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UNIVERSITY OF SOUTHAMPTON

FACULTY OF SOCIAL AND HUMAN SCIENCES

School of Psychology

Posttraumatic growth in physical health conditions: The role of distress and cognitive processing

Volume 1 of 1

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Abstract

Physical health conditions can be traumatic and are often associated with psychological morbidity. Recently, researchers have recognised that people are also capable of experiencing enhanced interpersonal relationships, greater appreciation of life and increased personal strength as a result of physical health problems. Typically, this posttraumatic growth has been conceptualised from the perspective of acute trauma, thus a need to better understand the development of the phenomenon for people with health related trauma and examine the relevance of current theoretical models was identified. This review presents an evaluation of empirical literature relating to four theoretical models of posttraumatic growth. The review highlights the commonalities of the models in their emphasis on distress and cognitive processing as crucial for positive outcomes although the research reflects mixed findings for the role of distress. The discussion explores the clinical implications of the literature whilst acknowledging the need for further, theory-driven research with populations affected by sudden onset physical health conditions.

Consequently, the empirical paper examines key predictions of an influential theoretical model of posttraumatic growth in adults after spinal cord injury. Using a cross-sectional design, the study aimed to understand the role of cognitive processing and distress in the development of posttraumatic growth. A total of 102 participants between one and 42 months post-injury completed measures of anxiety, depression, posttraumatic stress disorder, intrusive rumination, deliberate rumination and posttraumatic growth. Overall, participants exhibited comparable levels of posttraumatic growth to other health populations with depression and deliberate cognitive processing significantly predictive of growth outcomes. However, different types of distress showed different relationships with posttraumatic growth. The study findings were consistent with other empirical studies and revealed important clinical implications for the provision of psychological therapy to people after

spinal cord injury. The methodological limitations and modifications that would benefit from further research are discussed.

Contents

List of Tables	7
List of Figures.....	9
List of Accompanying Material	11
Declaration of Authorship.....	13
Acknowledgements	15
LITERATURE REVIEW PAPER	17
Theoretical Perspectives	23
The Functional-Descriptive Model	23
The Two-Component Model.....	26
Organismic Valuing Theory.....	28
The Affective-Cognitive Processing Model.....	29
Empirical Review	33
Method	34
Inclusion and Exclusion Criteria	34
Search Strategy	34
Results	35
Psychological Distress	42
<i>Positive Relationship</i>	44
<i>Negative Relationship</i>	47
<i>No Relationship</i>	50
<i>Curvilinear Relationship</i>	53
<i>Opposing Relationships</i>	54
Cognitive Processing	57
<i>Importance of Cognitive Processing</i>	58
<i>Pathways to Distress and Posttraumatic Growth</i>	59
Discussion.....	63
Clinical Implications	63
Future Directions.....	65
Conclusion.....	67
EMPIRICAL PAPER.....	69
Aims	78
Hypotheses	78
Method	81
Participants.....	81
Design.....	82
Measures.....	82
Hospital Anxiety and Depression Scale	82
The Impact of Event Scale Revised.....	82
The Event-Related Rumination Inventory.....	83
Posttraumatic Growth Inventory	83
Demographics.....	84
Procedure.....	84
Inpatients	84
Outpatients Attending Follow-up Appointments	85
Outpatients Responding to Postal Questionnaires.....	85
Online Advertisement.....	86
Statistical Analysis	86
Results	89

Demographic and Clinical Characteristics	89
Posttraumatic Growth and Distress After SCI	91
Relation of Demographic and Clinical Variables to PTG	92
Relation of Psychological Variables to PTG	92
Psychological Predictors of PTG	93
Psychological Predictors of Cognitive Processing	94
Discussion.....	95
Cognitive Processing and PTG	95
Distress and PTG.....	96
Relation of Demographic and Clinical Variables to PTG	97
Posttraumatic Growth and Distress After SCI	98
Clinical Implications	100
Limitations and Future Directions.....	101
Conclusion.....	103
References.....	105
Appendices.....	125

List of Tables

Table 1	Characteristics of the psychological distress studies included in the literature review	37
Table 2	Characteristics of the cognitive processing studies included in the literature review	56
Table 3	Demographic and clinical characteristics of study participants	90
Table 4	Means, standard deviations and range of scores for questionnaire measures	91
Table 5	Bivariate correlations (Pearson r) between demographic and clinical variables and posttraumatic growth	92
Table 6	Bivariate correlations (Pearson r) between psychological variables and posttraumatic growth	93
Table 7	Hierarchical multiple regression analyses of posttraumatic growth	93
Table 8	Multiple regression analysis of intrusive rumination	94
Table 9	Linear regression analysis of deliberate rumination	94

List of Figures

Figure 1	The Functional-Descriptive Model	25
Figure 2	The Affective-Cognitive Processing Model	31
Figure 3	Flow Chart of Systematic Search	36

List of Accompanying Material

Appendix A	Hospital Anxiety and Depression Scale	127
Appendix B	The Impact of Event Scale Revised	129
Appendix C	The Event-Related Rumination Inventory	131
Appendix D	Posttraumatic Growth Inventory	133
Appendix E	London Bridge NHS Ethics Approval	135
Appendix F	University of Southampton Ethics Approval	141
Appendix G	Salisbury NHS Foundation Trust Approval	143
Appendix H	Participant Information Sheet	145
Appendix I	Consent Form	149
Appendix J	Invitation Letter	151
Appendix K	Opt In Form	153
Appendix L	Invitation Letter – revised	155
Appendix M	Online Advertisement	157
Appendix N	Debrief Form	159

Declaration of Authorship

I, Philippa Joy Beckwith, declare that the thesis entitled “Posttraumatic growth in physical health conditions: The role of distress and cognitive processing” and the work presented in the thesis are both my own, and have been generated by me as the result of my own original research. I confirm that:

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

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

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

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

§ I have acknowledged all main sources of help;

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

§ none of this work has been published before submission.

Signed:

Date:.....

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LITERATURE REVIEW PAPER

Posttraumatic growth in physical health conditions: The role of distress and cognitive processing

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“I’m doing something that is absolutely amazing, that I would never ever have done, as a result of going through the most traumatic day of my life and nearly dying, and thank God I didn’t die” (Martine Wright, Paralympic Athlete in Laville, 2012).

Throughout the London 2012 Olympic and Paralympic Games, people were reminded of the stories of those who had overcome adversity to gain significant achievements. One example was Martine Wright, a British sitting volleyball player, who lost both her legs in the July 2005 London bombings. She underwent numerous surgeries and extensive rehabilitation before being asked to join the first women’s sitting volleyball team. She credits her experience with trauma as having given her the impetus to seize every opportunity. This idea of experiencing personal growth after suffering has been recognised historically in existential philosophy and psychology (Frankl, 1963; Kierkegaard, 1983; Nietzsche, 1955). More recently, there has been increasing research to understand the positive effects of trauma. These outcomes have been labelled in many ways including *adversarial growth* (Linley & Joseph, 2004), *positive by-products* (McMillen & Cook, 2003), *benefit finding* (Affleck & Tennen, 1996), *thriving* (O’Leary & Ickovics, 1995) and *stress-related growth* (Park, Cohen, & Murch, 1996) but Zoellner and Maercker (2006) argue that the term which most clearly describes this phenomenon is *posttraumatic growth* (PTG; Tedeschi & Calhoun, 2004). Consequently, this is the term that will be used throughout this review.

Posttraumatic growth is defined as the positive psychological changes that result from highly stressful and traumatic events. According to Tedeschi and Calhoun (2004), it is distinct from other concepts such as resilience, hardiness and sense of coherence because it is concerned with a person’s ability to move beyond pre-trauma levels of functioning rather than resist the effects of stressful circumstances.

The literature has identified three domains in which PTG typically manifests (Tedeschi, Park, & Calhoun, 1998). First, perception of the self is altered, which inevitably

brings a sense of strength, increased self-reliance and paradoxically some awareness of vulnerability. Second, interpersonal relationships are enhanced; a process that is proposed to reflect increased emotional expression and compassion for others. Third, philosophy of life is transformed to include a greater appreciation of life, re-evaluation of priorities, strengthened spiritual beliefs and wisdom.

Aspects of these domains are reflected in self-report measures of PTG such as the *Perceived Benefit Scale* (PBS; McMillen & Fisher, 1998), *Thriving Scale* (TS; Abraido-Lanza, Guier, & Colon, 1998), *Stress-Related Growth Scale* (SRGS; Park et al., 1996), *Changes in Outlook Questionnaire* (CiOQ; Joseph, Williams, & Yule, 1993), *Personal Growth Scale* (PGS; Garnefski, Kraaij, Schroevers, & Somsen, 2008), *Benefit Finding Scale* (Tomich & Helgeson, 2004) and the *Posttraumatic Growth Inventory* (PTGI; Tedeschi & Calhoun, 1996). Unlike other trauma concepts such as posttraumatic stress disorder (PTSD), there is no gold standard definition or measure for PTG although the PTGI is most widely used in the literature and demonstrates good internal consistency. It comprises 21-items with five subscales that correspond to the key domains of PTG: relating to others, new possibilities, personal strength, spiritual change and appreciation of life. Studies suggest that people report growth in one or more of these dimensions although there remains a debate about whether PTG is a unidimensional or multidimensional construct (Bhushan & Hussain, 2007).

Much of the PTG research has identified variables associated with PTG including sociodemographic factors (e.g. gender, age, education), personality factors (e.g. extroversion, openness to experience, optimism, self-efficacy), ways of coping (e.g. problem-focussed coping, acceptance, social support, spirituality), cognitive processing, affect and distress (Linley & Joseph, 2004). Time since the event and stressor type have also been considered, although it appears that the characteristics of subjective appraisal in terms of awareness,

controllability and perceived threat are more important to the development of PTG (Bhushan & Hussain, 2007).

The term “trauma” in the PTG literature is much broader than the Diagnostic and Statistical Manual of Mental Disorders criteria (DSM-IV; American Psychiatric Association [APA], 1994). This illustrates that there is little agreement in the theoretical literature about what event is necessary for the occurrence of PTG. One thing that proponents are clear about is that PTG is the result of a significant personal challenge not simply every bad experience a person encounters (Tedeschi, Calhoun, & Cann, 2007). In line with this idea, the theoretical conceptualisation of PTG has been largely based on acute traumatic events and empirically tested with survivors from natural disasters (Xu & Liao, 2011), accidents (Holgersen, Boe, & Holen, 2010), war (Dekel, Mandl, & Solomon, 2011), terrorism (Park, Riley, & Snyder, 2012), assault (Kleim & Ehlers, 2009) and bereavement (Taku, Calhoun, Cann, & Tedeschi, 2008).

Given the acknowledgement that some physical health conditions may also cause PTSD (APA, 1994), PTG has begun to be investigated in populations affected by coronary artery disease (Leung et al., 2010), cancer (Cordova et al., 2007), brain injury (Powell, Gilson, & Collin, 2012), human immunodeficiency virus (HIV; Milam, 2004), spinal cord injury (SCI; McMillen & Cook, 2003), rheumatoid arthritis (RA; Danoff-Burg & Revenson, 2005), multiple sclerosis (MS; Pakenham, 2005), systemic lupus erythematosus (Katz, Flasher, Cacciapaglia, & Nelson, 2001), psoriasis (Fortune, Richards, Griffiths, & Main, 2005), amputation (Phelps, Williams, Raichle, Turner, & Ehde, 2008) and severe acute respiratory syndrome (SARS; Cheng et al., 2006). Often the events from which these conditions result can be traumatic but in all cases a person endures persistent and pervasive physical, emotional, and behavioural effects (Collicutt-McGrath & Linley, 2006). Sumalla, Ochoa and Blanco (2009) make three main points when discussing the differences between

physical health and acute sources of trauma. First, they argue that illness tends to comprise multiple stressors such as diagnosis, treatment, loss of function and alterations in body image that make it difficult to identify the exact precipitant of PTG. Second, unlike acute traumatic events, the often progressive nature of illness means that the trauma is not clearly defined and comprises ongoing uncertainties about future recurrence or worsening of the condition. Third, the internal rather than external source to a number of conditions might impact more significantly on a person's sense of self than acute trauma. Thus, physical health conditions are distinct from the acute stressors previously described and are associated with a unique set of difficulties.

Therefore, the aim of the current review is to address how theories of PTG can contribute to an understanding of the phenomenon in physical health conditions. The review will focus on four contemporary PTG models: functional-descriptive (FD; Tedeschi & Calhoun, 2004), two-component (Maercker & Zoellner, 2004), organismic valuing (OV; Joseph & Linley, 2005) and affective-cognitive processing (ACP; Joseph, Murphy, & Regel, 2012). The discussion is structured into three parts. In the first section (Theoretical Perspectives) a description of the four theoretical models is provided together with a summary of key issues and common factors. This will provide the focus for the second section (Empirical Review) in which relevant research will be summarised to explore the application of key tenets of the PTG models to physical health conditions; notably the role of psychological distress and cognitive processing. In the final section (Discussion) an overview of the clinical implications and future directions for research is provided.

Theoretical Perspectives

Early theoretical work on change emphasised the interaction of personality, cognitive appraisal, coping and environmental factors to the development of growth (see Joseph & Linley, 2006). With the exception of Aldwin's (1994) model of transformational coping, the major limitation of early theories was a failure to examine the mechanisms for PTG or integrate theoretical ideas of PTSD with PTG. Consequently, Joseph and Linley (2005) suggest that a contemporary theory should account for the phenomenon of PTG and all of its domains, must be able to explain why some people develop PTG, why others are affected by psychopathology and should accommodate current empirical findings on correlates of PTG.

The Functional-Descriptive Model

Tedeschi and Calhoun (2004) propose that the development of PTG begins with a psychologically seismic event in which an individual's beliefs and assumptions about themselves and the world are fundamentally shattered (figure 1). Drawing on the work of Janoff-Bulman (1992), this model suggests that threats to one's assumptive world produce significant emotional distress. An individual must manage this distress by engaging in cognitive processing, which is automatic at first and characterised by intrusive thoughts and images. If this initial process is successful, individuals will show a reduction in distress and disengage from previous unrealistic goals that do not fit with their new circumstances. They must continue to build new assumptions, goals and worldviews through persistent cognitive processing or rumination that is deliberate and reflective. It is through analysing the impact of trauma, making sense of what happened and searching for meaning that the model proposes is crucial to PTG.

Environmental factors such as social support can aid the development of PTG particularly if individuals are encouraged to self-disclose. This is proposed to be effective

because writing or verbalising one's experiences facilitates the deliberate cognitive processing required for PTG. The support provided by others also helps to increase the individual's tolerance for distress, which is a necessary precursor for effective cognitive processing. Furthermore, other people can share alternative perspectives, listen to existing narratives and offer their own stories of survival, which provides a sound base for re-construction of schemas. In line with early theoretical work (e.g. O'Leary & Ickovics, 1995; Schaefer & Moos, 1992), the model also highlights the importance of personality factors such as extroversion, openness to experience and optimism to an individual's ability to find benefit from traumatic experiences.

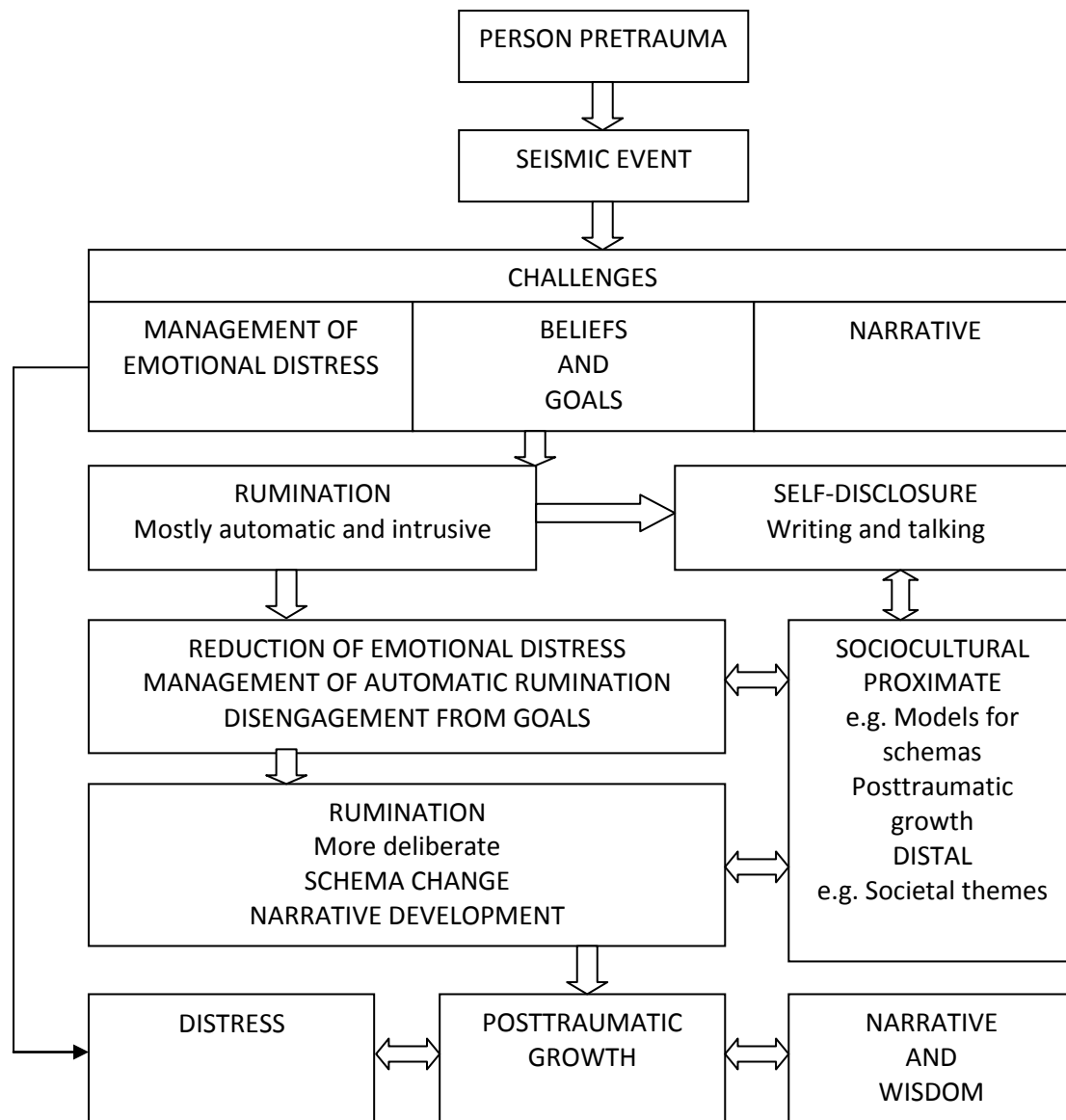


Figure 1. The functional-descriptive model of posttraumatic growth. Adapted from “Foundations of posttraumatic growth,” by L.G. Calhoun, and R.G. Tedeschi, 2006, *Handbook of posttraumatic growth: Research and practice*, p.8.

The FD model makes three key predictions. First, the process of PTG is set in motion by a major event that has the capability of shattering previously held beliefs about the world and the self. This is contrary to Aldwin’s (1994) developmental perspective on transformation and is supported by use of their term PTG rather than stress-related growth, resilience or thriving. Second, the extent to which individuals can move from intrusive to deliberate cognitive processing over time will determine their ability to either find benefit or

remain in a continuing state of distress. Third, successful deliberate cognitive processing should lead to lower levels of distress than experienced immediately after trauma. However, PTG and distress are essentially independent constructs and the presence of PTG does not preclude some level of enduring distress.

Using the criteria proposed by Joseph and Linley (2005), the FD model is able to account for the individual differences in experiences post-trauma and accounts for variables such as social support, personality factors and cognitive processing shown to be important to PTG in reviews of the literature (Linley & Joseph, 2004). However, the model's ability to account for all domains of PTG has been criticised by Janoff-Bulman (2004) as too simplistic. In the FD model, different domains of PTG such as new possibilities, personal strength and greater appreciation of life are grouped together and assumed to be the product of one type of deliberate rumination. Janoff-Bulman (2004) argues that PTG domains may have different cognitive processing pathways. For example, personal strength and new possibilities are proposed to result from "strength through suffering", which involves processing new evaluations of the self after trauma. In contrast, increased appreciation of life, relating to others and spiritual change can be understood as stemming from "existential re-evaluation" in which survivors explicitly find meaning from the trauma.

The Two-Component Model

Maercker and Zoellner (2004) liken PTG to the Roman God Janus, depicted as a two-faced being that looks to the future and the past. The two-component or "Janus face" model proposes that PTG consists of two sides: a constructive one and an illusionary one. The former is discussed within the FD model and is related to adjustment and wellbeing in the short and long term. The latter is thought to represent clinical observations of denial, avoidance and wishful thinking described by Taylor (1983) as positive illusions. The model

suggests that in the face of threat, people experience self-enhancing cognitions to reduce distress. This might represent a short-term adaptive coping strategy if positive illusions co-exist with deliberate cognitive processing of the traumatic event. However, when positive illusions are associated with denial they represent a cognitive avoidance strategy, which can have negative effects on adjustment in the long term. In particular, denial of the negative consequences of trauma represents a vulnerability factor for PTSD. Zoellner and Maercker (2006) highlight that successful coping after trauma occurs when the constructive PTG increases with time and the illusionary component decreases.

The model predicts that differential relationships between PTG and distress might exist in longitudinal and cross-sectional research designs. In longitudinal studies, constructive PTG has had time to develop and scores on measures of PTG would therefore demonstrate negative relationships with distress. Conversely, in cross-sectional studies it will be more difficult to detect the relative influence of illusionary or constructive PTG and as each has different effects on psychological adjustment, mixed results are more likely. This is compounded by the uncertainty that key PTG measures distinguish between constructive PTG and positive illusions. Maercker and Zoellner (2004) propose that measures of optimism and openness to experience might be more appropriate gauges of illusionary and constructive PTG respectively. However, personality characteristics tend to remain stable over time even after trauma (Tedeschi & Calhoun, 1996) therefore, they may not be the most accurate representation of an event-related outcome such as PTG. Much of the focus of this model is on the illusionary component and there is evidence that positive illusions come from deprecating past psychological status (McFarland & Alvaro, 2000). However, the same level of attention has not been afforded to clarifying the processes required for real PTG such as in other theoretical models.

Organismic Valuing Theory

The key basis of Joseph and Linley's (2005) OV theory of PTG is that humans are growth orientated organisms. They have a natural inclination to accommodate experiences into their sense of self and show a tendency to rebuild damaged assumptive worlds, a process called the completion tendency (Horowitz, 1982). Posttraumatic growth begins with a traumatic event that has a shattering effect on an individual's assumptions (Janoff-Bulman, 1992). This activates a person's completion tendency and they seek to integrate new trauma information into their self-structure. As the new trauma information is processed there will be high levels of distress and a series of oscillating phases between intrusion and avoidance states, characteristic of PTSD. Individuals can only process trauma and alleviate PTSD symptoms in one of two ways. A person must either assimilate trauma information into their existing schemas or they must change their existing worldviews to accommodate the new information. If a person does not engage in cognitive processing of the event but chooses to retain pre-trauma schemas through assimilation, they will remain at baseline functioning and are vulnerable to future PTSD. Accommodation is a more challenging and painful process that requires facilitation by a supportive environment. When an individual has a sense of autonomy and competence afforded by their environment they will positively accommodate the new information and experience PTG; when this is not the case a person will tend towards negative accommodation and will experience ongoing psychopathology.

The model predicts that those with greater disparity between their previous assumptions and new trauma information will have greater potential for PTSD or PTG depending on how trauma is accommodated. A person who does not experience an event as traumatic is unlikely to activate a conflict between trauma information and assumptions and is described as fully functioning. In this model, distress is a necessary precursor to PTG with the presence of intrusions and avoidance likely in the early stages posttrauma. Over time,

PTG will not necessarily be associated with reports of subjective wellbeing such as happiness. In this model, the emphasis is on psychological wellbeing and a sense of wisdom, which might, paradoxically leave an individual with a greater sense of sadness. Therefore, mixed findings on the links between PTG and distress are expected.

Similarly to the FD model's concept of deliberate rumination, the OV model highlights the importance of effortful cognitive processing for PTG. In the initial aftermath of trauma, a person begins to make sense of the event with a search for "meaning as comprehensibility" with questions such as what happened and why. When this is achieved, a person needs to move towards a search for "meaning as significance" for the development of PTG. This is best conceptualised as the deliberate cognitive processing of trauma to discover the implications of the event for one's life, future and philosophy (Davis, Nolen-Hoeksema, & Larson, 1998).

The Affective-Cognitive Processing Model

Joseph et al. (2012) argue that posttraumatic stress is the driver for PTG. Their ACP model describes how PTG and PTSD fit together in a system with cognitive processing at the core, influenced by personality, social and psychological factors (figure 2). After an event the extent to which it is considered traumatic will depend upon how much a person's pre-existing assumptions have been challenged. When there is incongruence between traumatic appraisals and pre-existing assumptions, the ACP element of the model is activated. This signals the presence of intrusions in the form of thoughts, images and sensations. These are subject to further appraisals called "ruminative brooding", which has a tendency to involve a person repeatedly going over what has happened. Both intrusions and brooding are expected to produce emotional states that lead to a person engaging in corresponding coping strategies. For example, high levels of anxiety often lead to cognitive and behavioural avoidance and

other emotion-focussed coping strategies. It is necessary for the coping and emotional states to facilitate a shift to more constructive cognitive processing called “reflective pondering”. This allows a person to make meanings from their experiences and reconcile the discrepancies between trauma-related information and existing assumptions. Like the OV model, these discrepancies are solved either through assimilation or accommodation. The latter involves a complete shift in assumptions and can be either negative (e.g. bad things happen and there is nothing I can do about them) or positive (e.g. bad things happen and I am stronger having gone through them). Positive accommodation of the discrepancies between trauma-related information and pre-existing assumptions is the expression of PTG.

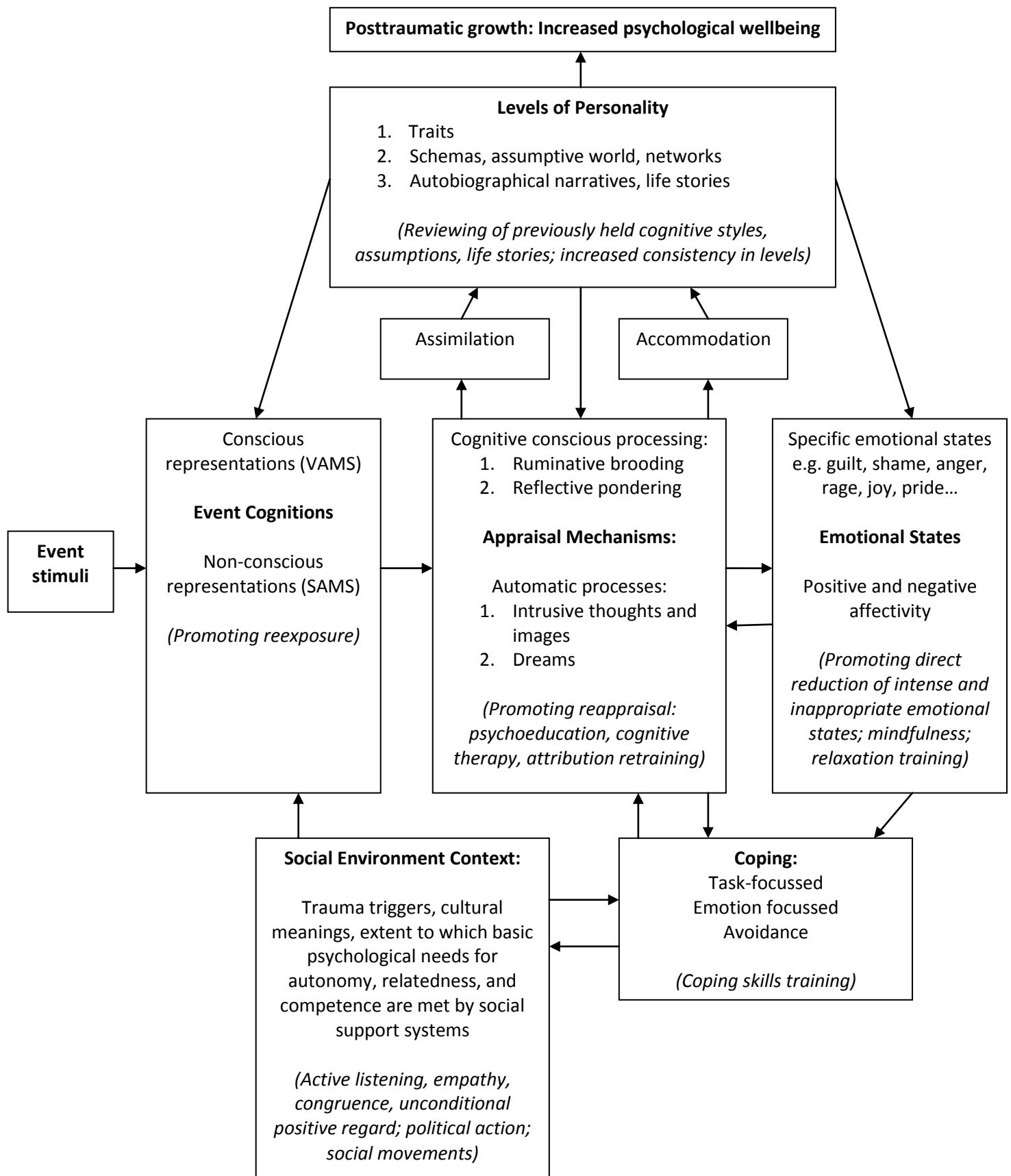


Figure 2. The affective-cognitive processing model of posttraumatic growth. Adapted from “An affective-cognitive processing model of post-traumatic growth,” by S. Joseph, D. Murphy, and S. Regel, 2012, *Clinical Psychology and Psychotherapy*, 19, p. 321.

This model predicts that states of intrusion and avoidance normally associated with PTSD are important drivers for PTG because they signify the start of cognitive processing. Reflective pondering is described as most crucial to PTG and is synonymous with the deliberate rumination that Tedeschi and Calhoun (2004) described and the search for meaning as significance highlighted by the OV model. The extent to which an individual can shift from brooding to reflective pondering through emotional, coping and social support mechanisms determines different responses to trauma.

According to this model there will be an optimum level of distress needed for PTG. When distress is low, a person's assumptions have been minimally challenged and low PTG would be expected. However, when distress is high it is likely to overwhelm an individual's coping and cognitive processing resources so their ability to resolve discrepancies will be impaired. A balance is needed in which moderate levels of distress challenge assumptions and activate intrusive and avoidant states but the person remains able to cope and engage in the necessary cognitive processing for PTG. Therefore, this model suggests that a curvilinear relationship exists between distress and PTG.

Empirical Review

Overall, the four theoretical perspectives are broadly consistent with one another and recognise the importance of several key themes. However, there are also some areas of difference. In terms of similarities, each model emphasises the idea that PTG only arises from the resolution of challenged assumptions, drawing upon the work of Janoff-Bulman (1992). The importance of cognitive processing for the development of PTG is also central to each model. The two-component model highlights the importance of cognitive processing for development of constructive PTG but does not speculate further on the content. The FD, OV and ACP models all propose the need for a person to move from one type of cognitive processing to another and whilst they have labelled these differently, the idea that it begins with intrusive rumination and develops into deliberate and reflective cognitive processing is common. However, the precise temporal course and mechanisms through which this occurs is unclear.

With regards to differences, each model proposes varying relationships between PTG and concepts of distress, psychopathology and adjustment. In the FD model, distress is necessary for PTG and may co-exist alongside positive changes but as an independent construct rather than each representing two ends of a continuum. Organismic valuing theory makes observations about the importance of intrusions and avoidance as signals that a person has begun the process of working through trauma and so positive associations between these measures of distress and PTG might be expected. It also suggests that PTG is not the same as subjective wellbeing and so, depending on the measurement tool, mixed relationships might also be detected. Intrusions and avoidance are discussed within the ACP model but a curvilinear relationship between distress and PTG is predicted. Finally, for the two-component model, associations between distress and PTG are likely to vary depending on the type of PTG detected.

The different theoretical models have some opposing predictions about the role of distress and cognitive processing in the development of PTG. The following review aims to explore the evidence for the application of current theoretical models of PTG to adults with physical health conditions. More specifically, the review will investigate the literature that has focussed on clarifying the relationships between cognitive processing and PTG and distress and PTG in physical health.

Method

Inclusion and Exclusion Criteria. Articles were included if they were peer reviewed, English language, quantitative studies. Only primary studies were examined, therefore reviews and theoretical articles were excluded. Articles had to examine the target concepts in adult patients, therefore, studies of children, adolescents, caregivers and parents were excluded. Articles with a focus on non-health related trauma such as bereavement, war, terrorism, displacement, natural disaster, road traffic accident, other accident, (sexual) assault, negative life events and daily stressors were excluded. Studies of childbirth were also excluded as this was considered a developmental event rather than a physical health condition. Measurement validation and treatment studies were excluded. Finally, studies that did not investigate the contributions of cognitive processing and distress to the development of PTG but rather focussed on other factors such as coping, resilience, personality and social support were excluded.

Search Strategy. Database searches were carried out in PsychInfo and Web of Knowledge (including PubMed and Medline) for published articles up to December 2012 containing one or a combination of the following search terms: (a) posttraumatic growth, post-traumatic growth, benefit finding, adversarial growth, positive by product, stress related

growth; (b) cognitive processing, rumination; (c) distress, anxiety, posttraumatic stress disorder, post-traumatic stress disorder, depression.

Results

A total of 592 articles were identified and screened for the aforementioned inclusion criteria. Figure 3 details a flow chart of the inclusion process. A total of 34 papers fulfilled inclusion criteria and hand searching of references identified a further seven papers resulting in a total of 41 articles to be included in this review. Details of the psychological distress studies can be found in Table 1 and a summary of the cognitive processing studies found in Table 2.

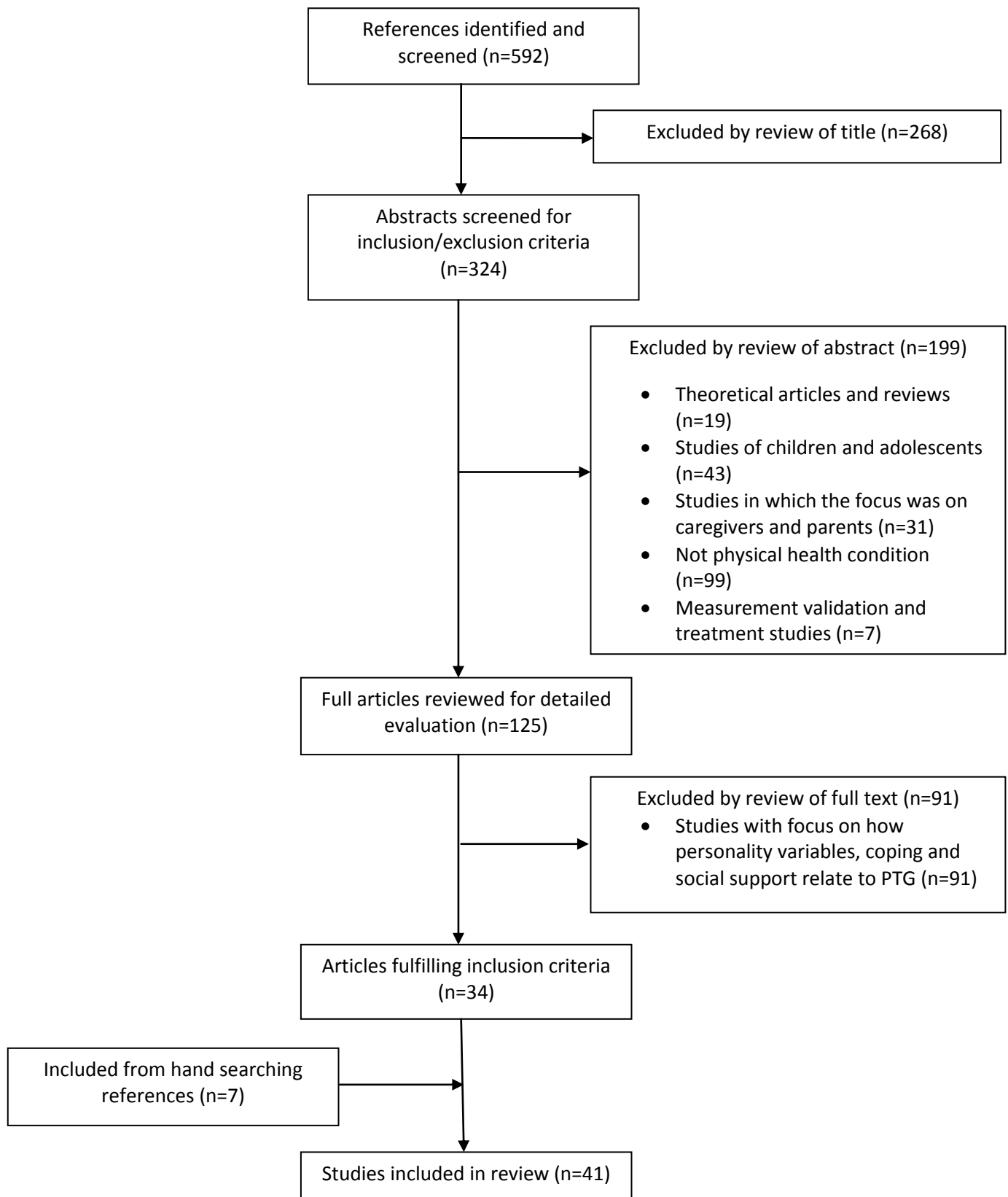


Figure 3. Flow chart of systematic search.

Table 1

Characteristics of the psychological distress studies included in the literature review (n = 39)

Study	Design	N	Health event	Mean age - years (range)	Gender composition	Mean time since occurrence	Measure of growth	PTG score	Measure of distress	Distress score
Positive relationship										
Andrykowski et al. (2005)	Cross-sectional	662	Hematopoietic stem cell transplant	49.1 (21-77)	252 (38%) male 410 (62%) female	7 years	PTGI	66.3	SF-36 CES-D STAI	75.9 11.7 37.2
Collicut-McGrath and Linley (2006)	Cross-sectional	21	Acquired brain injury	Early sample 52 (27-66) Late sample 46 (27-63)	11 males 10 females	Early sample 7 months Late sample 118 months	PTGI	Early sample median 51 Late sample median 80	HADS anxiety	Early sample median 3 Late sample median 8
Morris and Shakespeare-Finch (2011a)	Cross-sectional	235	Cancer	62.99 (19-89)	150 male 185 female	NR	PTGI	59.29	IES-R	23.80
Mystakidou et al. (2007)	Cross-sectional	58	Advanced cancer	59.79 (36-84)	16 (27.6%) male 42 (72.4%) female	<3 years (n=32) ≥3 years (n=26)	PTGI	52.33	IES-R (Greek version)	4.49
Nightingale, Sher and Hansen (2010)	Cross-sectional	112	HIV	44.9	82 (73%) male 30 (27%) female	10.9 years	PTGI	61.14	IES	25.32
Pollard and Kennedy (2007)	Longitudinal	87	Spinal cord injury	40.9 (25-73)	30 (81.1%) male 7 (18.9%) female	9.9 years	PTGI	45.72	BDI	12 weeks 10.65 10 years 9.39
Tartaro et al. (2005)	Longitudinal	39	Breast cancer	NR	100% female	Pre-diagnosis to 2.5 years post-diagnosis	Single item measure	NR	GHQ	Benefit finders 5.89 Non-benefit finders 2.75
Thornton et al. (2012)	Longitudinal	118	Lung cancer	66.81	50 (42.4%) male 68 (57.6%) female	16 weeks	PTGI	Time 1 55.30 Time 2 52.95	IES intrusions	Time 1 8.55 Time 2 8.88

Negative relationship

Cheng et al. (2006)	Cross-sectional	57	Severe acute respiratory syndrome	38.1 (22-72)	19 (33.3%) male 38 (66.7%) female	NR	TS	54.57	BDI BAI	13.61 15.81
Danoff-Burg and Revenson (2005)	Longitudinal	136	Rheumatoid arthritis	58	25 (18.4%) male 111 (81.6%) female	16 years	Single item measure	NR	HSCL	PTG group 42.43 No PTG group 48.17
Gangstad, Norman and Barton (2009)	Cross-sectional	60	Stroke	71.67 (41-88)	34 (57%) male 26 (43%) female	32.02 months	PTGI	50.33	HADS anxiety HADS depression	6.98 8.83
Garnefski et al. (2008)	Cross-sectional	139	Myocardial infarction	56.39 (35-70)	114 (82%) male 25 (18%) female	3-12 months	PGS	NR	HADS depression	NR
Ho, Chan and Ho (2004)	Cross-sectional	188	Cancer	49.29 (26-69)	32 (17%) males 156 (83%) females	≥ 5 years	Chinese PTGI	NR	HADS anxiety HADS depression GHQ	6.07 4.36 11.42
Katz et al. (2001)	Cross-sectional	87	Cancer and lupus	53	11 (12.6%) male 76 (87.4%) female	9 years	Impact of chronic illness measure	NR	POMS	NR
Leung et al. (2010)	Longitudinal	1497	Coronary artery disease	65.98	1066 (71.2%) male 431 (28.8%) female	NR	PTGI	50.3	BDI	10
Martins da Silva, Moreira and Canavarro (2011)	Cross-sectional healthy controlled study	71	Breast cancer	51.5 (30-68)	100% female	13.5 months	PTGI	63.93	HADS anxiety HADS depression	6.73 4.63
Milam (2004)	Longitudinal	835	HIV	38.35	727 (87.1%) male 108 (12.9%) female	6.39 years	Items from PTGI	4.05	CES-D	11.02
Mystakidou et al. (2008)	Cross-sectional	100	Advanced breast cancer	58.2 (31-81)	100% female	6.11 years	PTGI	43.76	HADS anxiety HADS depression	7.36 6.18

Rinaldis, Pakenham and Lynch (2010)	Longitudinal	1757	Colorectal cancer	64.96 (21-80)	1052 (59.9%) male 705 (40.1%) female	141 days	Benefit finding measure devised for study	3.68	Items from SCL-90	NR
Siegel, Schrimshaw and Pretter (2005)	Cross-sectional	138	HIV	37.6 (22-48)	100% female	7.3 years	TS	3.04	CES-D	5.70
Urcuyo, Boyers, Carver and Antoni (2005)	Cross-sectional	230	Breast cancer	53.45 (27-87)	100% female	≤ 12 months	Cancer benefit finding scale	NR	CES-D	12.24
No relationship										
Cordova, Cunningham, Carlson and Andrykowski (2001)	Cross-sectional healthy controlled study	70	Breast cancer	54.7 (27-87)	100% female	≤ 5 years	PTGI	64.1	IES CES-D	Total 23.9 12.5
Cordova et al. (2007)	Cross-sectional	65	Breast cancer	52.3 (32.5-72.8)	100% female	9.4 months	PTGI	57.8	PCL	33.1
Costa and Pakenham (2012)	Cross-sectional	154	Thyroid cancer	50.96 (19.06-87.27)	46 (29.9%) male 108 (70.1%) female	4.83 years	SRGS	4.87	HADS anxiety HADS depression	6.43 3.19
Dirik and Karanci (2008)	Cross-sectional	117	Rheumatoid arthritis	48.50 (20-75)	18 (15.4%) male 99 (84.6%) female	9 years	PTGI	51.86	HADS anxiety HADS depression	Total HADS 18.35
Fortune et al. (2005)	Longitudinal	120	Psoriasis	NR	49 (40.8%) male 71 (59.2%) female	19 years	Items from the COPE	10.2	HADS anxiety HADS depression	8.7 5.1
Harrington, McGurk and Llewellyn (2008)	Cross-sectional	76	Head and Neck cancer	66.9 (32-97)	37 (49%) male 39 (51%) female	≤ 121 months	Cancer benefit finding scale	3.55	HADS anxiety HADS depression	5.75 3.84
McMillen and Cook (2003)	Cross-sectional	42	Spinal cord injury	43.29	34 (81%) male 8 (19%) female	18-36 months	PBS	2.28	SCL-90 PDS	NR
Morris and Shakespeare-Finch (2011b)	Cross-sectional	313	Cancer	62.41	137 (43.8%) male 176 (56.2%) female	2.92 years	PTGI	59.29	IES-R	23.8

Phelps et al. (2008)	Longitudinal	83	Amputation	52.9	69 (82.6%) male 14 (17.4%) female	≤ 1 year	PTGI	6 months 61.7 12 months 57.5	PCL	6 months 31.2 12 months 31.9
									PHQ-9	6 months 6.3 12 months 6.6
Salsman, Segerstrom, Brechting, Carlson and Andrykowski (2009)	Longitudinal	55	Colorectal cancer	65.9	23 (41.1%) male 32 (58.9%) female	1.07 years	PTGI	Baseline 43.8 Follow-up 51.5	MHI anxiety	Baseline 78.7 Follow-up 79.6
									MHI depression	Baseline 84 Follow-up 85.5
									PCL	Baseline 23.2 Follow-up 21.4
Schroevers and Teo (2008)	Cross-sectional	113	Cancer	51.78 (17-85)	38 (33.6%) male 75 (66.4%) female	45 months	PTGI	73.12	SCL-90	NR
Silva, Ownsworth, Shields and Fleming (2011)	Longitudinal	60	Brain injury	44.18 (19-60)	44 (73.3%) male 16 (26.7%) female	32.92 days	PTGI	33.47	DASS	Time 1 9.5 Time 2 7.3
Thornton and Perez (2006)	Longitudinal	82	Prostate cancer	61.27 (41-78)	100% male	12 months post-surgery	PTGI	46.60	IES	Intrusions time 1 11.12 Avoidance time 1 10.91 Intrusions time 2 5.53 Avoidance time 2 6.62

Note. NR = not reported in the study.

Psychological Distress. A total of 39 studies were concerned with the relationship between distress and PTG although papers reported mixed results about the nature of the association. Five possible modes of relationship have been found and each will be discussed in turn (Table 1). Some studies found that distress is necessary to facilitate and maintain PTG (n=8). Others have suggested a negative relationship between the two variables with those high in PTG reporting less distress (n=13). Some studies reported no significant relationships between distress and PTG (n=13). One study outlined the possibility of a curvilinear relationship. Finally, four studies found opposing relationships within their samples. Results from studies that found opposing results highlight a number of key issues present across the literature.

First, studies varied considerably in their conceptualisation of distress and this had an impact on the associations reported. A total of nine studies used general composite measures of distress such as the Short Form Health Survey (SF-36; Ware & Sherbourne, 1992), General Health Questionnaire (GHQ; Goldberg & Williams, 1988), Symptom Checklist (SCL-90; Derogatis & Cleary, 1977), Profile of Mood States (POMS; McNair, Lorr, & Droppleman, 1981) and The Hopkins Symptom Checklist (HSCL; Derogatis, Lipman, Rickels, Uhlenhuth, & Covi, 1974). Overall, 24 studies utilised measures of anxiety and depression including the Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983), Centre for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977), Beck Depression Inventory (BDI; Beck & Steer, 1987), Beck Anxiety Inventory (BAI; Beck, Brown, Epstein, & Steer, 1988), Depression Anxiety Stress Scales (DASS; Lovibond & Lovibond, 1995), Patient Health Questionnaire-9 (PHQ-9; Spitzer, Kroenke, & Williams, 1999), Mental Health Inventory (MHI; Veit & Ware, 1983), Geriatric Depression Scale (GDS; Yesavage et al., 1983) and the Spielberger State-Trait Anxiety Inventory (STAI; Spielberger, 1983). Another 14 studies used measures of PTSD including the Impact of Event

Scale (IES; Horowitz, Wilner, & Alvarez, 1979), Impact of Event Scale-revised (IES-R; Weiss & Marmar, 1997), the PTSD Checklist (PCL; Weathers, Litz, Herman, Huska, & Keane, 1993) and the Posttraumatic Stress Diagnostic Scale (PDS; Foa, Cashman, Jaycox, & Perry, 1997). Studies demonstrated consistent findings of a negative relationship between depression and PTG, positive relationships between PTSD and PTG and more mixed results when distress was measured using a global tool (e.g. Dunn et al., 2011). This is in line with findings from a meta-analysis of PTG across a range of samples (Helgeson, Reynolds, & Tomich, 2006). The idea that PTSD is related to PTG supports the assumptions of the OV and ACP models that intrusions and avoidance are key mechanisms for PTG. However, it is worth considering whether PTSD scales used in the literature are measuring distress or cognitive processing. The ability for PTSD measures to assess both posttraumatic thinking and distress might explain why they are most often associated positively with PTG.

Second, the validity of PTG might play a role in explaining differing findings. Frazier et al. (2009) question whether self-reported PTG reflects genuine positive change and suggest that perceived PTG is related to increased distress whereas actual PTG is related to decreased distress. Throughout the literature, PTG is typically measured using self-report tools and the extent to which people are able to report perceived or actual PTG might impact the results. However, in the absence of more superior tools this is a difficult issue to overcome. Costa and Pakenham (2012) proposed that PTG action beyond PTG cognition is important to determining true PTG. It follows that those who are able to turn PTG cognitions into positive actions are likely to show less psychopathology than those who hold PTG cognitions alone.

Third, the timing of PTG and distress assessments has been shown to be influential. The literature in this area has examined people in the first few weeks of injury to decades later and overall the research has indicated that relationships between PTG and distress are stronger after two years.

Fourth, the impact of perceived trauma severity has been considered. The evidence reviewed has differed on whether an individual needs to perceive their condition as traumatic to experience PTG. Mixed results might be explained by how one conceptualises distress but it is noteworthy that not all conditions reviewed have traumatic or sudden onsets and were still associated with PTG (e.g. psoriasis and RA). Data such as this challenges the idea proposed by all the models that PTG arises following a seismic event. Instead it suggests that physical health conditions might be traumatic enough to produce PTG without needing a clear definition of the individual stressor responsible.

Overall, a number of the theoretical approaches are open to much interpretation. For example, the FD model suggests that PTG and distress can co-exist, therefore researchers have interpreted this to predict positive relationships between the two while others argue this means the two are independent constructs and unrelated. Nevertheless, theoretical models of PTG suggest that relationships will exist between psychological distress and PTG and this has been demonstrated in people with physical health conditions. However, the direction of the relationship remains unclear.

Positive Relationship. Across eight studies, higher levels of distress were associated with increased PTG (Table 1). This relationship was evident across a range physical health conditions such as cancer, SCI and brain injury. The positive distress-PTG link was also found in studies that used different outcome measures including global distress (Andrykowski et al., 2005; Tartaro et al., 2005), depression (Pollard & Kennedy, 2007) and anxiety (Collicutt-McGrath & Linley, 2006), lending support to the idea that there is potential for dual outcomes after life-threatening illness. Strongest support for a positive relationship between PTG and distress was provided by four studies examining the relationship between IES-(R) and PTGI scores (Morris & Shakespeare-Finch, 2011a; Mystakidou et al., 2007;

Nightingale et al., 2010; Thornton et al., 2012). This is in line with the OV and ACP model's hypothesis that intrusions and avoidance are the engine for PTG. Specifically, Thornton et al. (2012) used a longitudinal design to assess the predictive value of intrusions (from the IES subscale) on PTG. Findings indicated that intrusions predicted PTG at baseline but did not contribute to explaining PTG three months later. Therefore, it is possible that the positive linear relationship exists only when considering data cross-sectionally. Alternatively, distress might be necessary in the initial stages of PTG but over time this relationship may change.

Among those finding positive relationships, three studies examined the impact of time since trauma on PTG. Collicutt-McGrath and Linley (2006) found that participants with greater time since injury ($M=118$ months) showed significantly higher PTGI scores, which is in line with theoretical perspectives that PTG takes time to develop. However, Tartaro et al. (2005) went further to examine how time affects the association between distress and PTG. Results suggested that, whilst PTG and distress were initially positively related, women with breast cancer who showed high PTG demonstrated a significant decline in distress over time. This is proposed to reflect the FD model, which suggests that PTG does not preclude distress but is adaptive long-term. These results are contrary to Pollard and Kennedy (2007) who showed that, despite moderate levels of PTG, rates of depression remained consistent over 10 years in their sample of people with traumatically acquired SCI. In this study, mental disengagement as well as depression was significantly predictive of PTG and this concept is closely related to denial. In the two-component model, denial can co-exist with illusory PTG and this has negative effects on adjustment long-term. Therefore, it is possible that participants continued to show depressive symptoms because their experience of PTG co-existed with denial of their experience, which can lead to increased vulnerability for psychopathology (Maercker & Zoellner, 2004). Methodologically, however, it is difficult to assess what type of PTG was present in their study.

In two studies, objective and perceived disease severity was considered as a factor in the positive relationship between PTG and distress. Thornton et al. (2012) reported that people with small cell lung carcinoma had significantly higher PTGI scores than those with non-small cell lung cancer. As the former is the more aggressive form of lung cancer and is typically associated with poorer prognosis, it is possible that this diagnosis was more likely to challenge pre-existing schemas, proposed as crucial for PTG. Morris and Shakespeare-Finch (2011a) also noted that type of cancer had an impact on levels of PTG with breast cancer survivors more likely to report PTG than those with haematological and colorectal cancer. Unlike Thornton et al. (2012), this finding was not related to objective disease severity, but dependent on survivors reporting greater *perceived* severity. The study findings indicated that subjective appraisals of trauma severity were associated with greater PTSD symptoms, which in turn were significantly associated with PTG. These results suggest that both appraisals and PTSD symptoms play a role in the development of PTG lending support to the OV and ACP models.

Only one study among those finding positive relations raised the possibility that cognitive impairment might have an impact on reports of PTG and distress in physical samples. In their brain injury sample, Collicut-McGrath and Linley (2006) found evidence for comparable levels of PTG to other health conditions, although there were a disproportionate number of participants with a cerebrovascular rather than traumatic brain injuries. Whilst there was no evidence for significant demographic differences between these groups, research suggests that traumatic brain injury is associated with more diffuse damage that has differential neuropsychological effects including greater executive difficulties (Fish, Manly, Emslie, Evans, & Wilson, 2008). Given the strong cognitive element to PTG, including reflection and self-awareness, it would have been desirable to compare groups on measures of cognitive function as a possible contributing factor to PTG.

Negative Relationship. A total of 13 studies revealed that people who showed lower levels of distress were more likely to experience PTG after a physical health condition (Table 1). Most consistent evidence for this negative association was provided by studies that found significant inverse relationships between measures of depression and PTG. Whilst the literature in this area is dominated by studies of cancer, this negative relationship was also demonstrated consistently in other physical health conditions such as stroke (Gangstad et al., 2009), myocardial infarction (Garnefski et al., 2008), SARS (Cheng et al., 2006) and HIV (Siegel et al., 2005). In one methodologically robust study, Leung et al. (2010) used a large sample (n=1497) of coronary artery disease patients to prospectively identify the predictors of PTG. Participants completed questionnaire measures of demographic, social, psychological and behavioural correlates at baseline and completed the PTGI at nine months follow up. In regression analyses, having less depression at baseline was a significant predictor of PTG nine months later. Overall, the presence of depression might mean that people are less able to utilise effective coping resources and engage in cognitive processing necessary for PTG. However, many of the studies did not administer measures of cognitive processing or coping to assess this hypothesis.

Four studies administered more general measures of psychological distress and found less consistent results (Danoff-Burg & Revenson, 2005; Ho et al., 2004; Katz et al., 2001; Rinaldis et al., 2010). In one study of colorectal cancer patients assessed five and 12 months post-diagnosis, only a weak negative correlation between a composite measure of psychological distress and PTG was reported (Rinaldis et al., 2010). However, in two studies of patients with other health conditions, significant negative correlations between general distress and PTG have been exhibited. Comparison of systemic lupus erythematosus and cancer patients suggests that while people with cancer show significantly higher PTG, the

negative relationship between general distress and PTG exists for both conditions (Katz et al., 2001). Similarly, a longitudinal study of 136 adults with RA found that global distress was significantly negatively correlated with PTG (Danoff-Burg & Revenson, 2005). However, in the latter study, PTG was only measured at baseline making it difficult to draw conclusions about a causal role for distress in the development of PTG. Moreover, PTG was assessed with a single item, which is unlikely to reflect the potentially multidimensional nature of the construct.

The idea that perception of trauma has an impact on the relationship between distress and PTG was considered by one study. Martins da Silva et al. (2011) found that depression was negatively associated with PTG in breast cancer survivors but only when cancer was not perceived as traumatic. They argued that the objective rather than subjective severity of cancer was more relevant to the development of PTG in cancer survivors. Whilst recruitment was limited to women two years post-diagnosis, similar negative correlations between depression and PTG have been reported in both early stage (Urcuyo et al., 2005) and advanced breast cancer patients (Mystakidou et al., 2008). This suggests that the relationship observed by Martins da Silva et al. (2011) cannot be wholly accounted for by objective disease characteristics such as stage of breast cancer.

The majority of studies considered PTG from a Western perspective with studies conducted primarily in Europe, United States of America and Australia. Splevins, Cohen, Bowley and Joseph (2010) point out that the idea of growth following adversity is a universally sound principle, however, as cultural biases are likely to exist in the theoretical perspectives it is possible that different results might be expected in interdependent cultures. Ho et al. (2004) investigated PTG among a sample of 188 Chinese cancer patients and found that positive changes related to the self, interpersonal relationships and spirituality are likely to be universal dimensions of PTG. However, the study did not find a domain that related to

emotional change. This could reflect a tendency in Chinese culture to focus less on emotional experiences and might suggest any relationship between distress and PTG in this sample would be minimal. However, results showed PTG was negatively associated with general distress, anxiety and depression, suggesting that this mode of association is not limited to Western cultures.

Many studies in this area have assessed PTG using the PTGI, which has been questioned for failing to allow participants to report negative posttraumatic changes. It is claimed that this leads to a positive response bias and could impact on the distress-PTG relationship. Cann, Calhoun, Tedeschi and Solomon (2010) argue that people might experience both positive and negative changes in the same domains, and that examining both will create a greater understanding of posttraumatic transformation. Among the negative relationship studies, one used an adapted form of the PTGI in a longitudinal study of people with HIV (Milam, 2004). The measure allowed respondents to endorse positive and negative changes to the same items using a 1 (highly negative change) to 5 (highly positive change) scale. Posttraumatic growth was assessed in two ways: first, a mean of each PTGI item was taken and scores above three were taken to represent PTG; second, the sum of absolute positive changes was calculated. Results showed that PTG was significantly associated with lower levels of depression over time when both positive and negative changes were considered. However, when only the sum of positive changes was examined, this relationship no longer existed. Thus, depression is an impediment to PTG when PTG is made up of both positive and negative consequences of trauma. One explanation is that the wider conceptualisation of PTG in this study best represented the constructive growth identified in the two-component model and was therefore related to adjustment and wellbeing over time.

No Relationship. Thirteen studies revealed that PTG and distress were unrelated (Table 1). Seven studies tested this relationship using measures of PTSD as an indicator of distress and all failed to find significant associations between the two variables. It could be argued that the OV and ACP models imply that development of PTG from PTSD will occur over time and so it is possible those relationships will be better detected longitudinally. However, three of the studies used longitudinal designs; for example, Salsman et al. (2009) examined 55 colorectal cancer patients at 13 and 16 months post-diagnosis and found that PTSD and PTG scores were uncorrelated. Equally, studies of prostate cancer patients and people post-amputation found PTSD scores at baseline were not associated with PTG when assessed at one year follow-up (Phelps et al., 2008; Thornton & Perez, 2006).

Non-significant findings have also been reported in cancer studies utilising measures of general distress, anxiety and depression (e.g. Cordova et al., 2001; Costa & Pakenham, 2012; Harrington et al., 2008; Salsman et al., 2009; Schroevers & Teo, 2008). In health conditions other than cancer, similar contributions have been made to the literature. For example, Dirik and Karanci (2008) examined 117 Turkish RA patients around nine years post-diagnosis and found the relationship between HADS and PTGI scores was not significant.

With one exception, all of these studies recruited participants with a mean time since diagnosis of approximately one year. Among studies demonstrating a positive relationship between variables, the majority examined participants between 3-10 years post-diagnosis. Evidence from a meta-analysis of general PTG literature has shown stronger associations between PTG and distress when people were assessed more than two years after trauma (Helgeson et al., 2006). In physical health conditions, assessment of people within the first few months of diagnosis is likely to co-occur with other diagnostic assessments, treatments

and clinic visits that could also be construed as traumatic. Therefore, detection of PTG and associated correlates might be confounded by additional stressors beyond diagnosis.

Maercker and Zoellner (2004) argue that failure to find relationships between PTG and measures of psychological distress occurs because studies measure PTG using self-report tools, which may not be a valid indication of the phenomenon. One way to address this issue would be to compare self and other assessments of PTG to establish validity of the construct. Two similar studies explored the validity of PTG using self and proxy assessments and found that there were no significant correlations between PTG and distress measures and importantly there was minimal agreement between respondents and proxies on the types of positive changes that were reported (Costa & Pakenham, 2012; McMillen & Cook, 2003). These data could indicate that self-reported PTG represents illusory growth and hence is not supported by others' ratings and is not linked to psychological distress. Alternatively, the low agreement could reflect the private nature of PTG cognitions. Indeed, Costa and Pakenham (2012) found that self-reported positive lifestyle changes associated with PTG were supported by partner ratings of behaviour change suggesting that PTG action rather than cognition is more easily detected by others.

Earlier in this review, appraisals of trauma severity and their ability to contribute to levels of distress and PTG were considered (Martins da Silva et al., 2011; Morris & Shakespeare-Finch, 2011a). Among studies finding null relationships between distress and PTG, one considered the impact of subjective appraisal of trauma (Cordova et al., 2007). Consistent with predictions, perceived threat was a unique predictor of PTG and PTSD symptoms although there were minimal correlations between distress and PTG. Across the literature, subjective appraisal appears to be important for PTG outcomes although how this impacts the distress-PTG link remains unclear. In all these studies, appraisal was measured with a single "yes or no" response item based on DSM-IV criteria (APA, 1994). However,

subjective appraisals of trauma may be broader than simply whether receipt of diagnosis was experienced as traumatic. The extent to which participants view their condition as limiting them functionally may also have an impact on levels of distress and PTG. One longitudinal study examined the impact of subjective functional impairment on the relationship between PTG and distress in people with acquired brain injury (Silva et al., 2011). Findings revealed that subjective functional impairment was significantly correlated with depression and was also related to higher levels of PTG at six months. However, depression and PTG were not directly related. Therefore, perceiving injury as having greater impact on physical functioning and lifestyle might reflect the shattering of assumptions consistent with theoretical models. This challenge forced people to resolve the discrepancies between new information and pre-existing assumptions and in the case of this sample, discrepancies were resolved positively with PTG as an outcome.

The idea that one needs sufficient cognitive capacity to develop PTG is implied by the theoretical approaches and has been raised previously in this review. However, the related issue of emotional capacity has rarely been discussed in the PTG literature. The FD model proposes that the route to PTG involves letting go of old goals and identities and developing new perspectives to rebuild the assumptive world. This requires psychological mindedness. Only one study (Fortune et al., 2005) has explored this idea in the literature using the Toronto Alexithymia Scale (TAS-20; Bagby, Parker, & Taylor, 1994). Generally understood as a difficulty identifying and describing feelings, it was hypothesised that higher levels of alexithymia would be associated with lower PTG given the potential contribution of emotional awareness to its development. Results showed that anxiety and depression were not related to PTG suggesting, once again, that distress and PTG can co-exist but findings also highlighted that participants who scored highly on the alexithymia were significantly less likely to report PTG. According to Grotstein (1997) alexithymia is an affect-processing

disorder that hinders an individual's re-organising process. Therefore, it is not surprising that this should negatively impact on PTG. More important, this study highlights an exciting avenue for further investigation particularly if it is possible that teaching strategies for recognising emotions might facilitate PTG.

Curvilinear Relationship. In the ACP model, distress and PTG are proposed to show a curvilinear relationship because a moderate level of distress is an indication that the individual's assumptive world has been sufficiently challenged, but not so much that it impedes their ability to engage in cognitive processing (Joseph et al., 2012). Whilst this relationship has been demonstrated in non-health related studies (Dekel et al., 2011; Kunst, 2010; McCaslin et al., 2009), it has rarely been investigated in people with physical health conditions. Only one study has explored the possibility of a curvilinear relationship in breast cancer survivors by examining two previously studied cohorts of 230 and 136 women (Lechner et al., 2006). In the first cohort, there was a curvilinear relationship between CES-D scores and PTG and in the second cohort, IES scores showed a curvilinear relationship with PTG. At first glance this lends support to the ACP model's predictions, however, it is worth noting that the quadratic relationships described by this study were (a) low and high PTG is associated with low distress and (b) moderate PTG is associated with the highest distress. This is subtly different to the idea that moderate distress should be associated with the highest PTG suggested by Joseph et al. (2012). Some women reacted to cancer with low levels of distress and low levels of PTG perhaps because the diagnosis failed to sufficiently challenge their assumptions and they had no reason to experience distress or PTG. Others reacted to cancer with low distress but reported high levels of PTG. This seems to characterise the pattern of negative linear relationships although in this study the group of women demonstrating this relationship was small and therefore findings require replication. Finally,

there was a group of women who reported moderate levels of PTG but had the worst psychological profiles, characterised by higher levels of intrusive thoughts, more efforts to avoid thoughts and greater depression. According to the two-component model, this might simply reflect the tendency for this group of women to report illusionary rather than constructive PTG hence it was associated with poorer psychological wellbeing.

This study highlights a key methodological flaw with the literature discussed thus far in the tendency to consider only linear relationships between distress and PTG. Lechner et al. (2006) argue that positive relationships exist when a greater proportion of the sample fall towards one end of a scale and when a study uses a sample with a larger proportion of people falling to the other end of the scale a negative relationship will be found. When neither of these things happen, there will be no relationship. They suggest that future research should consider the possibility of quadratic relationships and examine samples that are large enough to produce a broad range of scores on key measures.

Opposing Relationships. Four studies identified opposing relationships between PTG and distress within their samples (Table 1). Two cross-sectional cancer studies illustrated how the different conceptualisations of distress have an impact on its relationship with PTG. Results revealed that anxiety and global distress were unrelated to PTG, depression exhibited a significant negative correlation and PTSD was significantly positively associated with PTG (Dunn et al., 2011; Jansen et al., 2011). Whilst cross-sectional, both studies benefitted from large samples.

In one of two longitudinal studies, Hawley and Joseph (2008) found no correlation between HADS scores and PTG in 165 people assessed six months after a traumatic brain injury. However, at 10 years follow-up, results indicated significant negative relationships between these variables. These results suggest that the relationship between PTG and distress

has the capacity to change over time. From the perspective of the FD model this represents the reduction of distress over time when PTG develops. Conversely, the two-component model would explain the findings by suggesting that in longitudinal studies, constructive PTG has had time to develop (and illusionary PTG reduce) therefore, scores on measures of PTG would be expected to be negatively associated with distress over time.

Zoellner and Maercker (2006) cite evidence that illusionary PTG arises from negatively biased recall of past psychological status (McFarland & Alvaro, 2000). One study has explored this idea by examining whether PTG is differentially related to actual versus perceived distress over time (Widows et al., 2005). A total of 72 cancer patients completed measures of distress (POMS) before bone marrow transplant and measures of PTG and distress post-transplant. In addition, participants were asked to complete the POMS a second time during the post-transplant assessment but were instructed to rate each item based on how they were feeling before their bone marrow transplant. Therefore, the study assessed pre-transplant distress, post-transplant distress and recalled pre-transplant distress. Results showed that both pre-transplant and post-transplant distress was not significantly related to PTG. However, recalled pre-transplant distress was significantly greater than pre-transplant distress and the more negatively biased this recall, the greater it was related to PTG. As predicted by the two-component model, perceptions of PTG are attributable to the deprecation of pre-transplant psychological status implying that the PTG detected in this sample was illusionary.

Table 2

Characteristics of the cognitive processing studies included in the literature review (n = 9)

Study	Design	N	Health event	Mean age - years (range)	Gender composition	Mean time since occurrence	Measure of growth	PTG score	Cognitive processing measure
Importance of cognitive processing									
Benetato (2011)	Cross-sectional	56	Amputation	31 (22-48)	53 (94.6%) male 3 (5.4%) female	3 years	PTGI	59.1	Rumination Inventory
Bower, Kemeny, Taylor and Fahey (1998)	Cross-sectional	40	HIV	39.5 (27-50)	100% male	8 months	Semi-structured interview items	NR	Semi-structured interview items
Dunn et al. (2011)	Cross-sectional	439	Cancer	59.27	180 (41%) male 259 (59%) female	87.5 weeks	Cancer benefit finding scale	NR	IES intrusions
Gangstad et al. (2009)	Cross-sectional	60	Stroke	71.67 (41-88)	34 (57%) male 26 (43%) female	32.02 months	PTGI	50.33	CPOTS
Garnefski et al. (2008)	Cross-sectional	139	Myocardial infarction	56.39 (35-70)	114 (82%) male 25 (18%) female	3-12 months	PGS	NR	CERQ
Pathways to distress and PTG									
Morris and Shakespeare-Finch (2011b)	Cross-sectional	313	Cancer	62.41	137 (43.8%) male 176 (56.2%) female	2.92 years	PTGI	59.29	Rumination Inventory
Nightingale et al. (2010)	Cross-sectional	112	HIV	44.9	82 (73%) male 30 (27%) female	10.9 years	PTGI	61.14	Rumination Inventory
Phelps et al. (2008)	Longitudinal	83	Amputation	52.9	69 (82.6%) male 14 (17.4%) female	≤ 1 year	PTCI	6 months 61.7 12 months 57.5	CPOTS
Salsman et al. (2009)	Longitudinal	55	Colorectal cancer	65.9	23 (41.1%) male 32 (58.9%) female	1.07 years	PTGI	Baseline 43.8 Follow-up 51.5	The Rumination Scale

Note. NR = not reported in the study.

Cognitive Processing. The FD, OV and ACP models acknowledge that intrusive thoughts are an expected outcome after a traumatic event and are necessary for the development of deliberate rumination and therefore PTG. However, if a person cannot disengage from this type of processing they will remain in a continued state of psychological distress. If a person can progress to deliberate rumination, this will be most crucial for PTG (Tedeschi & Calhoun, 2004). A total of nine studies concerned the relationship between cognitive processing and PTG (Table 2). Unlike studies relating to distress, there is much consensus in the empirical as well as theoretical literature about the importance of cognitive processing for the development of PTG. Overall, the literature indicated that the cognitive processing predictions made by the theoretical models of PTG can be applied to people with physical health conditions. There was support that effortful, deliberate and positive styles of rumination are predictive of PTG. Conversely, thinking that is characterised by intrusions, denial and blame might be a useful promoter of deliberate rumination but is more likely to be associated with distress, particularly if it is persistent over time. Studies differed in the focus of their research with some demonstrating the importance of cognitive processing for PTG (n=5) and others highlighting different pathways to distress and PTG through cognitive processing (n=4).

The measurement of cognitive processing in the literature is less contested than measurement of psychological distress. Whilst the term rumination is often used synonymously with cognitive processing, it is distinguished from the type of rumination associated with depression and other mood disorders (Tedeschi & Calhoun, 2004). Therefore, standard tools for measuring depressogenic rumination such as the Rumination Responses Scale (Treynor, Gonzalez, & Nolen-Hoeksema, 2003) are likely to be poor indicators of the type of rumination proposed as necessary for PTG. Therefore, Calhoun, Cann, Tedeschi, & McMillan (2000) developed the Rumination Inventory that was designed to assess the type of

cognitive processing common after trauma. As this scale was developed specifically to test for intrusive and deliberate rumination both in the moment and soon after trauma, three studies utilised this measure. Others have used the Cognitive Processing of Trauma Scale (CPOTS; Williams, Davis, & Millsap, 2002) that assesses five aspects of cognitive processing: (a) positive cognitive restructuring, (b) downward comparison, (c) resolution, (d) denial, and (e) regrets. One study conceptualised cognitive processing using the Cognitive Emotion Regulation Questionnaire (CERQ; Garnefski, Kraaij, & Spinhoven, 2002). This can be used to measure a cognitive response to a specific event, in particular, self-blame, other-blame, rumination, catastrophising, putting into perspective, positive refocusing, positive reappraisal, acceptance and planning. One study used the Rumination Scale (Martin, Tesser, & McIntosh, 1993), which measures a sense of control over thoughts and cognitive rehearsal. Another study used the intrusions subscale of the IES as it is possible that this can represent cognitive processing rather than distress in studies of PTG. Finally, one study assessed cognitive processing through use of a semi-structured interview that asked about the type of thinking participants had engaged in since trauma.

Importance of Cognitive Processing. Without exception, all of the studies reviewed agreed that cognitive processing was important to the development of PTG. Despite studies being consistent in discerning support for the role of cognitive processing, some are methodologically weak. For example, two studies used cross-sectional designs to report significant associations between cognitive processing and PTG, but neither considered more than one form of cognitive processing and both used questionable measures to assess the construct (Bower et al., 1998; Dunn et al., 2011). Even when another study used the Rumination Inventory to investigate PTG and cognitive processing in 56 people following a traumatic amputation, the analysis did not separate the individual effects of rumination type.

Therefore, it failed to significantly contribute to an understanding of what type of event-related rumination is helpful for development of PTG (Benetato, 2011).

Two studies examined various types of cognitive processing to gain a broader sense of the predictive validity of different types of rumination and found support for the idea that deliberate cognitive processing is necessary for PTG (Gangstad et al., 2009; Garnefski et al., 2008). Results showed that positive refocusing, positive reappraisal, resolution and putting into perspective were significantly correlated with PTG. These factors represent the efforts made to search for meaning and are akin to the deliberate rumination highlighted by the FD, OV and ACP models. However, in one study, results also showed that downward comparison and denial were predictive of PTG (Gangstad et al., 2009). These items characterise aspects of cognitive processing that are likely to include counterfactual thinking, blaming others and anger, all of which are proposed to hinder positive outcomes in the theoretical models. Regardless of their valence, these items signify the process of intrusive rumination, which is an important pre-cursor to deliberate rumination and therefore to PTG (Tedeschi & Calhoun, 2004). It is possible that participants had begun the process of shifting from one to the other but the temporal order of different cognitive processing styles could not be detected by the measure used. When the study results were examined with time as a factor, the association between resolution and PTG became more significant lending support to the idea that time is necessary for deliberate cognitive processing to develop.

Pathways to Distress and Posttraumatic Growth. Theoretical models predict that the extent to which individuals can move from intrusive to deliberate cognitive processing determines their ability to either develop PTG or experience some level of enduring distress. Evidence from non-health studies suggests that PTG and distress begin as similar constructs but are diverted by the type of cognitive processing that a person does (Dekel et al., 2011). It

is proposed that intrusive rumination is linked to distress and deliberate rumination to PTG. As predicted, across four studies in physical health conditions, intrusive aspects of cognitive processing were linked to distress outcomes and deliberate cognitive processing was associated with PTG (Table 2). One longitudinal study of people following amputation found that PTG could be predicted by positive cognitive processing factors whereas distress predicted by negative cognitive processing factors (Phelps et al., 2008). As positive cognitive processing can be mapped onto the components of deliberate rumination these data suggest the importance of fostering this type of cognitive processing for PTG. However, in this study it was unclear whether this pathway was mediated by coping strategies, social support or other behavioural changes. A separate study (Salsman et al., 2009) found similar results although they used a rumination tool that measured stable dispositions in the tendency to ruminate rather than transient event-related rumination; the latter of which is more important to PTG outcomes (Cann et al., 2011).

More convincing evidence of pathways to distress and PTG via cognitive processing is provided by one study of 313 people with cancer (Morris & Shakespeare-Finch, 2011b). Using the Rumination Inventory, results indicated that deliberate rumination was positively associated with PTG and intrusive rumination was positively associated with distress. The mean time since diagnosis in this study was three years, which suggests that intrusive rumination might only be dysfunctional when it persists long after trauma in line with the FD, OV and ACP models.

Theoretical models predict an interaction between the timing and content of cognitive processing, however, only one study used path analysis to explore this idea. Nightingale et al. (2010) administered the Rumination Inventory to 112 patients receiving treatment for HIV. Findings revealed that past intrusive rumination predicted PTG, past deliberate rumination predicted PTSD symptoms, recent intrusive rumination predicted PTSD symptoms and recent

deliberate predicted PTG. This is consistent with PTG models that postulate how, with time, deliberate cognitive processing is most predictive of PTG but that intrusive cognitive processing is needed to form the basis for this type of processing. Methodologically, the cross-sectional design of the study precludes generalisations about causal relationships. However, the relative paucity of the literature on the content and timing of cognitive processing in physical health samples means this study leads the way for further exploration.

Discussion

Clinical Implications

This discussion has described some of the changes associated with PTG as enhanced appreciation for life, personal strength, new opportunities and stronger relationships with others. Given the inherent value of these outcomes, researchers have begun to consider the clinical utility of PTG (Tedeschi & Calhoun, 2006). According to the different theoretical models, PTG can be facilitated in several ways. From the OV perspective, PTG can be engendered by supporting clients to accommodate rather than assimilate new trauma information. The ACP model highlights a need to provide a social environment that is able to support the cycle of cognitive processing. In addition, regular exposure to trauma related stimuli will be important to promote reappraisal of the trauma and its meaning. All of this should be addressed in the context of a therapeutic relationship that seeks to normalise distress (thus reducing denial), promote helpful coping strategies and reduce negative emotional states (Joseph et al., 2012). There is much overlap in the theoretical approaches suggesting that there are core principles in the application of PTG to clinical contexts. Notably, clinicians should be aware of PTG as an outcome of trauma and be careful not to suggest that the absence of PTG is a failure to recover successfully. They should describe PTG as an outcome from the struggle with a challenging event rather than a direct result of the event itself and encourage a person to rebuild their shattered assumptions by allowing them to integrate the self with trauma-related information (Joseph & Linley, 2006).

A number of therapeutic approaches for PTSD pertain to these ideas including exposure therapy (Foa & Rothbaum, 1998) and cognitive behaviour therapy (CBT; Ehlers & Clark, 2000). However, as this discussion has indicated, the relationship between distress and PTG is not straightforward and alleviation of distress might not signify facilitation of PTG. Both CBT and exposure therapy for PTSD after acute trauma appear highly effective for

reduction of PTSD symptoms but are associated with significant increases in only two domains of PTG; new possibilities and personal strength (Hagenaars & van Minnen, 2010; Zoellner, Rabe, Karl, & Maercker, 2011). These studies illustrate the care that should be taken to ensure PTG is not considered an expectation after treatment as the pressure to report positive outcomes might have the paradoxical effect of thwarting PTG (Sawyer, Ayers, & Field, 2010).

Empirical study of ways to facilitate growth in physical health conditions is in its infancy and only a few studies have included PTG as an outcome after treatment. For example, Antoni et al. (2001) delivered a cognitive-behavioural stress management intervention to women with early stage breast cancer and found that the intervention increased reports of PTG while reducing levels of depression. This is consistent with the data discussed showing a negative relationship between depression and PTG. Similar results were also found for men diagnosed with prostate cancer who showed increased PTG after a stress management intervention compared to controls (Penedo et al., 2006). It is possible that the interventions were successful because the group format provided a supportive environmental context and the treatment protocol had an emphasis on reducing distress and improving coping strategies in line with Joseph et al. (2012).

Rather than advocating specific treatment techniques, Tedeschi and Calhoun (2006) propose a therapeutic stance called expert companionship that is compatible with a number of standard treatment protocols. This comprises a set of basic assumptions about the role of the therapist as someone who facilitates rather than creates PTG. Treatment using this approach is characterised by high quality interactions with the clinician listening but not solving, tolerating distress and contributing their knowledge of trauma. Using the components of the FD model as a basis for guiding intervention, Tedeschi and Calhoun (2006) suggest that the expert companion helps clients to manage emotional distress, allow constructive self-

disclosure, encourage deliberate cognitive processing, explore trauma narratives with PTG domains and develop an alternative identity. As the central element of the model is cognitive processing, the goal of this approach is not to relieve all distress because distress is important for cognitive processing. Instead, the clinician helps the client to tell the difference between intrusive and deliberate rumination and guides the person to move from one to the other. Given the evidence that persistent intrusive rumination is linked to distress, the expert companion tends to allow a person to engage in early attempts to comprehend what has happened but helps to move them beyond this to meaning making for significance.

Future Directions

The literature discussed suggests that PTG is an area of research that has developed exponentially in the last decade perhaps reflecting the need for researchers and clinicians to shift their focus away from negative outcomes of trauma. Currently, empirical study is attempting to match the rate of theoretical development and there remains much to be learned. More research is necessary to produce consistent results on the relationships between psychological distress and PTG. Given the different relationships demonstrated between PTG, depression, anxiety and PTSD, it would be beneficial for studies to use consistent measures to capture these specific distress outcomes rather than use composite tools. It is likely that exploration of non-linear relationships and investigation of potential moderating variables such as cognitive processing, disease severity, subjective appraisal and contextual factors might also help explicate this relationship. A previous meta-analysis indicated that the timing of assessment of distress and PTG might have an impact on the strength of relationships between them (Helgeson et al., 2006) therefore, an important consideration for future work should be to analyse time since trauma as another potential moderator.

Although researchers are increasingly using theory to guide their work, many studies have explored correlates of PTG rather than testing specific hypotheses of the theoretical models. Some of this research has provided useful insights; however, it does not necessarily contribute to the progression of theoretical developments. For example, cognitive processing is a central component to all theoretical models, however, relatively few studies have measured the predictive value of cognitive processing in terms of the type and timing needed to produce PTG. Therefore, future studies should seek to test particular theoretical assumptions including those relating to cognitive processing.

One important concern in the current review is the over emphasis of studies on people with cancer. Comparatively few studies have examined other health conditions and a potential issue is the nature of the onset of the condition. The literature suggests that people who have developed complicated medical conditions gradually (e.g. psoriasis) are also capable of growth experiences. However, it is possible that those with an acute traumatic onset (e.g. SCI and amputation) to their condition will reveal different PTG profiles and further study might seek to dedicate more attention to these types of conditions.

An important avenue for further research is the adaptive significance of PTG over time. There is an assumption that positive outcomes characteristic of PTG will be beneficial, and there is some evidence that PTG is associated with improved physiological health outcomes such as reduced CD4 T cells in people with HIV (Bower et al., 1998). However, research is only beginning to identify the mechanisms, neural and behavioural, that might be responsible for these changes, which is an exciting and valuable area for investigation (Barskova & Oesterreich, 2009).

Research has shown that there is potential for PTG to be facilitated in people after trauma although there are few published empirical studies in this area. As much of the PTG research is conducted in groups of white, middle classed, western women, it will be necessary

for studies to establish if elements of PTG exist in more diverse ethnic and cultural groups before promoting universal PTG interventions. Additional work to determine if specific treatments are more helpful than others at supporting PTG and the effectiveness of the expert companion therapeutic stance is also required.

Conclusion

This review highlights that people who suffer from physical health conditions are able to report positive outcomes in the face of challenging medical and emotional circumstances. The four influential theoretical models present different ideas about whether this reflects real or illusionary change but all show they can be applied to populations beyond acute trauma and further investigation into their specific predictions in health populations is indicated. Although the current evidence base is limited, the growth of positive psychology is rapid and has promising clinical utility for the future. Enhancing our understanding of the PTG phenomenon might ultimately help to improve the interventions offered to people who have experienced loss and trauma. At the very least, a shift in culture from clinicians trained only to expect psychopathology to be accepting of growth outcomes will have significant implications for the types of mental health services offered to people with physical health conditions in the NHS.

EMPIRICAL PAPER

Posttraumatic growth after spinal cord injury: The role of distress and cognitive processing

Word count: 8,510

Spinal cord injury (SCI) presents a considerable challenge for survivors. Typically, the events from which they result are traumatic but the subsequent physical and psychological adjustments required are significant (Bonanno, Kennedy, Galatzer-Levy, Lude, & Elfstrom, 2012). The level of a SCI is described in terms of its nerve root level, which is broadly divided into the neck (cervical area; C1-8), chest (thoracic area; T1-12), low back (lumbar area; L1-5) and lower back (sacral area; S1-5). Damage at different levels of the spinal cord will reveal varying neurological deficits including motor, sensory and autonomic function impairments. This can include paralysis, breathing difficulties, bladder and bowel incontinence, sexual dysfunction, temperature dysregulation, muscle spasm and pain (Cole, 2004). Paralysis is reported as paraplegia (below the waist) and tetraplegia (below the neck), although the degree of function depends on whether the spinal cord is damaged completely or incompletely. For people with complete injuries there is total abolition of power and sensation below the injury, whereas those with incomplete injuries may have some preserved function, although this is likely to be variable between people (Glass, 1999).

Approximately 1000 SCIs occur in the UK each year, with a prevalence figure close to 40,000 (Glass, 1999). According to a review conducted on data worldwide, the majority of SCIs are caused by traumatic events with road traffic accidents (RTA) and falls the most common (van den Berg, Castellote, Mahillo-Fernandez, & de Pedro-Cuesta, 2010). Spinal cord injury might also develop from seemingly non-traumatic events such as infection or spinal stroke. In these types of SCI the onset of disability is still likely to be sudden and unexpected and may produce problems of adjustment similar to that of traumatic SCI (van Leeuwen, Hoekstra, van Koppenhagen, de Groot, & Post, 2012).

In addition to physical consequences, people with SCI are at increased risk of developing psychological distress, with rates of depression ranging from 20-40% (Craig, Tran, & Middleton, 2009). Other studies have examined rates of posttraumatic stress disorder

(PTSD) in those with SCI and prevalence estimates range from less than 10% (Krause, Saunders, & Newman, 2010) to over 60% (Hatcher, Whitaker, & Karl, 2009). Whilst people with SCI suffer significantly higher levels of distress compared to the general population, anxiety and depression are not inevitable consequences and people are capable of making adjustments and reporting positive outcomes (Pollard & Kennedy, 2007; Post & van Leeuwen, 2012).

A growing body of literature describes how experience of adverse life events may lead to positive changes (Joseph & Linley, 2006). Some examples include increased sense of emotional growth, closer family relationships, improved intimate relationships, increased appreciation of life and strengthened spiritual beliefs (Tedeschi & Calhoun, 1996). These changes have been labelled using a number of terms including *benefit finding* (Affleck & Tennen, 1996), *positive by-products* (McMillen & Cook, 2003), *thriving* (O'Leary & Ickovics, 1995) and *posttraumatic growth* (PTG; Tedeschi & Calhoun, 2004). The latter has been defined as the positive psychological changes experienced after challenging or traumatic events. This paper uses the term PTG as this is most commonly used in the literature and most clearly reflects the phenomenon.

Posttraumatic growth has been investigated in relation to physical health conditions such as cancer (Llewellyn et al., 2013), brain injury (Silva et al., 2011), heart disease (Leung et al., 2010) and HIV (Sawyer et al., 2010). To date, only five studies have investigated PTG in SCI populations. Most have focussed on identifying whether the concept is applicable to people after SCI although there are differences in the methodological approaches used to gain this understanding. Using self-report tools, McMillen and Cook (2003) found that PTG was commonly reported by 42 people between 18-36 months post SCI lending support to the idea that PTG is possible in this population. However, the study raised questions about the validity of PTG in this sample because there was limited agreement between participants and their

significant others on the amount of PTG experienced. Using a more robust methodology, Pollard and Kennedy (2007) found a wide range of PTG scores in 87 people assessed longitudinally at 12 weeks and again at 10 years post-injury. Results on the Posttraumatic Growth Inventory (PTGI; Tedeschi & Calhoun, 1996), showed that the mean score for this sample was 45.72, which is lower than reported for breast cancer survivors (Cordova et al., 2001; Morris & Shakespeare-Finch, 2011a). Differences between the two illnesses in terms of onset, diagnosis and treatment might account for the difference. Likewise, the status of cancer in the media and promotion of positive thinking among survivors might have inflated PTG scores in these samples.

Two qualitative studies aimed to capture the experience of PTG for people after SCI and crucially attempt to explain the mechanisms of change. Evidence of PTG was reported in three key domains: experience of meaningful family relationships, experience of meaningful engagement and appreciation of life (Chun & Lee, 2008). Furthermore, meaningful engagement in leisure was necessary for PTG because it provided opportunities to find personal strengths, build companionship and generate positive emotions (Chun & Lee, 2010).

Whilst PTG has been identified after SCI, researchers have also examined the adaptive value of PTG for adjustment after SCI. Kortte, Gilbert, Gorman and Wegener (2010) conducted a longitudinal study of 87 people assessed during inpatient rehabilitation and three months post-discharge and found that whilst participants reported moderate PTG, this was not significantly predictive of life satisfaction at baseline or follow-up. Together, this research has provided evidence that PTG is possible after SCI and has begun to identify the correlates associated with PTG, including active coping and depression (Pollard & Kennedy, 2007). However, all studies suggested the need for further research to clarify the extent of PTG in SCI populations, its predictors and relationship to adjustment and wellbeing.

In a review of the literature, Linley and Joseph (2004) reported variables associated more generally with PTG. The authors suggest that PTG is not a function of the type of trauma but more related to the subjective appraisal of the event. Specifically, greater perceived threat has been associated with increased growth. Further correlates indicated were sociodemographic factors, personality factors, ways of coping, social support, cognitive processing, and distress (Linley & Joseph, 2004). A number of these variables are reflected in an influential theoretical model of PTG; the functional-descriptive (FD) model (Tedeschi & Calhoun, 2004). According to this model, PTG is a process that begins with a crisis in which the individual's beliefs and schemas about themselves and the world are fundamentally shattered; a process which produces emotional distress. The individual engages in cognitive processing to manage this distress, a process central to the FD model. This is automatic at first and characterised by intrusive ruminative thoughts and images and if successful, individuals show a reduction in distress and disengage from unrealistic goals. From this point, rumination is more deliberate and reflective and according to the model, crucial to development of growth outcomes. In line with the research described on correlates, certain types of personality, social support and self-disclosure are proposed to positively enhance cognitive processing and therefore aid development of PTG.

Empirical studies of the role of demographics, coping and personality tend to agree that women report more PTG than men, younger age is associated with more PTG and marital status and education level are unrelated to PTG (Helgeson et al., 2006). In addition, extroversion, openness to experience, agreeableness, conscientiousness and optimism are positively associated with PTG with neuroticism negatively related to PTG (Bhushan & Hussain, 2007).

Some of the evidence for the model's other predictions are less clear. Central to the model are the ideas that distress is a necessary precursor to produce and maintain PTG and

that deliberate rumination is essential for PTG. The relationship between distress and PTG has been the subject of mixed research findings. Some studies have found positive relationships between measures of distress and PTG (Morris & Shakespeare-Finch, 2011a); supporting the assumption that PTG does not preclude ongoing distress. Others have demonstrated a negative relationship between the two variables with those high in distress reporting lower PTG (Leung et al., 2010) and others have reported no relationship (Costa & Pakenham, 2012). Finally, some studies have begun to examine the possibility of a curvilinear relationship (McCaslin et al., 2009). From this perspective, there will be an optimum level of distress needed for PTG. So when distress is low, a person's beliefs will not have been shattered and low PTG would be expected. However, when distress is high it is likely to overwhelm a person's ability to cope and low PTG will be the result. Highest PTG will be demonstrated when a person reports moderate levels of distress; enough to challenge assumptions but manageable for the person to be able to cope.

Among studies in SCI, results have mirrored the conflicting literature. For example, Pollard and Kennedy (2007) found a positive association between depression at 12 weeks and PTG at 10 years post-injury. Conversely, McMillen and Cook (2003) revealed that PTG was not related to anxiety, depression or PTSD symptoms. With one exception, all health related studies have failed to examine the possibility of non-linear associations in their data (Lechner et al., 2006).

Lack of consensus in the literature findings could be attributed to different conceptualisations of distress with measures of PTSD, anxiety, depression and global distress all being used. In a meta-analysis of PTG, Helegeson et al. (2006) concluded that PTG was negatively associated with mental health variables when these were operationalised as depression. Conversely, PTG was positively related to PTSD symptoms including intrusive thoughts and avoidance and generally unrelated to anxiety and measures of global distress.

Moreover, conflicting empirical results might also reflect the timing of assessments given to participants which range from a few weeks after the event to decades later. Overall, research demonstrates that stronger associations tend to be found two years after the event (Helgeson et al., 2006). The FD model does not make specific predictions about the amount of time that needs to have elapsed for PTG to occur, except to suggest that PTG will develop with increased time since the event. Once again, the empirical data appear inconclusive on this issue (Barskova & Oesterreich, 2009).

With regards to the proposed importance of cognitive processing, empirical accounts of the role of rumination are only recently emerging. An early study on 54 students who experienced a traumatic event revealed those who engaged in more event-related rumination after the event showed significantly more PTG (Calhoun et al., 2000). However, the study did not specify the type of rumination that was most effective. Deliberate, effortful and reflective rumination was most predictive of those who reported PTG in a study of HIV positive men (Bower et al., 1998). This is in line with the FD model, although the theory also makes predictions about the temporal order of effective cognitive processing with intrusive rumination leading to deliberate rumination and then to PTG. Taku, Cann, Tedeschi and Calhoun (2009) found evidence that intrusive rumination soon after the event and recent deliberate rumination was the best predictor of PTG. This suggests that it is both the type and timing of cognitive processing that is crucial for growth outcomes. However, this study has weaknesses including use of a student sample, which makes it difficult to generalise results to clinical populations.

The FD model further predicts that individuals' capacity to move from intrusive to deliberate cognitive processing determines their ability to either develop PTG or remain in a state of continuing distress. That is, there are different pathways to distress or PTG via different types of cognitive processing. Evidence from former Israeli prisoners of war

suggests that PTG and distress begin as a similar construct, but unique factors including cognitive processing divert this trauma reaction to either PTSD or PTG (Dekel et al., 2011). They conclude that intrusive rumination is linked to distress and deliberate rumination to PTG.

Only one clinical study has investigated both the pathways for distress and PTG and the temporal element of cognitive processing. Nightingale et al. (2010) administered a rumination measure to a sample of 112 HIV patients. Findings revealed that past intrusive rumination predicted PTG, past deliberate rumination predicted PTSD symptoms, recent intrusive rumination predicted PTSD symptoms and recent deliberate rumination predicted PTG. The authors reasoned that it is deliberate rumination that is most predictive of PTG but intrusive ruminations are needed to form the basis for further cognitive processing. The problem with this study is that it relied upon participants' memory to report on the type of cognitive processing they engaged in both "immediately after" the HIV diagnosis and "in the last few weeks", which might be biased. One alternative that has been examined in student and general population samples is to remove the "recent" and "past" element of the rumination measure and simply assess the extent to which participants engaged in the type of rumination in the last few weeks and then examine the effect of time since the event (Stockton, Hunt, & Joseph, 2011; Triplett, Tedeschi, Cann, Calhoun, & Reeve, 2012).

Overall, the relationships between PTG and distress are not clear; equally the literature exploring the role of cognitive processing in clinical populations affected by physical health conditions is scarce. The SCI studies in particular have been able to identify the potential for PTG and provide some detail on correlates but none have been theory driven. The inconsistent use of distress measures in the health literature has also contributed in part to discrepant results on the relationship between PTG and distress. Moreover, the failure for health studies to examine the possibility of non-linear relationships might have inadvertently

reduced their ability to detect meaningful associations between PTG and distress. In physical health studies, there has been little agreement on the association between time since the event and PTG and this requires further investigation. Evidently there is a key role for cognitive processing in PTG, however, despite its centrality to a number of theoretical models it has received comparatively little attention than personality or coping factors in the literature.

Aims

The focus of the current study will be to address the predictions of the FD model in a sample of people who have suffered a SCI. Previous research has shown that SCI is traumatic enough to produce PTSD among survivors (e.g. Hatcher et al., 2009). Therefore, experience of a SCI should be a sufficient enough event to challenge beliefs and assumptions; a necessary prerequisite for PTG according to the FD model. The primary aim of this study is to investigate how the type of cognitive processing a person engages in after a sudden onset SCI has an impact on development of PTG. Specifically, it will investigate the extent to which intrusive and deliberate rumination predict PTG. A secondary aim of this study is to clarify the relationships between anxiety, depression, PTSD and PTG. It will also seek to examine the predictors of cognitive processing as a way of exploring the assumptions that one type of rumination follows the other. The relationship between demographics, clinical characteristics and PTG will be explored to determine the influence of variables such as time since injury on PTG. Finally, this study will aim to establish comparable levels of PTG and distress found in other physical health samples, in particular SCI.

Hypotheses

Based on previous theoretical and empirical work, it is hypothesised that participants will exhibit PTG on a self-report measure comparable to other published data. In terms of

demographics and clinical correlates of PTG, it is predicted that being younger, female and having an increased time since injury will be associated with PTG. Conversely, objective injury severity (indexed by level and type of damage) will not be related to PTG. In line with the FD model, deliberate rumination is hypothesised to be significantly predictive of PTG. It is hypothesised that measures of distress will significantly predict intrusive rumination which will, in turn, be significantly predictive of deliberate rumination. Given the mixed results reported for relationships between distress and PTG, no specific hypotheses are offered about the direction of this relationship.

Method

Participants

Participants were recruited from The Duke of Cornwall Spinal Treatment Centre, Salisbury District Hospital and were seen in person by the researcher as inpatients or outpatients. An additional group of eligible participants were sent questionnaires by post. All participants that met inclusion criteria were identified and approached by clinical staff and invited to participate. Willing participants who gave consent comprised the sample of self-selected participants. Inclusion criteria for recruitment were that participants:

- i. Were aged over 18 years,
- ii. experienced a SCI in the last three and a half years,
- iii. experienced an acute onset (within one day) SCI rather than through a gradual process,
- iv. were already in the process of their rehabilitation rather than immobilised¹,
- v. were able to understand the consent process and questionnaires.

Participants were excluded if they did not meet the inclusion criteria or were, in the opinion of the supervising medical consultant, too physically unwell or cognitively impaired to take part.

One hundred and two participants completed the study. Of these, 37 were inpatients and 35 attended outpatient clinics. A further 30 outpatients returned completed questionnaires from a total of 171 posted (see procedure section for more detail). A total of nine questionnaires were returned uncompleted because the recipient no longer resided at the given address and one questionnaire was returned uncompleted because the participant was

¹During the initial stages of a SCI, medical efforts tend to be focussed on stabilising the injury and it is often several weeks before an accurate assessment of damage is possible. During this time, people tend to be on bed-rest to allow repair and resolution of the injury, although the duration will vary considerably between patients. It was decided that responses to questionnaires prior to the start of the rehabilitation process might be unduly influenced by medication, sensory deprivation and pain, which are common during the immobilisation phase.

deceased. Due to limits of confidentiality, it was not possible to gather data on those who declined to take part in the study.

Design

The current study utilised a cross-sectional design to establish the predictive validity of study variables on the development of PTG. The dependent variable was the score on a measure of PTG. The key independent variables were anxiety, depression, PTSD, intrusive rumination and deliberate rumination.

Measures

Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983; Appendix A). This self-report questionnaire assesses the presence of depression and anxiety symptoms. For this study it was used as one indicator of distress. The tool comprises 14 items (seven for anxiety, seven for depression) rated on a scale of 0-3. Total subscale scores in the 0 to 7 range are “non-clinical”, in the 8 to 10 range are “borderline clinical”, and “clinical” if scores are 11 or more. The measure is well accepted in clinical and normal populations (Bjelland, Dahl, Haug, & Neckelmann, 2002) and has demonstrated good internal consistency in the current sample for both the anxiety ($\alpha = .80$) and depression ($\alpha = .78$) subscales.

The Impact of Event Scale Revised (IES-R; Weiss & Marmar, 1997; Appendix B). This 22-item self-report measure assesses posttraumatic stress symptoms in response to traumatic events and represents the second indicator of distress in this study. Containing seven additional items to the original 15-item version (Horowitz et al., 1979), it corresponds directly to DSM-IV criteria for PTSD. Participants rate their distress caused by a symptom after identifying a specific traumatic event. Items are rated on a five-point scale ranging from

0 (not at all) to 4 (extremely). Total scores range from 0-88 with subscale scores for intrusion, avoidance and hyperarousal calculated separately. The proposed clinical-cut off for total scores is 33 (Creamer, Bell, & Failla, 2003). This measure has demonstrated good internal consistency in the current sample for total scores ($\alpha = .92$), intrusions ($\alpha = .88$), avoidance ($\alpha = .79$) and hyperarousal ($\alpha = .77$) subscales. As this scale can be adapted to refer to any life event, participants were instructed to indicate their responses with reference to “what caused your spinal cord injury”.

The Event-Related Rumination Inventory (ERRI; Cann et al., 2011; Appendix C). This 20-item self-report measure assesses intrusive (10 items) and deliberate (10 items) forms of repetitive thinking about a highly stressful event. The ERRI reflects event provoked cognitive processing rather than stable differences in cognitive style and is a useful predictor of PTG measured using the PTGI (Cann et al., 2011). Participants indicate the degree to which they have had particular thoughts without wanting them or deliberately spent time thinking about their experience on a four-point likert scale from 0 (not at all) to 3 (often). The measure has good internal consistency in the current study with alphas of .94 and .87 for the intrusive and deliberate scales respectively. Correspondence with the author confirmed that the instructions could be altered to refer to a specific experience more clearly. To reduce risk of bias, participants were instructed to consider their experience of SCI and rate each statement with respect to how often they engaged in the types of rumination “in the last few weeks” rather than “soon after the event” and “recently” as had been the case in the original version of the measure (A. Cann, 2011, personal communication, December 8, 2011).

Posttraumatic Growth Inventory (PTGI; Tedeschi & Calhoun, 1996; Appendix D). This 21-item measure assesses positive changes experienced after trauma and is most widely used in the PTG literature (Linley & Joseph, 2004). It comprises five subscales: new possibilities (five items); relating to others (seven items); personal strength (four items);

spiritual change (two items) and appreciation of life (three items). Respondents indicate the extent to which a specific change has taken place in their life as a result of their trauma using a six-point likert scale ranging from 0 (I did not experience this change) to 5 (I experienced this change to a very great degree). In the current study, participants indicated the degree of change experienced “as a result of your spinal cord injury”. Both the full scale ($\alpha = .88$) and subscales have shown satisfactory to good internal consistency in the current study with alphas ranging from .60 to .80.

Demographics. Demographic information on gender, age, ethnicity, relationship status, education, time since injury, injury cause, injury level and injury type was collected.

Procedure

The study was granted ethical approval by the London Bridge NHS Research Ethics Committee (Appendix E) and the University of Southampton, School of Psychology Ethics Committee (Appendix F). Permission to proceed was also granted by Salisbury NHS Foundation Trust Research Support Service (Appendix G).

Inpatients. Clinical staff identified all eligible inpatients at the Spinal Treatment Centre and they were given an information sheet (Appendix H) and invited to take part in the study. Willing participants notified the clinical staff or the researcher of their interest and an individual assessment session was arranged with the researcher. During this meeting, participants ($n=37$) were given verbal information about the study and had the opportunity to discuss the participant information sheet. The consent form (Appendix I) was discussed with the participants and they were asked to sign the form. For participants who were physically unable to do so, a record of their verbal consent was made and all participants received a copy of their consent form.

Participants provided demographic information and completed four questionnaires by hand, in person with the researcher. Participants with more compromised physical functioning indicated their responses to the questionnaire items verbally after they were read aloud by the researcher. During this session, all participants had the opportunity to ask questions if needed.

Outpatients Attending Follow-up Appointments. Eligible outpatients who were due to attend outpatient clinics received an invitation letter (Appendix J), participant information sheet and opt in form (Appendix K) from their medical consultant before their next outpatient appointment. Willing participants indicated their interest either by completing the opt in form and handing this into reception when they arrived at the Spinal Treatment Centre or by notifying clinic staff before their appointment. The researcher then arranged a convenient time to meet with the participant either before or after their outpatient appointment. This meeting took place in a quiet area of the Spinal Treatment Centre. Participants (n=35) then completed the consent procedure and questionnaire package as outlined for inpatients.

Outpatients Responding to Postal Questionnaires. One month after commencing the study, the rate of attendance at outpatient clinics was lower than clinic standards. This, together with feedback from outpatients already included in the study led to use of an additional recruitment method. Feedback suggested that, although outpatients were happy to complete the questionnaire package in the clinic, they might find it easier and more convenient to complete study questionnaires in their own home. Therefore, eligible outpatients who were due to attend clinics received a revised invitation letter from their medical consultant (Appendix L) together with a participant information sheet, opt in form, consent form, questionnaire package and pre-paid envelope. Participants were invited to

complete the consent form and questionnaire package and then return them in the pre-paid envelope (n=28).

Online Advertisement. Participants were also recruited from a UK spinal injury charity that agreed to advertise the study on their online forum (Appendix M). Those who contacted the researcher (n=2) were sent a questionnaire package and asked to complete and return this in the same way as postal outpatients.

After every individual session, participants were given verbal and written information about the study in the form of a debrief form (Appendix N) and were rewarded for their time and effort with a £5 gift voucher. Participants who returned questionnaires by post, were sent the debrief form and gift voucher and encouraged to call the researcher to ask further questions about the study if needed.

Those participants who were upset during the individual session and all those who scored above the clinical cut off for anxiety and depression on the HADS either in person with the researcher or via postal response were offered the opportunity to discuss their concerns with a member of the Clinical Psychology team at Salisbury District Hospital.

Statistical Analysis

Analyses were conducted using the Statistical Package for the Social Sciences (IBM SPSS; version 21). Power analyses indicated that 102 participants would be adequate for a multiple regression analysis with five predictors (Green, 1991). Initial data cleaning indicated minimal missing data that was demonstrably random. A total of six missing values were substituted with mean subscale scores. Descriptive statistical analyses were conducted to assess for data entry errors, examine the distributions and scan for outliers. This revealed three simple outliers that were recoded to reflect the next highest value plus one. As data were normally distributed they were subjected to parametric analyses.

Bivariate correlations of demographic, clinical and psychological variables with PTG were analysed using Pearson product-moment correlations. For categorical variables with more than two groups of unequal size including relationship status, education, injury cause, injury level and injury type, the Kruskal-Wallis test was used to examine differences between groups on levels of PTG. In cases where the accepted minimum group size of $n=5$ (Sundar Rao & Richard, 2012) was not reached, some categories were merged. Specifically, relationship status was recoded so that data were combined for those in a relationship and cohabiting ($n=2$) and those who were separated, divorced and widowed ($n=17$). Levels of education were combined for those with no formal education and primary education ($n=13$) and those who held a degree and postgraduate education ($n=20$). Data for those who sustained other accidents and assaults ($n=5$) were also combined for the purposes of the Kruskal-Wallis test.

Examination of scatterplots indicated that there were no non-linear relationships. Hierarchical multiple regression analyses were used to identify the relative contribution of the psychological variables of interest to PTG. Univariate screening to select predictor variables has been criticised for increasing the likelihood of overly optimistic model results (Babyak, 2004). Therefore, predictors were selected a priori. Cognitive processing variables (intrusive rumination and deliberate rumination) that were hypothesised to be related to PTG based on theoretical and empirical evidence were entered into the model in the first block using forced entry. Distress variables (anxiety, depression and PTSD) were entered into the second block using the forced entry method to explore whether they accounted for additional significant variability in PTG. A further multiple regression was conducted to assess the predictive value of measures of distress to intrusive rumination with anxiety, depression and PTSD entered simultaneously in one block. Finally, the contribution of intrusive rumination to deliberate

rumination was assessed with simple linear regression. Statistical significance for all analyses was set at $p \leq .05$.

Regressions were examined for accuracy and generalisability. Analysis using the Durbin-Watson test revealed no violations of the assumption of independent errors and graphical data revealed that residuals were normally distributed and showed homoscedasticity. The variance inflation factor (VIF) and tolerance statistics, which measure the impact of collinearity in the data were examined for problems with multicollinearity. A VIF value of greater than 10 can represent possible problems (Marquandt, 1980) and tolerance statistics less than .2 might also indicate multicollinearity (Field, 2009). In the current analysis all of the VIF values were less than three and tolerance statistics were greater than .41, suggesting there were no multicollinearity problems. The influence of certain cases on the parameters of the models was assessed by examining the standardised residuals for possible outliers. In each model, the percentage of cases with absolute values above two was $\leq 5\%$ and scores above 2.5 represented $< 1\%$ suggesting that there are unlikely to be any extreme cases affecting the accuracy of the regression models.

Results

Demographic and Clinical Characteristics

Data from 102 participants are reported in the final analyses. The age range was 18 to 80 years ($M = 51.9$, $SD = 15.6$) and mean time since injury was 14.25 months, ranging from one to 42 months ($SD = 10.4$). Other demographic and clinical characteristics of the sample are given in Table 3.

Table 3

Demographic and clinical characteristics of study participants (N = 102)

Variable	<i>n</i>	%
Gender		
Male	72	70.6
Female	30	29.4
Ethnicity ²		
White British	97	95.1
White Irish	1	1
White European	1	1
Black British	1	1
Indian	1	1
Asian	1	1
Relationship status		
Single	16	15.7
In a relationship	4	3.9
Cohabiting	8	7.8
Married	57	55.9
Separated	4	3.9
Divorced	9	8.8
Widowed	4	3.9
Education		
No formal qualification	4	3.9
Primary	9	8.8
Secondary	39	38.2
Diploma	30	29.4
Degree	18	17.6
Postgraduate	2	2
Injury cause		
Fall	36	35.3
Sporting accident	13	12.7
Other accident	3	2.9
RTA	18	17.6
Assault	2	2
Medical condition	21	20.6
Surgical complication	9	8.8
Injury level		
C2-C8	47	46.1
T1-T12	40	39.2
L1-L5	9	8.8
Unknown	6	5.9
Injury type		
Complete	36	35.3
Incomplete	61	59.8
Unknown	5	4.9

²Due to small sample sizes in ethnic categories other than White British, this variable was omitted from further statistical analyses.

Posttraumatic Growth and Distress After SCI

Table 4 presents the means, standard deviations and ranges for all variables of distress, cognitive processing and PTG measured in the sample. The results support the hypothesis that people with SCI will demonstrate comparable levels of PTG to other physical health conditions ($M = 50.62$) with the PTGI subscales “relating to others” and “appreciation of life” yielding the highest mean scores. Overall, the mean scores on measures of distress showed non-clinical levels of anxiety, depression and PTSD among the sample, however, individual scores were also examined using HADS and IES-R clinical cut-off criteria. For anxiety, 22 (21.6%) participants showed borderline clinical levels and 17 (16.6%) showed clinical levels. These figures were similar for depression with 24 (23.5%) participants showing borderline clinical levels and 13 (12.74%) scoring in the clinical range. Results showed that 25 (24.5%) participants scored in the clinical range for PTSD.

Table 4

Means, standard deviations and range of scores for questionnaire measures

Variable	<i>M</i>	<i>SD</i>	Range
HADS			
Anxiety	6.61	4.15	17 (0-17)
Depression	6.49	4.16	18 (0-18)
IES-R			
Total	20.28	16.34	60 (0-60)
Intrusion	1.00	.91	3.63 (0-3.63)
Avoidance	.97	.82	3 (0-3)
Hyperarousal	.77	.81	3.5 (0-3.5)
ERRI			
Intrusive	.97	.84	3 (0-3)
Deliberate	1.45	.78	3 (0-3)
PTGI			
Total	50.62	19.64	88 (1-89)
Relating to others	2.99	1.15	5 (0-5)
New possibilities	1.78	1.22	4.8 (0-4.8)
Personal strength	2.59	1.23	5 (0-5)
Spiritual change	.99	1.48	5 (0-5)
Appreciation of life	2.79	1.31	5 (0-5)

Relation of Demographic and Clinical Variables to PTG

Bivariate correlations were conducted to examine the relationship between demographic and clinical variables to PTG and are shown in Table 5. Contrary to predictions, PTG was not significantly related to gender ($p = .91$) or age ($p = .09$). Findings revealed that time since injury was negatively associated with PTG, although this was not significant ($p = .28$). In line with the hypotheses, the Kruskal-Wallis test revealed that PTG was not significantly affected by injury level ($H(3) = .77, p = .86$) or injury type ($H(2) = .04, p = .98$), variables that serve as objective measures of injury severity. In addition, PTG was not significantly affected by relationship status ($H(3) = 3.66, p = .30$), education ($H(3) = 1.37, p = .71$) or cause of injury ($H(5) = 7.62, p = .18$).

Table 5

Bivariate correlations (Pearson r) between demographic and clinical variables and PTG

	PTG
Gender	.012
Age	-.17
Time since injury	-.11

Relation of Psychological Variables to PTG

Given the disparity of the evidence describing the relationship between distress and PTG, no specific hypotheses were proposed. Results displayed in Table 6 show that there was a significant positive relationship between PTSD and PTG ($p = .04$). Conversely, the relationship between depression and PTG was significantly negative ($p = .05$). Anxiety was unrelated to PTG ($p = .39$). Consistent with predictions, cognitive processing, both intrusive ($p = .006$) and deliberate ($p < .001$) was significantly associated with PTG.

Table 6

Bivariate correlations (Pearson r) between psychological variables and PTG

	PTG
Anxiety	.09
Depression	-.19*
PTSD	.20*
Intrusive rumination	.27**
Deliberate rumination	.36***

* $p \leq .05$ ** $p < .01$ *** $p < .001$.**Psychological Predictors of PTG**

Hierarchical multiple regression was conducted to identify the predictive value of the psychological variables to PTG. As shown in Table 7, deliberate rumination and intrusive rumination accounted for 13.7% of the variance in PTG. Measures of distress including anxiety, depression and PTSD accounted for an additional 12.5% of the variance in PTG when added to the second block ($p = .002$). In particular, depression ($t(96) = -3.84, p < .001$) and deliberate rumination ($t(96) = 3.26, p = .002$) made significant individual contributions to the model.

Table 7

Hierarchical multiple regression analyses of PTG

	B	$SE\ B$	β
Step 1			
Constant	37.24	3.88	
Intrusive rumination	2.59	2.57	.11
Deliberate rumination	7.50	2.78	.30**
Step 2			
Constant	43.53	4.13	
Intrusive rumination	2.09	2.96	.09
Deliberate rumination	8.74	2.69	.34**
Anxiety	.45	.61	.09
Depression	-2.05	.53	-.43***
PTSD	.13	.17	.11

Note: $R^2 = .14$ for step 1, $\Delta R^2 = .13$ for step 2 ($p = .002$). ** $p < .01$ *** $p < .001$.

Psychological Predictors of Cognitive Processing

Multiple regression was conducted to assess the hypothesis that measures of distress would predict intrusive rumination. Results shown in Table 8 support this hypothesis, highlighting that anxiety, depression and PTSD accounted for 47.5% of the variance in intrusive rumination ($p < .001$). Specifically, PTSD made a significant individual contribution to the model ($t(98) = 6.31, p < .001$).

Table 8

Multiple regression analysis of intrusive rumination

	<i>B</i>	<i>SE B</i>	β
Constant	.22	.13	
Anxiety	.04	.02	.20
Depression	-.02	.02	-.11
PTSD	.03	.01	.60***

Note: $R^2 = .48$ *** $p < .001$.

A simple linear regression was performed to investigate the predictive value of intrusive rumination on deliberate rumination (see Table 9). Results supported the hypothesis with intrusive rumination significantly predicting deliberate rumination ($p < .001$) and accounted for 28.5% of the variance.

Table 9

Linear regression analysis of deliberate rumination

	<i>B</i>	<i>SE B</i>	β
Constant	.98	.10	
Intrusive rumination	.49	.08	.53***

Note: $R^2 = .29$ *** $p < .001$.

Discussion

The primary purpose of this study was to examine components of the FD model of PTG by investigating how cognitive processing after a sudden onset SCI has an impact on development of PTG. A secondary aim of this study was to clarify the relationships between anxiety, depression, PTSD and PTG. Overall, the data are consistent with Tedeschi and Calhoun's (2004) FD model with deliberate rumination making a significant contribution to the prediction of PTG. This contribution was second only to depression, which was the most significant psychological predictor of PTG in the regression model. These variables displayed a negative relationship with lower levels of depression being predictive of greater PTG.

Cognitive Processing and PTG

According to the FD model, cognitive processing is central to PTG. Specifically, it predicts that deliberate rumination is the most productive form of cognitive processing for growth outcomes. Findings were consistent with this idea and revealed that people who deliberately spent time thinking about what they have learned from their experience and what it might mean for their future were more likely to develop PTG than those who engaged in less deliberate rumination. Considering the emphasis on shattered assumptions within a number of theoretical perspectives of PTG, it is possible that engaging in cognitive processing to make sense of traumatic experiences assists people to integrate trauma related-information into existing schemas.

Although intrusive rumination demonstrated a moderate positive correlation with PTG it was not a significant predictor of PTG in regression analyses, consistent with predictions. Typically, intrusive rumination is perceived as unpleasant and unwanted, however it may be necessary in the aftermath of trauma as part of the PTG process. Indeed, this study aimed to examine the predictors of both cognitive processing and PTG to provide

insight into how intrusive and deliberate rumination might form part of a wider growth process. The FD model predicts that distress will predict intrusive rumination, which will in turn predict deliberate rumination and then lead to PTG. All of these relationships were demonstrated separately with PTSD symptoms significantly predictive of intrusive rumination and intrusive rumination significantly predictive of deliberate rumination. Evidently, this requires replication in a more methodologically robust study, however, these results suggest there might be merit in conducting structural equation modelling or a longitudinal design to assess this more rigorously. It is noteworthy that PTSD rather than depression or anxiety was predictive of intrusive rumination and it is proposed that PTSD assessment tools such as the IES-R used in this study may have acted as a measure of cognitive processing as well as distress because of its emphasis on intrusions and avoidance (Dunn et al., 2011). In future it might be useful to use a more diagnostic PTSD assessment such as the Clinician Administered PTSD Scale (Blake et al., 1995) to try to separate these constructs.

Distress and PTG

Given the lack of consensus in the literature on the relationship between distress and PTG, no specific hypotheses were proposed for this relationship in the current study. The finding that different measures of distress were differentially related to PTG is in line with reviews that suggest the failure to find consistent relationships is in part due to the different conceptualisations of distress (Helgeson et al., 2006). Anxiety scores were unrelated to PTG but PTSD symptoms were significantly and positively related to PTG, which is consistent with other studies in physical health conditions (e.g. Morris & Shakespeare-Finch, 2011a; Mystakidou et al., 2007; Nightingale et al., 2010; Thornton et al., 2012). This could be explained in a number of ways. The FD model suggests that distress is a pre-requisite for

PTG development and so it is possible that PTSD was necessary to start the process of PTG. Another theory of PTG, the affective-cognitive processing (ACP) model similarly argues that distress is a necessary precursor to PTG, specifically, intrusions and avoidance (as measured using the IES-R) are particularly important drivers. Furthermore, the possible dual use of the IES-R measure as a tool for assessment of both distress and cognitive processing might make it more likely that PTSD would be linked to PTG because it represents a state of intrusive rumination.

Conversely, depression exhibited a significant negative relationship with PTG with lower levels of depression associated with greater levels of PTG. Initially this appears to conflict with the theory that distress is required for PTG. However, it is possible that whilst PTSD might signal the start of cognitive processing, depression might hinder a person from engaging in effective coping strategies, seeking support from others and making disclosures about their experiences; all things that are necessary for PTG according to the FD model.

Equally, it has been established that certain personality traits such as neuroticism are negatively related to PTG (Evers et al., 2001; Garnefski et al., 2008) but positively associated with depression (Weinstock & Whisman, 2006). Whilst personality variables were not assessed in this study, it is possible that those scoring high on depression may have been less likely to exhibit PTG because they had certain personality traits which impede PTG.

Relation of Demographic and Clinical Variables to PTG

It has been suggested that younger people have superior ability to adapt to illness and report higher PTG compared to older people (Davis et al., 1998). This study did not lend support to these assumptions and contrary to predictions, age was unrelated to levels of PTG. Furthermore, there were no gender differences in PTG, which is in contrast to other studies that reported women show higher PTG because they are more likely to engage in cognitive

processing (Helgeson et al., 2006). In addition, injury level and type, that is, objective measures of injury severity were not associated with PTG. This is consistent with studies that found subjective appraisal rather than disease severity was most associated with PTG in cancer survivors (Cordova et al., 2007; Martins da Silva et al., 2011). According to the FD model the event preceding PTG should be seismic enough to challenge core beliefs and by definition, what is seismic for one person may be different for another. However, this study did not assess how much participants' beliefs were shattered as a result of their SCI, which would have provided additional support for the FD model's assumptions. A recently developed measure that might have been beneficial in this instance is the Core Beliefs Inventory (Cann, Calhoun, Tedeschi, Kilmer, et al., 2010), which is designed to examine the seismic nature of a traumatic event.

Posttraumatic Growth and Distress After SCI

This study also aimed to demonstrate that the PTG reported in this population would be comparable to other physical health samples. The range of scores given on the PTGI was high suggesting that people varied greatly in their perception of positive changes after their SCI. Results showed that mean total PTG was 50.62, which is consistent with other studies in colorectal cancer (Salsman et al., 2009), amputation (Benetato, 2011; Phelps et al., 2008) and stroke (Gangstad et al., 2009). The figure is higher than reported by Pollard and Kennedy (2007) in SCI using the same self-report tool ($M = 45.72$) although the highest average subscale score was reported on the "relating to others" scale in both studies. These items reflect increased closeness with others, learning about the goodness of others and acceptance of needing other people. Due to the overwhelming physical disability presented by a SCI it is possible that PTG is highest in areas that reflect the help and care of others that is inevitable after SCI.

The discrepancy in total PTG between the two studies might be due to the timing of the assessment of PTG; in this study the range was 1-42 months post-injury and for Pollard and Kennedy (2007) the assessment of PTG was conducted after 10 years. This links to the current findings on time since injury and PTG. Although the non-significant result precludes any firm conclusions, the negative correlation between time since injury and PTG appears in direct contrast to predictions of the FD model that PTG will increase with time.

In an alternative theory of PTG, the two-component model, Maercker and Zoellner (2004) provide a possible explanation for this unexpected finding. They note that PTG has two sides, constructive and illusionary that can occur at different times after trauma. The former is associated with the positive changes described by Tedeschi and Calhoun (1996) and is proposed to increase over time, whereas the illusionary part can be used in the short term as a way of coping with distress and is proposed to reduce with time. As this study recruited people in the first few years of a SCI it is possible that their reports of PTG were the illusionary type used as a way to avoid or deny their experiences of distress. The PTGI used in this study cannot differentiate between the two types of PTG proposed by the two-component model, therefore, it is difficult to assess which might have been influential. Maercker and Zoellner (2004) propose that measures of optimism and openness to experience might be more appropriate gauges of illusionary and constructive PTG. Another way to examine possible positive illusions would be to measure the validity of PTG by requesting significant others to comment on the PTG experienced by their relative, similarly to McMillen and Cook (2003). In addition, Costa and Pakenham (2012) argue that gaining an idea of PTG related behaviour rather than simply cognition might be a more accurate way of assessing constructive rather than illusionary PTG.

With regards to levels of distress, 16.6% of the sample showed clinical levels of anxiety, 12.74% scored in the clinical range for depression and 24.5% scored in the clinical

range for PTSD. A systematic review conducted to examine psychiatric morbidity after SCI reported that approximately 30% of individuals have clinically significant levels of anxiety, depression and PTSD (Craig et al., 2009). Methodologically, it is possible that those who agreed to take part in the current study were those who were less distressed. Unfortunately, it was not possible to assess the characteristics of those who did not take part due to confidentiality restrictions. Despite levels of psychological symptoms detected in the current sample falling below those reported by Craig et al. (2009), they remain higher than that of patients facing other illnesses. For example, in breast cancer, the reported occurrence of PTSD ranges from 2.4% to 19% (Koutrouli, Anagnostopoulos, & Potamianos, 2012). One explanation might be that health professionals working with SCI attribute the pattern of mood disorders to a normal reaction to trauma. Therefore, interventions are not offered for this population and high distress is maintained (North, 1999).

Clinical Implications

This study revealed that after a SCI people show a propensity to PTG in areas such as stronger relationships with others and enhanced appreciation of life. This finding has clinical implications for the types of psychological services and treatments that are offered to people after such a traumatic event. A number of researchers have highlighted that clinicians should be more aware of the possibility of growthful outcomes after trauma without imposing this as a specific expectation of therapy (Joseph & Linley, 2006). Certainly, this study suggests that PTG should be added to the agenda of clinicians and Tedeschi and Calhoun (2006) propose a therapeutic stance called expert companionship to aid this process. They suggest that therapists working in the aftermath of trauma should aim to manage their client's distress, allow disclosure and encourage deliberate rumination. As this study found that deliberate rumination was the most productive form of cognitive processing for PTG, the clinician

should help the client to tell the difference between intrusive and deliberate rumination and guide them to shift from one to the other for occurrence of PTG. The findings of this study support the idea that intrusive rumination may be necessary for development of PTG although it is possible this will feel emotionally painful for people because, by nature it is characterised by thoughts, images and memories that come to a person involuntarily. Therefore, the expert companion should allow a person to engage in early intrusive rumination while simultaneously assisting them with managing distress that may be present.

Current findings highlighted the potential importance of detecting and reducing depression as a way of facilitating PTG. Currently, psychological services tend to be concentrated in the post-acute rehabilitation period and there are few opportunities for longer term follow-up in community settings after discharge. This study suggests longer follow-up might be useful as distress continued to be reported in participants several years post-injury. There is evidence that group stress management interventions based on cognitive behaviour therapy (CBT) are effective for reducing depression and increasing PTG in breast cancer patients (Antoni et al., 2001). The current study indicates a need for similar psychological programmes to be delivered for people after SCI. Given the level of distress reported in the current sample was relatively high compared to other physical health populations, this study points to the potential value of increasing staff awareness of both the physical and psychological sequelae of SCI.

Limitations and Future Directions

This study had some methodological limitations that must be considered when interpreting results. The cross-sectional design provides a useful way to detect relationships between PTG, cognitive processing and distress; however, it limits the conclusions that can be drawn about the nature of these relationships over time and causation factors. In particular,

the FD model makes predictions about the order and time in which different growth processes occur and it would be beneficial to conduct a longitudinal study to establish if the relationships detected in this study can be replicated.

The PTGI is the most widely used measure of PTG across the literature; therefore, its use in this study means that results can be compared with other types of trauma. However, it has been criticised for limiting participants to purely positive responses (Cann et al., 2010). Moreover, the measure can only demonstrate PTG cognitions, which may not be a valid representation of true PTG and could be susceptible to social desirability biases. It has been discussed previously that in order to detect valid PTG, measures of PTG action need to be developed and future studies should always seek to gain corroborative evidence of PTG from sources close to the respondent.

The recruitment strategy of this study introduced the possibility of a sampling bias, which may prevent generalisability of the study findings. The response rate for postal questionnaires was relatively low, indicating a difficulty to recruit people once they have been discharged from a rehabilitation centre. This could be due to administrative limitations where the spinal unit cannot be certain about the accuracy of all the contact details held for outpatients. Alternatively, it might be that outpatients were less motivated to take part or were more avoidant.

This study did not exclude people with a history of trauma or mental illness and it is possible that this presented an additional bias to the results. It might be that participants were experiencing PTG as a result of a trauma other than their SCI, which might have altered the results. Furthermore, a stress inoculation model would predict that those who have experienced prior trauma or crises will become more resilient to future stress (Meichenbaum, 1985). Therefore, the impact of experiencing a SCI should have been considered in terms of the participants' wider context. The relationships between distress and PTG could also have

been impacted by the presence of past or concurrent mental health difficulties that were not measured and therefore not controlled for in the analyses.

This discussion has already highlighted the failure for the study to measure the shattering of beliefs indicated by the FD model. The assumption that a sudden SCI is a traumatic and seismic event is not without evidence given the rates of PTSD symptoms in the sample. However, the subjective appraisal of the event was not assessed and future research should aim to include this as part of the overall assessment package. Boals, Steward and Schuettler (2010) argue that the extent to which the (traumatic) event is central to one's identity will determine the potential for PTG and suggest that studies investigating PTG might benefit from altering their inclusion/exclusion criteria to reflect this. They suggest use of a measure such as the Centrality of Event Scale (Berntsen & Rubin, 2006) as a way of screening participants for entry into PTG research to ultimately increase the consistency across studies.

Research on the effect of specific psychological interventions on development of PTG is in its infancy, however, this is an area that warrants further investigation. In particular a randomised controlled trial evaluating the effect of a CBT intervention for depression on rates of PTG among people with SCI would be an interesting avenue for exploration.

Conclusion

This is the first study to investigate the predictive value of cognitive processing and distress on the development of PTG in people after SCI. The findings provide support for the FD model of PTG and highlight the importance of cognitive processing and the contributions of different types of distress to positive psychological change. This study investigated these constructs in a sample of people affected by SCI, which is a population largely neglected by the PTG literature. Therefore, this research has enhanced the understanding of trauma

outcomes after SCI and provided the basis for further investigation of theoretical perspectives of PTG to people suffering from significant physical and psychological crises. The finding that PTG was reported suggests that people are capable of drawing upon personal strength after SCI to find meaning from their suffering. It is hoped that this will begin to alter clinician's perceptions and show that outcomes of resilience, recovery and growth can be the rule rather than the exception.

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Appendices

Appendix A: Hospital Anxiety and Depression Scale

HADS

Read each item and place a firm tick (✓) in the box opposite the reply which comes closest to how you have been feeling in the past week. Tick only one box in each section.

I feel tense or "wound up":

Most of the time.....
A lot of the time.....
Time to time. Occasionally.....
Not at all.....

I feel as if I am slowed down:

Nearly all the time.....
Very often.....
Sometimes.....
Not at all.....

I still enjoy the things I used to enjoy:

Definitely as much.....
Not quite so much.....
Only a little.....
Hardly at all.....

I get a sort of frightened feeling like 'butterflies' in the stomach:

Not at all.....
Occasionally.....
Quite often.....
Very often.....

I get a sort of frightened feeling as if something awful is about to happen:

Very definitely and quite badly.....
Yes, but not too badly.....
A little, but it doesn't worry me.....
Not at all.....

I have lost interest in my appearance:

Definitely.....
I don't take so much care as I should...
I may not take quite as much care.....
I take just as much care as ever.....

I can laugh and see the funny side of things:

As much as I always could.....
Not quite so much now.....
Definitely not so much now.....
Not at all.....

I feel restless as if I have to be on the move:

Very much indeed.....
Quite a lot.....
Not very much.....
Not at all.....

Worrying thoughts go through my mind:

A great deal of the time.....
A lot of the time.....
From time to time but not too often...
Only occasionally.....

I look forward with enjoyment to things:

As much as ever I did.....
Rather less than I used to.....
Definitely less than I used to.....
Hardly at all.....

I feel cheerful:

Not at all.....
Not often.....
Sometimes.....
Most of the time.....

I get sudden feelings of panic:

Very often indeed.....
Quite often.....
Not very often.....
Not at all.....

I can sit at ease and feel relaxed:

Definitely.....
Usually.....
Not often.....
Not at all.....

I can enjoy a good book or radio or TV programme:

Often.....
Sometimes.....
Not often.....
Very seldom

Appendix B: The Impact of Event Scale Revised**IES-R**

Below is a list of difficulties people sometimes have after stressful life events. Please read each item, and then indicate how distressing each difficulty has been for you DURING THE PAST SEVEN DAYS with respect to what caused your spinal cord injury, how much were you distressed or bothered by these difficulties?

	Not at all	A little bit	Moderately	Quite a bit	Extremely
1. Any reminder brought back feelings about it	0	1	2	3	4
2. I had trouble staying asleep	0	1	2	3	4
3. Other things kept making me think about it	0	1	2	3	4
4. I felt irritable and angry	0	1	2	3	4
5. I avoided letting myself get upset when I thought about it or was reminded of it	0	1	2	3	4
6. I thought about it when I didn't mean to	0	1	2	3	4
7. I felt as if it hadn't happened or wasn't real	0	1	2	3	4
8. I stayed away from reminders about it	0	1	2	3	4
9. Pictures about it popped into my mind	0	1	2	3	4
10. I was jumpy and easily startled	0	1	2	3	4
11. I tried not to think about it	0	1	2	3	4
12. I was aware that I still had a lot of feelings about it, but I didn't deal with them	0	1	2	3	4
13. My feelings about it were kind of numb	0	1	2	3	4
14. I found myself acting or feeling as though I was back at that time	0	1	2	3	4
15. I had trouble falling asleep	0	1	2	3	4
16. I had waves of strong feelings about it	0	1	2	3	4
17. I tried to remove it from my memory	0	1	2	3	4
18. I had trouble concentrating	0	1	2	3	4
19. Reminders of it caused me to have physical reactions, such as sweating, trouble breathing, nausea, or a pounding heart	0	1	2	3	4
20. I had dreams about it	0	1	2	3	4
21. I felt watchful or on-guard	0	1	2	3	4
22. I tried not to talk about it	0	1	2	3	4

Appendix C: The Event-Related Rumination Inventory

ERRI

INTRUSIVE

After an experience like a spinal cord injury, people sometimes, but not always, find themselves having thoughts about their experience even though they don't try to think about it. Indicate for the following items how often, if at all, you had the experiences described in the last few weeks.

	Not at all	Rarely	Sometimes	Often
1. I thought about the event when I did not mean to	0	1	2	3
2. Thoughts about the event came to mind and I could not stop thinking about them	0	1	2	3
3. Thoughts about the event distracted me or kept me from being able to concentrate	0	1	2	3
4. I could not keep images or thoughts about the event from entering my mind	0	1	2	3
5. Thoughts, memories, or images of the event came to mind even when I did not want them	0	1	2	3
6. Thoughts about the event caused me to relive my experience	0	1	2	3
7. Reminders of the event brought back thoughts about my experience	0	1	2	3
8. I found myself automatically thinking about what had happened	0	1	2	3
9. Other things kept leading me to think about my experience	0	1	2	3
10. I tried not to think about the event, but could not keep the thoughts from my mind	0	1	2	3

ERRI**DELIBERATE**

After an experience like a spinal cord injury, people sometimes, but not always, deliberately and intentionally spend time thinking about their experience. Indicate for the following items how often, if at all, you deliberately spent time thinking about the issues indicated in the last few weeks.

	Not at all	Rarely	Sometimes	Often
1. I thought about whether I could find meaning from my experience	0	1	2	3
2. I thought about whether changes in my life have come from dealing with my experience	0	1	2	3
3. I forced myself to think about my feelings about my experience	0	1	2	3
4. I thought about whether I have learned anything as a result of my experience	0	1	2	3
5. I thought about whether the experience has changed my beliefs about the world	0	1	2	3
6. I thought about what the experience might mean for my future	0	1	2	3
7. I thought about whether my relationships with others have changed following my experience	0	1	2	3
8. I forced myself to deal with my feelings about the event	0	1	2	3
9. I deliberately thought about how the event had affected me	0	1	2	3
10. I thought about the event and tried to understand what happened	0	1	2	3

Appendix D: Posttraumatic Growth Inventory

PTGI

Indicate for the statement below the degree to which the change reflected in the question is true in your life as a result of your spinal cord injury, using the following scale:

0 = I did not experience this change as a result of my crisis.

1 = I experienced this change to a very small degree as a result of my crisis.

2 = I experienced this change to a small degree as a result of my crisis.

3 = I experienced this change to a moderate degree as a result of my crisis.

4 = I experienced this change to a great degree as a result of my crisis.

5 = I experienced this change to a very great degree as a result of my crisis.

	Did not experience this change	Very small degree	Small degree	Moderate degree	Great degree	Very great degree
1. I changed my priorities about what is important in life	0	1	2	3	4	5
2. I have a greater appreciation for the value of my own life	0	1	2	3	4	5
3. I developed new interests	0	1	2	3	4	5
4. I have a greater feeling of self-reliance	0	1	2	3	4	5
5. I have a better understanding of spiritual matters	0	1	2	3	4	5
6. I know that I can count on people in times of trouble	0	1	2	3	4	5
7. I established a new path for my life	0	1	2	3	4	5
8. I have a greater sense of closeness with others	0	1	2	3	4	5
9. I am more willing to express my emotions	0	1	2	3	4	5
10. I know I can handle difficulties	0	1	2	3	4	5
11. I'm able to do better things with my life	0	1	2	3	4	5
12. I'm better able to accept the way things work out	0	1	2	3	4	5
13. I can better appreciate each day	0	1	2	3	4	5
14. New opportunities are available which wouldn't have been otherwise	0	1	2	3	4	5
15. I have more compassion for others	0	1	2	3	4	5
16. I put more effort into my relationships	0	1	2	3	4	5
17. I'm more likely to try to change things which need changing	0	1	2	3	4	5
18. I have a stronger religious faith	0	1	2	3	4	5
19. I discovered that I'm stronger than I thought I was	0	1	2	3	4	5
20. I learned a great deal about how wonderful people are	0	1	2	3	4	5
21. I better accept needing others	0	1	2	3	4	5

Appendix E: London Bridge NHS Ethics Approval**eNRES Committee London - London Bridge**

Health Research Agency
Skipton House
80 London Road
London
SE1 6LH

Tel: 0207 972 2559
Fax: 0207 972 2592

08 November 2012

Ms Philippa Beckwith
Trainee Clinical Psychologist
Taunton and Somerset NHS Foundation Trust
Musgrove Park Hospital
Taunton
Somerset
TA1 5DA

Dear Ms Beckwith

Study title: A questionnaire study examining the role of cognitive processing in the development of posttraumatic psychological growth in adults after spinal cord injury.

REC reference: 12/LO/1781

The Research Ethics Committee reviewed the above application at the meeting held on 31 October 2012. Thank you for attending to discuss the study.

Ethical opinion

In answer to questions from the Committee you clarified that:

- With the constraints of time and resources it is not possible at this time to do a longitudinal study. Although there are many other factors that you could gather information on you will not be doing that in this study as the model you are trying to validate is a cognitive processing model. Based on other studies in this area, which have also not measured other factors, this has not been a problem in achieving meaningful data.
- There is the potential for slight bias as those that are more able may also be more willing to take part in the study, however they feel that this is unavoidable. You will be excluding those with severe cognitive impairment but you will not discriminate according to cognitive ability when you are approaching patients to see if they want to take part.
- You acknowledged that it will be hard work but you are confident that you will be able to recruit 90 patients within the timeframe. There are three outpatient clinics a week with 10 patients in each. There are also 68 in patients' beds.
- Initially you were intending to enter all participants into a prize draw as compensation

for taking part however on further consultation it was decided to pay them in line with other studies, they will all receive a £5 voucher.

- A49-1- In the in-patient unit there is a care pathway which, should it be required, will lead to referral to a clinical psychologist as part of routine care, this information will also be routinely passed to their GP. The out patients routinely have an assessment of their mood from their consultant. All the measures are already in place for the patients to access a clinical psychologist it is therefore not necessary to have a process specific to this study.
- The questionnaire has been validated in a student sample however it has not been validated in a clinical sample. It was felt that it was generic enough to be used in a clinical sample and they will be passing on the results to the authors.
- A6-2- If it is necessary to refer the patient to the clinical psychologist, the referral will happen immediately and they will be seen within a few days, they will not be waiting for weeks. If any risk to themselves or others becomes apparent during the course of the study this will be reported to the care team who will follow routine procedure in this regard.

The members of the Committee present gave a favourable ethical opinion of the above research on the basis described in the application form, protocol and supporting documentation, subject to the conditions specified below.

Ethical review of research sites

NHS Sites

The favourable opinion applies to all NHS sites taking part in the study, subject to management permission being obtained from the NHS/HSC R&D office prior to the start of the study (see "Conditions of the favourable opinion" below).

Conditions of the favourable opinion

The favourable opinion is subject to the following conditions being met prior to the start of the study.

Management permission or approval must be obtained from each host organisation prior to the start of the study at the site concerned.

Management permission ("R&D approval") should be sought from all NHS organisations involved in the study in accordance with NHS research governance arrangements.

Guidance on applying for NHS permission for research is available in the Integrated Research Application System or at <http://www.rdforum.nhs.uk>.

Where a NHS organisation's role in the study is limited to identifying and referring potential participants to research sites ("participant identification centre"), guidance should be sought from the R&D office on the information it requires to give permission for this activity.

For non-NHS sites, site management permission should be obtained in accordance with the procedures of the relevant host organisation.

Sponsors are not required to notify the Committee of approvals from host organisations

It is responsibility of the sponsor to ensure that all the conditions are complied with before the start of the study or its initiation at a particular site (as applicable).

Approved documents

The documents reviewed and approved at the meeting were:

Document	Version	Date
Covering Letter	Letter from 16 Ms. Beckwith	October 2012
Evidence of insurance or indemnity		01 August 2012
Investigator CV		23 July 2012
Letter from Sponsor	1	15 October 2012
Letter of invitation to participant	1	23 March 2012
Other: Appendix B - opt in sheet	1	23 March 2012
Other: Appendix F - Debrief form	1	23 March 2012
Other: CV for academic supervisor		23 July 2012
Participant Consent Form: Appendix C	1	23 March 2012
Participant Information Sheet: Appendix A	1	23 March 2012
Protocol		23 October 2012
Questionnaire: Appendix D - <u>Questionnnire</u> package		
REC application	109940	16 October 2012
Referees or other scientific critique report		02 February 2012

The members of the Ethics Committee who were present at the meeting are listed on the attached sheet.

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

After ethical review

Reporting requirements

The attached document "After ethical review - guidance for researchers" gives detailed guidance on reporting requirements for studies with a favourable opinion, including:

- Notifying substantial amendments
- Adding new sites and investigators
- Notification of serious breaches of the protocol
- Progress and safety reports
- Notifying the end of the study

The NRES website also provides guidance on these topics, which is updated in the light of changes in reporting requirements or procedures.

Feedback

You are invited to give your view of the service that you have received from the National Research Ethics Service and the application procedure. If you wish to make your views known please use the feedback form available on the website.

Further information is available at National Research Ethics Service website > After Review.

12/LO/1781:	Please quote this number on all correspondence
--------------------	---

With the Committee's best wishes for the success of this project.

Yours sincerely

A handwritten signature in blue ink, appearing to read 'pp David Bartlett'.

Professor David Bartlett
Chair

Email: nrescommittee.london-londonbridge@nhs.net

Enclosures: *List of names and professions of members who were present at the meeting and those who submitted written comments*
"After ethical review - guidance for researchers" [SL-AR2](#)

Copy to: *Martina Prude, University of Southampton*
Dr Stef Scott, Salisbury NHS Foundation Trust

eNRES Committee London - London Bridge

Health Research Agency
Skipton House
80 London Road
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SE1 6LH

Tel: 0207 972 2559

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21 January 2013

Ms Philippa Beckwith
Trainee Clinical Psychologist
Taunton and Somerset NHS Foundation Trust
Musgrove Park Hospital
Taunton
Somerset
TA1 5DA

Dear Ms Beckwith

Study title: A questionnaire study examining the role of cognitive processing in the development of posttraumatic psychological growth in adults after spinal cord injury.
REC reference: 12/LO/1781
Protocol number: N/A
Amendment number: AM01: Additional recruitment
Amendment date: 17 December 2012
IRAS project ID: 109940

The above amendment was reviewed at the meeting of the Sub-Committee held on 21 January 2013.

Ethical opinion

There were no ethical issues

The members of the Committee taking part in the review gave a favourable ethical opinion of the amendment on the basis described in the notice of amendment form and supporting documentation.

Approved documents

The documents reviewed and approved at the meeting were:

Document	Version	Date
Research study letter	2	17 December 2012
Summary of protocol changes	1	17 December 2012
Notice of Substantial Amendment (non-CTIMPs)		17 December 2012

Membership of the Committee

The members of the Committee who took part in the review are listed on the attached sheet.

R&D approval

All investigators and research collaborators in the NHS should notify the R&D office for the relevant NHS care organisation of this amendment and check whether it affects R&D approval of the research.

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

We are pleased to welcome researchers and R & D staff at our NRES committee members' training days – see details at <http://www.hra.nhs.uk/hra-training/>

12/LO/1781:

Please quote this number on all correspondence

Yours sincerely
PP



Professor David Bartlett
Chair

E-mail: claudette.beckles@nhs.net

Enclosures: *List of names and professions of members who took part in the review*

Copy to: *Dr Stef Scott, Salisbury NHS Foundation Trust*
 Martina Prude, University of Southampton

Appendix F: University of Southampton Ethics Approval**Original submission**

Submission Number: 1672

Submission Name: Positive psychological change after spinal cord injury

This is email is to let you know your submission was approved by the Ethics Committee.

Please note that you cannot begin your research before you have had positive approval from the University of Southampton Research Governance Office (RGO) and Insurance Services. You should receive this via email within two working weeks. If there is a delay please email rgoinfo@soton.ac.uk.

Comments

None

[Click here to view your submission](#)

ERGO : Ethics and Research Governance Online

<http://www.ergo.soton.ac.uk>

DO NOT REPLY TO THIS EMAIL

Substantial amendment

Submission Number: 5101

This email is to confirm that the amendment request to your ethics form (Positive psychological change after spinal cord injury (Amendment 1))has been approved by the Ethics Committee.

Please note that you cannot begin your research before you have had positive approval from the University of Southampton Research Governance Office (RGO) and Insurance Services. You should receive this via email within two working weeks. If there is a delay please email rgoinfo@soton.ac.uk.

Comments

None

[Click here to view your submission](#)

ERGO : Ethics and Research Governance Online

<http://www.ergo.soton.ac.uk>

DO NOT REPLY TO THIS EMAIL

Appendix G: Salisbury NHS Foundation Trust Approval

8093/E1672

Salisbury **NHS**
NHS Foundation Trust

Salisbury Research Support Service
Block 24 SDH South
Salisbury District Hospital
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SP2 8BJ
Telephone: (01722) 425026
Email: stef.scott@salisbury.nhs.uk

28 November 2012

Ms Philippa Beckwith
Clinical Psychology
Salisbury District Hospital
Salisbury
Wiltshire
SP2 8BJ

Dear Philippa Beckwith

CSP number: Not applicable
REC number : 12/LO/1781
UKCRN ID number: Not applicable
RDMC number 37/2012/2013
Title: Positive psychological change after spinal cord injury

Thank you for submitting the above research project to the Salisbury Research Support Service (RSS) for NHS permission to proceed at Salisbury NHS Foundation Trust.

I am pleased to inform you that NHS permission to proceed for the above research was granted for Salisbury NHS Foundation Trust on 28 November 2012. Salisbury NHS Foundation Trust will act as a Participant Identification Centre. We note that Dr Vinod may identify and refer potential study participants to the Chief Investigator and their study team. The NHS permission to proceed applies to this referral only. Salisbury NHS Foundation Trust is not a research site, and is not responsible for the conduct of any research activities.

NHS permission was granted on the basis described in the application form, protocol and supporting documentation.

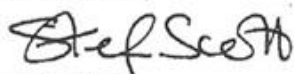
You should notify the RSS Office, within the same timeframe of notifying the REC and any other regulatory bodies, of the following:

- Amendments (including changes to the local research team) in accordance with guidance on IRAS
- Progress reports
- Changes to the status of the study
- End of study reports

Please do not hesitate to contact the RSS Office on 01722 425026 if you require any additional information or support.

I wish you every success with your research project

Yours sincerely



Dr Stef Scott
RSS Manager

Cc: Dr Nigel North, Dr Sarah Kirkby, Martina Prude

Salisbury 
NHS Foundation Trust

Salisbury Research Support Service
Block 24 SDH South
Salisbury District Hospital
Salisbury
Wiltshire
SP2 8BJ
Telephone: (01722) 425026
Email: stef.scott@salisbury.nhs.uk

25th January 2013

Miss Phillippa Beckwith
Clinical Psychology
Salisbury District Hospital
Salisbury
Wiltshire SP2 8BJ

Dear Miss Beckwith

CSP number:	Not applicable
REC number :	12/LO/1781
UKCRN ID number:	Not applicable
RDMC number	37/2012/2013
Title:	Positive psychological change after spinal cord injury
REC amendment number:	AM01: Additional recruitment

Thank you for submitting substantial amendment AM01: additional recruitment of the above named study to the Salisbury Research Support Service (RSS) for NHS continuing permission to proceed within Salisbury NHS Foundation Trust. We have reviewed the amendment documentation accordingly, and this letter confirms their continued permission for Salisbury NHS Foundation Trust to act as a Participant Identification Centre for the above study. The amendment may be implemented locally at your convenience.

Please ensure that all study personnel, including those in support departments, are aware of the amendment, and have up-to-date versions of the paperwork.

Please do not hesitate to contact the RSS Office on 01722 425026 if you require any additional information or support.

I wish you every success with your research project

Yours sincerely



Dr Stef Scott
RSS Manager

Cc: Dr Nigel North, Dr Sarah Kirkby, Martina Prude

Appendix H: Participant Information Sheet**INFORMATION SHEET**

Project title: Positive psychological change after spinal cord injury

Study number: 12/LO/1781

We would like to invite you to take part in our research study. Before you decide we would like you to understand why the research is being done and what it would involve for you. Please take time to read the following information carefully. **One of our team will go through the information sheet with you and answer any questions you have.** This should take about 5 minutes. Please talk to others about the study if you wish and ask us if there is anything that is not clear.

Part 1 tells you the purpose of this study and what will happen to you if you take part.

Part 2 gives you more detailed information about the conduct of the study.

PART 1**1. What is the purpose of this study?**

This study aims to help us better understand the role of different types of thinking on how people interpret negative events that have happened to them. We are specifically interested in finding out about the impact of negative experiences and what makes people find them more or less difficult to cope with. The findings will help us to plan different strategies for how we teach people to manage when they experience negative events. We are also conducting this study as part of a University of Southampton Doctorate in Clinical Psychology.

2. Why have I been invited to take part?

You are invited to take part because you have experienced a spinal cord injury and this is the sort of event that we are interested in learning more about. In total we will be asking 90 people who have spinal cord injuries to take part in the study. Some people will still be in hospital and some will have left hospital but are returning for regular outpatient appointments.

3. Do I have to take part?

It is up to you to decide to join the study. We will describe the study and go through this information sheet. If you agree to take part, we will then ask you to sign a consent form. You are free to withdraw at any time, without giving a reason. Choosing not to take part or withdrawing will not affect the standard of care you receive.

4. What do I have to do if I agree to take part?

If you agree to take part, you will be asked to complete a consent form and a short set of five questionnaires which will ask you questions about yourself and your response to the spinal cord injury. We expect these questionnaires to take around 25 minutes to complete. You may ask for someone to help you with them if you would like.

5. Expenses and payment

Unfortunately we cannot pay for your travel to your hospital appointment or parking costs but if you complete the study questionnaires then you will be given a £5 Amazon voucher for your time and effort.

6. What are the potential disadvantages and risks of taking part?

The questionnaires that you will be asked to complete may contain questions which are uncomfortable to answer. We do not anticipate that there are risks to taking part in this study; however, it is possible that you might become upset. If this happens, you will be offered the opportunity to discuss this with someone from the Clinical Psychology or counselling team at Salisbury District Hospital.

7. What are the possible benefits of taking part?

This study is not a treatment study and we cannot promise that it will help you. We do hope that the information we get from this study might help to improve the psychological treatment of people with spinal cord injury.

8. Will my taking part in the study be kept confidential?

Yes. We will follow ethical and legal practice and all information about you will be handled in confidence. However, if we are worried about you in any way we will need to talk to someone else involved in your care. Although we will talk to you about this first we might need to do this even if you do not agree.

If the information in Part 1 has interested you and you are considering participation, please read the additional information in Part 2 before making any decision.

PART 2**9. What will happen if I don't want to carry on with the study?**

If you choose to withdraw from the study, we will destroy any information you gave us that is identifiable. Any anonymous information that has already been collected will continue to be used in the study.

10. What will my information be used for?

We will use the information you give us to assess the research question of how different types of thinking affect how people interpret negative events. The information we collect will also be used as part of a University of Southampton

Doctorate in Clinical Psychology. You will not be identified in any way in reports of this study.

11. Where and how will my information be stored?

All information which is collected about you during the course of the study will be kept strictly confidential. The paper questionnaires you complete will be kept in a locked filing cabinet at Salisbury District Hospital until the end of the study when they will be securely transferred to the University of Southampton confidential storage facility. Questionnaire responses will be entered into a secure computer database; we will not enter your name or other identifying information so that the data is completely anonymous. Only authorised people will have access to the information you provide such as members of the research team or regulatory authorities to monitor the quality of the research. Paper copies of the questionnaires, consent forms, opt in sheets and anonymous electronic data will be kept for ten years after the study is complete and then securely destroyed.

12. What will happen to the results of the research study?

When the study is complete it will be used as part of a University of Southampton Doctoral project and it is intended that results will be published in an academic journal. The results will also be made available to be displayed at the Duke of Cornwall Spinal Treatment Centre if you would like to find out more. You will not be identified in any report or publication.

13. What if there is a problem?

If you have a concern about any aspect of this study, you should ask to speak to one of the researchers who will do their best to answer your questions (contact details below). If you remain unhappy and wish to complain formally, you can do this via the University of Southampton Complaints Procedure. Details can be obtained from Sarah Boak or Martina Johnson on 023 80 598101 or s.l.boak@soton.ac.uk.

14. Who is organising and funding the study?

This study is being funded by the University of Southampton and the researchers will not be paid for conducting the study.

15. Who has reviewed the study?

All research in the NHS is looked at by an independent group of people, called a Research Ethics Committee, to protect your interests. This study has been reviewed and given favourable opinion by London Bridge NHS Research Ethics Committee. This study has also been given approval by the University of Southampton, School of Psychology Ethics Committee.

16. Where can I get more information or ask questions?

If you have any questions you can speak to a member of the research team using the contact details below or ask one of the clinical staff to get in touch with us.

Philippa Beckwith, Chief Investigator
Dr. Nigel North, Consultant Clinical Psychologist

a: Department of Clinical Psychology, Salisbury District Hospital, Odstock Road,
Salisbury, SP2 8BJ
t: 01722 425105
e: philippa.beckwith@nhs.net
e: nigel.north@salisbury.nhs.uk

Thank you for taking time to read this information sheet.

Appendix I: Consent Form**CONSENT FORM**

Project title: Positive psychological change after spinal cord injury

Study number: 12/LO/1781

Researcher name: Philippa Beckwith

Please initial the boxes if you agree with the statement(s):

I confirm that I have read and understood the information sheet dated 23.03.2012 (version 1.0) for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.

☐

I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason, without my medical care or legal rights being affected.

☐

I understand that data collected during the study will remain secure and confidential and used for the purpose of this research by the University of Southampton. It may be looked at by individuals from regulatory authorities and Salisbury NHS Foundation Trust where relevant.

☐

I agree to take part in the above study.

☐

Name of participant (print name).....

Signature of participant..... Date.....

I have discussed this study with the participant using a language that is understandable and appropriate. I believe the participant understood this explanation.

Name of person taking consent..... Date.....

PARTICIPANT (INVESTIGATOR) COPY

Appendix J: Invitation Letter**Department of Clinical Psychology (Health)**

Salisbury NHS Foundation Trust
Salisbury District Hospital

Salisbury
Wiltshire

SP2 8BJ

Ext. 2105

Direct Line & Fax: 01722 425105

RESEARCH STUDY**Positive psychological change after spinal cord injury**

I am writing to tell you that we are currently conducting a research project within the Duke of Cornwall Spinal Treatment Centre investigating how different types of thinking affect how people deal with negative events like spinal cord injury (NHS Research Ethics Committee Reference Number: 12/LO/1781). We would like to invite you to take part in this study and we have enclosed an information sheet that tells you more about the project.

We hope that with the help of our patients in this study we will be able to understand more about the factors that play a role in whether someone finds a spinal cord injury more or less difficult to cope with and therefore learn how to improve the psychological treatments we offer.

Please read the information sheet carefully and think about whether you would like to be involved in the project. This decision is up to you and if you do decide to take part you will be asked to sign a consent form. Even if you do decide to take part you are still free to withdraw at any time and without giving a reason. Whatever you decide your care will not be affected now or in the future and you should come to your appointment(s) as normal.

If you think you might be interested in becoming involved please fill in your name and details on the form provided and hand it in to the clinic when you come for your appointment. Alternatively, please tell a member of staff when you come for your appointment that you are interested or contact the researcher directly: Philippa Beckwith on 01722 425105.

Yours sincerely,

Dr. Chalil Vinod
Consultant in Spinal Cord Injuries

Appendix K: Opt In Form**OPT IN SHEET**

Project title: Positive psychological change after spinal cord injury

Study number: 12/LO/1781

Researcher name: Philippa Beckwith

I am interested in finding out more about this project and agree to be contacted

Name.....

Telephone Number.....

Email.....

Please give this form to a member of staff or get in touch with us:

Philippa Beckwith, Chief Investigator

Dr. Nigel North, Consultant Clinical Psychologist

a: Department of Clinical Psychology, Salisbury District Hospital, Odstock Road,
Salisbury, SP2 8BJ

t: 01722 425105

e: philippa.beckwith@nhs.net

e: nigel.north@salisbury.nhs.uk

Appendix L: Invitation Letter – revised**Department of Clinical Psychology (Health)**

Salisbury NHS Foundation Trust

Salisbury District Hospital

Salisbury

Wiltshire

SP2 8BJ

Ext. 2105

Direct Line & Fax: 01722 425105

RESEARCH STUDY**Positive psychological change after spinal cord injury**

I am writing to tell you that we are currently conducting a research project within the Duke of Cornwall Spinal Treatment Centre investigating how different types of thinking affect how people deal with negative events like spinal cord injury (NHS Research Ethics Committee Reference Number: 12/LO/1781). We would like to invite you to take part in this study and we have enclosed an information sheet that tells you more about the project.

We hope that with the help of our patients in this study we will be able to understand more about the factors that play a role in whether someone finds a spinal cord injury more or less difficult to cope with and therefore learn how to improve the psychological treatments we offer.

Please read the information sheet carefully and think about whether you would like to be involved in the project. This decision is up to you and if you do decide to take part you will be asked to sign a consent form. Even if you do decide to take part you are still free to withdraw at any time and without giving a reason. Whatever you decide your care will not be affected now or in the future and you should come to your appointment(s) as normal.

If you think you might be interested in becoming involved please either:

1. Fill in the consent form and questionnaires enclosed and post them both back in the stamped addressed envelope provided, or
2. Fill in your name and details on the opt in form and hand it in to the clinic when you come for your appointment,
3. Alternatively, please tell a member of staff when you come for your appointment that you are interested or contact the researcher directly: Philippa Beckwith on 01722 425105.

If you have any questions or concerns at any time during your participation in the study, or if you require help to complete the questionnaires please contact Philippa Beckwith on 01722 425105.

Yours sincerely,

Dr. Chalil Vinod
Consultant in Spinal Cord Injuries

Appendix M: Online Advertisement

RESEARCH STUDY

Positive psychological change after spinal cord injury

We are conducting a research project sponsored by the University of Southampton investigating how different types of thinking affect how people deal with a spinal cord injury. The Duke of Cornwall Spinal Treatment Centre has been helpful in identifying participants and we would also like to invite you to take part in this study.

Are you?

- **Over 18 years old**
- **Experienced a sudden onset spinal cord injury in the last 3.5 years**

Then you could be eligible to take part!

We'll ask you to fill in a consent form and some questionnaires, which usually take about 20 minutes and in return we will send you a **£5 Amazon voucher** to say thank you.

We hope that with your help we will be able to understand more about the factors that play a role in whether someone finds a spinal cord injury more of less difficult to cope with and therefore learn how to improve the psychological treatments we offer.

If you'd like to take part, please contact me, Philippa Beckwith for a research pack - pjb1g10@soton.ac.uk

Are you male, over 18 and have experienced a spinal cord injury in the last 6 years? You could be eligible for another study within our research group - contact Rachel Hamblin for details - rph1g10@soton.ac.uk

Thank you!

Appendix N: Debrief Form**DEBRIEF FORM**

Project title: Positive psychological change after spinal cord injury

Study number: 12/LO/1781

Researcher name: Philippa Beckwith

The aim of this study is to help us better understand the role of different types of thinking on how people interpret negative events that have happened to them.

Previous research has shown that people who have a spinal cord injury are often understandably distressed afterwards. However, sometimes people also report positive outcomes after the injury such as increased appreciation of life and closer relationships. At the moment it is not clear what factors contribute to some people finding benefit from this negative experience and your data will help us to understand some of the processes responsible.

The results of this study will not include your name or any other identifying information.

If you have any further questions please contact me, Philippa Beckwith or Dr. Nigel North

a: Department of Clinical Psychology, Salisbury District Hospital, Odstock Road, Salisbury, SP2 8BJ

t: 01722 425105

e: philippa.beckwith@nhs.net

e: nigel.north@salisbury.nhs.uk

Thank you for your participation in this study.