder features. Taken together, these findings appear to suggest the presence of a sub-group characterised by features commonly associated

with borderline personality disorder, including emotional dysregulation, insecure attachments and a strong passive-avoidant coping style. It is also possible that patients in this cluster, whilst reporting significant weight and shape related concerns, are less likely to present with severe levels of eating disorder behaviours.

9.4.2 'Passive/avoidant restrictors' cluster

In contrast, many of the features characteristic of those in the 'passive/avoidant restrictors' cluster resemble AN, and 71% of those diagnosed with AN at assessment were allocated to this group. Participants in this cluster presented with the lowest BMI and reported the highest level of dietary restraint, excessive exercise and laxative misuse. They also reported high levels of concern related to weight and shape, and relatively low levels of binge eating and self-induced vomiting. When compared with the existing literature, this cluster appeared to reflect the restricting sub-groups identified in previous studies focused on clustering eating disorder features. For example, the first cluster identified by Sloan et al (2005) was characterised by low levels of binge eating and purging, and low body weight (current BMI 17.8, SD 2.4), and the 'anorexic' group identified in each of the two samples investigated by Clinton et al (2004) were both characterised by high levels of restriction, low BMI and low levels of binge eating and self-induced vomiting. These findings appear to support the identification of a broadly restrictive sub-group within the eating disorders population. However within the present study the clinical description of this group can be further enhanced by drawing upon information related to attachment and coping. Participants in this group reported an avoidant attachment style and a predominantly passive coping style. It is possible that this group is similar to Wonderlich et al's (2005) affective–perfectionistic cluster or those included in Westen and Harnden-Fischer's (2001) constricted/overcontrolled group, both of which were characterised by low levels of novelty seeking and restriction in areas such as needs, emotions and relationships. It is also possible that the avoidant attachment patterns reported by many of this group overlap with the characteristics reported by the rigid/compulsive group identified by Goldner et al (1999) or the 'avoidant' group identified by Holliday et al (2006), who reported significant problems with intimacy, social avoidance and self-identity.

9.4.3 'Bulimic' cluster

Those in the 'bulimic' cluster reported relatively few attachment and coping difficulties and a high frequency of objective bulimic episodes and self-induced vomiting. Seventy five percent were diagnosed with BN at assessment and this group is likely to reflect the BN type groups identified in previous studies focusing on clustering eating disorder features. For example, the third cluster reported by Sloan and colleagues presented with normal body weight and a high frequency of binge eating and purging behaviours (Sloan et al, 2005) and similar clinical features (high levels of binge eating and self-induced vomiting) were reported in the 'generalised eating disorder' clusters identified by Clinton et al (2004) in their English and Swedish samples.

Comparisons can also be made between the 'bulimic' cluster and the personality sub-groups identified by Wonderlich et al (2005) and Westen and Harnden-Fischer (2001). In parallel with the 'bulimic' group, Wonderlich et al (2005) identified a group of patients who presented with no significant co-morbid personality difficulties but who reported significant symptoms of BN. A similar cluster was also identified by Westen and Harnden-Fischer (2001). In their three cluster solution they identified a 'high functioning' group who scored significantly lower than those in their 'emotionally dysregulated' and 'constricted / overcontrolled' clusters on all personality disorder features, and 60% of this group presented with a lifetime diagnosis of BN. However whilst this would suggest that a sub-group of patients present with behavioural symptoms that are primarily related to binge eating and purging, it is important to note that in the present study those in the 'bulimic' group did score higher than normal controls on the need for approval subscale of the ASQ (see Table 30, p127). This would suggest that whilst patients in this cluster may not present with significant difficulties related to attachment and coping, they do present with some anxieties about their interpersonal relationships which may need to be addressed in treatment.

9.4.4 'Mild eating disorder' cluster

Finally, those in the 'mild eating disorder' cluster presented with lower levels of eating disorder psychopathology and appeared relatively secure in their attachment and coping styles. As with those in the 'ambivalent generalised eating disorder'

cluster, just over 70% of this less severe group were diagnosed with EDNOS at assessment. On the surface this group seemed to overlap with the 'mild' group identified by Goldner et al (1999); a group that was relatively free from personality pathology. However a more detailed look at these data revealed that 20% had a BMI of 17.5 or less, and 20 % of those with a DSM-IV diagnosis of AN were allocated to this group. It is therefore possible that some participants in this group overlap with those in the fourth cluster identified by Turner & Bryant-Waugh (2004), which was characterised by low levels of eating, weight and shape concern, low levels of eating disorder behaviours and low BMI. This sub-group may also mirror the 'atypical' AN patients identified by Strober et al (1999), who although presenting with low BMI denied a fear of weight gain and body size distortion. Such accounts are congruent with accounts from non-Westen countries, where symptoms of weight phobia and body image disturbance are absent in those presenting with low body weight (Hsu & Lee, 1993). This sub-group can also be compared with the 'mild/inhibited-compulsive' cluster identified by Holliday et al (2006). Whilst participants in their mild group presented with few extreme personality traits, they did report a significantly increased incidence of AN in first and second degree relatives. On the basis of this finding the authors suggest that these patients may present with a more 'pure' AN phenotype, characterised by core AN features of compulsivity and restricted expression but in the absence of additional personality difficulties. It is possible that the AN patients who were allocated to the 'mild eating disorder' cluster in the present study represent those with a similar clinical profile. However this is a tentative suggestion that requires further investigation.

Overall the clusters identified in the present study appear to make clinical sense in relation to previous work that has focused on clustering eating disorder features, and that which has focus on clustering personality traits. However the clinical descriptions given in the present study benefit from drawing upon both eating disorder features and aspects of the wider clinical picture, thus allowing a more comprehensive clinical picture to emerge.

### 9.5 Discussion of clusters on wider clinical variables

As previously discussed, a key method for assessing the clinical validity of a classification system is to explore whether the sub-groups differ in relation to wider aspects of the clinical presentation. Within the present study the clusters were compared on measures of general functioning (SF-36 and WSAS) and mood (BDI). Significant differences were found across the clusters on aspects of general functioning. Those in the 'mild eating disorder' group reported significantly higher levels of social functioning, vitality and general mental health compared with those in the 'passive/avoidant restrictors' and 'insecure generalised eating disorder' groups. Participants in these latter two groups also reported significantly higher levels of depression compared with those in the 'bulimic' and 'mild eating disorder' groups. These findings make clinical sense in light of the cluster descriptions; those with the most severe attachment and coping difficulties reported the poorest general functioning and the highest levels of depression, whilst those with the lowest levels of eating disorder and related psychopathology experienced the highest levels of general functioning. Similar findings were found when exploring the distribution of EDNOS patients reporting high and low levels of functional impairment. Although not supported statistically, adjusted standardised residuals indicated that those highly impaired by their eating difficulties were more likely to be found in the 'insecure generalised eating disorder' group, whilst those experiencing low levels of functional impairment were more likely to be found in the 'mild eating disorder' group.

Such differences in aspects of general functioning and co-morbidity are similar to those reported for cluster groups identified in other studies. For example, Wonderlich et al (2005) compared their three personality clusters (affective/perfectionistic; impulsive, low co-morbidity) on aspects of co-morbidity and found that patients in the 'affective/perfectionistic' cluster reported significantly higher levels of depression and trait anxiety compared with the other two clusters. They also found that those in the 'impulsive' cluster were characterised by the highest scores on measures of impulsive/self-destructive behaviour, whilst the 'low co-morbidity' group showed consistently lower scores on all aspects of psychopathology. A similar study has been conducted exploring the external validity of the three personality clusters (emotionally dysregulated; constricted/overcontrolled; and high functioning/perfectionistic) identified by Westen and Harnden-Fischer (2001). In

their follow-up validation study Thompson-Brenner & Westen asked a group of therapists (n=145) to select a recently terminated case of a female with clinically significant symptoms of 'bulimia nervosa' and answer questions related to personality ratings, diagnostic information, adaptive functioning and co-morbidity, as well as treatment intervention and outcome. They found that patients in their 'emotionally dysregulated' cluster reported significantly higher rates of hospitalisation and clinician reported rates of childhood sexual abuse. They also reported significantly higher levels of Axis I and Axis II co-morbidity, including major depressive disorder, dissociative disorder, substance use disorder and borderline personality disorder. In contrast, the 'high-functioning' group reported the lowest level of functional impairment and co-morbidity (Thompson-Brenner & Westen, 2005). Although this study is limited by the potential for bias in retrospective recall and its reliance on one clinician reporting on each patient, the findings do lend preliminary support to the validity of the clusters identified by Westen and Harnden-Fischer (2001). The direction of difference seen in these studies (i.e. that the 'impulsive' and 'constricted/over-controlled' groups report the highest levels of co-morbidity) is similar to the direction of difference identified across the clusters in the present study (i.e. that those in the 'insecure generalised eating disorder' and 'passive/avoidant restrictors' groups report the highest level of co-morbidity). These findings provide initial evidence for the external validity of the clusters identified in the present study.

### 9.6 Discussion of clusters in relation to treatment intensity and outcome

As previously highlighted (see Section 1.3), a valid psychiatric classification system should ideally predict treatment response and thus further evidence for the validity of the clusters was sought by the analysis of data relating to treatment intensity and outcome. Although no statistically significant findings were identified, possibly because of small group numbers, a number of interesting trends were identified.

Participants in the 'passive/avoidant restrictors' cluster were more likely to have received an intensive intervention, such as day or in-patient treatment, and participants in this and the 'insecure generalised eating disorder' cluster were also more likely to have been in treatment for 12 months or longer. These preliminary associations are interesting to consider in relation to those reported by Westen and

colleagues, who explored whether their previously identified personality based sub-groups (high-functioning, constricted and dysregulated) differed in relation to treatment intervention and outcome (Thompson-Brenner & Westen, 2005). They found that patients rated as dysregulated reported the lowest recovery rates (43.5%) followed by those in the constricted (50%) and the high-functioning groups (62%). The dysregulated group also attained recovery on average 5 months later than the constricted group and 10 months later than the high-functioning patients (Thompson-Brenner & Westen, 2005). In broad parallel, within the present study those in the 'passive/avoidant restrictors' and 'insecure generalised eating disorder' clusters were more likely to have received treatment for a prolonged period of time compared with those in the two more adaptive groups. It is also interesting to note that 67% of those not offered treatment were from the 'insecure generalised eating disorder' and 'mild eating disorder' groups. It is possible that a proportion of patients allocated to the 'insecure generalised eating disorder' group were not offered treatment as they represent a group of patients with complex needs, who require shared care with general mental health services. These participants may have been offered treatment by local general psychiatric services, specialist services taking a secondary role in care provision. Similarly, it is possible that those in the 'mild eating disorder' group who were not offered treatment were sign-posted for treatment in primary care.

The majority of those in the 'bulimic' cluster received out-patient treatment and this falls in line with current treatment recommendations, which suggest that patients presenting for treatment of BN should be offered an initial course of out-patient psychological treatment, such as cognitive-behavioural treatment or inter-personal psychotherapy (National Collaborating Centre for Mental Health, 2004). It is also noteworthy that a third of those lost to treatment within 6 months were from the 'bulimic' cluster. This is consistent with findings in the general literature. In a review of drop-out rates from psychological treatments of BN, Mahon (2000) reported that treatment-phase attrition rates for treatment trials ranged from 5 - 40% (median 20%), the rate being higher (15 - 65%, median 30%) for drop-out from regular treatment that is not evaluated as part of a treatment trial. This finding has important implications for engagement in treatment, which will be discussed further in Sections 9.10 and 9.13.

It is also possible that the clusters are differentiated by outcome; the majority of those lost to treatment or identified as having a poor outcome at 12 months were allocated to the 'passive/avoidant restrictors' or 'insecure generalised eating disorder' clusters, whilst a large percentage of those who did well in treatment were from the 'mild eating disorder' group. Again these findings can be understood within the context of the current literature. Patients with AN are often ambivalent about entering treatment, possibly because of the ego-syntonic nature of their symptoms, and drop-out rates of up to 50% have been reported in treatment studies (Mahon, 2000). The small number of published treatment trials in AN also report relatively poor outcomes, regardless of the type of intervention. In a recent randomized controlled trial of three psychotherapies for adults with AN (cognitive behavioural therapy, interpersonal psychotherapy and nonspecific supportive clinical management) 70% of patients either did not complete treatment or made small or no gains (McIntosh et al., 2005). These findings mirror those of an earlier RCT, which reported that only a third of patients no longer met the DSM-IV diagnostic criteria for AN at the end of the 1 year treatment period (Dare et al., 2001). The relatively poor outcome of those in the 'insecure generalised eating disorder' cluster is perhaps related to the problematic attachment and coping styles reported by this group. This again appears to mirror earlier research findings, which has found that compared with non-borderline bulimics, those presenting with BN and co-morbid personality pathology have poorer treatment outcomes (Johnson et al., 1990). Although the clusters identified in the present study show clear trends regarding treatment intensity and outcome that are comparable to the published literature, these findings are preliminary and require further detailed investigation before any firm conclusions can be drawn.

### 9.7 Comparison of clusters with the current DSM-IV system

The comparison of statistically derived clusters with conventional diagnoses is important since any alternative scheme for classification must demonstrate greater utility than the conventional diagnostic scheme (Clinton et al., 2004). Within the present study this was explored by comparing effect sizes across the clusters and DSM-IV diagnoses on a range of key variables. Comparison of effect sizes indicated that whilst the DSM-IV system placed greater emphasis on a few key eating disorder behaviours, such as binge eating, the clusters were differentiated on a greater range

of cognitive and behavioural features of eating disorders. Higher effect sizes were also found for clusters on all subscales of the ASQ and UCL, indicating that these sub-groups were more clearly distinguished on the basis of information related to attachment and coping, compared with the DSM-IV diagnoses. This might be expected given their inclusion in the cluster analyses. However, the pattern of difference extended beyond the cluster variables to other important aspects of co-morbidity, larger effect sizes being found for clusters as opposed to DSM-IV diagnoses on aspects of general functioning and depression. Overall, these results lend preliminary support to the utility of the clusters above that demonstrated by DSM-IV diagnoses.

When considering treatment intensity and outcome it would seem that, consistent with what one might expect to see in clinical practice, a DSM-IV diagnosis of AN identified those most likely to receive in-patient treatment. However the diagnosis of EDNOS was more problematic. Participants given this diagnosis at assessment went on to vary widely in relation to treatment intensity and outcome. For example, 50% of those reporting a satisfactory outcome at 6 months and 53% of those in on-going treatment past 12 months were all diagnosed with EDNOS at assessment. These findings clearly indicate that EDNOS is not a useful category to predict treatment need. In contrast, although no significant differences were found across the clusters, these groupings appeared to make sense in relation to treatment intervention and outcome; the two sub-groups presenting with the most severe underlying psychopathology receiving the most intensive or prolonged treatment interventions. In contrast, and again as one might expect to see in clinical practice, participants allocated to the two clusters presenting with the least severe underlying psychopathology were also among those who received less intensive treatment interventions. Further research is required in order to determine whether, when compared with the current diagnostic system, these clusters are better able to differentiate patients on the basis of treatment intensity and outcome.

### 9.8 The relocation of EDNOS patients

As previously highlighted (see Section 3.1) one of the most unsatisfactory aspects of the current DSM-IV classification system relates to the common occurrence of EDNOS. Whilst some have suggested this issue might be addressed through relaxing

the boundaries of AN and BN (Andersen et al., 2001) others have called for more extensive revisions to be considered (Fairburn & Bohn, 2005). In line with previous findings, one of the positive outcomes of the present study is the potential relocation of some EDNOS patients to more clinically relevant categories. Within the present study it would seem that 29% of patients diagnosed with EDNOS may be similar to, and perhaps more appropriately classified along with, those presenting with a typically restrictive clinical picture. Similarly, a smaller proportion (8%) might be more appropriately grouped with those presenting with high levels of objective bingeing and self-induced vomiting. However whilst these findings may appear to support the case for reallocation, the sub-grouping of the remainder challenges the view that merely tweaking the edges of the diagnostic categories will lead to the development of a more clinically relevant diagnostic system. In the present study over half of those diagnosed with EDNOS (62%) presented with relatively low levels of eating disorder symptoms but were clearly distinguishable by significant variation in coping and attachment style. Whilst a proportion are likely to represent the least severe cases that may respond well to less intensive interventions, the remainder presented with the most severe underlying psychopathology and are likely to include those most challenging to treat. A similar pattern was found when exploring degree of functional impairment across this group. As previously mentioned, EDNOS patients who reported being highly impaired by their eating difficulties were more likely to be found in the 'insecure generalised eating disorder' group, whilst those experiencing lower levels of functional impairment were more likely to be found in the 'mild eating disorder' group.

These findings mirror those of other researchers who have systematically investigated the impact of relaxing the diagnostic criteria for AN and BN. For example Thaw and colleagues reported that removal of a single criterion, such as the frequency of binge eating in BN or the body weight criterion for AN, yielded relatively small changes in the base rates of AN, BN and EDNOS (Thaw et al., 2001). Similar findings have been reported by Fairburn and colleagues. In their analysis of 170 consecutive referrals to two eating disorder clinics, they found that relaxing one or more of the diagnostic criteria for AN or BN had little impact on the relative prevalence of EDNOS, which remained at 50% or more of the total sample (Fairburn et al., 2007). Overall, these findings lend further support to the notion that

EDNOS constitutes a sizable group of eating disorder patients that present with significant variability in clinical presentation.

### 9.9 Clinical outliers – what did they look like?

A small number of participants (n = 17) were omitted from the cluster analyses as they were identified as clinical "outliers". Inspection of data relating to these cases indicated that statistical "outliers" primarily presented with significantly higher frequencies of eating disorder behaviours, including self-induced vomiting, objective bingeing and laxative misuse, or relatively extreme (high or low) scores on subscales of the ASQ and UCL. In relation to DSM-IV diagnoses, 9 had been given a diagnosis of EDNOS, 7 BN and 1 no clinical eating disorder. Of those given a diagnosis of EDNOS, four reported a low BMI (14.5 – 17.7) combined with relatively high levels of dietary restraint and laxative misuse. Although it might seem that these patients resemble those identified in the 'passive/avoidant restrictors' cluster, their scores on the ASQ and UCL subscales indicate relatively higher levels of confidence and lower levels of avoidance. The other five EDNOS participants identified as "outliers" presented with significant but varied clinical profiles. One presented with BMI 20, high laxative use and insecure attachments; one presented with extreme self-induced vomiting and high scores on the ASQ and UCL subscales; and one presented with BMI 30, no binge eating, high dietary restraint and insecure attachment patterns. The remaining two presented with less severe eating disorder features and relatively low levels of avoidance. Of those given a diagnosis of BN, five presented with extreme levels of binge eating and/or self-induced vomiting; one presented with relatively high levels of binge eating and self-induced vomiting in the context of a lower BMI (17.6), whilst the other participant presented with BMI 18, moderate levels of bingeing and vomiting, high dietary restraint, and relatively high levels of confidence in her relationships with self and others. The participant not given a clinical eating disorder diagnosis presented with a BMI 50, low levels of dietary restraint, and relatively high levels of confidence. It is clear from these descriptions that the patients identified as clinical "outliers" present with significant variability in clinical presentation. These data also add further support to the notion that EDNOS patients are no less severe than those diagnosed with BN or AN (Fairburn et al., 2007).

### 9.10 Implications for clinical practice

In 2004, the NICE guidelines on the treatment and management of AN, BN and atypical presentations were published in the UK, a document that offers a series of evidence based recommendation regarding important aspects of patient care (National Collaborating Centre for Mental Health, 2004). In relation to the treatment of BN it is recommended that all those presenting for treatment should initially be offered a course of evidence based guided self-help, followed by either Cognitive Behavioural Therapy for BN (CBT-BN) (Fairburn et al., 1993a) or Interpersonal Psychotherapy (IPT) (Fairburn, 1992) if required. Treatment intervention for AN is less clear-cut and it is generally agreed that in the absence of clear evidence-based interventions, treatment should consider four key areas. The first is concerned with helping the patient to acknowledge they need help and to maintain their motivation to change. The second is concerned with weight restoration, and the third with addressing issues related to the over-evaluation of shape and weight, eating habits and general psychosocial functioning. The fourth aspect of management is concerned with compulsory treatment and applies to only a minority of patients. In the absence of evidence to guide the management of EDNOS, it is recommended that the clinician follows the guidance on the treatment of the eating problem that most closely resembles the individual patient's eating disorder (National Collaborating Centre for Mental Health, 2004).

Although further work is required before it can be argued that the clusters identified in the present study represent clinically valid sub-groups, they do raise a number of interesting clinical implications which will be discussed in the context of current treatment guidelines. Patients presenting in the 'mild eating disorder' group may do well with a low level intervention that adopts a guided self-help approach, focusing on symptom reduction. In the case of those presenting with bulimic type presentations, this might involve the use of an evidence-based manual for BN such as Overcoming Binge Eating (Fairburn, 1995). However, those presenting with a low BMI in the context of low levels of symptoms are likely to require a different approach to treatment and this group requires further investigation. Those in the 'bulimic' cluster may do well with a course of CBT-BN (Fairburn et al., 1993a), since they present with high frequency of objective binge eating and self-induced vomiting, but are relatively secure in relation to underlying attachments. It might also

be appropriate to consider offering those in this group who do identify some attachment related issues, a course of IPT (Fairburn, 1992).

Given their resemblance to restricting AN, those allocated to the 'passive/avoidant restrictors' group may benefit from an intervention that broadly focuses on the areas outlined by the NICE guidelines for the treatment of AN, particularly the initial three goals (National Collaborating Centre for Mental Health, 2004). It is also argued that given their likely patterns of attachment and coping these patients may benefit from an approach that not only focuses on symptom change but also addresses underlying issues related to interpersonal functioning, such as avoidance and passivity. Finally, because of their lower levels of eating disorder symptoms, patients presenting in the 'insecure generalised eating disorder' cluster may often be regarded as less severe in clinical terms. However it is argued that because of their underlying attachment and coping styles, patients in this group may represents some of those most challenging to treat. This is to some extent reflected in the 12 month follow-up data which indicated that 68% of patients in this group had a poor outcome, were lost to treatment, or remained in treatment longer than 12 months. In view of their clinical presentation, it is suggested that patients in this group might benefit from interventions designed for patients with borderline personality disorder, such as Cognitive Analytic Therapy (Ryle et al., 1997) or Dialectical Behavioural Therapy (Linehan, 1993). One can also raise the question as to whether such patients are most appropriately treated in specialist eating disorder services, or whether they might be better seen in general services

It is also possible that information related to attachment style may be used to facilitate the development of a positive therapeutic alliance, thereby maximising the potential for therapeutic engagement and clinical change. For example, when engaging patients presenting in the 'passive/avoidant restrictors' cluster it may be appropriate to adopt a stance that although empathic, reflects a more distant style of reflection and interest that will not overpower the patient. Similarly, when working with patients presenting in the 'insecure generalised eating disorder' cluster, expressions of empathy and the reflection of affect may be overwhelming for the patient, and thus a therapist style that simply reflects the words used by the patient may be more appropriate (Dolan et al., 1993). It is argued that matching the patient's

mode of expression in this way may serve to facilitate the development of a trusting therapeutic relationship, which in turn will facilitate clinical change. These findings highlight the importance of detailed assessment prior to treatment planning, thus allowing for the appropriate tailoring of treatment to clinical presentation.

### 9.11 Implications for future research - building on the present study

#### 9.11.1 Exploration of cluster profiles

The findings generate a number of proposals for future research. Additional work may initially focus on exploring whether the clusters can be replicated in a new sample. The inclusion of a non-clinical control group would allow for comparisons regarding the relative levels of behaviours and their relationship to normality. It would also be beneficial to explore those presenting in the 'mild eating disorder' cluster in more detail. As highlighted in the discussion, it remains unclear as to whether this cluster includes patients presenting with low weight in the absence of some key features of AN, such as weight phobia or fear of weight gain (Strober et al., 1999). It is also unclear as to whether this group reflects patients presenting with a 'pure' AN phenotype, such as that commented upon by Holliday et al (2006).

#### 9.11.2 Cluster validity

There are a number of ways in which the issue of diagnostic validity can be approached. As previously discussed, diagnostic categories can be considered valid if they are found to be different on a range of key variables, including clinical description, laboratory studies and family studies (Kendell, 1989). External validity could be assessed by investigating whether the clusters differ in relation to variables not used to form them - this may include trauma history, previous psychiatric admissions, alcohol and substance misuse, self-harm and personality characteristics such as perfectionism and traits associated with borderline personality disorder. Diagnostic stability is a further indicator of validity. Migration between DSM-IV diagnoses is common (Milos et al., 2005) and it would be important to explore the diagnostic stability of the clusters over time. Additional investigations may also explore predictive validity through investigating whether the clusters are distinct in relation to recovery, relapse and response to treatment. Although the present study includes an initial attempt at exploring the relationship to treatment and outcome, this

question requires more rigorous investigation using a prospective longitudinal study design.

## 9.12 Implications for future research - wider issues within the field

### 9.12.1 The usefulness of EDNOS

The study findings highlight a number of inter-related areas for future research and debate within the field. The first concerns the widespread occurrence of EDNOS in community settings. In line with previous research (Turner & Bryant-Waugh, 2004; Fairburn & Harrison, 2003) 51% of those who participated in the present study were diagnosed with EDNOS at assessment and data analysis revealed considerable variability in type and severity of clinical presentation within this group. To date a number of approaches have been taken towards addressing this issue. These include identifying further sub-groups within EDNOS, such as BED (Wilfley et al., 2003); relaxing the diagnostic criteria for AN and BN, so that a percentage of EDNOS patients are re-allocated to these groups; or creating a single eating disorder category, that would encompass AN, BN and EDNOS (Fairburn & Bohn, 2005). The question of whether the field should be looking to move away from sub-typing towards defining a diagnosis of eating disorders per se requires further careful thought and is one of considerable debate within the field. Waller (2005), for example, argues that rather than focusing on sub-grouping, we should focus on understanding and working with the core features of eating disorders, an approach that has also been adopted by Fairburn and colleagues, whose transdiagnostic work is based on the idea that eating disorders, regardless of subtype, are maintained by the same psychopathological processes (Fairburn et al., 2003). This single group approach also raises further questions relating to whether those presenting with eating disorders are clinically distinct from those presenting with other psychological disorders, or whether a single set of pathological processes underpins a range of psychological disorders.

The boundaries of EDNOS and what constitutes a clinically significant eating disorder also requires further investigation. To date surprisingly few attempts have been made to generate a definition of an eating disorder. However there has been some attempt to address this issue through exploring the concept of functional impairment. Rather than focusing on the frequency of symptom presentation, this

approach focuses on assessing the degree of functional impairment and distress caused by symptoms as a marker of clinical significance. Although interesting, the potential for patients to report significant distress in the absence of key eating behaviours (for example, many dieters find eating distressing) means this requires further investigation before any firm conclusions regarding clinical usefulness can be drawn.

In this thesis it is argued that rather than pursing any of the above, it might be more fruitful to consider an approach to sub-grouping similar to that adopted by fellow researchers in related fields, and again it is helpful to draw upon the work conducted by Parker and colleagues (Parker & Manicavasagar, 2005). It is argued here that a model of eating disorders which distinguishes sub-groups on the basis of key eating disorder symptoms as well as wider clinical features, might allow for the development and provision of differential treatment approaches, thereby enhancing outcome through facilitating a more precise match between clinical presentation and intervention. It is also suggested here that such a model might assume both categorical and dimensional aspects. This in turn raises the question as to whether research has to necessarily focus on determining whether the eating disorders are best conceptualised as *either* continuous *or* categorical.

### 9.12.2 The value of axis II symptoms

The current work on personality features in relation to the eating disorders has generated a number of important findings, and in line with the present study, has raised the possibility of whether the classification system might be enhanced by the inclusion of information relating to wider aspects of psychopathology. To date research into personality has primarily focused on sub-grouping bulimic type presentations based on key personality features. Further work is required exploring personality traits in relation to the wide range of eating disorder presentations, including restrictive presentations and those diagnosed with EDNOS. Future research might also usefully explore the possible benefits of sub-grouping based on both eating disorder and personality features. Such research might generate empirically based findings that could be generalised to the whole eating disorder population, thus usefully informing the classification debate. Within the context of the present study one can question whether attachment and coping style are the most clinically relevant

variables to use when thinking about sub-grouping the eating disorders. Although preliminary evidence for the validity of the cluster solution has been reported, other variables such as personality, impairment, duration and severity have been suggested as additional dimensions to consider and each requires further investigation (Wilfley et al., 2007). Future research should also be concerned with the reliable assessment of these key features. At present personality measures such as the Dimensional Assessment of Personality Pathology – Basic Questionnaire (Livesley et al., 1992) are time consuming to complete and not feasible for use in routine clinical practice. What is required is the development of concise, reliable instruments that focus directly on those aspects of the presentation (eating disorder symptoms and related psychopathology) that might be most usefully addressed in treatment.

### 9.13 Development of treatment interventions

The overarching aim of this work was to explore whether clinically relevant sub-groups could be identified across the wide range of eating disorder presentations seen in routine clinical practice. It is argued that this type of sub-grouping system should be simple and practical to use in routine clinical practice, and should highlight aspects of the clinical presentation that if addressed in treatment might facilitate improved clinical outcomes. Given this aim, future work might usefully focus on developing the links between the clusters and treatment interventions. Initial work may involve defining the key components of treatment for patients presenting in each of the four clusters; a task that may involve conducting a number of case series. It is possible that treatments for those presenting in the 'bulimic' group may focus on the alleviation of presenting symptoms. In view of their high treatment drop-out rate, issues related to engagement should also be addressed, and this may involve exploring the pros and cons of change, as well as addressing any treatment related concerns. In contrast, interventions for those in the 'insecure generalised eating disorder' and 'passive/avoidant restrictors' clusters may focus more heavily on therapeutic engagement, inter-personal functioning and coping styles. As mentioned in Section 9.10, information relating to presenting attachment style might also be used to inform the therapeutic stance of the therapist, the aim being for the therapist to modify his/her stance in order to fit the patient's presenting attachment style, thereby facilitating the process of therapeutic engagement. Treatment development work of this type might be usefully set within the preclinical stages outlined within

the MRC Framework for the Development and Evaluation of RCTs for Complex Interventions to Improve Health (Campbell et al., 2000). Following this, it would be important to explore whether these treatment approaches work better than existing treatments for patients in each cluster.

### 9.14 Final conclusions

To date studies exploring the classification of eating disorders have either focused on classifying eating disorder symptoms or examining broader aspects of the presentation within specific sub-groups of this clinical population. This study made a novel attempt to cluster a broad sample of eating disorder patients on the basis of conventional eating disorder symptoms and specific features believed to have an impact on treatment engagement and outcome, the aim being to establish whether this population could be divided into clinically relevant clusters. Four sub-groups were identified, each presenting with a distinct profile of clinical characteristics. Preliminary analyses provided some evidence for their validity, although this requires further investigation in relation to co-morbidity, clinical course and outcome. Whilst debate abounds as to whether psychological disorders should be grouped according to similarity or divided on the basis of difference, in this thesis it is suggested that the eating disorder population might be usefully divided into sub-groups, each highlighting key aspects of the clinical presentation that if used to inform the process and content of treatment, may lead to improved clinical outcomes.

**Attachment** - Parent-child relationships play a central role in children's psychological development. Quality & form of these relationships predict later **interpersonal relationship** and have a significant influence on **personality development** and related **psychological functioning**, such as emotional coping and self-esteem.
Theory link - links directly to the developmental theory underpinning the intervention
Evidence for effect – Through the use of case vignettes. Dallos (2003) recently presented case material demonstrating the clinical utility of addressing attachment styles in systemic family therapy with eating disorders. Fonagy et al (1996) also highlight the impact of attachment style on psychotherapy outcome
Change feasible – Drawing upon attachment theory and measuring this will form an important part of the formulation (developmental context) within which present difficulties, (eg: coping style, relationship difficulties) can be understood. This provides a sound platform from which patients can experiment with change in present life situations.

| Measure, author and year | Subscales | Psychometrics | Used in the ED field | Item/lang | Practice |
|---|---|---|---|---|---|
| Parental Attachment Questionnaire (PAQ, Kenny 1990) * | Designed to adapt Ainsworth's conceptualisation of attachment as an enduring effective bond, which serves as a secure base in providing emotional support and in fostering autonomy.<br>**Subscales**<br>Affective quality of attachment<br>Parental fostering of autonomy<br>Parental role in providing emotional support | Cronbach's alpha<br>Affective quality of attachment - .96<br>Parental fostering of autonomy - .88<br>Parental role in providing emotional support - .88<br>Test re-test whole scale - .92<br>Scales .82-.91 | Yes - secure and preoccupied attachment styles predicted membership to in non-clinical and ED group respectively (Kenny & Hart 1992) | 55<br>English | Possible |
| Relationship Questionnaire (Bartholomew & Horowitz, 1991) * | Adapted & expanded version of Hazan & Shaver's AAQ. Yields dimensional scores on 4 categories of attachment. Assess respondents' relative commitments to 4 descriptive paragraphs consistent with 4 attachment styles (secure, preoccupied, dismissing, fearful). Obtains continuous rating of each attachment patterns<br>Self report instrument measures **4 categories** of attachment: avoidant/dismissing; secure/autonomous; ambivalent/preoccupied; disorganised/fearful | Validated against interview measures of attachment (Griffin & Bartholomew, 1994) | Yes – secure & preoccupied attachment styles predicted membership in either non clinical or ED group (Friedberg & Lyddon, 1996). Translated, back translated and validated in Sweden explored attachment and interpersonal difficulties in ED group and controls (Broberg, 2001) | 4<br>English | Possible |

| Measure, author and year | Subscales | Psychometrics | Used in the ED field | Item/lang | Practice |
|---|---|---|---|---|---|
| Relationship Styles Questionnaire (RSQ; Griffin & Bartholomew 1994) dimensional | Items describe feelings about close relationships. Scale yields 6 subscales but can be scored for the 4 attachment styles: secure; fearful; preoccupied; and dismissing | Not reported | None found | 30 English | |
| Attachment History Questionnaire (Pottharst, 1990) * | Designed to elicit information about experiences with primary and later attachment figures - asks respondents to recall experiences related to childhood attachment such as separation, threatened separation, parental discipline, child-parent interaction and peer relationships **Subscales** Secure attachment base ,parental discipline, threats of separation, peer affectional support | Not reported | Yes – ED patients experienced early attachment figures as significant less responsive, available and trustworthy. Early attachment difficulties might be used to identify individuals at risk of developing an eating disorder (Chassler, 1997) | 51 English | Possible |
| Reciprocal Attachment Questionnaire (West et al 1987) | Operationalises the key components of reciprocal attachment and is in close theoretical agreement with the AAI **Subscales** Compulsive care seeking, compulsive self reliance, compulsive care-giving, angry withdrawal | Not reported | Yes - eating disorder patients scored higher than control on most scales, most notably on compulsive care seeking and compulsive self reliance (Ward et al, 2000) | 43 English | Possible |
| Adult Attachment Interview (Goerge, Kaplan, & Main, 1985) * | Semi structured interview – enables evaluation of quality of past attachments in childhood. Asks about relationship in childhood and evaluates coherence of their accounts. Concerned about how the subjects feels about what happened. Categories; free autonomous, dismissive, preoccupied and unresolved Interviews rated on a number of scales concerning probable experience of attachment figures and current 'state of mind', | Good predictive validity for quality of infant attachment in the next generation (van IJzendoorn 1995) | Yes – eating disorder individuals rated as dismissive are more likely to show improvement in psychotherapy than preoccupied or secure patients, at least by time of discharge (Fonagy et al, 1996) | n/a English | No - interview |

| Measure, author and year | Subscales | Psychometrics | Used in the ED field | Item/lang | Practice |
|---|---|---|---|---|---|
| Attachment Style Questionnaire (ASQ, Feeney et al, 1994)<br><br>dimensional | Asks about relationships in general rather than close or romantic relationship<br>**Subscales:**<br>Confidence (low reflects anxiety)<br>Discomfort with closeness (reflect avoidance)<br>Relationships as secondary (reflect avoidance)<br>Need for approval (reflect anxiety)<br>Preoccupation with relationships (reflect anxiety) | Cronbach's alphas: confidence .80;<br>discomfort .84; need for approval .79; preocc with relat .76; relat as sec .76<br><br>Test re-test (10 wks): confidence and discomfort .74; need or approval .78; preocc with rel .72; relat as sec .67 | Controls show more secure attachment than AN and BN, AN and BN higher on anxious and insecure avoidant subsales than controls (Triosi et al 2005) | 40<br>English | Possible |
| Revised Adult Attachment Scale (RAAS, Collins & Read, 1990) | Designed to assess beliefs and attitudes about adult relationship analogous to those thought to be important in early attachment relationships<br>Subscales<br>**Close** – assess extent to which someone is comfortable with closeness & intimacy<br>**Depend** - assess degree to which indiv is comfortable depending on others & believes people can be relied on when needed<br>**Anxiety** – assess extent to which indiv is worried about being abandoned and rejected by others.<br>Scoring protocol converts dimensional scores into 4 categories; secure, preoccupied, dismissive, fearful | Cronbach's alphas;<br>Close - .74<br>Depend - .83<br>Anxiety - .85 (Hammen et al, 1995)<br><br>Test re-test reliabilities (6mts)<br>Close - .71<br>Depend - .70<br>Anxious - .64<br><br>Also good construct validity & convergent validity | No, undergrads<br>Perceived coping moderates relationship between attachment & psychological distress (Wei, Heppner & Mallinckrodt, 2003) | 18<br>English | Possible but not used in clinical sample |
| Separation Anxiety Test (Hansberg 1980) * | Semi projective measure of separation anxiety, derived from Bowlby's theory<br>Taps strongly held beliefs which have developed largely from family interactions | | Yes – those with an eating disorder show more severe separation difficulties than controls (Armstrong & Roth, 1989) | n/a | No |



* = mentioned in recent review of attachment and eating disorders (Ward & Gowers, 2003)
+ RQ and RSQ can be combined to form composit measure of adult attachment

**Other measures**

- Experiences in Close Relationships Scale (ECRS, Bennan et al, 1998) – old version of ECR-R
- Parental Intrusiveness Rating Scale (PIRS, Rorty et al 2000) – measurement of attachment designed specifically for bulimia
- Parental Bonding Inventory (Parker et al 1969) - measures; paternal care, parental over protection, maternal care, maternal overprotection. Widely used in eating disorders field but is not directly related to Bowlby's attachment constructs
- Family Adaptability & Cohesion Evaluation Scale (FACES-III, Olson et al, 1982) Assess family functioning by measuring family cohesion and adaptability. Adaptability scale includes – child control, discipline, leadership role, rules. Cohesion scale includes – emotional bonding, family boundaries, interests and reaction, and supportiveness. 20 items

**Issues/comments**

- Early attachment instruments classified people into discrete categories. Now strongly recommended that attachment measures assess individual differences on attachment dimensions
- Commonly used in attachment research – ECRS (Brennan et al, 1998, first edition), AAS (Collins and Read, 1990), RSQ (Griffin & Bartholomew, 1994)
- AAI only measure to be used in relationship to changes in attachment over the course of ED treatment

**Appendix B**

Project Reference Number: 050/04/t

## Attachment Style Questionnaire

Show how much you agree with the following items by rating them on the scale below

| | | totally disagree | strongly disagree | slightly disagree | slightly agree | strongly agree | totally agree |
|---|---|---|---|---|---|---|---|
| 1. | Overall, I am a worthwhile person | 1 | 2 | 3 | 4 | 5 | 6 |
| 2. | I am easier to get to know than most people | 1 | 2 | 3 | 4 | 5 | 6 |
| 3. | I feel confident that other people will be there for me when I need them | 1 | 2 | 3 | 4 | 5 | 6 |
| 4. | I prefer to depend on myself rather than other people | 1 | 2 | 3 | 4 | 5 | 6 |
| 5. | I prefer to keep to myself | 1 | 2 | 3 | 4 | 5 | 6 |
| 6. | To ask for help is to admit that you are a failure | 1 | 2 | 3 | 4 | 5 | 6 |
| 7. | People's worth should be judged by what they achieve | 1 | 2 | 3 | 4 | 5 | 6 |
| 8. | Achieving things is more important than building relationships | 1 | 2 | 3 | 4 | 5 | 6 |
| 9. | Doing your best is more important than getting on with others | 1 | 2 | 3 | 4 | 5 | 6 |
| 10. | If you've got a job to do, you should do it no matter who gets hurt | 1 | 2 | 3 | 4 | 5 | 6 |
| 11. | It's important to me that others like me | 1 | 2 | 3 | 4 | 5 | 6 |
| 12. | It's important to me to avoid doing things that others won't like | 1 | 2 | 3 | 4 | 5 | 6 |
| 13. | I find it hard to make a decision unless I know what other people think | 1 | 2 | 3 | 4 | 5 | 6 |
| 14. | My relationships with others are generally superficial | 1 | 2 | 3 | 4 | 5 | 6 |
| 15. | Sometimes I think I am no good at all | 1 | 2 | 3 | 4 | 5 | 6 |
| 16. | I find it hard to trust other people | 1 | 2 | 3 | 4 | 5 | 6 |
| 17. | I find it difficult to depend on others | 1 | 2 | 3 | 4 | 5 | 6 |
| 18. | I find that others are reluctant to get as close as I would like | 1 | 2 | 3 | 4 | 5 | 6 |
| 19. | I find it relatively easy to get close to other people | 1 | 2 | 3 | 4 | 5 | 6 |
| 20. | I find it easy to trust others | 1 | 2 | 3 | 4 | 5 | 6 |
| 21. | I feel comfortable depending on other people | 1 | 2 | 3 | 4 | 5 | 6 |
| 22. | I worry that others won't care about me as much as I care about them | 1 | 2 | 3 | 4 | 5 | 6 |
| 23. | I worry about people getting too close | 1 | 2 | 3 | 4 | 5 | 6 |
| 24. | I worry that I won't measure up to other people | 1 | 2 | 3 | 4 | 5 | 6 |
| 25. | I have mixed feelings about being close to others | 1 | 2 | 3 | 4 | 5 | 6 |
| 26. | While I want to get close to others, I feel uneasy about it | 1 | 2 | 3 | 4 | 5 | 6 |
| 27. | I wonder why people would want to be involved with me | 1 | 2 | 3 | 4 | 5 | 6 |
| 28. | It's very important to me to have a close relationship | 1 | 2 | 3 | 4 | 5 | 6 |
| 29. | I worry a lot about my relationships | 1 | 2 | 3 | 4 | 5 | 6 |
| 30. | I wonder how I would cope without someone to love me | 1 | 2 | 3 | 4 | 5 | 6 |
| 31. | I feel confident about relating to others | 1 | 2 | 3 | 4 | 5 | 6 |
| 32. | I often feel left out or alone | 1 | 2 | 3 | 4 | 5 | 6 |
| 33. | I often worry that I do not really fit in with other people | 1 | 2 | 3 | 4 | 5 | 6 |
| 34. | Other people have their own problems, so I don't bother then with mine | 1 | 2 | 3 | 4 | 5 | 6 |
| 35. | When I talk over my problems with others, I generally feel ashamed or foolish | 1 | 2 | 3 | 4 | 5 | 6 |
| 36. | I am too busy with other activities to put much time into relationships | 1 | 2 | 3 | 4 | 5 | 6 |
| 37. | If something is bothering me, others are generally aware and concerned | 1 | 2 | 3 | 4 | 5 | 6 |
| 38. | I am confident that other people will like and respect me | 1 | 2 | 3 | 4 | 5 | 6 |
| 39. | I get frustrated when others are not available when I need them | 1 | 2 | 3 | 4 | 5 | 6 |
| 40. | Other people often disappoint me | 1 | 2 | 3 | 4 | 5 | 6 |

**Appendix C**

Project Reference: 050/04/T

## The Utrecht Coping List

When people are faced with problems or unpleasant events they often react very differently. What someone does in any one situation depends a lot on the nature and seriousness of the problem or event. Nevertheless, IN GENERAL people tend to react more often in one way than another. Below are a number of descriptions that indicate what people can think or do when faced with problems. **PLEASE INDICATE AFTER EACH SENTENCE HOW OFTEN OVER THE PAST 3 MONTHS, YOU HAVE REACTED IN THE WAY DESCRIBED**. You can do this by putting a tick in one circle after each sentence. There are no right or wrong answers. Please take care not to miss out any sentences.

| | Seldom/ never | Sometimes | Often | Very often |
|---|---|---|---|---|
| 1. Realised that worse things can happen | o | o | o | o |
| 2. Tried to relax | o | o | o | o |
| 3. Cut yourself off from others | o | o | o | o |
| 4. Shown your irritation | o | o | o | o |
| 5. Looked on the gloomy side of things | o | o | o | o |
| 6. Kept yourself busy so that you didn't have to think about a problem | o | o | o | o |
| 7. Shown that you were angry with those responsible for the problem | o | o | o | o |
| 8. Given in to avoid difficult situations | o | o | o | o |
| 9. Resigned yourself to the situation | o | o | o | o |
| 10. Shared your worries with someone | o | o | o | o |
| 11. Taken action straight away when there were problems | o | o | o | o |
| 12. Told yourself things would be OK | o | o | o | o |
| 13. Seen problems as a challenge | o | o | o | o |
| 14. Tried to forget about your problems for a while by taking a break | o | o | o | o |
| 15. Adopted a let's-wait-and-see attitude | o | o | o | o |
| 16. Tried to reduce tension by, e.g., smoking, drinking, eating more, or taking exercise | o | o | o | o |
| 17. Sought distractions | o | o | o | o |
| 18. Looked at a problem from every angle | o | o | o | o |
| 19. Avoided difficult situations as much as possible | o | o | o | o |
| 20. Stayed optimistic about the future | o | o | o | o |
| 21. Stayed calm in difficult situations | o | o | o | o |
| 22. Thought of different ways to sort out a problem | o | o | o | o |
| 23. Purposefully worked on sorting out a problem | o | o | o | o |
| 24. Worried about the past | o | o | o | o |
| 25. Sought out cheerful company when you were worried or upset | o | o | o | o |
| 26. Tried to disentangle yourself from a situation | o | o | o | o |
| 27. Let off steam | o | o | o | o |
| 28. Waited for better times | o | o | o | o |
| 29. Asked someone for help | o | o | o | o |
| 30. Used calming substances if you felt tense or nervous | o | o | o | o |
| 31. Escaped into fantasies | o | o | o | o |
| 32. Sorted out your problems by looking at them one at a time | o | o | o | o |
| 33. Let yourself be completely overwhelmed by problems | o | o | o | o |
| 34. Thought about other things not related to the problem | o | o | o | o |
| 35. Tried to make yourself feel better one way or another | o | o | o | o |
| 36. Told yourself that other people also have their problems from time to time | o | o | o | o |
| 37. Realised that every cloud has a silver lining | o | o | o | o |
| 38. Shown your feelings | o | o | o | o |
| 39. Looked for comfort and understanding | o | o | o | o |
| 40. Let problems wash over you | o | o | o | o |
| 41. Seen the funny side of problems | o | o | o | o |
| 42. Shown that you were bothered by something | o | o | o | o |
| 43. Discussed the problem with friends or relatives | o | o | o | o |
| 44. Let matters take their own course | o | o | o | o |
| 45. Haven't got worked up because everything usually turns out alright | o | o | o | o |
| 46. Felt unable to do anything | o | o | o | o |
| 47. Given yourself courage when faced with problems | o | o | o | o |

**Appendix D**

Project Reference: 050/04/T

## Short Form 36 Health Survey

The following questions ask you for your views about your health, how you feel and how well you are able to do your usual activities. If you are unsure how to answer any questions please give the best answer you can.

1. **In general** would you say your health is: (Please tick **one** box)

| | |
|---|---|
| Excellent | ☐ |
| Very Good | ☐ |
| Good | ☐ |
| Fair | ☐ |
| Poor | ☐ |

2. **Compared to one year ago**, how would you rate your general health **now**? (Please tick **one** box)

| | |
|---|---|
| Much better than one year ago | ☐ |
| Somewhat better than one year ago | ☐ |
| About the same | ☐ |
| Somewhat worse than one year ago | ☐ |
| Much worse than one year ago | ☐ |

3. The following questions are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?

(Please tick **one** box on each line)

| | | Yes, limited a lot | Yes, limited a little | No, not limited at all |
|---|---|---|---|---|
| 3a | **Vigorous activities**, such as running, lifting heavy objects, participating in strenuous sports | | | |
| 3b | **Moderate activities**, such as moving a table, pushing a vacuum cleaner, bowling or playing golf. | | | |
| 3c | Lifting or carrying groceries | | | |
| 3d | Climbing **several** flights of stairs | | | |
| 3e | Climbing **one** flight of stairs | | | |
| 3f | Bending, kneeling or stooping | | | |
| 3g | Walking **more than a mile** | | | |
| 3h | Walking **half a mile** | | | |
| 3i | Walking **100 yards** | | | |
| 3j | Bathing and dressing yourself | | | |

4. During the past **4 weeks**, have you had any of the following problems with your work or other regular daily activities **as a result of your physical health**?

(Please tick **one** box on each line)

| | | Yes | No |
|---|---|---|---|
| 4a | Cut down on the **amount of time** you spent on work or other activities | | |
| 4b | **Accomplished less** than you would like | | |
| 4c | Were limited in the **kind** of work or other activities | | |
| 4d | Had difficulty performing the work or other activities (e.g., it took extra effort) | | |

5. During the past **4 weeks**, have you had any of the following problems with your work or regular daily activities **as a result of any emotional problems (such as feeling depressed or anxious)**?

(Please tick **one** box on each line)

| | | Yes | No |
|---|---|---|---|
| 5a | Cut down on the **amount of time** you spent on work or other activities | | |
| 5b | **Accomplished less** than you would like | | |
| 5c | Didn't do work or other activities as **carefully** as usual | | |

6. During the **past 4 weeks**, *to what extent* has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbours, or groups ?

(Please tick **one** box)

- Not at all ☐
- Slightly ☐
- Moderately ☐
- Quite a bit ☐
- Extremely ☐

7. How much **bodily** pain have you had in the **past 4 weeks**?

(Please tick **one** box)

- None ☐
- Very mild ☐
- Mild ☐
- Moderate ☐
- Severe ☐
- Very Severe ☐

8. During the **past 4 weeks**, how much did **pain** interfere with your normal work (including work outside the home and housework)?

(Please tick **one** box)

- Not at all ☐
- A little bit ☐
- Moderately ☐
- Quite a bit ☐
- Extremely ☐

9. Theses questions are about how you feel and how things have been with you **during the past month**. For each question, please give the one answer that comes closest to the way you have been feeling.

(Please tick **one** box on each line)

| | | All of the time | Most of the time | A good bit of the time | Some of the time | A little of the time | None of the time |
|---|---|---|---|---|---|---|---|
| 9a | Did you feel full of life? | | | | | | |
| 9b | Have you been a very nervous person? | | | | | | |
| 9c | Have you felt so down in the dumps that nothing could cheer you up? | | | | | | |
| 9d | Have you felt calm and peaceful? | | | | | | |
| 9e | Did you have a lot of energy? | | | | | | |
| 9f | Have you felt downhearted and low? | | | | | | |
| 9g | Did you feel worn out? | | | | | | |
| 9h | Have you been a happy person? | | | | | | |
| 9i | Did you feel tired? | | | | | | |
| 9j | Has your **health limited your social activities** (such as visiting friends or close relatives)? | | | | | | |

10. Please choose the answer that best describes how **true** or **false** each of the following statements is for you?

(Please tick **one** box on each line)

| | | Definitely true | Mostly True | Not sure | Mostly false | Definitely false |
|---|---|---|---|---|---|---|
| 10a | I seem to get ill more easily than other people | | | | | |
| 10b | I am as healthy as anybody I know | | | | | |
| 10c | I expect my health to get worse | | | | | |
| 10d | My health is excellent | | | | | |

**Appendix E** Project reference: 050/04/t

## Work and Social Adjustment Scale

*Please circle the number that best applies to you*

1. Because of my eating difficulties my ability to work is impaired

0---------1---------2---------3---------4---------5---------6---------7---------8
not at all impaired — very severely impaired

2. Because of my eating difficulties my home management (cleaning, tidying, shopping, cooking, looking after home or children, paying bills) is impaired

0---------1---------2---------3---------4---------5---------6---------7---------8
not at all impaired — very severely impaired

3. Because of my eating difficulties, my social leisure activities (with other people, such as parties, bars, clubs, outings, visits, dating, home entertainment) are impaired

0---------1---------2---------3---------4---------5---------6---------7---------8
not at all impaired — very severely impaired

4. Because of my eating difficulties my private leisure activities (done alone, such as reading, collecting, sewing, walking alone) are impaired

0---------1---------2---------3---------4---------5---------6---------7---------8
not at all impaired — very severely impaired

5. Because of my eating difficulties my ability to form and maintain close relationships with others, including those I live with, is impaired

0---------1---------2---------3---------4---------5---------6---------7---------8
not at all impaired — very severely impaired

**Appendix F**

Hampshire Partnership NHS
NHS Trust

Date: 1st April 2004

Project Reference number: 050/04/t (version 2)

Adult Mental Health
Eating Disorders Service
Eastleigh Community Enterprise Centre
Unit 3, Barton Park
Eastleigh
SO50 6RR

Tel: 023 8062 6262
Fax: 023 8062 6279

Dear

We are currently conducting a study at the Eating Disorder Service, which aims to investigate possible links between eating disorder symptoms and factors such as inter-personal relationships and the way people cope with day to day life. We hope this study will help us develop a better understanding of eating disorders.

All those who are referred for an assessment at the Hampshire Partnership NHS Trust Eating Disorders Service are being invited to take part in this study. If you would like to take part this would involve you giving written consent for some information collected as part of the routine clinical assessment to be used in this study. In addition, you would also be asked to complete five additional questionnaires. These can be completed at the beginning of the assessment and will not involve you having to stay longer than your routine appointment time.

Any decision you make regarding this issue will not affect your access to the service now or in the future. Please read the attached information sheet for more details.

On arrival at assessment a member of the team with discuss this with you.

Yours sincerely

Hannah Turner DClinPsych
Clinical Psychologist
Hampshire Partnership NHS Trust Eating Disorders Service

Appendix G

Hampshire Partnership NHS
NHS Trust

Date: 1st April 2004

Project Reference Number: 050/04/t (version 2)

Adult Mental Health
Eating Disorders Service
Eastleigh Community Enterprise Centre
Unit 3, Barton Park
Eastleigh
SO50 6RR

Tel: 023 8062 6262
Fax: 023 8062 6279

**Information Sheet**

**An Investigation into Eating Disorder Profiles**

You are being invited to take part in a research study. Before you decide whether or not to take part, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with friends, family and your GP if you wish. Do not hesitate to ask us if there is anything that is not clear, or if you would like more information. Take time to decide whether or not you wish to take part.

**What is the purpose of this study?**
Having problems with eating, weight and shape can be very distressing and upsetting. Although a number of treatments have been developed, recovery is often hard work and can take time. In order to help us develop a better way of deciding who might benefit from which type of treatment, it is important that we understand the factors that might serve to keep individuals stuck in their illness. The aim of this study is to explore some of those factors by asking you to complete some questionnaires about your relationships and how you cope with day to day life.

**Why have I been chosen?**
All clients who have been referred to the Hampshire Partnership NHS Trust Eating Disorder Service will be given the opportunity to opt-in to the research. We hope to recruit 100-150 people for the study.

**Do I have to take part?**
It is entirely up to you to decide whether or not to take part. If you do decide to take part, you will be asked to sign a consent form. However, you are still free to withdraw at any time, without giving a reason. A decision to withdraw, or a decision not to take part, will not affect your access to this service or any other health care services.

**What will happen to me if I decide to take part?**
If you decide to take part you will be asked to give consent for some information collected as part of the routine assessment to be used in this study. This will include descriptive data such as your age, as well as data generated from two self-report questionnaires and the information you give concerning your eating difficulties. You will also be asked to complete five additional questionnaires. These can be done at the beginning of the morning when you complete the two routine questionnaires and will not involve you having to stay longer than your routine appointment time. You might also be asked for permission to audio-tape the part of the assessment that focuses on your eating difficulties, but you can decline this and still take part in the study.

**What are the possible benefits of taking part?**
It is hoped that taking part will help you understand more about some of the factors that might contribute to your eating problems. It is also hoped that this information will help us think about which type of treatment might be the most appropriate for you.

**Will my taking part in this study be kept confidential?**
Yes, any information that you give us when participating in this study will be kept strictly confidential.

**What will happen to the results of the research?**
The results of the study will be written up as part of my PhD studies. The results will also be written into a number of papers and submitted for publication in eating disorder journals. You will not be identified in any report or publication. If you are interested, I will send you a summary of the findings when the study is complete.

**Who has reviewed the study?**
This study has been reviewed by the Hampshire Partnership NHS Trust Research and Development Department, as well as the Southampton and South West Hampshire Local Research and Ethics Committee.

**Contact for further information**
If you would like more information about any aspect of the study, or if you have any questions or concerns at any time, please do not hesitate to contact me by telephone on 02380 626262. If I am not available when you phone, please leave a message and I will call you back as soon as possible.

Thank you for taking the time to read this.

**Hannah Turner** DClinPsych
Clinical Psychologist

**Appendix H**

Hampshire Partnership NHS
NHS Trust

Date: 1st April 2004

Project Reference Number: 050/04/t (version 2)

Eating Disorders Service
Eastleigh Community Enterprise Centre
Unit 3, Barton Park
Eastleigh SO50 6RR

Tel: 023 8062 6262
Fax: 023 8062 6279

# CONSENT FORM

**Title of Project:** An Investigation into Eating Disorder Profiles

Name of Researcher: Hannah Turner, Clinical Psychologist

**Please initial box**

1. I confirm that I have read and understand the information sheet dated 1.4.04 (version 2) 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. ☐

3. I understand that sections of any of my medical notes may be looked at by responsible individuals from the Hampshire Partnership Trust Eating Disorder Service where it is relevant to my taking part in research. I give permission for these individuals to have access to my records. ☐

4. I agree to take part in the above study. ☐

5. I agree to the Eating Disorder Examination being audio-taped ☐

| | | |
|---|---|---|
| Name of client | Date | Signature |
| Name of person taking consent (if different from researcher) | Date | Signature |
| Researcher | Date | Signature |

1 for client; 1 for researcher

## Appendix I: Inter-rater reliability of the Eating Disorder Examination

| | Time point 1 | Time point 2 |
|---|---|---|
| **EDE subscales** | | |
| Restraint | .96 | .99 |
| Eating concern | 1 | 1 |
| Weight concern | .97 | .98 |
| Shape concern | .95 | .99 |
| **Binge eating** | | |
| OBEs, number of days – month 1 | .97 | .99 |
| OBEs, number of episodes – month 1 | .91 | .96 |
| SBEs, number of days – month 1 | .80 | .95 |
| SBEs, number of episodes – month 1 | .80 | 1 |
| OOEs, number of days – month 1 | n/a | n/a |
| OOEs, number of episodes – month 1 | n/a | n/a |
| OBEs, number of days – month 2 | .97 | .98 |
| OBEs, number of days – month 3 | .81 | .98 |
| OBEs, number of episodes – month 2 | .79 | .94 |
| OBEs, number of episodes – month 3 | .98 | .97 |
| Week free from OBEs | 1 | .92 |
| **Compensatory behaviours** | | |
| Restriction outside OBEs - month 1 | 1† | 1 |
| Restriction outside OBEs - month 2 | 1† | 1 |
| Restriction outside OBEs - month 3 | .89† | 1 |
| vomiting, number of days – month 1 | .99 | .99 |
| vomiting, number of episodes – month 2 | .81 | 1 |
| Vomiting outside BEs | 1 | 1 |
| Vomiting, number of episodes – month 2 | 1 | .99 |
| Vomiting, number of episodes – month 3 | .74 | .92 |
| Vomiting, number of episodes – months 4-6 | .81 | .96 |
| laxatives, number of days – month 1 | 1 | 1 |
| laxatives, number of episodes – month 1 | .97 | 1 |
| Laxatives outside BEs | 1 | 1 |
| Laxatives, number of episodes – month 2 | -.10 | .99 |
| Laxatives, number of episodes – month 3 | -.10 | .89 |
| laxatives, number of episodes – months 4-6 | -.01 | .94 |
| Diuretics, number of days – month 1 | 1 | 1 |
| Diuretics, number of episodes – month 2 | 1 | 1 |
| Diuretics, outside BEs | .44 | .72 |
| Diuretics, number of episodes – month 2 | 1 | 1 |
| Diuretics, number of episodes – month 3 | 1 | 1 |
| Diuretics, number of episodes – months 4-6 | 1 | 1 |
| Exercise, number of days – month 1 | .84† | .99 |
| Exercise, number of days – month 2 | 1† | 1 |
| Exercise, number of days – month 3 | 1† | 1 |
| Other – month 1 | n/a | 1 |
| Other – month 2 | n/a | 1 |
| Other month 3 | n/a | 1 |
| Abstinence over past 3 months | .66 | n/a |
| Maintained low weight | 1 | .73 |
| Menstruation 0-3 months | 1 | 1 |
| Menstruation 0-6 months | 1 | 1 |

NB: †For restriction outside of OBEs and exercise, systematic data recording errors were corrected prior to analysis

**Appendix J** **COPE Inventory**

We are interested in how people respond when they confront difficult or stressful events in their lives. There are lots of ways to try to deal with stress. This questionnaire asks you to indicate what you generally do and feel, when you experience stressful events. Obviously, different events bring out somewhat different responses, but think about what you usually do when you are under a lot of stress.

Then respond to each of the following items by placing a tick (√ ) in the column that best applies to you. Please try to respond to each item separately in your mind from each other item. Choose your answers thoughtfully, and make your answers as true FOR YOU as you can. Please answer every item. There are no "right" or "wrong" answers, so choose the most accurate answer for YOU - not what you think "most people" would say or do. Indicate what YOU usually do when YOU experience a stressful event.

| | I usually don't do this at all | I usually do this a little bit | I usually do this a medium amount | I usually do this a lot |
|---|---|---|---|---|
| 1. I try to grow as a person as a result of the experience | | | | |
| 2. I turn to work or other substitute activities to take my mind off things | | | | |
| 3. I get upset and let my emotions out | | | | |
| 4. I try to get advice from someone about what to do | | | | |
| 5. I concentrate my efforts on doing something about it | | | | |
| 6. I say to myself "this isn't real" | | | | |
| 7. I put my trust in God | | | | |
| 8. I laugh about the situation | | | | |
| 9. I admit to myself that I can't deal with it, and quit trying | | | | |
| 10. I restrain myself from doing anything too quickly | | | | |
| 11. I discuss my feelings with someone | | | | |
| 12. I use alcohol or drugs to make myself feel better | | | | |
| 13. I get used to the idea that it happened | | | | |
| 14. I talk to someone to find out more about the situation | | | | |
| 15. I keep myself from getting distracted by other thoughts or activities | | | | |
| 16. I daydream about things other than this | | | | |
| 17. I get upset, and am really aware of it | | | | |
| 18. I seek God's help | | | | |
| 19. I make a plan of action | | | | |
| 20. I make jokes about it | | | | |
| 21. I accept that this has happened and that it can't be changed. | | | | |
| 22. I hold off doing anything about it until the situation permits | | | | |
| 23. I try to get emotional support from friends or relatives | | | | |
| 24. I just give up trying to reach my goal | | | | |
| 25. I take additional action to try to get rid of the problem | | | | |
| 26. I try to lose myself for a while by drinking alcohol or taking drugs | | | | |
| 27. I refuse to believe that it has happened | | | | |
| 28. I let my feelings out | | | | |
| 29. I try to see it in a different light, to make it seem more positive | | | | |
| 30. I talk to someone who could do something concrete about the problem | | | | |
| 31. I sleep more than usual | | | | |

| | I usually don't do this at all | I usually do this a little bit | I usually do this a medium amount | I usually do this a lot |
|---|---|---|---|---|
| 32. I try to come up with a strategy about what to do | | | | |
| 33. I focus on dealing with this problem, and if necessary let other things slide a little | | | | |
| 34. I get sympathy and understanding from someone | | | | |
| 35. I drink alcohol or take drugs, in order to think about it less | | | | |
| 36. I kid around about it | | | | |
| 37. I give up the attempt to get what I want | | | | |
| 38. I look for something good in what is happening | | | | |
| 39. I think about how I might best handle the problem | | | | |
| 40. I pretend that it hasn't really happened | | | | |
| 41. I make sure not to make matters worse by acting too soon | | | | |
| 42. I try hard to prevent other things from interfering with my efforts at dealing with this | | | | |
| 43. I go to movies or watch TV, to think about it less | | | | |
| 44. I accept the reality of the fact that it happened | | | | |
| 45. I ask people who have had similar experiences what they did | | | | |
| 46. I feel a lot of emotional distress and I find myself expressing those feelings a lot | | | | |
| 47. I take direct action to get around the problem | | | | |
| 48. I try to find comfort in my religion | | | | |
| 49. I force myself to wait for the right time to do something | | | | |
| 50. I make fun of the situation | | | | |
| 51. I reduce the amount of effort I'm putting into solving the problem | | | | |
| 52. I talk to someone about how I feel | | | | |
| 53. I use alcohol or drugs to help me get through it | | | | |
| 54. I learn to live with it | | | | |
| 55. I put aside other activities in order to concentrate on this | | | | |
| 56. I think hard about what steps to take | | | | |
| 57. I act as though it hasn't even happened | | | | |
| 58. I do what has to be done, one step at a time | | | | |
| 59. I learn something from the experience | | | | |
| 60. I pray more than usual | | | | |

THANK YOU FOR COMPLETING THESE QUESTIONNAIRES

## Appendix K

Additional cluster analysis omitting BMI

The following variables were entered into the cluster analysis: laxative misuse, self induced vomiting, binge eating, exercise and EDE subscales relating to eating concern, shape concern, weight concern and dietary restraint, as well as the ASQ and UCL subscales.

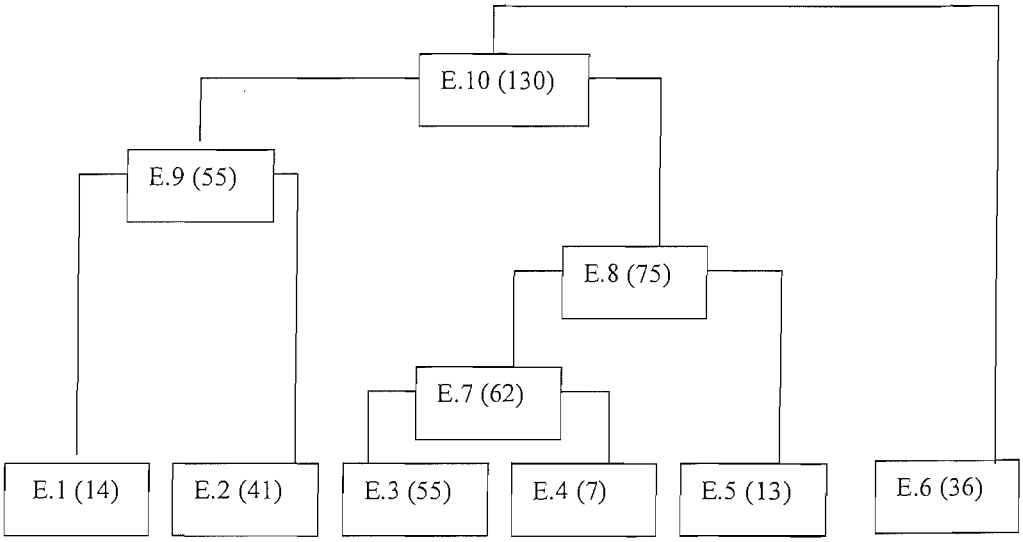
*Step 1: Identification of outliers*

A residual analysis using SLEIPNER'S RESIDUE module was initially conducted to identify statistical "outliers". This procedure was conducted on standardised data and 16 of the 182 participants were identified as statistical "outliers". The "outliers" presented with extremely high frequencies of binge eating and extreme vomiting, as well as significantly lower scores on some aspects of attachment and coping. These cases were omitted from further analysis leaving 166 cases to be entered into the cluster analysis.

*Step 2: Hierarchical cluster analysis*

Standardised scores for the above variables were entered into SLEIPNER'S CLUSTER module and analysed using the Ward's clustering algorithm. Again, the most interesting cluster solutions were those from 6 down to 2 clusters. See Figure 17 for a graphical presentation of the cluster solutions and Tables 41a- 41c for a summary of the statistics.

**Figure 17: Dendrogram for eating disorder (no BMI) and wider clinical features**




Looking at the six cluster solution, those in cluster E.1 (n = 14) presented with the highest frequency of bingeing and vomiting, and above average concern related to eating, weight and shape. They also reported below average levels of need for approval and avoidance. Those in cluster E.2 (n = 41) presented with the highest levels of dietary restraint and the highest levels of eating, weight and shape concern. This group also scored the lowest on confidence in relationships and the highest on passive and avoidant coping styles. Those in cluster E.3 (n = 55) presented with below average levels of dietary restraint, vomiting and laxative misuse as well as slightly above average levels of exercise and concern about weight and shape. This group also scored above average on active tackling, social support seeking and confidence in relationships. Those in cluster E.4 (n =7) presented with the highest levels of exercise and laxative misuse, as well as the lowest levels of avoidance. Participants in E.5 (n = 13) presented with below average levels of concern about eating, weight and shape and below average frequencies of eating disorder behaviours, including dietary restraint, exercise and vomiting. This group also presented with the highest levels of insecure attachment and lowest levels of active tackling. Those in cluster E.6 (n = 36) presented with below average levels of eating disorder behaviours, such as dietary restriction, self-induced vomiting, exercise and laxative misuse, and below average levels of concern related to eating, weight and shape. They also presented with above average levels of active tackling, social support seeking, reassuring thoughts and confidence in relationships.

When the two closest clusters were agglomerated at the five-cluster level, clusters E.3 and E.4 merged to form a group of patients (E.7; n = 62) presenting with below average levels of bingeing, self-induced vomiting, laxative misuse and dietary restraint, above average levels of exercise and below average levels of discomfort with closeness and need for approval. When the two closest clusters were agglomerated at the four-cluster level clusters E.5 and E.7 merged to form one group of patients presenting with above average levels of exercise and concern related to weight and shape, and below average levels of binge eating, self-induced vomiting, laxative misuse and dietary restraint. This group also reported below average levels of confidence and above average levels of discomfort with relationships, need for approval and active tackling (E.8; n = 75). When the two closest clusters were agglomerated at the three-cluster level, clusters E.1 and E.2 merged to form a (E.9; n = 55) group presenting with above average levels of dietary restraint, binge eating and vomiting, and relatively high levels of eating, weight and shape concerns, as well as the highest levels of dysfunctional attachment and coping styles. Finally, at the two-cluster level, clusters E.8 and E.9 merged to form a group (E.10; n = 130) presenting with above average levels of eating disorder psychopathology as well as relatively problematic attachment and coping styles.

Table 41a: Standard scores on clinical variables in relation to specific (eating disorder & wider clinical features) cluster solutions – No BMI

| | N | restraint | eating concern | weight concern | shape concern | vomiting | laxative misuse | OBEs | exercise |
|---|---|---|---|---|---|---|---|---|---|
| **Six cluster solution** | | | | | | | | | |
| Cluster E. 1 | 14 | 0.13 | 0.50 | 0.27 | 0.11 | 0.85 | -0.08 | 1.29 | -0.03 |
| Cluster E.2 | 41 | 0.65 | 0.81 | 0.74 | 0.72 | -0.13 | -0.14 | -0.22 | 0.14 |
| Cluster E.3 | 55 | -0.08 | -0.25 | 0.21 | 0.22 | -0.24 | -0.28 | -0.23 | 0.14 |
| Cluster E.4 | 7 | 0.42 | 0.23 | 0.42 | 0.51 | -0.53 | 2.00 | -0.33 | 0.25 |
| Cluster E.5 | 13 | -0.12 | -0.93 | -0.99 | -0.90 | -0.41 | -0.06 | -0.39 | -0.21 |
| Cluster E.6 | 36 | -0.72 | -0.63 | -0.94 | -0.88 | -0.26 | -0.36 | -0.22 | -0.31 |
| **Five cluster solution** | | | | | | | | | |
| Cluster E.1 | 14 | 0.13 | 0.50 | 0.27 | 0.11 | 0.85 | -0.08 | 1.29 | -0.03 |
| Cluster E.2 | 41 | 0.65 | 0.81 | 0.74 | 0.72 | -0.13 | -0.14 | -0.22 | 0.14 |
| Cluster E.5 | 13 | -0.12 | -0.93 | -0.99 | -0.90 | -0.41 | -0.06 | -0.39 | -0.21 |
| Cluster E.6 | 36 | -0.72 | -0.63 | -0.94 | -0.88 | -0.26 | -0.36 | -0.22 | -0.31 |
| Cluster E.7 | 62 | -0.02 | -0.19 | 0.24 | 0.26 | -0.28 | -0.02 | -0.24 | 0.15 |
| **Four cluster solution** | | | | | | | | | |
| Cluster E.1 | 14 | 0.13 | 0.50 | 0.27 | 0.11 | 0.85 | -0.08 | 1.29 | -0.03 |
| Cluster E.2 | 41 | 0.65 | 0.81 | 0.74 | 0.72 | -0.13 | -0.14 | -0.22 | 0.14 |
| Cluster E.6 | 36 | -0.72 | -0.63 | -0.94 | -0.88 | -0.26 | -0.36 | -0.22 | -0.31 |
| Cluster E.8 | 75 | -0.04 | -0.32 | 0.02 | 0.05 | -0.30 | -0.03 | -0.27 | 0.09 |
| **Three cluster solution** | | | | | | | | | |
| Cluster E.6 | 36 | -0.72 | -0.63 | -0.94 | -0.88 | -0.26 | -0.36 | -0.22 | -0.31 |
| Cluster E.8 | 75 | -0.04 | -0.32 | 0.02 | 0.05 | -0.30 | -0.03 | -0.27 | 0.09 |
| Cluster E.9 | 55 | 0.52 | 0.73 | 0.62 | 0.57 | 0.12 | -0.13 | 0.16 | 0.10 |
| **Two cluster solution** | | | | | | | | | |
| Cluster E.6 | 36 | -0.72 | -0.63 | -0.94 | -0.88 | -0.26 | -0.36 | -0.22 | -0.31 |
| Cluster E.10 | 130 | 0.19 | 0.12 | 0.27 | 0.27 | -0.12 | -0.07 | -0.08 | 0.09 |

OBEs = objective bulimic episodes

| Table 41b: Standard scores on UCL subscales in relation to specific (eating disorder & wider clinical features) cluster solutions - No BMI | | | | | | | |
|---|---|---|---|---|---|---|---|
| | N | Active tackling | Palliative reacting | Avoidance | Social support | Passive reacting | Reassuring thought |
| **Six cluster solution** | | | | | | | |
| Cluster E. 1 | 14 | -0.35 | 0.19 | -0.17 | -0.59 | -0.01 | -0.23 |
| Cluster E.2 | 41 | -0.42 | -0.13 | 0.47 | -0.41 | 0.75 | -0.55 |
| Cluster E.3 | 55 | 0.03 | -0.10 | -0.13 | 0.08 | -0.15 | 0.08 |
| Cluster E.4 | 7 | -0.33 | -0.45 | -1.03 | 0.27 | -0.06 | -0.15 |
| Cluster E.5 | 13 | -0.59 | -0.61 | 0.38 | -0.47 | 0.18 | -1.06 |
| Cluster E.6 | 36 | 0.60 | 0.21 | -0.39 | 0.67 | -0.75 | 0.60 |
| **Five cluster solution** | | | | | | | |
| Cluster E.1 | 14 | -0.35 | 0.19 | -0.17 | -0.59 | -0.01 | -0.23 |
| Cluster E.2 | 41 | -0.42 | -0.13 | 0.47 | -0.41 | 0.75 | -0.55 |
| Cluster E.5 | 13 | -0.59 | -0.61 | 0.38 | -0.47 | 0.18 | -1.06 |
| Cluster E.6 | 36 | 0.60 | 0.21 | -0.39 | 0.67 | -0.75 | 0.60 |
| Cluster E.7 | 62 | -0.01 | -0.14 | -0.23 | 0.10 | -0.14 | 0.05 |
| **Four-cluster solution** | | | | | | | |
| Cluster E.1 | 14 | -0.35 | 0.19 | -0.17 | -0.59 | -0.01 | -0.23 |
| Cluster E.2 | 41 | -0.42 | -0.13 | 0.47 | -0.41 | 0.75 | -0.55 |
| Cluster E.6 | 36 | 0.60 | 0.21 | -0.39 | 0.67 | -0.75 | 0.60 |
| Cluster E.8 | 75 | -0.11 | -0.22 | -0.13 | 0.00 | -0.08 | -0.14 |
| **Three cluster solution** | | | | | | | |
| Cluster E.6 | 36 | 0.60 | 0.21 | -0.39 | 0.67 | -0.75 | 0.60 |
| Cluster E.8 | 75 | -0.11 | -0.22 | -0.13 | 0.00 | -0.08 | -0.14 |
| Cluster E.9 | 55 | -0.40 | -0.05 | 0.30 | -0.46 | 0.55 | -0.47 |
| **Two cluster solution** | | | | | | | |
| Cluster E.6 | 36 | 0.60 | 0.21 | -0.39 | 0.67 | -0.75 | 0.60 |
| Cluster E.10 | 130 | -0.23 | -0.15 | 0.06 | -0.19 | 0.19 | -0.28 |

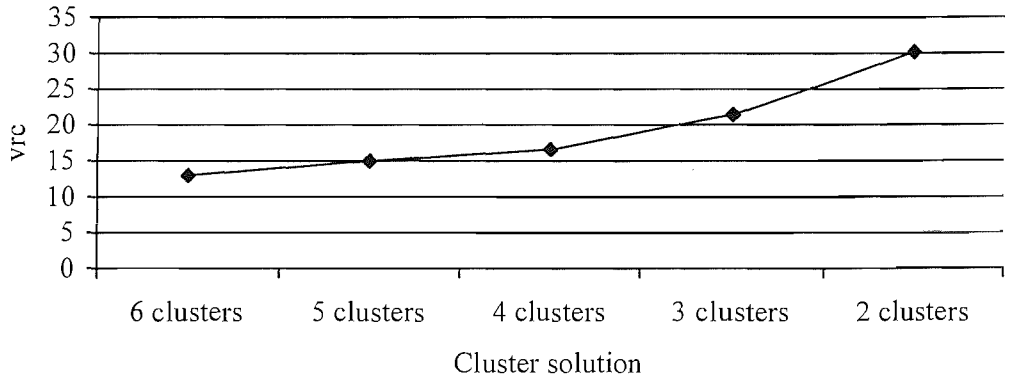
| Table 41c: Standard scores on ASQ subscales in relation to specific (eating disorder & wider clinical features) cluster solutions - No BMI | | | | | | |
|---|---|---|---|---|---|---|
| | N | Confidence | Discomfort with closeness | Need for approval | Preoccupation with relationships | Relationships as secondary |
| **Six cluster solution** | | | | | | |
| Cluster E. 1 | 14 | -0.30 | 0.18 | -0.01 | 0.33 | 0.09 |
| Cluster E.2 | 41 | -0.86 | 0.75 | 0.79 | 0.48 | 0.43 |
| Cluster E.3 | 55 | 0.04 | 0.01 | -0.04 | -0.14 | 0.04 |
| Cluster E.4 | 7 | 0.16 | -0.25 | 0.02 | 0.38 | 0.23 |
| Cluster E.5 | 13 | -0.70 | 0.61 | 0.67 | 0.85 | 0.90 |
| Cluster E.6 | 36 | 1.05 | -1.05 | -0.86 | -0.67 | -0.78 |
| **Five cluster solution** | | | | | | |
| Cluster E.1 | 14 | -0.30 | 0.18 | -0.01 | 0.33 | 0.09 |
| Cluster E.2 | 41 | -0.86 | 0.75 | 0.79 | 0.48 | 0.43 |
| Cluster E.5 | 13 | -0.70 | 0.61 | 0.67 | 0.85 | 0.90 |
| Cluster E.6 | 36 | 1.05 | -1.05 | -0.86 | -0.67 | -0.78 |
| Cluster E.7 | 62 | 0.056 | -0.014 | -0.03 | -0.083 | 0.06 |
| **Four-cluster solution** | | | | | | |
| Cluster E.1 | 14 | -0.30 | 0.18 | -0.01 | 0.33 | 0.09 |
| Cluster E.2 | 41 | -0.86 | 0.75 | 0.79 | 0.48 | 0.43 |
| Cluster E.6 | 36 | 1.05 | -1.05 | -0.86 | -0.67 | -0.78 |
| Cluster E.8 | 75 | -0.07 | 0.09 | 0.09 | 0.08 | 0.21 |
| **Three cluster solution** | | | | | | |
| Cluster E.6 | 36 | 1.05 | -1.05 | -0.86 | -0.67 | -0.78 |
| Cluster E.8 | 75 | -0.07 | 0.09 | 0.09 | 0.08 | 0.21 |
| Cluster E.9 | 55 | -0.71 | 0.61 | 0.59 | 0.44 | 0.34 |
| **Two cluster solution** | | | | | | |
| Cluster E.6 | 36 | 1.05 | -1.05 | -0.86 | -0.67 | -0.78 |
| Cluster E.10 | 130 | -0.35 | 0.31 | 0.30 | 0.23 | 0.26 |

*Step 3: Determination of the optimal number of clusters*

Variance Ratio Criterion

As shown by the peak of the graph in Figure 18, the VRC indicates a two cluster solution.

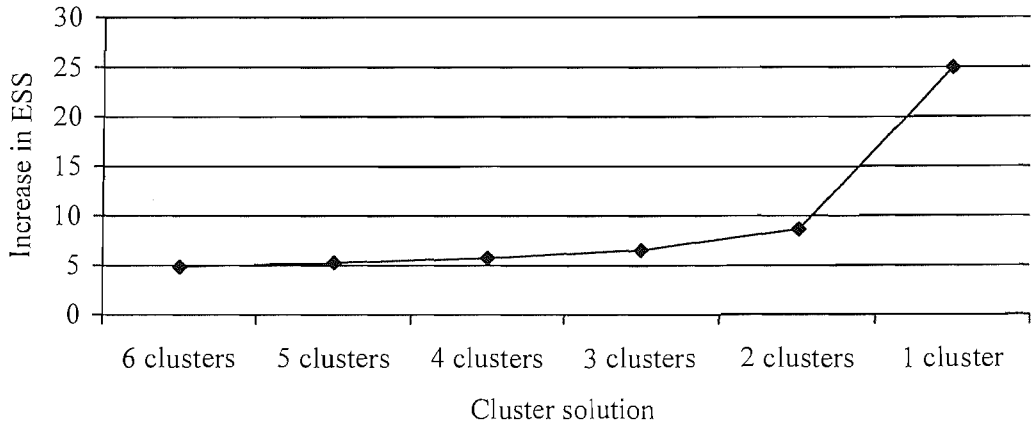
**Figure 18: VRC for clusters based on eating disorder (no BMI) and wider clinical features**




Increase in Error Sum of Squares

As indicated in Figure 19, the ESS also indicates a two cluster solution.

**Figure 19: Increase in ESS for clusters based on eating disorder (no BMI) and wider clinical features**



The four cluster solution following RELOCATE analysis

The clinical characteristics of the four clusters identified following RELOCATE analysis are described below (see Table 42 and Figures 20-22 for further detail).

Group E.1 (n = 51) Participants in this group were characterised by high levels of attempted dietary restraint, and high levels of concern related to weight and shape. They also reported below average levels of binge eating and self-induced vomiting. This group also reported the highest levels of avoidance, discomfort with closeness and need for approval.

Group E.2 (n = 52) Participants in this group scored below average on eating disorder behaviours such as laxative misuse and attempted dietary restraint. They also scored above average on aspects of insecure attachment, particularly relationships as secondary.

Group E.3 (n = 24) Participants in this group were characterised by high levels of binge eating and self-induced vomiting. This group was also characterised by slightly above average scores on ASQ subscales measuring discomfort with closeness and preoccupation with relationships.

Group E.4 (n = 39) Participants in this group presented with the lowest level of eating disorder cognitions and behaviours, and also reported the most adaptive attachment and coping styles.

**Table 42: Standard scores on clinical variables in relation to the four cluster solution generated using eating disorder features (no BMI) and wider clinical variables**

| | clusters | | | |
|---|---|---|---|---|
| **Clinical variable** | **Cluster E.1 N = 51** | **Cluster E.2 N = 52** | **Cluster E.3 N = 24** | **Cluster E.4 N = 39** |
| Restraint | 0.60 | -0.21 | 0.10 | -0.58 |
| Weight concern | 0.81 | -0.58 | 0.42 | -0.50 |
| Shape concern | 0.75 | -0.45 | 0.31 | -0.47 |
| Eating concern | 0.73 | -0.54 | 0.38 | -0.64 |
| Laxative misuse | 0.03 | -0.11 | -0.23 | -0.31 |
| Exercise | 0.06 | 0.23 | -0.09 | -0.31 |
| Vomiting | -0.32 | -0.26 | 0.80 | -0.37 |
| OBEs | -0.25 | -0.23 | 0.67 | -0.26 |
| **Attachment** | | | | |
| Confidence | -0.76 | -0.13 | -0.17 | 1.09 |
| Discomfort with closeness | 0.62 | 0.20 | 0.21 | -1.13 |
| Need for approval | 0.63 | 0.24 | 0.09 | -0.98 |
| Preoccupation with relationships | 0.48 | 0.22 | 0.13 | -0.84 |
| Relationships as secondary | 0.47 | 0.40 | -0.28 | -0.82 |
| **Coping style** | | | | |
| Active tackling | -0.52 | -0.11 | -0.11 | 0.67 |
| Palliative reacting | -0.07 | -0.25 | -0.17 | 0.23 |
| Avoidance | 0.15 | 0.05 | -0.05 | -0.40 |
| Social support | -0.24 | -0.22 | -0.38 | 0.81 |
| Passive reacting | 0.65 | -0.04 | -0.11 | -0.81 |
| Reassuring thought | -0.51 | -0.24 | -0.13 | 0.69 |

BMI = body mass index; OBEs = objective bulimic episodes

**Figure 20: Comparisons of clusters on eating disorder features (no BMI)**

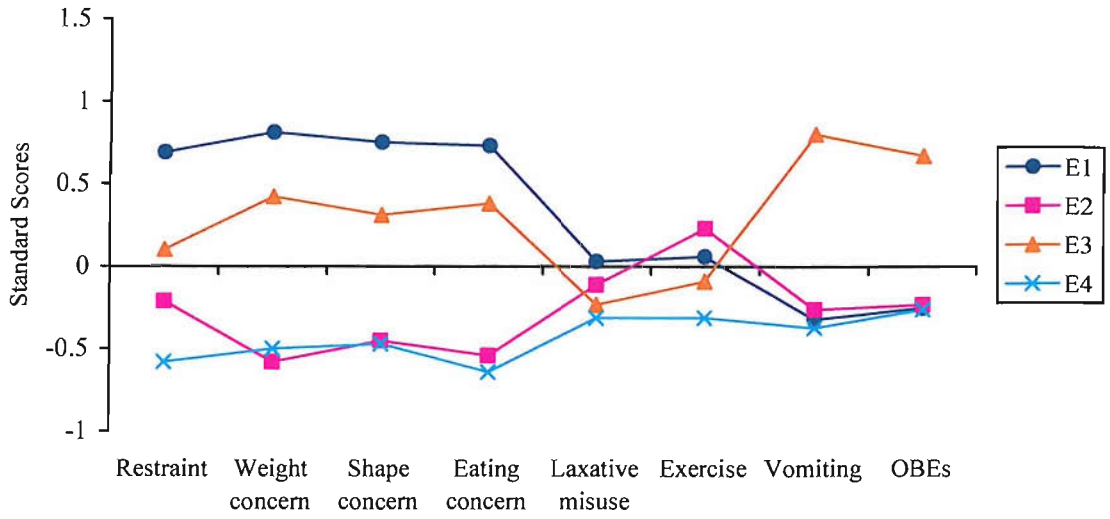



**Figure 21: Comparisons of clusters on the ASQ subscales**

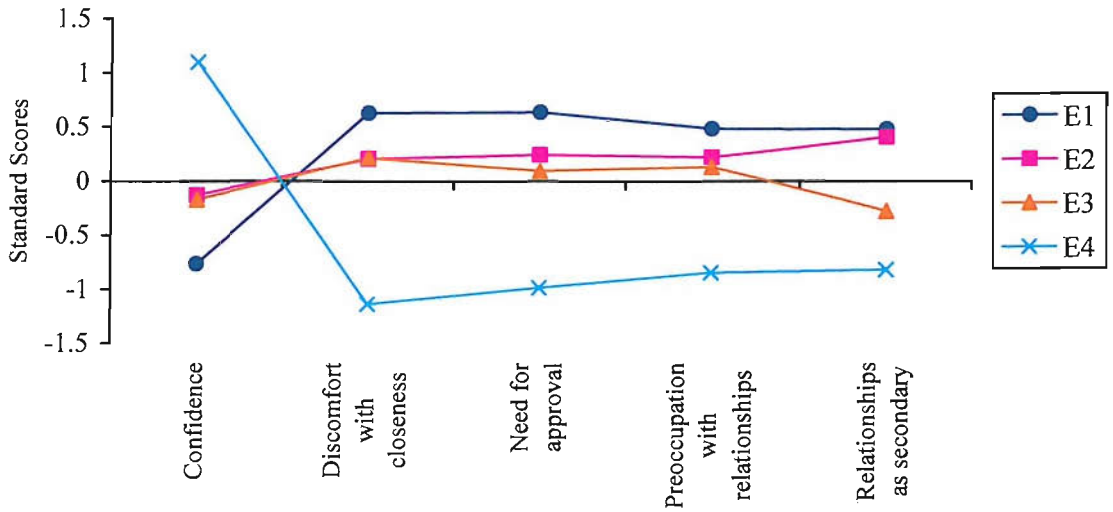
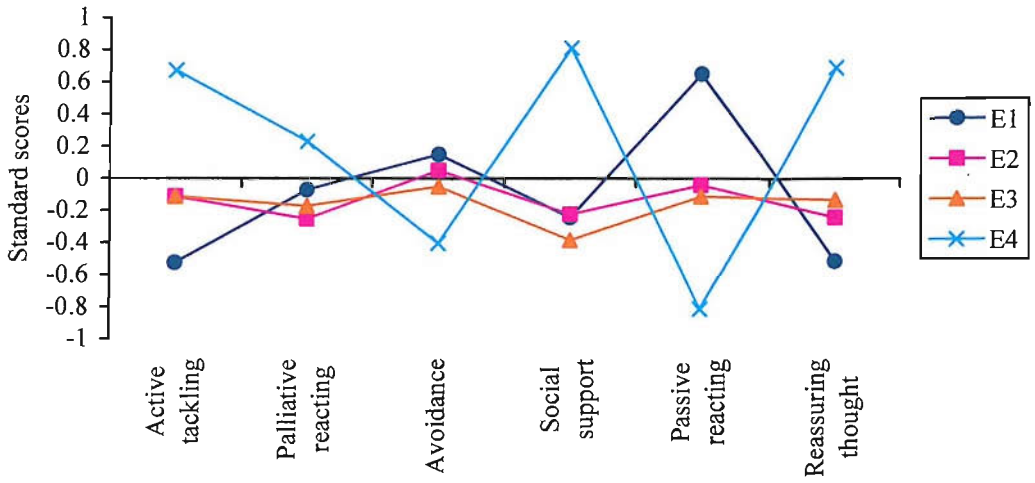


**Figure 22: Comparisons of clusters on the UCL subscales**




Comparison of clusters and DSM-IV diagnoses

There was a significant difference across the clusters for diagnosis ($\chi^2$ = 24.9, df = 6, exact $p$ = 0.003). Adjusted standardised residuals indicated that those given a DSM-IV diagnosis of BN at assessment were more likely to be allocated to cluster E.3, whilst those given a DSM-IV diagnosis of EDNOS were more likely to be allocated to cluster E.4 and less likely to be allocated to cluster E.3. (see Table 43).

**Table 43: Comparison of clusters and DSM-IV diagnoses**

| | DSM-IV diagnosis | | | | |
|---|---|---|---|---|---|
| | Anorexia nervosa | Bulimia nervosa | EDNOS | No ED | Total |
| Cluster label | n | N | n | n | N |
| Cluster E.1 | 7 | 16 | 26 | 2 | 51 |
| Cluster E.2 | 5 | 17 | 29 | 1 | 52 |
| Cluster E.3 | 0 | 18 | 6 | 0 | 24 |
| Cluster E.4 | 2 | 8 | 28 | 1 | 39 |
| Total | 14 | 59 | 89 | 4 | |

EDNOS = eating disorder not otherwise specified; No ED = no eating disorder

Comparison of clusters and DSM-IV diagnoses at initial assessment

Comparisons were made between the clusters and DSM-IV diagnoses on key eating disorder features as well as ASQ and UCL subscales (see Table 44).

**Table 44: Comparison of clusters and diagnoses at initial assessment**

| | Clusters | | | DSM diagnoses | | |
|---|---|---|---|---|---|---|
| | F | *P* | $h^2$ | F | *p* | $H^2$ |
| **Eating disorder features** | | | | | | |
| BMI* | | | | 12.6 | 0.000 | .12 |
| Restraint | 13.6 | 0.000 | .21 | 6.5 | 0.002 | .06 |
| Eating concern | 33.3 | 0.000 | .38 | 2.6 | 0.07 | .03 |
| Weight concern* | 36.9 | 0.000 | .41 | 1.4 | 0.24 | .01 |
| Shape concern* | 24.2 | 0.000 | .31 | 3.2 | 0.04 | .03 |
| Vomiting* | 43.6 | 0.000 | .45 | 11.9 | 0.00 | .12 |
| Laxative misuse* | 2.6 | 0.057 | .05 | 1.5 | 0.22 | .01 |
| Exercise* | 2.4 | 0.073 | .04 | 4.5 | 0.01 | .04 |
| OBEs* | 18.7 | 0.000 | .26 | 40.2 | 0.00 | .31 |
| **ASQ** | | | | | | |
| Confidence | 48.4 | 0.000 | .47 | 0.3 | 0.7 | .00 |
| Discomfort with closeness | 43.4 | 0.000 | .45 | 0.9 | 0.4 | .01 |
| Need for approval* | 33.2 | 0.000 | .38 | 1.5 | 0.2 | .02 |
| Preoccupation with relationships | 20.0 | 0.000 | .27 | 1.3 | 0.3 | .02 |
| Relationship as secondary | 23.2 | 0.000 | .30 | 0.8 | 0.5 | .01 |
| **UCL** | | | | | | |
| Active tackling | 14.9 | 0.000 | .22 | 1.8 | 0.17 | .02 |
| Palliative reacting | 1.9 | .122 | .04 | 1.8 | 0.16 | .02 |
| Avoidance | 2.6 | .052 | .05 | 2.3 | 0.10 | .02 |
| Social support* | 14.7 | 0.000 | .21 | 0.8 | 0.44 | .01 |
| Passive reacting | 23.9 | 0.000 | .31 | 2.1 | 0.13 | .02 |
| Reassuring thought* | 16.4 | 0.000 | .23 | 1.1 | 0.32 | .01 |
| **Sf36** | | | | | | |
| Physical functioning* | 1.1 | .371 | .02 | 2.4 | 0.08 | .02 |
| Roll limitations due to physical health * | 3.7 | .014 | .07 | 8.0 | 0.00 | .08 |
| Social functioning | 6.4 | .000 | .11 | 3.1 | 0.04 | .03 |
| Pain* | 2.8 | .041 | .06 | 6.3 | 0.002 | .07 |
| General mental health | 19.5 | .000 | .29 | 3.3 | 0.04 | .03 |
| Roll limitations due to emotional health * | 4.0 | .009 | .08 | 0.4 | 0.6 | .005 |
| Vitality* | 10.7 | .000 | .18 | 4.6 | 0.01 | .05 |
| General health perception | 1.7 | .166 | .04 | 2.4 | 0.08 | .02 |
| **WSAS** | 4.1 | .008 | .08 | 3.6 | 0.02 | .04 |
| **BDI** | 18.7 | .000 | .28 | 2.7 | 0.06 | .03 |

WSAS = work and social adjustment scale; BDI = beck depression inventory

Reference List


Ainsworth, M. D., Blehar, M. C., Water, E., & Wall, S. (1978). *Patterns of attachment: A psychological study of the strange situation.* Hillsdale, NJ: Erlbaum.

Altman, D. G. (1991). *Practical statistics for medical research.* Chapman & Hall/CRC.

American Psychiatric Association (1952). *Diagnostic and Statistical Manual of Mental Disorders*. Washington, D.C.: American Psychiatric Association.

American Psychiatric Association (1968). *Diagnostic and Statistical Manual of Mental Disorders.* (DSM-II) (2nd ed.). Washington,D.C.: American Psychiatric Association.

American Psychiatric Association (1980). *Diagnostic and Statistical Manual of Mental Disorders.* (DSM-III). (3rd ed.). Washington, D.C.: American Psychiatric Association.

American Psychiatric Association (1987). *Diagnostic and Statistical Manual of Mental Disorders.(DSM-III-R).*(3rd ed.).Washington D.C.: American Psychiatric Association.

American Psychiatric Association (1994). *Diagnostic and Statistical Manual of Mental Disorder.* (DSM-IV). (4th ed.).Washington DC: American Psychiatric Association.

Anderluh, M. B., Tchanturia, K., Rabe-Hesketh, S., & Treasure, J. (2003). Childhood obsessive-compulsive personality traits in adult women with eating disorders: Defining a broader eating disorder phenotype. *American Journal of Psychiatry, 160*, 242-247.

Andersen, A. E., Bowers, W. A., & Watson, T. (2001). A slimming program for eating disorders not otherwise specified: Reconceptualizing a confusing, residual diagnostic category. *The Psychiatric Clinics of North America, 24*, 271-280.

Armstrong, J.G. & Roth, D.M. (1989). Attachment and seperation difficulties in eating disorders: A preliminary investigation. *International Journal of Eating Disorders, 8,* 141-155.

Bartholomew, K. & Horowitz, L. M. (1991). Attachment styles among young adults: A test of a four-category model. *Journal of Personality and Social Psychology, 61*, 226-244.

Baumann, L. J., Cameron, L. D., Zimmerman, R. S., & Leventhal, H. (1989). Illness representations and matching labels with symptoms. *Health Psychology, 8*, 449-469.

Beck, A.T., Steer, R.A., Ball, R., & Ranieri, W.F. (1996). Comparison of Beck Depression Inventories -IA and -II in psychiatric outpatients. *Journal of Personality Assessment, 67*(3), 588-597.

Beck, A.T., Steer, R.A., & Brown, G.K. (1996). *Manual for the Beck Depression Inventory-II.* San Antonio, TX: Psychological Corporation

Bell, L. (2002). Does concurrent psychopathology at presentation influence response to treatment for bulimia nervosa? *Eating and Weight Disorders, 7*, 168-181.

Bergman, L. R. & El-khouri, B. M. (1998). Sleipner: A statistical package for pattern orientated analyses (Version 2.0). Stockholm: Department of Psychology, Stockholm University.

Beumont, P. J. V., Kopec-Schrader, E. M., Talbot, P., & Touyz, S. W. (1993). Measuring the specific psychopathology of eating disorder patients. *Australian and New Zealand Journal of Psychiatry, 27*, 506-511.

Binswanger, L. (1944). Der Fall Ellen West. *Archives of Nuerology and Psychiatry, 54*, 69-117.

Birketvedt, G. S., Florholmen, J., Sundsfjord, J., Osterud, B., Dinges, D., Bilker, W. et al. (1999). Behavioral and neuroendocrine characteristics of the night-eating syndrome. *Journal of the American Medical Association, 282*, 657-663.

Blashfield, R. K. & Aldenderfer, M. S. (1988). The methods and problems of cluster analysis. In J.R.Nesselroade & R. B. Cattell (Eds.), *Handbook of multivariate experimental psychology.* (2 ed, pp 447-473). New York: Plenum.

Bloks, H., Spinhoven, P., Callewaert, I., Willemes-Koning, C., & Turksma, A. (2001). Changes in coping style and recovery after inpatient treatment for severe eating disorders. *European Eating Disorders Review, 9*, 397-415.

Bloks, H., van Furth, E. F., Callewaert, I., & Hoek, H. (2004). Coping strategies and recovery in patients with a severe eating disorder. *Eating Disorders: The Journal of Treatment and Prevention, 12*, 157-169.

Blundell, J. E. (1986). Serotonin manipulations and the structure of feeding behaviour. *Appetite, 7*, Suppl, 39-56.

Bowlby, J. (1977a). The making and breaking of affectional bonds. I. Aetiology and psychopathology in the light of attachment theory. An expanded version of the Fiftieth Maudsley Lecture, delivered before the Royal College of Psychiatrists, 19 November 1976. *British Journal of Psychiatry, 130*, 201-210.

Bowlby, J. (1977b). The making and breaking of affectional bonds. II. Some principles of psychotherapy. The Fiftieth Maudsley Lecture. *British Journal of Psychiatry, 130*, 421-431.

Brazier, J. E., Harper, R., Jones, N. M., O'Cathain, A., Thomas, K. J., Usherwood, T. et al. (1992). Validating the SF-36 health survey questionnaire: New outcome measure for primary care. *British Medical Journal, 305*, 160-164.

Brennan, K.A., Clark, L. & Shaver, P. (1989). Self report measures of adults romantic attachment. In J.A. Simpson & W.S. Rholes (Eds). *Attachment theory and close relationships*. (pp. 46-76). New York : Guildford Press.

Broberg, A. G., Hjalmers, I., & Nevonen, L. (2001). Eating disorders, attachment and interpersonal difficulties: A comparison between 18- to 24-year-old patients and normal controls. *European Eating Disorders Review, 9*, 381-396.

Brown, C., Dunbar-Jacob, J., Palenchar, D. R., Kelleher, K. J., Bruehlman, R. D., Serika, S. et al. (2001). Primary care patients' personal illness models for depression: A preliminary investigation. *Family Practice, 18*, 314-320.

Bruch, H. (1962). Perceptual and conceptual disturbances in anorexia nervosa. *Psychosomatic Medicine, 24*, 187-194.

Bulik, C. M., Sullivan, P. F., & Kendler, K. S. (2000). An empirical study of the classification of eating disorders. *American Journal of Psychiatry, 157*, 886-895.

Button, E. J., & Whitehouse, A. (1981). Subclinical anorexia nervosa. *Psychological Medicine, 11*, 509-516.

Cachelin, F. M., & Maher, B. A. (1998). Is amenorrhea a critical criterion for anorexia nervosa? *Journal of Psychosomatic Research, 44*, 435-440.

Calinski, T. & Harabasz, J. (1974). A dendrite method for cluster analysis. *Communications in Statistics, 3*, 1-27.

Campbell, M., Fitzpatrick, R., Haines, A., Kinmonth, A. L., Sandercock, P., Spiegelhalter, D. et al. (2000). Framework for design and evaluation of complex interventions to improve health. *British Medical Journal, 321*, 694-696.

Candelori, C. & Ciocca, A. (1998). Attachment and eating disorders. In *Psychotherapeutic issues in eating disorders: Models, methods, and results* (pp. 139-153). Rome: Societa Editrice Universo.

Carver, C.S., Scheier, M.F., & Weintraub, J.K. (1989). Assessing coping strategies: A theoretically based approach. *Journal of Personality and Social Psychology, 56*, 267-283.

Castonguay, L. G., Goldfried, M. R., Wiser, S., Raue, P. J., & Hayes, A. M. (1996). Predicting the effect of cognitive therapy for depression: A study of unique and common factors. *Journal of Consulting & Clinical Psychology, 64*, 497-504.

Clatworthy, J., Buick, D., Hankins, M., Weinman, J., & Horne, R. (2005). The use and reporting of cluster analysis in health psychology: A review. *British Journal of Health Psychology, 10*, 329-358.

Clinton, D., Button, E., Norring, C., & Palmer, R. (2004). Cluster analysis of key diagnostic variables from two independent samples of eating-disorder patients: Evidence for a consistent pattern. *Psychological Medicine, 34*, 1035-1045.

Coccaro, E. F., Siever, L. J., Klar, H. M., Maurer, G., Cochrane, K., Cooper, T. B. et al. (1989). Serotonergic studies in patients with affective and personality disorders. Correlates with suicidal and impulsive aggressive behavior. *Archives of General Psychiatry, 46*, 587-599.

Collins, N.L. & Read, S.J. (1990). Adult attachment, working models, and relationship quality to dating couples. *Journal of Personality and Social Psychology, 58*, 644-663.

Cooper, Z. & Fairburn, C. F. (1987). The Eating Disorder Examination: A semi-structured interview for the assessment of the specific psychopathology of eating disorders. *International Journal of Eating Disorders, 6*, 1-8.

Corter, J. E. & Tversky, A. (1986). Extended similarity trees. *Psychometrika, 51*, 429-451.

Crow, S. J., Agras, W. S., Halmi, K., Mitchell, J. E., & Kraemer, H. C. (2002). Full syndromal versus subthreshold anorexia nervosa, bulimia nervosa, and binge eating disorder: A multicenter study. *International Journal of Eating Disorders, 32,* 309-318.

Currin, L., Schmidt, U., Treasure, J., & Jick, H. (2005). Time trends in eating disorder incidence. *British Journal of Psychiatry, 186*, 132-135.

Dallos, R. (2003). Using narrative and attachment theory in systemic family therapy with eating disorders. *Clinical Child Psychology and Psychiatry, 8*, 521-535.

Dare, C., Eisler, I., Russell, G., Treasure, J., & Dodge, L. (2001). Psychological therapies for adults with anorexia nervosa: randomised controlled trial of out-patient treatments. *British Journal of Psychiatry, 178*, 216-221.

Darton, K. (2004). *Notes on the history of mental health care*. Retrieved October 11, 2006, from http:/www.mind.org.uk/Information/Factsheets/History+of+mental+health/Notes+on+the +history+of+Mental+Health+Care.htm.

de Zwaan, M., Mitchell, J. E., Howell, L. M., Monson, N., Swan-Kremeier, L., Crosby, R. D. et al. (2003). Characteristics of morbidly obese patients before gastric bypass surgery. *Compr.Psychiatry, 44,* 428-434.

Dolan, R., Arnkoff, D. B., & Glass, C. R. (1993). Client attachment style and the psychotherapist's interpersonal stance. *Psychotherapy, Theory, Research, Practice and Training, 30,* 408-412.

Doll, H. & Fairburn, C. F. (2005). Do eating disorders occur on a continuum? A taxometric analysis. Short paper presented at the Eating Disorders Research Society Meeting.

Eisler, I., Dare, C., Hodes, M., Russell, G., Dodge, E., & Le, G. D. (2000). Family therapy for adolescent anorexia nervosa: the results of a controlled comparison of two family interventions. *Journal of Child Psychology and Psychiatry, 41*, 727-736.

Everitt, B. S. & Dunn, G. (1991). *Applied multivariate data analysis*. New York: Edward Arnold.

Everitt, B. S., Landau, S., & Leese, M. (2001). *Cluster analysis*. (4th ed.) London: Arnold.

Fairburn, C. G. (1992). Interpersonal psychotherapy for bulimia nervosa. In G.L.Klerman & M. W. Weissman (Eds.), *New applications of interpersonal psychotherapy* (pp. 353-378). Washington, D.C.: American Psychiatric Press.

Fairburn, C. G. (1995). *Overcoming binge-eating*. New York: Guilford Press.

Fairburn, C. G., & Bohn, K. (2005). Eating disorder NOS (EDNOS): An example of the troublesome "not otherwise specified" (NOS) category in DSM-IV. *Behaviour Research and Therapy, 43,* 691-701.

Fairburn, C. G., & Cooper, Z. (1993). The Eating Disorders Examination 12th Edition. In C.F.Fairburn & G. T. Wilson (Eds.), *Binge eating: Nature, assessment and treatment* (pp. 317-360). New York:Guildford Press.

Fairburn, C. G., & Cooper, Z. (2007). Thinking afresh about the classification of eating disorders. *International Journal of Eating Disorders, 40*, Suppl, S107-110.

Fairburn, C. G., Cooper, Z., Bohn, K., O'Connor, M. E., Doll, H. A., & Palmer, R. L. (2007). The severity and status of eating disorder NOS: Implications for DSM-V. *Behaviour Research and Therapy, 45*, 1705-1715.

Fairburn, C. G., Cooper, Z., Doll, H., Norman, P., & O'Connor, M. (2000). The natural course of bulimia nervosa and binge eating disorder in young women. *Archives of General Psychiatry, 57,* 659-665.

Fairburn, C. G., Cooper, Z., & Shafran, R. (2003). Cognitive behaviour therapy for eating disorders: a "transdiagnostic" theory and treatment. *Behaviour Research and Therapy, 41*, 509-528.

Fairburn, C. G., & Harrison, P. J. (2003). Eating Disorders. *The Lancet, 361*, 407-416.

Fairburn, C. G., Marcus, M., & Wilson, G. T. (1993a). Cognitive-behavioural therapy for binge eating and bulimia nervosa: A comprehensive treatment manual. In C.F. Fairburn & G. T. Wilson (Eds.), *Binge eating: Nature, assessment and treatment* (pp. 361-404). New York: Guilford Press.

Fairburn, C. G. & Walsh, B. T. (2002). 'Atypical' eating disorders (EDNOS). In C.F.Fairburn & K. D. Brownell (Eds.), *Eating disorders and obesity: A comprehensive handbook* (2nd ed., pp. 171-177). New York: Guildford Press.

Fairburn, C. G., Welch, S. L., & Hay, P. J. (1993b). The classification of recurrent overeating: the "binge eating disorder" proposal. *International Journal of Eating Disorders, 13*, 155-159.

Feeney, J. A., Noller, P., & Hanrahan, M. (1994). Assessing adult attachment: Developments in the conceptualisation of security and insecurity. In M.B.Sperling & W. H. Berman (Eds.), *Attachment in adults: Theory, assessment and treatment* (pp. 128-152). New York: Guildford Press.

Fichter, M. M. & Quadflieg, N. (2004). Twelve-year course and outcome of bulimia nervosa. *Psychological Medicine, 34,* 1395-1406.

First, M. B., Pincus, H. A., Levine, J. B., Williams, J. B. W., Ustun, B., & Peele, R. (2004). Clinical utility as a criterion for revising psychiatric diagnoses. *American Journal of Psychiatry, 161*, 946-954.

Fleiss, J. L. & Zubin, J. (1969). On the methods and theory of clustering. *Multivariate Behaviour Research, 4,* 235-250.

Folkman, S. & Lazarus, R.S. (1988). *Manual for the Ways of Coping Questionnaire.* Palo Alto: Consulting Psychologists Press.

Fonagy, P. (2000). Attachment and borderline personality disorder. *Journal of the American Psychoanalytic Association, 48*, 1129-1146.

Fonagy, P., Leigh, T., Steele, M., Steele, H., Kennedy, R., et al (1999). The relation of attachment status, psychiatric classification, and response to psychotherapy. *Journal of Consulting and Clinical Psychology*, *64*(1), 22-31

Franko, D.L., & Omori,M. (1999). Subclinical eating disorders in adolescent women: A test of the continuity hypothesis and its psychological correlates. *Journal of Adolescence*, *22* (3), 389-396.

Fulford, K. W. M., Broome, M., Stanghellini, G., & Thornton, T. (2005). Looking with both eyes open: Facts and values in psychiatric diagnosis? *World Psychiatry, 4*, 78-86.

Garratt, A. M., Ruta, D. A., Abdalla, M. I., Buckingham, J. K., & Russell, I. T. (1993). The SF 36 health survey questionnaire: An outcome measure suitable for routine use within the NHS? *British Medical Journal, 306*, 1440-1444.

Geller, J., Drab-Hudson, D., Whisenhunt, B., & Srikameswaran, S. (2004). Readiness to change dietary restriction predicts outcomes in the eating disorders. *Eating Disorders: The Journal of Treatment and Prevention, 12*, 209-224.

George, C., Kaplan, N, & Main, M. (1985). *The Adult Attachment Interview.* Unpublished manuscript, University of California at Berkeley, Department of Psychology, Berkeley, CA.

Gleaves, D. H., Brown, J. D., & Warren, C. S. (2004). The continuity/discontinuity models of eating disorders: a review of the literature and implications for assessment, treatment, and prevention. *Behavior Modification, 28*, 739-762.

Gleaves, D. H., Lowe, M. R., Green, B. A., Cororve, M. B., & Williams, T. L. (2000a). Do anorexia and bulimic occur on a continuum? A taxometric analysis. *Behavior Therapy, 31*, 195-219.

Gleaves, D. H., Lowe, M. R., Snow, A. C., Green, B. A., & Murphy-Eberenz, K. P. (2000b). Continuity and discontinuity models of bulimia nervosa: A taxometric investigation. *Journal of Abnormal Psychology, 109*, 56-68.

Goldner, E. M., Srikameswaran, S., Schroeder, M. L., Livesley, W. J., & Birmingham, C. L. (1999). Dimensional assessment of personality pathology in patients with eating disorders. *Psychiatry Research, 85*, 151-159.

Goodwin, G. M., Fraser, S., Stump, K., Fairburn, C. G., Elliott, J. M., & Cowen, P. J. (1987). Dieting and weight loss in volunteers increases the number of alpha 2-adrenoceptors and 5-HT receptors on blood platelets without effect on [3H]imipramine binding. *Journal of Affective Disorders, 12*, 267-274.

Griffin, D.W. & Bartholomew, K. (1994). Models of the self and other: Fundamental dimensions underlying measures of adult attachment. *Journal of Personality and Social Psychology, 67*, 430–445.

Gull, W. W. (1874). Anorexia nervosa (Apepsia hysterica, anorexia hysterica). *Transcripts of the Clinical Society of London, 7*, 22-28.

Hansburg, H.G., (1980a). *Adolescent separation anxiety: A method for the study of adolescent separation problems* (Vol 1). New York: Robert E. Krieger.

Hansburg, H.G., (1980b). *Adolescent separation anxiety: A method for the study of adolescent separation problems* (Vol 2). New York: Robert E. Krieger.

Hay, P. (2003). Quality of life and bulimic eating disorder behaviors: Findings from a community-based sample. *International Journal of Eating Disorders, 33*, 434-442.

Hay, P.J. & Fairburn, C.G. (1998). The validity of the DSM-IV scheme for classifying bulimic eating disorders. *International Journal of Eating Disorders, 23*, 7-15.

Hazan, C. & Shaver, P. R. (1987). Romantic love conceptualized as an attachment process. *Journal of Personality and Social Psychology, 52*, 511-524.

Heatherton, T. F. & Baumeister, R. F. (1991). Binge eating as escape from self-awareness. *Psychological Bulletin, 110*, 86-108.

Hellerstein, D. J., Rosenthal, R. N., Pinsker, H., Samstag, L. W., Muran, J. C., & Winston, A. (1998). A randomized prospective study comparing supportive and dynamic therapies. Outcome and alliance. *Journal of Psychotherapy Practice and Research, 7*, 261-271.

Holliday, J., Uher, R., Landau, S., Collier, D., & Treasure, J. (2006). Personality pathology among individuals with a lifetime history of anorexia nervosa. *Journal of Personality Disorders, 20*, 417-430.

Holliday, J., Wall, E., Treasure, J., & Weinman, J. (2005). Perceptions of illness in individuals with anorexia nervosa: A comparison with lay men and women. *International Journal of Eating Disorders, 37*, 50-56.

Hsu, L. K. & Lee, S. (1993). Is weight phobia always necessary for a diagnosis of anorexia nervosa? *American Journal of Psychiatry, 150*, 1466-1471.

Hsu, L. K., Mulliken, B., McDonagh, B., Krupa, D. S., Rand, W., Fairburn, C. G. et al. (2002). Binge eating disorder in extreme obesity. *International Journal of Obesity and Related Metabolic Disorders, 26*, 1398-1403.

Jacobi, C., Hayward, C., de, Z. M., Kraemer, H. C., & Agras, W. S. (2004). Coming to terms with risk factors for eating disorders: application of risk terminology and suggestions for a general taxonomy. *Psychological Bulletin, 130*, 19-65.

Jenkinson, C., Coulter, A., & Wright, L. (1993). Short form 36 (SF-36) health survey questionnaire: normative data for adults of working age. *British Medical Journal, 306*, 1437-1440.

Jimerson, D. C., Lesem, M. D., Kaye, W. H., & Brewerton, T. D. (1992). Low serotonin and dopamine metabolite concentrations in cerebrospinal fluid from bulimic patients with frequent binge episodes. *Archives of General Psychiatry, 49*, 132-138.

Johnson, C., Tobin, D. L., & Dennis, A. (1990). Differences in treatment outcome. between borderline and non-borderline bulimics at one-year follow-up. *International Journal of Eating Disorders, 9*, 617-627.

Kantak, K. M., Hegstrand, L. R., Whitman, J., & Eichelman, B. (1980). Effects of dietary supplements and a tryptophan-free diet on aggressive behavior in rats. *Pharmacology Biochemistry and Behavior, 12,* 173-179.

Kaye, W. H., Gwirtsman, H. E., George, D. T., & Ebert, M. H. (1991). Altered serotonin activity in anorexia nervosa after long-term weight restoration. Does elevated cerebrospinal fluid 5-hydroxyindoleacetic acid level correlate with rigid and obsessive behavior? *Archives of General Psychiatry, 48*, 556-562.

Keel, P. K., Fichter, M., Quadflieg, N., Bulik, C. M., Baxter, M. G., Thornton, L. et al. (2004). Application of a latent class analysis to empirically define eating disorder phenotypes. *Archives of General Psychiatry, 61*, 192-200.

Keel, P. K., Haedt, A., & Edler, C. (2005). Purging disorder: an ominous variant of bulimia nervosa? *International Journal of Eating Disorders, 38*, 191-199.

Keel, P. K., Mayer, S. A., & Harnden-Fischer, J. H. (2001). Importance of size in defining binge eating episodes in bulimia nervosa. *International Journal of Eating Disorders, 29*, 294-301.

Kendell, R. (1989). Clinical validity. *Psychological Medicine,* 19, 45-55.

Kendell, R. & Jablensky, A. (2003). Distinguishing between the validity and utility of psychiatric diagnoses. *American Journal of Psychiatry, 160*, 4-12.

Kendler, K. S. (1980). The nosologic validity of paranoia (simple delusional disorder). A review. *Archives of General Psychiatry, 37*, 699-706.

Kenny, M. E. (1990). College students' perceptions of parental attachments: The value and stability of family ties. *Journal of College Student Development, 31*, 39-46.

Klump, K. L., Strober, M., Bulik, C. M., Thornton, L., Johnson, C., Devlin, B. et al. (2004). Personality characteristics of women before and after recovery from an eating disorder. *Psychological Medicine, 34*, 1407-1418.

Lasegue, C. (1873). De L'anorexie hysterique. *Archive General de Medicine, 21*, 385-403.

Lau, R. R., Nernard, T. M., & Hartman, K. A. (1989). Further explorations of commonsense representations of common illnesses. *Health Psychology, 8,* 195-219.

Lazarus, R. S. & Folkman, S. (1984). *Stress, appraisal, and coping*. New York: Springer.

Leventhal, H., Diefenbach, M., & Leventhal, E. A. (1992). Illness cognition: using common-sense to understand treatment adherence and affect cognition interactions. *Cognitive Therapy and Research, 16,* 143-163.

Leventhal, H., Meyer, C., & Nerenz, D. (1980). The common-sense representations of illness danger. In S.Rachmann (Ed.), *Medical Psychology* (2 ed., pp. 7-30). New York: Pergamon.

Linehan, M. M. (1993). *Cognitive Behavioural Treatment of Borderline Personality Disorder*. New York and London: The Guilford Press.

Livesley, W. J., Jackson, D. N., & Schroeder, M. L. (1992). Factorial structure of traits delineating personality disorders in clinical and general population samples. *Journal of Abnormal Psychology, 101*, 432-440.

Lorr, M. (1983). *Cluster analysis for social sciences*. San Francisco: Jossey-Bass.

Lowe, M.R., Gleaves, D.H., DiSimone-Weiss, R.T., Furgueson, C., Gayada, C.A., Kolsky, P.A.,et al (1996). Restraint, dieting and the continuum model of bulimia nervosa. *Journal of Abnormal Psychology, 105*, 508-517.

Luborsky, L., McLellan, A. T., Woody, G. E., O'Brien, C. P., & Auerbach, A. (1985). Therapist success and its determinants. *Archives of General Psychiatry, 42*, 602-611.

Mahon, J. (2000). Dropping out from psychological treatment for eating disorders: What are the issues? *European Eating Disorders Review, 8*, 198-216.

Mallinckrodt, B., Coble, H. M., & Gantt, D. L. (1995). Working alliance, attachment memories, and social competencies of women in brief therapy. *Journal of Counselling Psychology, 42*, 79-84.

Marks, I. (1986). The Work and Social Adjustment Scale. In *Behavioural Psychotherapy,* Bristol: John Wright.

Marshall, H. M., Allison, K. C., O'Reardon, J. P., Birketvedt, G., & Stunkard, A. J. (2004). Night eating syndrome among nonobese persons. *International Journal of Eating Disorders, 35*, 217-222.

Martin, C. K., Williamson, D. A., & Thaw, J. M. (2000). Criterion validity of the multiaxial assessment of eating disorders symptoms. *International Journal of Eating Disorders, 28*, 303-310.

Masheb, R. M. & Grilo, C. M. (2004). Quality of life in patients with binge eating disorder. *Eating and Weight Disorders, 9,* 194-199.

McCarthy, L. & Gerring, J. (1994). Revising psychiatry's charter document DSM-IV. *Written Communication, 11*, 147-192.

McIntosh, V. V., Jordan, J., Carter, F. A., Luty, S. E., McKenzie, J. M., Bulik, C. M. et al. (2005). Three psychotherapies for anorexia nervosa: a randomized, controlled trial. *American Journal of Psychiatry, 162*, 741-747.

Meyer, D., Leventhal, H., & Gutmann, M. (1985). Common-sense models of illness: the example of hypertension. *Health Psychology, 4,* 115-135.

Millar, H.R. (1988). New eating disorder service. *Psychiatric Bulletin, 22*, 751-754

Milligan, G. W. & Cooper, M. C. (1987). Methodology review: Clustering methods. *Applied Psychological Measurement, 11*, 329-354.

Milos, G., Spindler, A., Schnyder, U., & Fairburn, C. G. (2005). Instability of eating disorder diagnoses: Prospective study. *British Journal of Psychiatry, 187,* 573-578.

Milos, G. F., Spindler, A. M., Buddeberg, C., & Crameri, A. (2003). Axes I and II comorbidity and treatment experiences in eating disorder subjects. *Psychotherapy and Psychosomatics, 72,* 276-285.

Mitchell, J. E., Crosby, R., Wonderlich, S., Hill, L., Le Grange D., Powers, P. et al. (2007). Latent profile analysis of a cohort of patients with eating disorder not otherwise specified. *International Journal of Eating Disorders, 40*, 95-98.

Mizes, J. S. & Sloan, D. M. (1998). An empirical analysis of eating disorder not otherwise specified: Preliminary support for a distinct subgroup. *International Journal of Eating Disorders, 23*, 233-242.

Mond, J., Hay, P., Rodgers, B., Owen, C., Crosby, R., & Mitchell, J. (2006). Use of extreme weight control behaviors with and without binge eating in a community sample: implications for the classification of bulimic-type eating disorders. *International Journal of Eating Disorders, 39*, 294-302.

Mond, J. M., Hay, P. J., Rodgers, B., Owen, C., & Beumont, P. J. (2005). Assessing quality of life in eating disorder patients. *Quality of Life Research, 14*, 171-178.

Monteleone, P., Brambilla, F., Bortolotti, F., La, R. A., & Maj, M. (1998). Prolactin response to d-fenfluramine is blunted in people with anorexia nervosa. *British Journal of Psychiatry, 172*, 439-442.

Morton, R. (1695). *Phtisiologia: A treatise on consumption*. London: Smith and Walford.

Moss-Morris, R., Petrie, K. J., & Weinman, J. (1996). Functioning in chronic fatigue syndrome: Do illness perceptions play a regulatory role. *British Journal of Health Psychology, 1*, 15-25.

Mundt, J. C., Marks, I. M., Shear, K., & Greist, J. H. (2002). The work and social adjustment scale: A simple measure of impairment in functioning. *British Journal of Psychiatry, 180,* 461-464.

National Collaborating Centre for Mental Health (2004). *Eating disorders: core interventions in the treatment and management of anorexia nervosa, bulimia nervosa and related eating disorders.* London: British Psychological Society.

New, A. S., Trestman, R. L., Mitropoulou, V., Benishay, D. S., Coccaro, E., Silverman, J. et al. (1997). Serotonergic function and self-injurious behavior in personality disorder patients. *Psychiatry Research, 69*, 17-26.

Nylander, J. (1971). The feeling of being fat and dieting in a school population: Epidemiologic interview investigation. *Acta Sociomedica Scandinavica, 3,* 17-26.

Office of Population Censuses and Surveys (OPCS) (2000). *Standard Occupational Classification* Her Majesty's Stationary Office (HMSO): London.

Olson, D.H., Portner, J. amd Bell, R.Q. (1982). *FACES II: Family Adaptability and Cohesion Evaluation Scales*. Minnesota: Family Social Science, University of Minnesota

Orbell, S., Johnston, M., Rowley, D., Espley, A., & Davey, P. (1998). Cognitive representations of illness and functional and affective adjustment following surgery for osteoarthritis. *Social Science and Medicine, 47*, 93-102.

Parker, G. & Manicavasagar, V. (2005). *Modelling and managing the depressive disorders*. Cambridge: Cambridge University Press.

Parker, G., Tupling., H. & Brown, L.B. (1979). A Parental Bonding Instrument. *British Journal of Medical Psychology, 52* 1-10.

Parry-Jones, W. L. & Parry-Jones, B. (1995). Implications of historical evidence for the classification of eating disorders. *British Journal of Psychiatry, 165*, 287-292.

Pottharst, K. (1990). Attachment History Questionnaire. In K. Pottharst (Ed). *Research explorations in adult attachment.* New York: Peter Lang Publishing.

Ramacciotti, C. E., Dell'Osso, L., Paoli, R. A., Ciapparelli, A., Coli, E., Kaplan, A. S. et al. (2002). Characteristics of eating disorder patients without a drive for thinness. *International Journal of Eating Disorders, 32*, 206-212.

Ricca, V.,Mannucci, E., Mezzani, B., Di Bernardo, M., Zucchi, T., Paionni, A., Placidi, G.P., Faravelli, C. (2001) Psychopathological and clinical features of outpatients with an eating disorder not otherwise specified. *Eating and Weight Disorders, 6*(3), 157 - 165.

Robins, E. & Guze, S. B. (1970). Establishment of diagnostic validity in psychiatric illness: its application to schizophrenia. *American Journal of Psychiatry, 126*, 983-987.

Rockert, W., Kaplan, A. S., & Olmsed, M. (2007). Eating disorder not otherwise specified: The view from a tertiary treatment center. *International Journal of Eating Disorders, 40,* 99-103.

Rorty, M., Yager, J., Buckwalter, J.G., Rossotto, E. & Guthrie, D. (2000). Development and validation of a parental intrusiveness scales among bulimic and comparison women. *International Journal of Eating Disorders, 28* (2), 188-201.

Rosen, J. C., Vara, L., Wendt, S., & Leitenberg, H. (1990). Validity studies of the eating disorder examination. *International Journal of Eating Disorders,* 9, 519-528.

Ruderman, A.J. & Besbeas, M. (1992). Psychological characteristics of dieters and bulimics. *Journal of Abnormal Psychology, 101*(3), 383-390.

Russell, G. F. M. (1979). Bulimia nervosa: An ominous variant of anorexia nervosa. *Psychological Medicine, 9,* 429-448.

Ryle, A., Leighton, T., & Pollock, P. (1997). *Cognitive analytic therapy and borderline personality disorder: The model and the method.* Chichester: Wiley.

Ryle, J. A. (1936). Anorexia nervosa. *Lancet, 2,* 893.

Scharloo, M., Kaptein, A. A., Weinman, J., Hazes, J. M., Willems, L. N., Bergman, W. et al. (1998). Illness perceptions, coping and functioning in patients with rheumatoid arthritis, chronic obstructive pulmonary disease and psoriasis. *Journal of Psychosomatic Research, 44,* 573-585.

Schreurs, P. J. G., Willige, G. v. d., Tellegen, B., & Brosschot, J. F. (1993). *Herziene handleiding Utrechtse Coping Lijst (UCL).* Lisse: Swets & Zeitlinger.B.V.

Simmonds, M. (1914). Ueber Hypophysisschwund mit todlichem Ausgang. *Deutsche Medizinische Wochenschrift, 40,* 322-323.

Sloan, D. M., Mizes, J. S., & Epstein, E. M. (2005). Empirical classification of eating disorders. *Eating Behaviors, 6,* 53-62.

Soukup, V. M., Beiler, M. E., & Terrell, F. (1990). Stress, coping style, and problem solving ability among eating-disordered inpatients. *Journal of Clinical Psychology, 46,* 592-599.

Spitzer, R., Devlin, M., Walsh, B. T., Hasin, D., Wing, R., Marcus, M. D. et al. (1992). Binge eating disorder: A multisite field trial of the diagnostic criteria. *International Journal of Eating Disorders, 11,* 191-203.

Spitzer, R. L., Yanovski, S., Wadden, T., Wing, R., Marcus, M. D., Stunkard, A. et al. (1993). Binge eating disorder: Its further validation in a multisite study. *International Journal of Eating Disorders, 13,* 137-153.

SPSS Inc (2004). Advanced statistics 12 [Computer software]. Chicago: SPSS Inc.

Steiger, H. (2004). Eating disorders and the serotonin connection: State, trait and developmental effects. *Journal of Psychiatry and Neurosciences, 29,* 20-29.

Steiger, H., Gauvin, L., Israel, M., Kin, N. M., Young, S. N., & Roussin, J. (2004). Serotonin function, personality-trait variations, and childhood abuse in women with bulimia-spectrum eating disorders. *Journal of Clinical Psychiatry, 65,* 830-837.

Steiger, H., Gauvin, L., Israel, M., Koerner, N., Ng Ying Kin, N. M., Paris, J. et al. (2001). Association of serotonin and cortisol indices with childhood abuse in bulimia nervosa. *Archives of General Psychiatry, 58,* 837-843.

Steiger, H., Joober, R., Israel, M., Young, S. N., Ng Ying Kin, N. M., Gauvin, L. et al. (2005). The 5HTTLPR polymorphism, psychopathologic symptoms, and platelet [(3)H-] paroxetine binding in bulimic syndromes. *International Journal of Eating Disorders, 37,* 57-60.

Steiger, H., Leonard, S., Kin, N. Y., Ladouceur, C., Ramdoyal, D., & Young, S. N. (2000). Childhood abuse and platelet tritiated-paroxetine binding in bulimia nervosa: Implications of borderline personality disorder. *Journal of Clinical Psychiatry, 61*, 428-435.

Steinhausen, H. C. (1995). Treatment and outcome of adolescent anorexia nervosa. *Hormone Research, 43,* 168-170.

Stice, E., Ziemba,A.C., Margolis, J. & Flick, P. (1996). The dual pathway model differentiates bulimics, subclinical bulimics, and controls: Testing the continuity hypothesis. *Behavior Therapy, 27*(4), 531-549

Stockford, K., Turner, H. M., & Cooper, M. C. (2007). Illness perception and its relationship to readiness to change in the eating disorders: A preliminary investigation. *British Journal of Clinical Psychology, 46*, 139-154.

Striegel-Moore, R. H., Cachelin, F. M., Dohm, F. A., Pike, K. M., Wilfley, D. E., & Fairburn, C. G. (2001). Comparison of binge eating disorder and bulimia nervosa in a community sample. *International Journal of Eating Disorders, 29,* 157-165.

Striegel-Moore, R. H., Dohm, F. A., Kraemer, H. C., Taylor, C. B., Daniels, S., Crawford, P. B. et al. (2003). Eating disorders in white and black women. *American Journal of Psychiatry, 160*, 1326-1331.

Strober, M., Freeman, R., & Morrell, W. (1999). Atypical anorexia nervosa: Separation from typical cases in course and outcome in a long-term prospective study. *International Journal of Eating Disorders, 25*, 135-142.

Stunkard, A., Grace, W. J., & Wolff, H. G. (1955). The night-eating syndrome: A pattern of food intake among certain obese patients. *American Journal of Medicine, 19*, 78-86.

Stunkard, A. (1990). A description of eating disorders in 1932. *American Journal of Psychiatry, 147*, 263-268.

Stunkard, A. & Messick, S. (1985). The Three-Factor Eating Questionnaire to measure dietary restraint and hunger. *Journal of Psychosomatic Research,* 29, 71-83.

Sullivan, P. F., Bulik, C. M., & Kendler, K. S. (1998). The epidemiology and classification of bulimia nervosa. *Psychological Medicine, 28,* 599-610.

Swedo, S. E., Leonard, H. L., Kruesi, M. J., Rettew, D. C., Listwak, S. J., Berrettini, W. et al. (1992). Cerebrospinal fluid neurochemistry in children and adolescents with obsessive-compulsive disorder. *Archives of General Psychiatry, 49*, 29-36.

Tareen, A., Hodes, M., & Rangel, L. (2005). Non-fat-phobic anorexia nervosa in British South Asian adolescents. *International Journal of Eating Disorders, 37*, 161-165.

Thaw, J. M., Williamson, D. A., & Martin, C. K. (2001). Impact of altering DSM-IV criteria for anorexia and bulimia nervosa on the base rates of eating disorder diagnoses. *Eating and Weight Disorders, 6,* 121-129.

The Price Foundation Collaborative Group (2001). Deriving behavioural phenotypes in an international multi-centre study for eating disorders. *Psychological Medicine, 31,* 635-645.

Thompson-Brenner, H. & Westen, D. (2005). Personality subtypes in eating disorders: validation of a classification in a naturalistic sample. *British Journal of Psychiatry, 186,* 516-524.

Tozzi, F., Thornton, L. M., Klump, K. L., Fichter, M. M., Halmi, K. A., Kaplan, A. S. et al. (2005). Symptom fluctuation in eating disorders: correlates of diagnostic crossover. *American Journal of Psychiatry, 162,* 732-740.

Treasure, J., Katzman, M., Schmidt, U., Troop, N., Todd, G., & de Silva. P. (1999). Engagement and outcome in the treatment of bulimia nervosa: first phase of a sequential design comparing motivation enhancement therapy and cognitive behavioural therapy. *Behaviour Research and Therapy, 37,* 405-418.

Treasure, J. & Schmidt, U. (2001). Ready, willing and able to change: Motivational aspects of the assessment and treatment of eating disorders. *European Eating Disorders Review, 9,* 4-18.

Troisi, A., Massaroni, P., & Cuzzolaro, M. (2005). Early separation anxiety and adult attachment style in women with eating disorders. *British Journal of Clinical Psychology, 44,* 89-97.

Troop, N. A., Holbrey, A., & Treasure, J. L. (1998). Stress, coping, and crisis support in eating disorders. *International Journal of Eating Disorders, 24,* 157-166.

Troop, N. A., Holbrey, A., Trowler, R., & Treasure, J. L. (1994). Ways of coping in women with eating disorders. *Journal of Nervous and Mental Disease, 182,* 535-540.

Turner, H. M. & Bryant-Waugh, R. (2004). Eating disorder not otherwise specified (EDNOS): Profiles of clients presenting at a community eating disorder service. *European Eating Disorders Review, 12,* 18-26.

Tylka, T.L., & Subich, L.M. (1999). Exploring the construct validity of the eating disorder continuum. *Journal of Counseling Psychology, 49,* 273-279.

Tylka, T. & Subich, L. M. (2003). Revisiting the latent structure of eating disorders: Taxometric analyses with nonbehavioral indicators. *Journal of Counselling Psychology, 50,* 276-286.

Valzelli, L. (1984). Reflections on experimental and human pathology of aggression. *Prog.Neuropsychopharmacol.Biol.Psychiatry, 8,* 311-325.

Waller, G. (2005). Psychological perspectives on atypical diagnoses in the eating disorders. In C.Norring & B. Palmer (Eds.), *Eating Disorders Not Otherwise Specified: Scientific and Clinical Perspectives on the Other Eating Disorders* (pp. 313-323). New York: Routledge.

Waller, J. V., Kaufman, M. R., & Deutsch, F. (1940). Anorexia nervosa: a psychosomatic entity. *Psychosomatic Medicine, 2,* 3-16.

Waller, N. G. & Meehl, P. E. (1998). *Multivariate taxometric procedures: Distinguishing types from continua.* Thousand Oaks, CA: Sage.

Ward, A. & Gowers, S. (2003). Attachment and childhood development. In J. Treasure., U. Schmidt. and E. van Furth. (Eds), *Handbook of eating disorders* (2nd ed, pp.103-120). Chichester: Wiley.

Ward, A., Ramsay, R., Turnbull, S., Benedettini, M., & Treasure, J. (2000). Attachment patterns in eating disorders: Past in the present. *International Journal of Eating Disorders, 28,* 370-376.

Ware, J. C. & Sherbourne, C. D. (1992). The MOS 36-item short form health survey, (SF-36): 1 Conceptual framework and item selection. *Medical Care, 30,* 473-483.

Watson, T. L. & Andersen, A. E. (2003). A critical examination of the amenorrhea and weight criteria for diagnosing anorexia nervosa. *Acta Psychiatricia Scandinavia, 108,* 175-182.

Weizman, R., Carmi, M., Tyano, S., Apter, A., & Rehavi, M. (1986). High affinity [3H]imipramine binding and serotonin uptake to platelets of adolescent females suffering from anorexia nervosa. *Life Sciences, 38,* 1235-1242.

West, M. & Sheldon, A.E. (1988). Classification of pathological attachment patterns in adults, *Journal of Personality Disorders, 2,* 153-159.

Westen, D. & Harnden-Fischer, J. (2001). Personality Profiles in Eating Disorders: Rethinking the Distinction Between Axis I and Axis II. *American Journal of Psychiatry, 158,* 547-562.

Westen, D. & Weinberger, J. (2004). When clinical description becomes statistical prediction. *American Psychologist, 59,* 595-613.

Widiger, T. A. & Clark, L. A. (2000). Toward DSM-V and the classification of psychopathology. *Psycholgical Bulletin, 126,* 946-963.

Wilfley, D. E., Bishop, M. E., Wilson, G. T., & Agras, W. S. (2007). Classification of eating disorders: Toward DSM-V. *International Journal of Eating Disorders, 40,* Suppl, S123-129.

Wilfley, D. E., Schwartz, M. B., Spurrell, E. B., & Fairburn, C. G. (2000). Using the eating disorder examination to identify the specific psychopathology of binge eating disorder. *International Journal of Eating Disorders,* 27, 259-269.

Wilfley, D. E., Wilson, G. T., & Agras, W. S. (2003). The clinical significance of binge eating disorder. *International Journal of Eating Disorders,* 34, Suppl, S96-106.

Williamson, D. A., Gleaves, D. H., & Savin, S. S. (1992). Empirical classification of eating disorder not otherwise specified: Support for DSM-IV changes. *Journal of Psychopathology and Behavioral Assessment, 14,* 201-216.

Williamson, D. A., Womble, L. G., Smeets, M. A., Netemeyer, R. G., Thaw, J. M., Kutlesic, V. et al. (2002). Latent structure of eating disorder symptoms: a factor analytic and taxometric investigation. *American Journal of Psychiatry, 159*, 412-418.

Wilson, G. T. & Smith, D. (1989). Assessment of bulimia nervosa: An evaluation of the Eating Disorders Examination. *International Journal of Eating Disorders, 8*, 173-179.

Wonderlich, S. & Mitchell, J. E. (2001). The role of personality in the onset of eating disorders and treatment implications. *The Psychiatric Clinics of North America, 24,* 249-258.

Wonderlich, S. A., Crosby, R. D., Joiner, T., Peterson, C. B., Bardone-Cone, A., Klein, M. et al. (2005). Personality subtyping and bulimia nervosa: psychopathological and genetic correlates. *Psychological Medicine, 35*, 649-657.

World Health Organisation (1977). *The ICD-9 classification of mental and behavioural disorders*. Geneva: World Health Organisation.

World Health Organisation (1992). *The ICD-10 classification of mental and behavioural disorders* Geneva: World Health Organisation.

Ziolko, H.-U. (1996). Bulimia: A historical outline. *International Journal of Eating Disorders, 20*, 345-358.