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ELEANOR K. NOONE BSc (Hons)

COGNITIVE PROCESSING PATHWAYS TO POSTTRAUMATIC
GROWTH.

Section A:

A cognitive processing model of posttraumatic growth: A review of the
literature

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Section B:

Direct and indirect effects of unsupportive interactions on posttraumatic growth

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CANTERBURY CHRIST CHURCH UNIVERSITY



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Summary

Section A: This is a review of the literature pertaining to a cognitive processing model of Posttraumatic Growth (PTG). Twenty-six studies were identified via an electronic search which were reviewed under eight broad headings. Overall, there is evidence that cognitive processing is related to PTG, both cross-sectionally and longitudinally. Deliberate processing is suggested to be particularly related to PTG, although it is not clear if the timing of this processing is important. Overall, the literature contains methodological limitations which require further investigation, for example, regarding the measurement of cognitive processing. Clinical implications are also considered.

Section B: This study aimed to investigate the relationship between unsupportive reactions to the disclosure of HIV and PTG and whether this relationship was mediated by cognitive processing. Thirty-eight participants were recruited online and via non-statutory organisations. Results supported a two-mediator model of the data. It was found that unsupportive reactions were related to intrusive rumination, which in turn was related to deliberate rumination, and this was also correlated with PTG. No initial correlation between unsupportive reactions and PTG, however when the indirect effects of cognitive processing were accounted for, a significant, direct, negative effect was found between these variables. Limitations, and implications for research and clinical work are discussed

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Abstract

This paper reviews the empirical evidence for the cognitive processing model of posttraumatic growth (PTG) proposed by Tedeschi and Calhoun (2004). Twenty-six studies were identified via an electronic search. Overall, there is strong evidence that cognitive processing is related to PTG as is suggested by the model, but the exact nature of this relationship requires further investigation. Disruption to core beliefs was found to have a significant impact on the cognitive processing relationship with PTG and longitudinal analysis showed that deliberate rumination appears more associated with PTG than intrusive rumination, with this relationship strengthening over time. Some limited evidence was reported regarding the cognitive processing model of PTG sharing some pathways with PTSD, having some cross-cultural validity and being effected by social support. The evidence is inconclusive in relation to the effect of when the cognitive processing took place i.e. in the past or recently. Methodological limitations are considered, such as numerous cross-sectional studies and issues with the measurement of cognitive processing. Implication for theory, research and clinical work are discussed.

Introduction

The aim of this paper is to review the evidence base pertaining to a cognitive processing model of posttraumatic growth (PTG). A theoretical overview of the model is given first, followed by a review of the literature.

What is PTG?

While the literature on negative sequelae of trauma is ever increasing, so too is the literature on ‘positive’ consequences after trauma. Yet, this is not a new tradition and positive difference after crisis has been recognised by religion, philosophy and the arts for centuries (Tedeschi & Calhoun, 1995). One of the most commonly studied constructs in this vein is PTG, which describes positive psychological change after a trauma (Calhoun & Tedeschi, 1999). ‘Trauma’ in the PTG literature is used interchangeably with terms such as crisis, highly stressful event etc. (Tedeschi & Calhoun, 2004). Tedeschi and Calhoun conceptualise PTG as consisting of five domains;

1. Greater appreciation of life and changed sense of priorities. This refers to noticing small positives that may previously have seemed insignificant, for example, the beauty in nature.

2. Warmer, more intimate relationships. Relationships can become more meaningful. This can occur via numerous routes, for example as a result of others offering help and support or because of increased compassion for others, given your own struggle.

3. A greater sense of personal strength. Tedeschi and Calhoun postulate that an increased sense of strength co-occurs with an increased sense vulnerability. A person is more

aware of their own fragility, but equally, reassured by the knowledge that they can cope with whatever may arise.

4. Recognition of new possibilities. Trauma can often be the catalyst for evaluating one's life and choosing a new path. Tedeschi and Calhoun note the story of woman whose decision to become an oncology nurse was influenced by losing a family member to cancer, and so, wanted to help those in a similar situation.

5. Spiritual development. This domain does not necessarily refer to a religious faith and may simply relate to an increased engagement with fundamental existential questions such as the meaning of life.

PTG has been found to occur after numerous types of trauma, for example, breast cancer (Cordova, Cunningham, Carlson, & Andrykowski, 2001), terrorist attacks (Pargament, Smith, Koenig, & Perez, 1998), bereavement (Davis, Nolen-Hoeksema, & Larson, 1998), natural disasters (McMillen, Smith, & Fisher, 1997) and HIV (Milam, 2004). Prevalence rates range from 35% following a plane crash (McMillen et al., 1997) to 100% after rape (Thompson, 2000).

In a meta-analysis, Helgeson, Reynolds and Tomich (2006) found that benefit finding (analogous to PTG) was associated with a range of mental health outcomes including lower depression rates and increased positive well-being. There is also longitudinal evidence that PTG is related to better physical health outcomes. For example, PTG was reported to predict lymphocyte proliferation (Dunigan, Carr, & Steel, 2007) and cortisol levels (Creuss et al., 2000) in cancer survivors. Similar results were found among people living with HIV; research showed that PTG (or finding meaning) at Time 1 related to better immune system functioning, as measured by CD4 counts and viral load, at Time 2 (Bower, Kemeny, Taylor, & Fahey, 1998; Milam, 2006).

What is the hypothesised mechanism by which PTG occurs?

Tedeschi and Calhoun (2004) propose a cognitive processing model of PTG (Figure 1) which suggests that it is not the trauma itself that causes PTG, but the cognitive processes involved in dealing with a trauma. Tedeschi and Calhoun claim that the trauma acts as a “seismic event” (p.7) that challenges our fundamental beliefs about the world, for example, that the world is a safe, just place. Thus, when a person experiences a trauma, not only must they deal with the direct consequences of that trauma, for example grief after bereavement, but they must also re-evaluate their shattered assumptions about the world. It is this re-evaluation that Tedeschi and Calhoun suggest generates growth.

It can be seen in Figure 1 that, although trauma creates multiple challenges, it is the challenge to schemas that generates rumination. The initial intrusive rumination gives rise to disengagement of goals (that may no longer be relevant post-trauma such as retirement plans with a spouse after they have died) and deliberate rumination. Deliberate rumination is hypothesised to rebuild new schemas which take account of vulnerability, but also one’s ability to cope with future challenges. Figure 1 also shows that there are other factors which are hypothesised to affect the process, such as disclosure and social support, as these give rise to further rumination.

What is cognitive processing?

As has been discussed above, rumination is key to the development of PTG (in the PTG literature cognitive processing and rumination are used interchangeably). Although rumination often refers to negative thinking styles (Nolen-Hoeksema, McBride, & Larson, 1997), in this model it simply denotes ‘thinking’ and carries no particular valence. Tedeschi and Calhoun (2004) base their understanding of rumination on the work of

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Figure 1: A cognitive processing model of posttraumatic growth (Tedeschi & Calhoun, 2004)

Martin and Tesser (1996) in which rumination is defined as being conscious, recurrent, instrumentally orientated, and not directly cued by the environment.

It has been hypothesised that there are two forms of rumination post-trauma: deliberate and intrusive rumination. The former refers to actively seeking to understand the event and its impact on your life, while the latter refers to unwanted thoughts about the event

COGNITIVE PROCESSING PATHWAYS TO PTG – SECTION A

that are avoided. It is postulated by the model that deliberate rumination is most associated with PTG, while intrusive thought is more associated with distress post-trauma (Cann, Calhoun, Tedeschi, & Solomon, 2010). However, intrusive rumination is thought to trigger deliberate rumination so may have an indirect effect on PTG. The timing of processing has also been proposed as pertinent to PTG. It is suggested that deliberate processing soon after the event might be more related to PTG than deliberate processing years later which might suggest unresolved trauma (Tedeschi & Calhoun, 2004).

The above is a description of the theoretical basis for a cognitive processing model of PTG. The evidence for such a model is reviewed below.

Method

An electronic search was conducted using PsycINFO, Medline (carried out simultaneously in Ovid) and Web of Science in December 2014. A diagram of the search strategy can be seen in Figure 2. The search terms used were ‘posttraumatic growth’, ‘post traumatic growth’, ‘personal growth’, ‘positive change’ or ‘meaning’ and ‘cognitive processing’ or ‘rumination’. No time limit was applied to the search as no reason to do so was suggested in the literature. The articles resulting from the initial search were checked for duplications. The title and abstract of the remaining articles were read to establish relevance which, at this point, was determined by relating to both PTG and cognitive processing. The references of remaining studies were then hand searched to identify further relevant sources (determined by reading the title and abstract). All outstanding papers were read in full to determine adherence to the exact inclusion criteria which were:

- 1) Use an outcome measure of PTG that is representative of the five domains of PTG identified by Tedeschi and Calhoun (1996).
- 2) Use an outcome measure of cognitive processing that directly measures event-related cognitive processing.
- 3) Be published in a peer reviewed journal.
- 4) Be in English.
- 5) Include participants over the age of 18 only.
- 6) Contain new empirical data.
- 7) Report quantitative data.

This process resulted in 26 studies, details of which can be seen in Table 1. All studies were identified through the original electronic search and not the hand search.

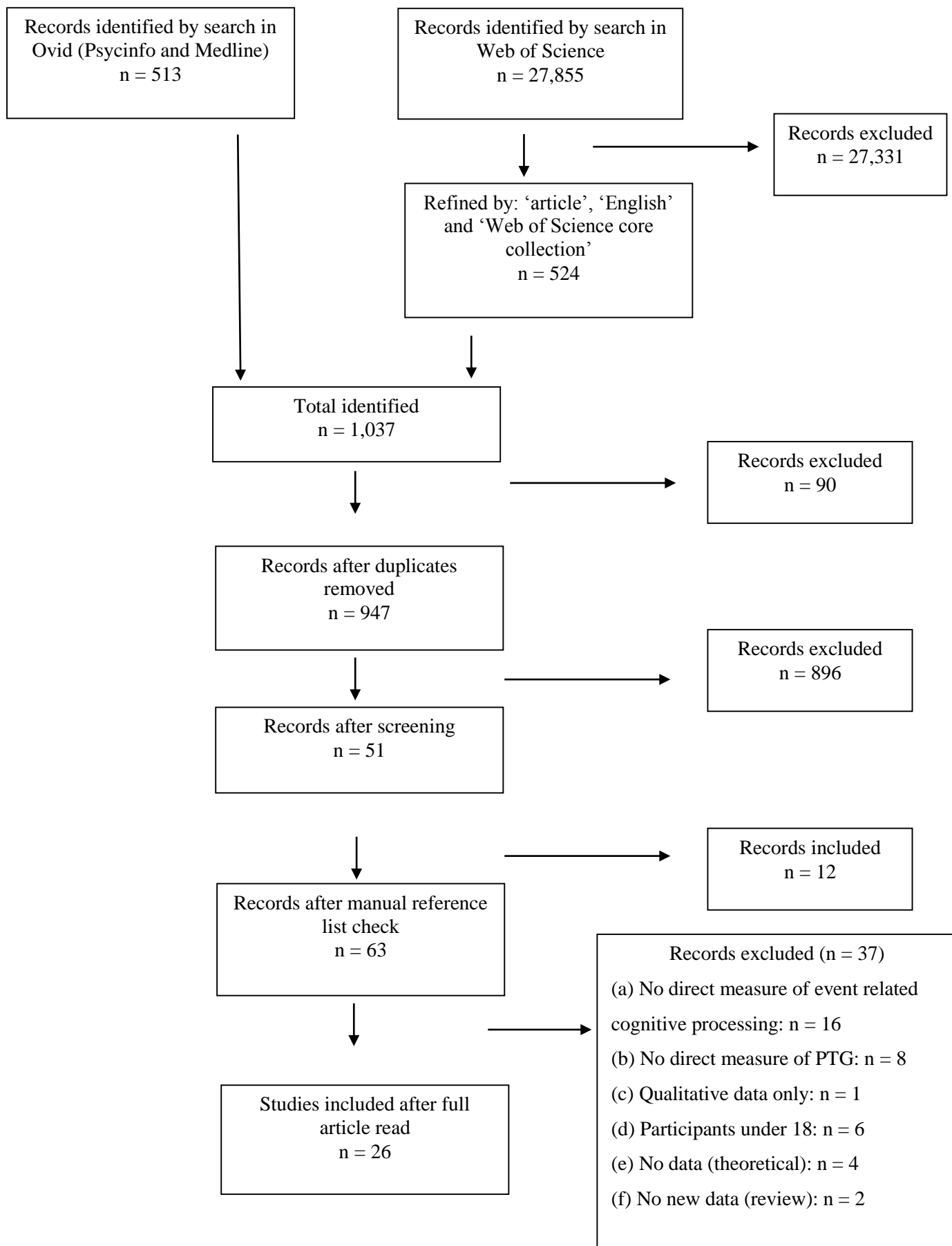


Figure 2: Search Strategy Flow Diagram

Table 1

Studies Included in Review

Study	Trauma	Country	N	Design	Sample	Cognitive Processing Measure
Benetato (2011)	Amputation	USA	56	Cross-sectional	Army veteran amputees 94.6% male 82.1% White Mean age = 31 (SD = N.S)	Rumination Inventory
Boals et al. (2011)	Mixed including: unexpected death, serious danger of death, serious car accident, childhood sexual or physical abuse, other similar traumatic event, natural disaster, rape robbery or assault, unwanted sexual experience, adult physical abuse, witness a serious injury or death, relationship break-up, academic failure	USA	929	Cross-sectional	University students 64.9% female 59% White Mean age = 20.1 (SD = 3.6)	CPOTS ¹ ERRI ² (deliberate scale and soon after event time point only)
Bosson et al. (2012)	Hurricane Katrina	USA	85	Cross-sectional	85 mothers of children 12-18 60% African American Mean age = 43.5 (SD = 7.85)	

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Calhoun et al. (2000)	Mixed including: victim of serious crime, sudden death of loved one, serious injury from car accident, major property loss, miscellaneous (e.g. combat, earthquake)	USA	54	Cross-sectional	University students who had experienced a major trauma 64.81% female 98.2% White Mean age = 22.5 (SD = N.S)	Rumination Inventory
Cann et al. (2010)	Mixed including: death of a loved one, serious illness, being attacked or robbed, military deployment	USA	123	Cross-sectional	University students 67.4% female 68.60% White Mean age = 20.7 (SD = N.S)	Modification of Rumination Inventory; 12 items, deliberate and intrusive subscales asked at past and recent time points
Cann e al. (2011)	Mixed (both studies): experience of one of the following in last 3 years; death of close other, serious medical issue for self or other, serious accident, victim of robbery, assault or stalking, residence seriously damaged, divorce.	USA	Study 1 = 198 Study 2 = 202	Cross-sectional	Study 1 / Study 2: University students (both studies) 65.2% / 57.9% female 66.7 / 60.4% White Mean age = 21.45 (SD = N.S) / 21.64 (SD = N.S)	ERRI
Chan et al. (2011)	Breast cancer	Hong Kong	174	Cross-sectional	Breast cancer survivors Racial make-up N.S Mean age = 48.36 (SD = 7.0)	Chinese Cancer Related Rumination Inventory (Tedeschi, personal communication, 2006); two

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						subscales (positive and negative) asked at past and recent time points
Cohen & Numa (2011)	Breast cancer	Israel	124	Cross-sectional	Breast cancer survivors Racial make-up N.S Mean age = 59.26 (SD = 10.01)	3 item scale of deliberate rumination, no timescale. Cronbach's $\alpha = 0.83$.
Currier et al. (2013)	War	USA	110	Cross-sectional	Army veterans 80% male 92.7% White Mean age = 31.18 (SD = 9.71)	CPOTS
Forgeard (2013)	Mixed including: natural disasters, serious accidents, physical assault, sexual assault, combat, illness and psychological suffering, death of other, harm to someone else, and other	USA	373	Cross-sectional	Online volunteers 78% female 75% White Mean age = 39.63 (SD = 13.64)	ERRI (soon after event time point only)
Gangstad et al. (2009)	Stroke	UK	60	Cross-sectional	Stroke survivors with no cognitive impairment 56.67% male 100% White Mean age = 71.67 (SD = 10.64)	CPOTS

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Hallam & Morris (2014)	Friend/relative having a stroke	UK	69	Cross-sectional	Carers of stroke survivors 73.2% female 97.2% White Mean age = 66.5 (SD = 11.4)	Rumination Inventory (no delineation of time)
Lindstrom et al. (2013)	Mixed: Had to be in last 2 years, meet DSM-IV criteria for traumatic event and be between 4-7 on 0-7 Likert scale of stressfulness. Most common = death of other and sexual assault	USA	129	Cross-sectional	University students with experience of a trauma meeting DSM IV criteria 67.4% female 67.4 White Mean age = 20.29 (SD = 3.73)	Rumination Inventory
Losavio et al. (2011)	Daily stressors e.g. argument or doing poorly in an exam	USA	82	Cross-sectional	University students 87.2% female 81.7% White Mean age = 18.12 (SD = 0.51)	An event-related rumination scale (Nolen-Hoeksema, 1991). No subscales, no specific time point
Marshall et al. (2013) (Study 2 only)	Relationship break-up	Mixed (87% USA)	465	Cross-sectional	Online volunteers (partial recruitment via university website) 82.7% female Racial make-up N.S Mean age = 21.36 (SD = 5.49)	General Rumination Scale; brooding (6 items) and reflection (5 items) subscales. Reliability statistics N.S
Morris & Shakespeare-Finch (2011)	Cancer	Australia	313	Cross-sectional	Cancer survivors 52.2% female 90% White Mean age = 62.14 (SD = 12.06)	Rumination Inventory (early version of ERRI)

Nightingale et al. (2010)	HIV	USA	112	Cross-sectional	People with HIV diagnosis for 1 yr+ 73% male 88% African American Mean age = 44.9 (SD = 8.9)	Modification of RS ³ ; 12 items, deliberate and intrusive subscales asked at past and recent time points
Phelps et al. (2008)	Amputation		83	Longitudinal	Amputees 82.6% = male 85.7% = White Mean age = 52.9 (SD = 14.4)	CPOTS
Proffitt et al. (2007)	Mixed including: death of a close other, marital problems	USA	30	Cross-sectional	Clergy 63.33% female 86.66% White Mean = 49.1 (SD = N.S)	Rumination Inventory
Salsman et al. (2009)	Colorectal cancer	USA	55	Longitudinal	Colorectal cancer survivors 58.9% = female 98.2% White Mean age = 65.9 (SD = 12.7)	Intrusion subscale of IES-R ⁴ and 4 item deliberate rumination scale (based on Martin & Tesser, 1993)
Stockton et al. (2011)	Mixed including: bereavement, sexual assault or abuse, serious illness or injury, car accident, other	UK	Study 1 = 212 Study 2 = 188	Cross-sectional	Study 1 / Study 2: Online volunteers / volunteers from university intranet advert 82.1% / 74.4% female 89.2% / 81.4% White Mean age = 31.78 (SD = 10.92) / 26.30 (SD = 8.37)	Study 1: Intrusion scale from IES-R Study 2: A modification of the RS. Deliberate and intrusive scales with 10 items each

Taku et al. (2008)	Bereavement	Japan	71	Cross-sectional	Bereaved university students 53.3% = female Racial make-up N.S Mean age = 19.94 (SD = 1.15)	Intrusion subscale of IES-R
Taku et al. (2009)	Mixed including: death of close other, events of 9/11, serious illness, other or not specified	USA & Japan	USA = 224 Japan = 431	Cross-sectional	USA / Japan N.S / University students 62.05 % / 61.25% = female 87.9% = White / N.S Mean age = 36.9 (SD = 14.2) / 19.9 (SD = 1.20)	Rumination Inventory (only 4 items used)
Triplett et al. (2012)	Mixed: at least one of the following in last 18-24 months - death of close other, serious illness of self or other, serious accident, serious damage to residence, divorce, physical or sexual assault, victim or robbery/mugging, being stalked	USA	148	Cross-sectional	University students 64.2% female 66.2% White Mean age = 22.26 (SD = 6.64)	ERRI (recent timescale only)
Wilson et al. (2014)	Prostate cancer	Australia	514	Cross-sectional	Prostate cancer survivors Racial make-up N.S Mean age = 70.04 (SD = 8.36)	ERRI (no timescale)
Zhang et al. (2013)	Child being diagnosed with Autism	China	102	Cross-sectional	Mothers of children diagnosed with Autism Racial make-up N.S Mean age = 31.86 (SD = 9.0)	Chinese ERRI

¹ Cognitive Processing of Trauma Scale, ² Event Related Rumination Inventory, ³ Rumination Scale, ⁴ Impact of Event Scale - Revised

Measures

The most commonly used cognitive processing measures are discussed below.

Posttraumatic growth inventory (PTGI) (Tedeschi & Calhoun, 1996). The PTGI was the only PTG measure used. It consists of 21 items divided into five subscales: new possibilities (5 items), relating to others (7 items), personal strength (4 items), spiritual change (2 items) and appreciation of life (3 items). Items are things such as “I changed my priorities about what is important in life” (appreciation of life). Answers are given on a seven point Likert scale ranging from 0 (I did not experience this change as a result of my crisis) to 6 (I experienced this change to a very great degree as a result of my crisis). Test-retest reliability was reported as $r = .71$, and the internal consistency was $\alpha = .90$. Alternate versions of the PTGI were used in Taku, Calhoun, Cann and Tedeschi (2008), Taku, Cann, Tedeschi and Calhoun (2009) (18 item Japanese PTGI), Zhang, Yan, Du and Liu (2013), Chan, Ho, Tedeschi and Leung (2011) (20 and 15 item Chinese PTGI respectively) and Stockton, Hunt and Joseph (2011) (13 item clinician version of the PTGI).

Event Related Rumination Inventory (ERRI) (Cann et al., 2011). This is a 20 item measure of the cognitive processing of a traumatic event. One scale (10 items) measures deliberate rumination and the other (10 items) measures intrusive rumination. Items include statements such as “I thought about the diagnosis when I did not mean to” (intrusive), or “I thought about whether I could find meaning from my experience” (deliberate). Answers are given on a 4 point Likert scale ranging from 0 (not at all) to 3 (often). Many studies administer the scales twice on the same occasion; firstly enquiring about rumination in the two weeks following the trauma and secondly about rumination in the two weeks preceding completing the measure which yields four subscales; past deliberate, past intrusive, recent

deliberate and recent intrusive. No test-retest reliability was reported but internal consistency was reported to be $\alpha = .88$, for the deliberate subscale and $\alpha = .94$ for the intrusive subscale.

Rumination Inventory (RI) (Calhoun, Cann, Tedeschi, & McMillan, 2000). The RI is a precursor to the ERRI and consists of 14 items divided evenly into two scales: past rumination (soon after the event) and recent rumination (last two weeks). Internal consistencies were $\alpha = 0.81$ and $\alpha = 0.88$ respectively. No test-retest reliability was reported. Response options ranged on a 4 point Likert scale from 1 (not at all) to 4 (often). No examples of individual items were reported, but descriptions appear similar to those in the ERRI.

Cognitive Processing of Trauma Scale (CPOTS) (Williams, Davies, & Millsap, 2002). This 17-item scale measures cognitive processing post-trauma. It contains five subscales: positive cognitive restructuring (3 items), downward comparison (3 items), resolution/acceptance (4 items), denial (4 items) and regrets (3 items). Answers are given on a 7 point Likert scale ranging from -3 (strongly disagree) to +3 (strongly agree). Statements are things such as “there is ultimately more good than bad in this experience” (positive cognitive restructuring). Subscale test-retest reliability was reported to range from $r = .70$, $p < .001$ to $r = .85$, $p < 0.001$ and the Cronbach’s alpha levels from $\alpha = 0.72$ to $\alpha = 0.85$. For ease of interpretation, the CPOTS subscales will be discussed in this paper as having two overarching domains; positive (positive cognitive restructuring, downward comparison and resolution) and negative processing (denial, regrets). These domains cluster theoretically but also statistically; Phelps, Williams, Raichle, Turner and Ehde (2008) conducted principal component analysis on the CPOTS and endorsed the use of these two domains. It should be noted that there is a lot of overlap theoretically between deliberate and positive rumination and between intrusive and negative rumination.

Impact of Events Scale – Revised (IES-R) – intrusion subscale (Weiss & Marmar, 1997). This is a 22 item scale that measures post-trauma distress in three domains; intrusion, avoidance, and hyper arousal. The eight-item intrusion domain is used by some studies as a measure of intrusive rumination. Items are things such as “I thought about it when I didn’t mean to” and answers are given on a five point Likert scale ranging from 0 (not at all) to 4 (extremely). Test-retest reliability was reported to be 0.94 while internal consistency was reported to be 0.79.

Any variations to cognitive processing measures are detailed in Table 1.

Quality measure

The Quality Assessment Tool for Quantitative Studies (Thomas, Ciliska, Dobbins, & Micucci, 2004) informed the current review. A numerical quality assessment for each paper was not undertaken as the QATQS pertains to research on intervention. As none of the current studies relate to intervention, many of the domains were redundant. However, the domains that were relevant (selection bias, study design and analysis) informed the critique in this paper. The QATQS was selected as other tools considered also focused on intervention, and the relevant domains in the QATQS are well described so as to inform a thorough critique

Review

Although the exact hypotheses vary from study to study, they fall into eight broad categories. These were developed by examining the topics of each hypothesis, and categorising them into overarching themes. The evidence for each will be reviewed in turn, with an overview of the literature presented and one particularly salient study discussed in more detail.

The eight areas are:

- 1) Is cognitive processing related to PTG?
- 2) Are different types of processing differentially related to PTG?
- 3) Is the timing of cognitive processing related to the development of PTG?
- 4) Is there any longitudinal evidence for the relationship between cognitive processing and PTG?
- 5) Does PTG share cognitive processing pathways with PTSD?
- 6) Do social factors influence the relationship between cognitive processing and PTG?
- 7) Do event related factors such as severity of trauma impact on the cognitive processing and PTG relationship?
- 8) Does the cognitive processing model of PTG have any cross cultural validity?

1. Is cognitive processing related to PTG?

This question relates to those papers that measured cognitive processing as a unitary construct. Hallam and Morris (2014) compared Tedeschi and Calhoun's (2004) cognitive processing model of PTG with Schaefer and Moo's (1998) coping based model among 69 UK carers of a spouse with a stroke. It was found that cognitive processing was highly

correlated with PTG ($r = .63^5$, $p < .01$). Importantly, the factors included in Tedeschi and Calhoun's model explained more variance in PTG than those factors in Schaefer and Moo's model (49% and 21% respectively), suggesting that the former is more representative of the data. Benetato (2011) and Losavio et al. (2011) also reported correlations between rumination as a unitary construct and PTG. These results all support Tedeschi and Calhoun's cognitive processing model of PTG. Losavio et al. (2011) however used 'daily stressors' as the trauma. Arguably having an argument with someone would not ordinarily be considered a trauma, and so the psychological after-effects may not be comparable with other traumas such as a loved one having a stroke for example.

2. Are different types of processing differentially related to PTG?

Morris and Shakespeare-Finch (2011) sampled 313 Australian cancer survivors for a Structural Equation Modelling (SEM) study. An unpublished measure of cognitive processing was used (a version of the RI; Cann, personal communication, August 22, 2008). Principal component analysis supported a three factor model of intrusive rumination, deliberate rumination of benefits and life purpose rumination. While the two former types of rumination map relatively clearly onto intrusive and deliberate rumination as described by Tedeschi and Calhoun (2004), the third is somewhat anomalous and a mixture of deliberate and intrusive rumination about life purpose. Results showed that all three facets of cognitive processing correlated with PTG, (ranging from $r = .27$, $p < .001$ to $r = .47$, $p < .001$). Results from the SEM showed that deliberately ruminating on benefits was significantly associated with PTG, while intrusive and life purpose rumination were not. A strength of this study was that because participants were identified via a hospital, researchers had access to

⁵ 1 All correlations reported are positive unless otherwise stated.

demographic data for non-responders. No significant differences were reported between these and responders on demographic variables, but data was not available for psychological domains such as level of PTG.

Like Morris and Shakespeare-Finch (2011), seven other studies found correlations between deliberate or positive cognitive processing scales and PTG (Boals & Schuettler, 2011; Cohen & Numa, 2011; Currier, Lisman, Harris, Tait, & Erbes, 2013; Gangstad, Norman, & Barton, 2009; Hallam & Morris, 2014; Marshall, Bejanyan, & Ferenczi, 2013; Wilson, Morris, & Chambers, 2014). Similarly, most studies also reported positive correlations between negative cognitive processing and PTG (Boals & Schuettler, 2011; Hallam & Morris, 2014; Marshall et al., 2013; Wilson et al., 2014). However, Currier, Lisman, Harris, Tait and Erbes (2013) found no relationship, Gangstad et al. (2009) found it with only one negative subscale of the CPOTS (denial) and Stockton et al. (2011) found a negative correlation between intrusive processing and PTG.

Of the studies that conducted regression analysis the results were mixed. Currier et al. (2013), Gangstad et al. (2009) and Wilson et al. (2014) did not find that positive cognitive processing was an individually significant predictor of PTG. However, Cohen et al. (2011), Boals and Schuettler (2011) and Hallam and Morris (2014) along with Morris and Shakespeare-Finch (2011) reported above did report such a relationship. There were similarly mixed results concerning negative cognitive processing as a significant predictor of PTG with Currier et al. (2013) and Boals and Schuettler (2011) reporting no such findings, as were reported above. Conversely, Gangstad et al. (2009), Wilson et al. (2014) and Hallam and Morris (2014) reported finding that negative cognitive processing was an individually significant predictor of PTG. It should be noted that Boals and Schuettler (2011) use a university sample. Although the prevalence of trauma is comparable with the general population, (Bernat, Ronfeldt, Calhoun, & Arias, 1998) they will likely be younger and better

educated than the general population (Linley & Joseph, 2004), possibly skewing results. This is also true of other studies using student samples.

Overall, the results in this area show a complex and at times contradictory picture. All studies found a correlation between positive cognitive processing and PTG, which is in line with Tedeschi and Calhoun's model. However only four studies found an extension of this relationship in more detailed analysis, while three did not. All but one study found some degree of association between negative cognitive processing and PTG, but again this relationship only remained significant after regression analysis or SEM in three studies. In Tedeschi and Calhoun's model (2004), there is no direct link from intrusive rumination to PTG but it is related through deliberate processing. The data presented above suggest that cognitive processing is related to PTG, however, no clear pattern regarding the differential effects of deliberate and intrusive rumination is discernible.

3. Is the timing of cognitive processing related to the development of PTG?

This question was investigated using correlational analysis, path analysis and bootstrapping procedures among 112 people with HIV recruited from a community HIV clinic (Nightingale, Sher, & Hansen, 2010). Unusually, the sample was predominantly male (73%) and African American (88%). Results showed that all four aspects of cognitive processing were significantly correlated with PTG; past intrusive ($r = .31, p < .01$), past deliberate ($r = .23, p < .05$), recent intrusive ($r = .21, p < .05$) and recent deliberate ($r = .33, p < .01$). The model with best fit for the data showed a significant path to PTG from past intrusive cognitive processing and current deliberate processing. While neither past deliberate nor current intrusive processing showed direct paths to PTG, both were indirectly related through current deliberate processing.

All other studies that researched this area (Cann et al., 2011; Cann, Calhoun, Tedeschi, & Solomon, 2010; Lindstrom, Cann, Calhoun & Tedeschi, 2013; Taku et al., 2009 [US sample used only]; Triplett, Tedeschi, Cann, Calhoun & Reeve, 2012) found a significant correlation between intrusive cognitive processing in the immediate aftermath of the event and PTG. These studies in addition to Bosson, Kelley and Jones (2012) also reported significant correlations between deliberate cognitive processing soon after the trauma and PTG. Nightingale et al. (2010), Taku et al. (2009 [US sample only]), Cann et al. (2011) and Lindstrom et al. (2013) reported significant associations between intrusive rumination recently and PTG. The same authors reported comparable associations between recent deliberate cognitive processing and PTG as did Cann et al. (2010).

It can be seen from the correlational analysis that, in general, there appears to be a relationship between both forms of cognitive processing at both timescales and PTG. However, this does not necessarily hold true for more detailed analysis (hierarchical regression, path analysis or SEM). In further analysis two studies (Triplett et al., 2012 and Forgeard, 2013) found no association or individual significant predictive value of intrusive rumination soon after the event. However, in Triplett et al. (2012) there was an indirect path from intrusive cognitive processing soon after the event to PTG via deliberate processing soon after the event. Contrastingly, Taku et al. (2009) found that past intrusive cognitive processing was individually significant in their regression model. Interestingly, each of the aforementioned studies found the opposite relationship between past deliberate cognitive processing and PTG i.e. those that found no relationship between intrusive processing and PTG did find one with deliberate processing and vice versa.

With regard to recent intrusive processing, results are again mixed with Taku et al. (2009) not finding it to be individually significant in the regression and Cann et al. (2010) finding the opposite. However, the results pertaining to recent deliberate processing are

somewhat clearer with both Taku et al. (2009) and Cann et al. (2010) in addition to Nightingale et al. (2010) finding that recent deliberate rumination is an individually significant predictor of, or significantly associated with, PTG. It is important to note that many studies citing mixed trauma, such as Forgeard (2013), do not give a full list of traumas reported and so it is unclear if all events would ordinarily be considered trauma and thus be comparable with other studies.

There was a subset of studies that defined cognitive processing by time but not type of processing. Calhoun et al. (2000) reported a significant correlation between past rumination and PTG and this factor continued to be individually significant in a regression model. Although current rumination was significant in correlational analysis, it became individually non-significant in regression analysis. Lindstrom et al. (2013) found similar results; past rumination added significant variance to the regression model. Finally Proffitt, Cann, Calhoun and Tedeschi (2007) found a significant correlation between past processing but none between recent processing. Interestingly, they also reported that past cognitive processing was a suppressor variable in the regression analysis and that when it was removed, recent rumination was significantly, negatively related to PTG. However, this study had a small sample size and was carried out with clergy only so the generalisability of results is limited. The initial relationships between all four cognitive processing variables and PTG becomes more complex and contradictory in more detailed analysis. Past intrusive processing, past deliberate processing, and recent intrusive processing showed mixed results with some studies finding significant associations and others not. However, recent deliberate rumination was associated with PTG in more detailed analysis in all three studies it was investigated. This finding could be considered contrary to Tedeschi and Calhoun's model that deliberate processing long after the event may be negative as it suggests unresolved

trauma, however as no timescale is provided in their model, it is impossible to fully assess this.

4. Is there any longitudinal evidence for the relationship between cognitive processing and PTG?

Phelps et al. (2008) explored this issue among a predominantly white, male sample of amputees. Cognitive processing was measured at one month post-amputation and all other measures were administered at 6 and 12 months. Positive cognitive processing did not correlate with PTG at 6 months but did so at 12 months ($r = .33, p < .001$), indicating that the relationship with PTG may take time to develop. Negative cognitive processing did not correlate with PTG at either 6 or 12 months which is in contrast to the majority of findings from cross sectional data. In a hierarchical regression, neither subscale was independently significant in predicting variance in PTG at 6 months, but the positive subscale was individually significant at 12 months ($\beta = 0.42, p < .01$) and both subscales combined accounted for 15% of the unique variance in 12 month PTG scores. These results lend further support to the idea that the relationship between processing and PTG takes time to develop.

Salsman, Segerstrom, Brechting, Carlson and Andrykowski (2009) collected longitudinal data from 55 colorectal cancer survivors; 58.9% female, 98.2% Caucasian. All measures were administered at Time 1 (within 6-18 months of diagnosis) and again at Time 2 (three months later). Intrusive cognitive processing at Time 1 was not correlated with either Time 1 or 2 PTG, however, intrusive processing at Time 2 was associated with PTG Time 2 ($r = .32, p < .05$). Deliberate cognitive processing at Time 1 was not significantly correlated

with PTG Time 1 but was at Time 2 ($r = .36, p < .001$) as was deliberate processing at Time 2 ($r = .42, p < .001$).

Regression analysis showed that neither Time 1 intrusive, nor deliberate processing, predicted PTG at either Time 1 or 2. Though, the authors note that the results for deliberate processing and PTG Time 2 are suggestive of a trend in the data. As such secondary, less conservative, analysis was carried out which excluded age at diagnosis and education and controlled for PTG at baseline, and found that baseline deliberate processing at Time 1 did significantly predict PTG scores at Time 2 ($\beta = .25, p < .05$). This suggests that the relationship between deliberate cognitive processing and PTG might strengthen over time. The authors note some methodological considerations; people in the later stages of cancer did not respond so the sample is skewed towards those in the earlier stages, and that there is a relatively short period between Time 1 and 2 which may not have allowed PTG to develop sufficiently. A further issue is that the deliberate processing measure used in this study is brief and not well validated.

The results of these studies suggest that deliberate processing might play a causal role in PTG, but that the effect on PTG takes time to develop from the time of processing. Also, while these results do not support a direct link between intrusive processing and PTG, it should be noted that Salsman et al. (2009) reported that intrusive processing at Time 1 was strongly correlated with deliberate processing at Time 1 ($r = .56, p < .001$) and moderately correlated with it at Time 2 ($r = .36, p < .001$) suggesting an indirect relationship between intrusive rumination and PTG via deliberate rumination, although this was not formally analysed so should not be over-interpreted. These longitudinal studies support the Tedeschi and Calhoun model of PTG in that deliberate processing is predictive of PTG over time.

5. Does PTG share cognitive processing pathways with PTSD?

While the pathways between trauma and PTSD are not directly related to the topic of this paper, their similarity or difference to PTG pathways is investigated by numerous studies in this paper's sample and so will be discussed. However, this paper's literature search did not pertain to PTSD and so should not be considered a comprehensive review of pathway from trauma to PTSD.

Previous research suggested that PTSD and PTG are separate constructs, and not two ends of the same spectrum (Calhoun & Tedeschi, 1998). This is supported by the data in this review as four studies found no association between the two variables (Chan et al., 2011; Currier et al., 2013; Phelps et al., 2008; Salsman et al., 2009) and three found a positive correlation (Boals & Schuettler, 2011; Cann et al., 2011; Triplett et al., 2012). This suggests that any association there may be is a positive one, implying that they cannot be two extremes of the same concept. All of the above studies found associations between all cognitive processing variables and PTSD, apart from Phelps et al. (2008) which, in a longitudinal study, found that positive processing was not related to PTSD at 6 or 12 months and negative processing was only related to PTSD at 12 months.

Only two studies exploring the pathways to PTSD integrated the results with pathways to PTG (Taku et al., 2008; Triplett et al., 2012). Triplett et al. (2012) sampled 148 students from the US who had experienced a trauma in the last 18-24 months. Correlations showed that PTSD was significantly associated with PTG ($r = .25, p < .01$), deliberate rumination ($r = .44, p < .01$) and intrusive rumination ($r = .56, p < .01$). Subsequent path analysis that included both PTSD and PTG as endogenous variables found that they have separate direct paths from trauma. The path from deliberate rumination to PTG was significant as was the path from intrusive rumination to PTSD. However, intrusive

rumination was indirectly associated with PTG via deliberate rumination suggesting that some indirect pathways may be shared. Similar results were found by Taku et al. (2008). SEM analysis also showed different cognitive processing pathways; from intrusive rumination to PTSD and deliberate rumination to PTG. However, as the exact nature of the pathways from trauma to PTG remains inconclusive, it is difficult to compare these with those of another variable.

6. Do social factors influence the relationship between cognitive processing and PTG?

Lindstrom et al. (2013) investigated the effect of the disclosure of trauma on cognitive processing and PTG. Participants were 129 university students who had experienced mixed traumas that met DSM IV criteria (American Psychiatric Association, 2000). Results showed that those who had discussed positive consequences of their trauma with others reported significantly more deliberate rumination soon after the event than those that did not, $t(126) = 2.86, p < .01$. However, PTG scores did not significantly differ between the two groups. An identical pattern of results was found for those who disclosed negative consequences; they also reported more deliberate rumination immediately after the event than those who had not $t(126) = 3.38, p < .01$ but showed no difference in PTG scores. In a stepwise regression, disclosure variables did not predict a significant amount of unique variance in PTG. The authors posit that one potential explanation for this, is that the dichotomous measurement of disclosure limited variance. However they also suggest that response to disclosure may be more salient in developing PTG than disclosure itself and suggest this as an avenue for further research.

All the studies that investigated cognitive processing, social support and PTG (Benetato, 2011; Cohen & Numa, 2011; Currier et al., 2013; Hallam & Morris, 2014; Morris

& Shakespeare-Finch, 2011) all found a significant correlation between social support and PTG. However only two found an association between cognitive processing and social support. Hallam and Morris (2014) reported a relationship between deliberate processing, but not intrusive processing, and social support while Morris and Shakespeare-Finch (2011) reported associations between both intrusive and deliberate processing and social support. The latter two studies further analysed these relationships. Hallam and Morris (2014) conducted a regression analysis and found that social support was a significant predictor of PTG and that it was mediated by deliberate rumination. Morris and Shakespeare-Finch (2011) used SEM and found that social support was directly related to both forms of rumination and both directly and indirectly (via deliberate processing) related to PTG.

In summary, results suggest that disclosure is linked to rumination but a clear link to PTG has not yet been shown which may in part be due to methodological issues. Social support appears to be both indirectly related to PTG via deliberate processing and perhaps even also directly related, although the latter finding lacks theoretical explanation in the literature. Overall, the research supports Tedeschi and Calhoun's (2004) model of PTG which postulated that increased social support will increase deliberate rumination which will in turn increase PTG.

7. Do event related factors such as severity of trauma impact on the cognitive processing and PTG relationship?

Tedeschi and Calhoun (2004) propose that cognitive processing is triggered by a 'seismic' event that shakes a person's core beliefs about the world. It could thus be hypothesised that severity of trauma would be related to the amount of cognitive processing and, in turn, PTG. However, there have been mixed findings in this area. Proffitt et al.

(2007) found no association between severity and cognitive processing variables or PTG among members of the clergy. Contrastingly, Morris and Shakespeare-Finch (2011) reported a correlation between both deliberate and intrusive processing and PTG. In further SEM, severity of event was not found to be directly related to PTG, although it was indirectly related through social support behaviour.

Other researches have suggested that it is not the severity of the trauma that is important, rather the distress caused. Cann et al. (2010) and Marshall et al. (2013) found a correlation between cognitive processing variables and distress. Lindstrom et al. (2013) also found correlations between distress soon after the event, recent distress and recent deliberate rumination but not deliberate rumination soon after the event. PTG and distress were not found to be associated by either Lindstrom et al. (2013) or Cann et al. (2010). However, Marshall found that distress at the time of a break-up was indirectly related to PTG via both brooding and reflective rumination (analogous to negative and positive rumination).

Both severity of trauma and distress at the time of the trauma could be considered proxy measures for the effect of the trauma on core beliefs which is what the Tedeschi and Calhoun (2004) model posits is central. Wilson et al. (2014) investigated this more directly with a measure of disruption to core beliefs (Core Belief Inventory [CBI]) (Cann et al., 2009). This was a large study consisting of 514 Australian men with prostate cancer. Results showed that the level of disruption to core beliefs was correlated with all PTG subscales ($r = .44, p < .001$ to $r = .57, p < .001$) deliberate rumination ($r = .41, p < .001$) and intrusive rumination ($r = .62, p < .001$). This relationship was further investigated by SEM which showed that core belief disruption was directly related to PTG but there was also an indirect path via intrusive rumination.

The four other studies which explored this area (Cann et al., 2010; Cann et al., 2011; Lindstrom et al., 2013; Triplett et al., 2012) found similar results i.e. all cognitive processing scales were correlated with the level of core belief disruption. Both Cann et al. (2010) and Cann et al. (2011) found CBI to predict a significant amount of unique variance in PTG scores in regression analyses. However, no mediation analysis was carried out so the mechanism of this relationship is unclear. Triplett et al. (2012) investigated these relationships with SEM and found, like Wilson et al. (2014), that core belief disruption was both directly and indirectly related to PTG, but the indirect relationship was found to be via deliberate rumination rather than intrusive rumination as was found by Wilson et al. (2014).

The results regarding severity of trauma are contradictory and so firm conclusions cannot be drawn. While distress may be related to rumination there are mixed results concerning its relationship to PTG with some studies finding no relationship but one finding an indirect one. The results pertaining to the disruption of core beliefs seem to show more conclusively that a relationship exists between level of disruption and both cognitive processing and PTG. It is not yet entirely clear the nature of this relationship but results seem to indicate that both direct and indirect pathways exist. The findings regarding the importance of disruption of core beliefs fit with the Tedeschi and Calhoun (2004) model.

8. Does the cognitive processing model of PTG have any cross cultural validity?

As a broad pattern of results has not been established among Western populations, it is difficult to conclusively answer this question, however relevant evidence is discussed. The majority of the studies investigating PTG have been carried out in the USA and other Western countries such as the UK. However, four studies have been conducted in more Eastern collectivist cultures (Chan et al., 2011; Taku et al., 2008; Taku et al., 2009, Zhang et al., 2013). Taku et al. (2009) was the only study to include a Western comparison sample.

They explored the cognitive processing model of PTG among both 431 Japanese college students and 224 US participants (specific details were not provided) who had experienced mixed traumas, for example, bereavement or relationship problems. All four measures of processing (past intrusive and past deliberate, and current intrusive and current deliberate) were significantly correlated with PTG in both samples. In regression analyses for both samples, past intrusive processing and recent deliberate processing were individually significant. In the Japanese sample, past deliberate processing was also individually significant. Overall, the pattern of results was very similar, apart from one finding pertaining to deliberate processing in the regression. The authors highlight that there were notable differences between the samples such as a wider age range in the US sample. Another limitation of this study is that hypotheses were not tested between-countries. This limits the comparisons that can be made.

Similar to the findings discussed in 1, 2, and 3 the other three studies comprising Asian populations found no discernible pattern of results. A second Japanese study (Taku et al., 2008) found significant relationships between past deliberate, recent deliberate and recent intrusive rumination and PTG, but not past intrusive. The SEM suggested a direct pathway between recent deliberate processing to PTG, and an indirect path from both past intrusive and past deliberate processing to PTG via recent deliberate rumination. A study from Hong Kong (Chan et al., 2011) reported no association between intrusive cognitive processing and PTG, but did report one between deliberate processing and PTG. In regression analysis, deliberate processing was found to be an individually significant predictor of PTG. These studies seem comparable with the literature described above; there appear to be some associations between cognitive processing variables and PTG, but the exact nature of this relationship remains inconclusive. Finally, Zhang et al. (2013) found no relationship between any cognitive processing variables and PTG in their sample of Chinese mothers of

children with Autism. This is unusual compared to the rest of the literature. However, whether having a child diagnosed with Autism is analogous to being diagnosed with cancer is debatable, although there may be a cultural significance to the diagnosis not highlighted in the article.

It is also important to highlight that a limitation of many of the studies carried out with Western populations is that they have included predominantly white samples. However, one study (Nightingale et al., 2010) reported participants being 88% African American. The results from this study (detailed in 3) are in line with those papers reporting different ethnic make-ups. While one study should not be over-generalised, it lends credence to the idea that the cognitive processing model of PTG is, to some extent, cross culturally valid.

Discussion

While some specific findings in this area might be contradictory, the general results do support a relationship between cognitive processing and PTG and, more precisely, deliberate processing and PTG as suggested by the Tedeschi and Calhoun model (2004). Some of the correlational data in this area have been equivocal, but the findings from longitudinal data are more conclusive. As longitudinal designs are considered far more methodologically robust, these are important to consider. The longitudinal data also suggest that intrusive rumination may be causally related to deliberate processing, and as such, be indirectly related to PTG. Some evidence for the cross-cultural validity of this model was also found; however, it is difficult to establish this conclusively, as there remains much uncertainty in the original Western literature as to the exact nature of the relationship between cognitive processing variables and PTG.

Two different issues investigated regarding timing were explored in the literature. The first was the effect of time between cognitive processing occurring and PTG. The findings from longitudinal studies suggest that the effect of rumination on PTG strengthens over time. This implies that when PTG is measured in a study, it may be more related to cognitive processing 12 months ago, rather than now, although processing during these two time frames is likely to be correlated. The second issue pertained to the impact of when the processing took place, in other words, in the last few weeks or immediately after the event. The only conclusive result pertained to recent deliberate rumination which, results suggest, is related to PTG.

The findings from investigations into whether PTG shared cognitive processing pathways with PTSD suggest that they may share some direct and indirect paths. However, as the exact nature of the cognitive processing pathways involved in PTG are not yet clear, it

is difficult to assess their similarity. Pathways pertaining to PTSD or distress are not described in the Tedeschi and Calhoun model (2004). Similarly, no mechanism for the direct effect of core belief disruption of PTG that has been found is included in the model. The indirect cognitive processing pathways, however, are included in the model. While core belief disruption has been found to be fundamental, other event-related factors, such as severity of the event, have not been found to impact on cognitive processing or PTG.

The model of PTG presented by Tedeschi and Calhoun (2004) proposes that increased social support and disclosure will increase deliberate rumination, and so increase PTG. Disclosure was not found to be related to PTG, however, it was associated with rumination. While the lack of findings could be due to measurement issues, Nightingale et al. (2010) suggest that it may also be due to the response to disclosure, rather than the act of disclosure itself. Social support was found to be related to PTG both directly and indirectly via cognitive processing by some studies, but results are inconclusive.

Methodological Limitations

Sample and methodology. The limitation that applies to most studies in this sample is the fact that the vast majority of them are cross-sectional, which negates any inferences about causality. Also, much of the research was conducted among university populations, which authors argue are analogous to general population samples in terms of exposure to trauma. However, they are obviously a younger, better educated sample than a general population sample, which is likely to impact on results (Linley & Joseph, 2004). Another sampling issue is the fact that the participants in these studies are self-selecting. The only study to report on non-responders (Morris & Shakespeare-Finch, 2011) found that those who

did not participate had a more advanced cancer, suggesting that the remaining sample would not be representative of the whole population.

Numerous studies have investigated events that would not, ordinarily, be referred to as 'trauma' in psychological literature, for example, relationship break-up or bereavement. While Tedeschi and Calhoun (2004) stress that trauma is synonymous with highly stressful events, it must be of a magnitude that fundamentally alters the way the world is viewed. It is possible that a relationship break-up or the death of an elderly relative may not trigger this shattering of the assumptive world; however, an acrimonious divorce or the death of one's child may. In other words, the trauma category may belie a plethora of experiences. The recent emergence of core belief disruption as an investigated variable is a welcome addition to the literature, as it moves the focus away from the trauma itself and towards the psychological disruption it caused.

Analysis. Very few studies conducted mediation analysis. As many of these studies are effectively suggesting that the relationship between trauma and PTG is mediated by cognitive processing, it seems an omission. For example, while independent variables such as social support are correlated with cognitive processing variables, the exact causal mechanism is not investigated. There was also a lack of detailed analysis on the relationship between intrusive and deliberate rumination, especially as they were found to co-vary and one study (Proffitt et al., 2007) found past cognitive processing to be a suppressor variable. Potential interactions between these scales may be one reason for the contradictory results in this area.

Measurement. The results pertaining to past and recent rumination were among the least conclusive. One possible reason for this may be the way these time points were defined. It is arguable that 'recent' rumination is a somewhat meaningless concept as it is being

measured in relation to the time when questionnaires are being completed, rather than in relation to when the trauma occurred. It is not a coherent metric as it could pertain to rumination two months after a trauma or two decades after a trauma which would be analysed as one group. There are also issues with the 'past' time point. Expecting a person to accurately recall the content of their thoughts from years previous seems less than valid. Longitudinal analysis offers a more methodologically robust alternative.

The wide variety of cognitive processing scales is another methodological issue possibly adding to the variation in results. To the author's knowledge, there is no published research comparing event-related cognitive processing scales, and so it has not yet been established that they are measuring exactly the same construct. The ERRI seems to be becoming increasingly popular, which is a positive development for two reasons; it is the scale that has most face validity in terms of the constructs deliberate and intrusive rumination, and using one measure would help determine if variation in measures is one of the reasons for such contradictory findings.

Implications for Research and Practice

As should be clear from the paper thus far, the evidence pertaining to each question requires further investigation addressing the methodological concerns raised above. Firstly, more longitudinal research is required to better establish causality in the relationship between cognitive processing and PTG. This would help elucidate if there are patterns in the way this relationship develops over time. Intrusive and deliberate processing should also be measured longitudinally, as this would help ascertain if intrusive processing is causally related to deliberate processing. Another priority for researchers should be to alter the way time of processing is measured and move away from questionable definitions of time. The use of one

type of cognitive processing measure is also recommended for the reasons discussed above. As was also previously discussed, the use of a measure of core belief disruption in future work would be useful as it is thought to be central to the development of PTG. More studies with non-Western samples, and non-White samples are also required to further investigate cross-cultural validity.

It is vital to gather more data on those people choosing not to participate in these studies. Are they simply a random subsection of the population or are they a discrete sub-population thus skewing the result? Future work should also ensure mediation is investigated; it is necessary to establish the underlying mechanisms of a relationship. Another important area discussed above is the relationship between response to disclosure and PTG. Are responses to trauma more salient than disclosure itself?

The research thus far is extremely theoretical and further research regarding clinical implications is certainly required. However, one of the clearest findings from this review is that thinking about trauma is related to increased PTG and, more especially, the way we think about trauma (i.e. deliberate rumination). This could be used to guide tentative exploration with clients about how their lives have changed since the trauma. It would need to be carefully balanced with ensuring their distress and possible losses associated with the trauma are validated. This could be done in any modality of therapy but perhaps fits best with narrative therapy, which works to move away from problem saturated narratives and privilege alternative narratives.

There is, however, an ethical issue about whether clinicians have the authority to guide cognitive processing in order to facilitate PTG. When a client attends therapy for depression, for example, there is a clear mandate to work on things that will help manage their mood. However, few, if any, clients will attend therapy expecting to be guided towards

PTG. At the heart of this issue seems to be collaboration; who decides what, and how explicit are these arrangements? Another clinical issue not addressed in the PTG literature is how similar or otherwise the content of intrusive thoughts are to those experienced in PTSD. If, for example, PTG intrusive rumination contains elements of reliving, this could be extremely distressing and so should be addressed. However, the aim of this intervention would thus be to reduce intrusive rumination, possibly thereby reducing deliberate rumination and, in turn, PTG. This potential conflict would pit immediate distress against later PTG, yet little space has been devoted to this tension in the literature.

Conclusion

There has been an explosion of PTG research in the last decade and of varying quality. Results seem to suggest that cognitive processing, especially deliberate cognitive processing, is related to PTG. However the exact nature of this relationship remains unclear. One of the clearest findings reported is that the level of disruption to core beliefs is central to cognitive processing and PTG. These findings support the model proposed by Tedeschi and Calhoun (2004). However, there remains contradictory evidence in numerous other areas that requires further, methodologically sound, investigation to be able to draw any firm conclusions.

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COGNITIVE PROCESSING PATHWAYS TO POSTTRAUMATIC
GROWTH.

Section B:

Direct and indirect effects of unsupportive interactions on posttraumatic growth

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Abstract

This study investigated the relationship between unsupportive stressor-specific reactions to the disclosure of HIV and posttraumatic growth (PTG). Thirty-eight participants were recruited online and via non-statutory organisations. The sample was predominantly young, white, male, gay and HIV was well controlled with medication. Results showed that unsupportive reactions were not correlated with PTG. However, there was a significant indirect effect through total cognitive processing. This was broken down into a two-mediator model which was also significant. It showed that unsupportive reactions were related to intrusive rumination which, in turn were related to deliberate rumination which also correlated with PTG. Further analysis showed that models using individual subscales of the unsupportive social interactions inventory (distancing, and bumbling subscales) also produced a significant indirect effect in, both one and two, mediator models. When the indirect effects of cognitive processing were accounted for, the negative direct effect of unsupportive interactions on PTG became significant. The findings suggest that unsupportive reactions to the disclosure of HIV may act as another ‘traumatic event’ and shows similar cognitive consequences. They also suggest that there is an alternative path to PTG, other than cognitive processing, which has not yet been identified in the literature and requires further investigation.

Introduction

What is Posttraumatic Growth?

It has long-since been recognised that adversity can have a transformative effect (Tedeschi & Calhoun, 1995) and can generate growth. Tedeschi and Calhoun (2004) define posttraumatic growth (PTG) as “positive psychological change experienced as a result of the struggle with highly challenging life circumstances” (p. 1). PTG consists of five domains: greater appreciation of life and changed sense of priorities, more intimate relationships, a greater sense of personal strength, recognition of new possibilities or paths, and spiritual development (Tedeschi & Calhoun, 1996).

The first domain of increased appreciation of life refers to the fact that many who have experienced trauma subsequently report a sense of being fortunate and grateful for the small things in life. More intimate relationships pertains to the experience, often reported after adversity, that relationships become more meaningful. This can occur through people rallying around and offering support together with the increased compassion felt for the suffering of others due to one’s own struggle. The recognition of one’s strength relates to the experience of feeling better able to cope with whatever adversity might lie ahead since you have already coped with difficult circumstances. After trauma it is not uncommon for people to reassess their priorities and what is important to them; this can lead to choosing a new path in life more in keeping with these newly realised values. Finally spiritual or existential growth is also common after adversity. This can relate to changes in a person’s relationship with God, if they have a faith, and for those who do not it can pertain to increased engagement with fundamental existential questions, such as the meaning of life.

It should be noted that the use of the term ‘trauma’ in the PTG literature differs somewhat to its use in other psychological literature and is used interchangeably with ‘crisis’

or ‘highly stressful event’ (Tedeschi & Calhoun, 2004). It is also important to highlight that consideration of growth does not negate the experience of distress. Numerous studies have found that growth and distress can, and do, co-exist (e.g. Boals & Schuettler, 2011; Cann et al., 2011).

PTG has been found to occur in populations who have experienced various forms of trauma, including: bereavement (Davis, Nolen-Hoeksema, & Larson, 1998), breast cancer (Cordova, Cunningham, Carlson, & Andrykowski, 2001), natural disasters (McMillen, Smith, & Fisher, 1997) and terrorist attacks (Pargament, Smith, Koenig, & Perez, 1998). In a review of the topic, Linley and Joseph (2004) cite prevalence rates ranging from 35 % after a plane crash (McMillen et al., 1997) to 100% following rape (Thompson, 2000). More recently, researchers have turned their attention to the positive potential effects of PTG. In a systematic review of the literature, Barskova and Oeterreich (2009) reported that longitudinal evidence using objective measures of health, such as biological markers, has shown that PTG is related to later improved physical health e.g. lymphocyte proliferation (Dunigan, Carr, & Steel, 2007) and cortisol levels (Creuss et al., 2000) in cancer survivors. A meta-analysis of benefit finding (which is in many ways analogous to PTG and included numerous PTG studies) (Helgeson, Reynolds, & Tomich, 2006) concluded that benefit finding was associated with better mental health, specifically, lower rates of depression and increased well-being. However they highlight that PTG should be thought of as a positive outcome in its own right, and not simply as a precursor to other outcomes.

PTG in an HIV Context

One area that is becoming increasingly prominent in the PTG literature is HIV. Milam (2004) reported a PTG prevalence rate of 59% in a US sample of people living with HIV. As with other types of adversity discussed above, PTG in HIV populations has been shown to

reduce negative mental health (Milam, 2004) and, as reported in a well conducted meta-analysis, improve positive mental health and subjective physical health (Sawyer, Ayers, & Field, 2010). Some of the most convincing research into the effects of the physical health benefits of PTG have come from the area of HIV. In their seminal paper, Bower, Kemeny, Taylor and Fahey (1998) found that, among a sample of (predominantly white) men living with HIV who had also experienced an AIDS-related bereavement, finding meaning (comparable to PTG) resulted in less rapid decline of CD4 counts (a key marker of disease progression) over a 2-3 year follow up and lower AIDS-related mortality rates over a 4-9 year follow-up. Importantly, these results were independent of health at baseline and health behaviours. Milam (2006) also found that PTG predicted disease progression (lower viral load and higher CD4 count) over time and that these findings were also independent of health behaviours. However, these results were only true for Hispanic participants and those low on measures of optimism and pessimism, suggesting that the relationship between PTG and physical health is a complex one. Given that results from Bower et al. (1998) were not replicated in their entirety, and the field in general is in its infancy, caution should be used when inferring causal relationships between HIV and disease progression.

A Cognitive Processing Model of PTG

One of the most well-researched and comprehensive models of PTG is the cognitive processing model of Tedeschi and Calhoun (2004). They posit that PTG is generated by the cognitive processing that follows a traumatic event. It is suggested that a trauma can destroy our fundamental beliefs about the world (what Janoff-Bulman [1992] referred to as the assumptive world). One of the primary intrapsychic goals following adversity is to rebuild these shattered assumptions so that they reflect the new world; one in which bad things can happen but that you are strong enough to cope with them. It is from the cognitive processing

required to rebuild these shattered assumptions that PTG is thought to occur, rather than from the trauma itself. Tedeschi and Calhoun (2004) base their theory of cognitive processing on Martin and Tesser's (1996) concept of rumination, which is defined as being conscious, recurrent, instrumentally orientated, and not directly cued by the environment. Martin and Tesser (1996) suggest that it is prompted by incongruities in goal attainment, for example not being able to lead an active life after sustaining serious injuries in a car crash. Crucially, this form of rumination is not theorised to be necessarily negative and carries no inherent valence.

Different forms of cognitive processing have been suggested and investigated in the PTG literature, most notably deliberate and intrusive. Deliberate cognitive processing refers to actively trying to understand the event and its implication for one's life, while intrusive processing refers to unsolicited thoughts about the event that one does not feel one has control over (Cann et al., 2011). The model suggests that intrusive processing occurs more in the immediate aftermath of a trauma, but over time this gives way to more deliberate processing, with the latter being more related to PTG. The cross-sectional research in this area has, at times, been contradictory (e.g. Gangstadt, Norman, & Barton; Hallam & Morris, 2014). However, longitudinal analysis has more conclusively shown that deliberate processing predicted PTG, while intrusive processing did not (Phelps, Williams, Raichle, Turner, & Ehde, 2008; Salsman, Segerstrom, Brechting, Carlson, & Andrykowski, 2009).

Disclosure

Although PTG is an intrapsychic process, it does not occur in a social vacuum. In a review of the topic, Tedeschi and Calhoun (2006) conclude that PTG is more related to stressor-specific interactions than general levels of social support. One particularly pertinent 'stressor-specific interaction' is the issue of disclosure. Theoretically, disclosure is thought to be relevant to PTG as it is likely to trigger the type of reflective, deliberate rumination

thought to be associated with the development of PTG (Treyner, Gonzalez, & Nolen-Hoeksema, 2003; Lindstrom, Cann, Calhoun, & Tedeschi, 2013). Disclosure also offers an opportunity to hear and develop alternative narratives that can be integrated into rebuilt schemas (Neimeyer, 2001). An association between disclosure and PTG has been found among breast cancer survivors (Cordova et al., 2001; Henderson, Davison, Pennebaker, Gatchel, & Baum, 2002) and Japanese university students (Taku, Cann, Tedeschi, & Calhoun, 2009). However such a relationship was not found by Lindstrom et al. (2013) among a US university sample. It should also be borne in mind that the context of disclosing cancer and HIV are likely to be markedly different given the stigma surrounding the latter (Logie & Gadall, 2009).

Lindstrom et al. (2013) suggested that this discrepancy could be explained by others' reactions to disclosure and that other's reactions, rather than disclosure itself, is the salient variable. Findings in this area were also mixed. Neither, Cordova et al. (2007) nor Nenova, DuHamel, Zemon, Rini and Redd (2013), found an association between social constraints to disclosure⁶ over the preceding month and PTG in samples of breast cancer survivors and stem cell transplant survivors respectively. Wilson, Morris and Chambers (2014) reported significant correlations between social constraints and three domains of PTG, but these became non-significant in Structural Equation Modelling (SEM). However, Ingram, Betz, Mindes, Schmitt and Smith (2001) argue that social constraints, although related to unsupportive interactions, is in fact a separate construct, and so, should be investigated as such. Taku et al. (2009) investigated reactions to disclosure (rather than social constraints) by coding participants' written accounts of the responses into either positive, negative or other (responses that did not fit into the preceding two categories). They found an association between more positive reactions and higher PTG and vice versa.

⁶ A combination of social conditions and the interpretation of these that lead to a reduced likelihood of disclosure (Lepore & Revenson, 2007).

The above studies (Cordova et al., 2007; Nenova et al., 2013; Taku et al., 2009; Wilson et al., 2014) contain some methodological limitations which suggest replication. Firstly, social constraints is used in three studies and this is argued to be a distinct construct from unsupportive responses. This measure also uses the very narrow time frame of the preceding month. It is possible, if not likely, that the more negative reactions occurred sooner after initial disclosure and that one month is not an accurate snapshot of a person's whole disclosure experience. Taku et al. (2009) suggest that their study should be repeated using an inventory to measure negative responses, as only 8% of responses were actually coded as negative which may reflect participants giving socially desirable answers. This study was also carried out with a Japanese sample and it is not clear if the findings from an Eastern, more collectivist culture, map onto Western, more individualistic samples. Finally, only Wilson et al. (2014) investigated cognitive processing in relation to these constructs. Correlational analysis showed relationships between social constraints and both deliberate and intrusive rumination. However, in SEM, only intrusive rumination remained significant; it was found that intrusive rumination led to social constraints. Theoretically it is not logical that intrusive rumination could lead to unsupportive responses from others. As such, further research is needed into the role cognitive processing plays in the potential relationship between unsupportive responses and PTG.

The Current Study

The current study aimed to investigate the relationship between unsupportive responses to disclosure and PTG. It also aimed to investigate the possible role cognitive processing plays in mediating this relationship. Specific unsupportive reactions to disclosure were investigated, rather than social constraints. This was measured using an inventory to minimise the chance of participants giving socially desirable responses. A longer time frame

(since the event) was used in order to ascertain a more comprehensive view of participants' disclosure experiences. A measure of cognitive processing was included to facilitate investigation of this relationship. The sample consisted of people living with HIV in the UK. To the author's knowledge, neither PTG, nor the relationship between response to disclosure and PTG have been investigated previously in an HIV or UK population.

People living with HIV could be expected to experience more negative reactions to disclosure due to the stigma associated with the virus. Logie and Gadall (2009) found that HIV-related stigma continues to be a significant social problem. The National Aids Trust (2010) reported that 64% of the UK public agree that there is "a great deal of stigma ... around HIV" (p. 20). Those living with HIV also report frequently experiencing judgement from others (Courtney-Quirk, Wolitski, Parsons, & Gomez, 2006). Numerous studies have shown the potential negative reactions of friends and family to the disclosure of HIV (Powell-Cope & Brown, 1992; Weitz, 1989; Bor, Miller, & Goldman, 1993). A report from HIV charity Positive East (2013) notes that those disclosing a diagnosis of HIV continue to be "shunned or disowned by friends, family, and community" (p. 7).

Study Hypotheses. The aim of the current study was to investigate the relationship between unsupportive reactions to disclosure of HIV and PTG and also to investigate the mechanism by which this hypothesised relationship occurs. It was hypothesised that unsupportive reactions to disclosure would be negatively correlated with PTG, and that this relationship would be mediated by deliberate cognitive processing (with deliberate processing being negatively related to unsupportive reactions and positively related to PTG).

Method

The study was granted full ethical approval by the Salomons Ethics Panel (see Appendix 1).

Participants

Demographic information can be seen in Table 1. It shows that the majority of the sample responded online and consisted predominantly of white, gay men who have been HIV positive for approximately a decade and had been successfully treated with antiretroviral medication.

Recruitment

Participants were recruited via 16 non-statutory organisations and online via twitter. The non-statutory organisations facilitated recruitment to varying degrees, including: putting up posters, placing leaflets about their premises, advertising the study in newsletters and on twitter. The advertising material can be seen in Appendix 2. All advertising included the link to an online version of the study. However, for those organisations who agreed to advertise on their premises, hard copies of the questionnaires were also available to potential participants. These were provided together with freepost envelopes to preserve anonymity. The principal researcher, along with one supervisor, offered a workshop on the topic of growth for one organisation. However completing the survey was not a requirement of attending the group, nor were the attendees asked to complete the questionnaires at that time. Every effort was made to ensure that participants did not feel pressured into completing the questionnaires. The lead researcher also advertised directly on twitter. Inclusion criteria stated that participants must: be between 18 – 65 years old, have been diagnosed with HIV for at least one year (to ensure time to have processed the event and disclosed it to others);

Table 1

Demographic Information

	n	%	Mean	SD
Questionnaire Format				
Online	32	84.21		
Paper	6	15.79		
Age			26.62	8.8
Gender				
Male	30	78.9		
Female	8	21.05		
Ethnicity				
White British	31	81.6		
White European	3	7.9		
British Indian	1	2.6		
Black African	3	7.9		
Relationship Status				
Married or civil partnership	8	81.6		
Divorced	5	13.2		
Widowed	1	2.6		
Single	17	44.7		
In a relationship	5	13.1		
Sexuality				
Straight	12	31.6		
Gay	24	63.2		
Bisexual	2	5.3		
Education				
Secondary school	6	15.8		
Certificate/Diploma/NVQ	10	26.3		
Degree	16	42.1		
Masters/Doctorate	6	15.8		
Level of Income				
£0 - 10,000	9	23.7		
£10,000 - £20,000	10	26.3		
£20,000 - £30,000	5	13.2		
£30,000 - £40,000	7	18.4		
£50,000 - £60,000	5	13.2		
£70,000 - 80,000	1	2.6		
Level of Spirituality				
Very	5	13.2		
Quite	8	21.1		
Somewhat	7	18.4		
Not very	9	23.7		
Not at all	8	21.1		
Rather not say	1	2.6		

COGNITIVE PROCESSING PATHWAYS TO PTG – SECTION B

Employment				
Full-time	18	47.4		
Part-time	3	7.9		
Unemployed	10	26.3		
Other	7	18.4		
Time since diagnosis (years)			10.2	7.31
No disclosed to				
1 - 19	13	34.2		
20 - 39	4	10.5		
40+	20	52.6		
Taking Antiretroviral Medication	34	89.5		
CD4 count			703.35	287.86
Viral load*			3,428.42	11,232.77

*Modal value for viral load was ‘undetectable’

have disclosed the diagnosis to at least one non-healthcare professional; and be able to read and write English.

Materials

Please see Appendix 3 for a copy of all questionnaires. The online questionnaire was hosted on Bristol Online Survey.

Posttraumatic Growth Inventory (PTGI) (Tedeschi & Calhoun, 1996). The PTGI is a 21-item scale measuring all five domains of PTG; new possibilities (5 items), relating to others (7 items), personal strength (4 items), spiritual change (2 items) and appreciation of life (3 items). Items are statements such as “I changed my priorities about what is important in life” (appreciation of life) or “I more clearly see that I can count on people in times of trouble” (relating to others) with which participants indicate their level of agreement on a 0 (I did not experience this change as a result of the event) to 6 (I experienced this change to a very great degree as a result of the event). Tedeschi and Calhoun (1996) reported test-retest reliability of $r = .71$ and the internal consistency of $\alpha = .90$. The internal consistency for the

current sample was high, $\alpha = 0.96$. Factor analysis on the current sample supported a one factor solution suggesting a unitary construct.

Event Related Rumination Inventory (ERRI) (Cann et al., 2011). The ERRI comprises two 10-item subscales, with one measuring intrusive rumination and the other measuring deliberate rumination. Items such as “I thought about the diagnosis when I did not mean to” (intrusive) or “I thought about whether I could find meaning from my experience” (deliberate) are answered on a 4-point Likert scale ranging from 0 (not at all) to 3 (often). The original measure suggests administering both subscales twice on the same occasion, each enquiring about different time points; firstly in the two weeks following the trauma and secondly in the two weeks preceding the study. However, not all studies have used this format and have instead asked about all processing since the trauma (e.g. Wilson et al., 2014). The current study uses the latter timeframe for two reasons. Firstly, the hypothesis concerns the possible effect of disclosure on processing. Therefore, disclosure must temporally precede cognitive processing and it is likely that disclosure will continue beyond two weeks post-diagnosis. Secondly, it is unlikely that a person would remember, with any degree of accuracy, the frequency of particular thoughts occurring during a two week period which may have occurred years previous. No test-retest reliability was reported in the original study but internal consistency was reported to be $\alpha = .88$ for the deliberate subscale and $\alpha = .94$ for the intrusive subscale. The current corresponding values are $\alpha = 0.89$ and $\alpha = 0.95$, respectively and $\alpha = 0.94$ for both scales combined (total ERRI). Factor analysis conducted for the current study suggested a one factor solution for each subscale and a two factor solution for total ERRI that broadly maps onto each subscale.

Core Beliefs Inventory (CBI) (Cann, Calhoun, Tedeschi, & Solomon, 2010). The CBI is a nine item measure of disruption to core beliefs. It was included as it has been shown to be central to PTG development (e.g. Wilson et al., 2014). Participants are asked to answer

on a scale of 0 (not at all) to 5 (to a very great degree) the degree to which they agree with statements such as “Because of my diagnosis, I seriously examined the degree to which I believe things that happen to people are fair”. Cann et al. (2010) found test retest reliability to be $r = .69$. Internal reliability was reported to be high at $\alpha = .90$ and was similarly high at $\alpha = .88$ in the current study. Factor analysis suggested a 3 factor solution, however the first factor accounted for the vast majority of the variance. Given that the measure’s internal reliability is so high, it has been considered appropriate to analyse it as one construct.

The Unsupportive Social Interactions Inventory (USII) (Ingram et al., 2001).

The USII comprises 24 items divided evenly between four subscales, each measuring a different element of unsupportive behaviour to disclosure; distancing, minimising, bumbling and blaming. Distancing refers to either the emotional or behavioural disengagement from someone. Bumbling denotes a range of behaviours such as appearing awkward and uncomfortable or being overly concerned with ‘fixing’ the situation. Minimising behaviours are those such as excessive optimism or downplaying the concerns of the person with HIV. Blaming refers to criticising or finding fault with the person. These domains were drawn from a review of the literature into reactions experienced by those who had experienced a stressful life event. Items are statements such as “Someone felt that I was over-reacting to having HIV” (minimising) or “After becoming aware that I had HIV, someone responded to me with uninvited physical touching, such as hugging” (bumbling). Respondents are asked to indicate on a scale of 0 (none) to 4 (a lot) the extent to which they experienced these reactions. Internal reliability was reported by Ingram et al. (2001) to be at $\alpha = .86$ and no test-retest reliability was reported. The current study’s internal reliability was slightly higher at $\alpha = .95$. Factor analysis for the current study suggested a three factor solution however, as with CBI, the first factor explained most of the variance. As the alpha value is so high, it was decided that it is appropriate to analyse it as a unitary scale.

Design

The study used a cross-sectional, between-subjects design. The independent variable is the USII, the mediating variable is the ERRI and the dependent variable is the PTGI.

Procedure

If completing online, participants followed the link and were presented with the information and consent forms (Appendices 1 and 2) first and then the questionnaires (presented in the same order as they are discussed here). Helpline numbers were included both before and after completing the questionnaires. Subsequent to completing the questionnaires, participants were offered the opportunity to enter a competition to win a £50 Amazon voucher, and a separate option was given for the participant to provide contact details to receive a summary of the study, if they wished. Both were optional and it was made clear that any personal details would be stored separately to the other information provided. The paper version contained identical information and in the same order. Participants who completed a paper version were also given a freepost envelope.

Planned Statistical Analysis

A sample size of 67 was suggested by the power analysis program, GPower, (Faul, Erdfelder, Buchner, & Lang, 2009). Data analyses were conducted using Statistical Package for the Social Sciences (SPSS), version 22. Firstly, the method of completing the questionnaire was analysed to determine if there were significant differences between groups or if they could be analysed as one sample. Secondly the data were investigated to see if they violated the assumptions of normality. This was done by inspecting the histograms, checking

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whether the skewness and kurtosis values were larger than +/-2 and whether the Kolmogorov-Smirnov and Shapiro-Wilk tests were significant (significance indicates a violation of the assumptions of normality).

This was followed by obtaining descriptive statistics for the data. Analysis was then carried out to ascertain if any demographic variables were significantly associated with any of the questionnaire scales. This was investigated by using bootstrapped Pearson correlations for ratio level data, bootstrapped independent t-tests for binary level categorical data and the Kruskal-Wallis test for nominal level categorical data. Subsequently, all measures were correlated with each other using Pearson's bootstrapped correlation. Lastly, mediation was tested by using the Hayes custom dialogue box for SPSS, PROCESS (Hayes, 2012) which calculates the indirect effect of mediation and the Preacher and Kelley (2011) kappa squared (k^2) estimate of effect size. Interpretation of the size of k^2 is approximately analogous to Cohen's d; .01 = small, .09 = medium and .25 = large. Missing data were excluded on a pairwise basis for all analysis.

Results

Analysis of Response Format

The results of all measures for those who completed the study online were compared to those who completed a paper copy. Bootstrapping procedures⁷ were used to make the independent t-tests more robust as the number of respondents who used paper questionnaires was relatively small. No significant difference between the groups was found on any of these variables. As such, the remainder of the analysis was conducted on the whole sample.

Checks for the Violation of the Assumptions of Normality

The normal distribution of the data was assessed against three criteria: skewness and kurtosis being within normal limits (+/-2), a visual inspection of the histogram, and ensuring non-significance of the Kolmogorov-Smirnov and Shapiro-Wilk tests. These conditions were met in full for the PTGI, ERRI Deliberate and the ERRI Total. For the ERRI Intrusive and USII the first two conditions were met and the Kolmogorov-Smirnov test was non-significant, however, the Shapiro-Wilk was significant. However, it was decided that these scales could be accepted as normally distributed as the other conditions have been met and bootstrapping procedures were employed for further analysis. The CBI met the first two conditions but both the Kolmogorov-Smirnov test and Shapiro-Wilk tests were significant. However bootstrapping was used in further analysis and the CBI was not central to hypotheses so the normality of its distribution was less of a concern.

Descriptive Statistics

Descriptive variables can be seen in Table 2. The convention in the PTG literature is to use the mean of the totals (rather than means) for the PTGI, ERRI and CBI. This is the

⁷ All bootstrapped procedures were performed using 1000 samples, apart from for the mediation analysis which required 20,000 samples.

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score that was used in analysis and is presented here. In addition for these three scales, the mean of the mean (i.e. the mean of the totals divided by the number of items in the scale) is given to aid interpretation against the scales' own anchors. The mean PTGI score was 64.64 (SD = 26.5). This represents moderate PTG (3.08). However, the standard deviation was quite large suggesting a wide range in experiences of growth, in fact the totals range spans from 11 to 103. The mean intrusive rumination score was 19.78 (SD = 8.17) which places it just on the cusp of the sometimes range (1.98). Similarly, deliberate processing was in the sometimes range (2.09) with a mean of 20.89 (SD = 7.1). As expected, given that it is a composite of the previous two measures, the total rumination score was also in the sometimes range (2.05) with a mean of 40.94 (SD = 13.17). It seems that participants experience similar levels of the different types of rumination and that neither one predominates. The CBI mean was 28.27 (SD = 11.1) which represents disruption in the moderate range (3.14). This suggests that receiving a diagnosis of HIV resulted in a significant shaking of participants' assumptive world and is in line with the moderate levels of PTG that were found.

Conversely to the other measures, instructions for scoring the USII are given by the authors and stipulate that for each participant, the mean of each subscale should be calculated along with the total mean of all items. The sample mean thus is in the original units of the scale. The mean score for USII was 1.43 (SD = 1.02). The scale runs from 0 (none) to 4 (a lot) and so this score is at the lower end of the scale suggesting that participants did not experience many unsupportive reactions. Similarly all USSI subscales were also low; Distancing mean = 1.16 (SD = 1.2), Bumbling mean = 1.6 (SD = 1.12), Minimising mean = 1.41 (SD = 1.2) and Blaming mean = 1.6 (SD = 1.24).

Table 2
Descriptive Statistics

Measure	Mean	SD	Min and Max Values	Range
PTGI	64.64	26.5	0 - 105	moderate
ERRI Intrusive	19.78	8.17	0 - 30	rarely-sometimes
ERRI Deliberate	20.89	7.1	0 - 30	sometimes
ERRI Total	40.94	13.17	0 - 60	sometimes
CBI	28.27	11.1	0 - 27	moderate
USII Total	1.43	1.02	0 - 5	N/A
Distancing	1.16	1.2	0 - 5	N/A
Bumblng	1.6	1.12	0 - 5	N/A
Minimising	1.41	1.2	0 - 5	N/A
Blaming	1.6	1.24	0 - 5	N/A

Associations between Demographics and Variables

The only demographic variables to show a significant relationship⁸ with one of the questionnaires were sexual orientation, employment and spirituality. The mean Deliberate ERRI score for men was 19.93 (SD = 7.30) and for women was 26 (SD = 3.06). A bootstrapped independent samples t-test showed this difference to be borderline significant $t(33) = -2.14, p = 0.04, CI [-9, 0.57]$. Even though the p value is under .05, the bootstrap confidence intervals do not suggest a significant result. Female participants also reported significantly more minimising behaviours from others than male participants did $t(33) = -2.98, p = .005, CI [-2.32, -0.34]$ with means of 2.55 (SD = 1.24) and 1.15 (SD = 1.15), respectively.

Results showed that scores on the minimising subscale of the USII differed significantly depending on sexual orientation, $H(2) = 8.00, p = .02$. Pairwise comparisons with adjusted p-values and effect size showed no significant difference between people identifying as bisexual and either those identifying as gay, ($z = 0.41, p = 1.00$) or straight ($p z = 1.68, p = .28$). However there was a significant difference between those identifying as

⁸ All effects positive unless stated otherwise.

straight (mean = 2.27, SD = 1.29) and those identifying as gay (mean = 1.08, SD = 0.98), $z = 2.7$, $p = .02$. This suggests that participants identifying as straight experienced more minimising behaviour than those identifying as gay.

The relationship between level of income and both distancing and minimising subscales of the USII was significant, $H(5) = 12.04$, $p = .03$ and $H(5) = 11.69$, $p = .04$, respectively. However, follow-up pairwise comparisons did not find any significant differences. This is likely due to lack of variance in the data because of small sample sizes in some groups. Results showed that the total USII score as well as distancing and bumbling subscales significantly differed as a function of employment status, $H(6) = 12.79$, $p = 0.047$, $H(6) = 18.08$, $p = .006$ and $H(6) = 13.89$, $p = .03$, respectively. However as above, follow-up pairwise comparisons did not show any significant results. Both PTGI and the blaming subscale of the USII were found to differ according to level of spirituality, $H(4) = 10.52$, $p = 0.03$ and $H(5) = 11.71$, $p = .04$, respectively. Again, follow-up pairwise comparisons did not find any significant differences.

Associations between Variables

The correlation matrix is shown in Table 3. As predicted, the PTGI was significantly correlated with Deliberate ERRI. It was also correlated with Total ERRI but not with Intrusive ERRI. However, contrary to the hypothesis, the PTGI was not correlated with the USSI (or any of its subscales) which suggests that there is no relationship between unsupportive reactions to disclosure and the level of PTG experienced. Also contradictory to the hypothesis is the lack of relationship between Deliberate ERRI and USII meaning that overall unsupportive reactions to disclosure do not relate to decreased deliberate rumination. However, Deliberate ERRI was significantly related to the minimising subscale of the USII, although this relationship is positive which is contrary to what had been predicted. As would

Table 3
Correlation Matrix for Study Variables

	1	2	3	4	5	6	7	8	9	10
1. PTGI	-	0.26	.65**	.51**	.63**	0.08	-0.13	-0.03	-0.1	-0.02
2. ERRI-Intrusive		-	.51**	.89**	.56**	.36*	.36*	0.29	.44**	0.15
3. ERRI-Deliberate			-	.85**	.73**	0.27	0.22	0.21	.37*	0.16
4. ERRI-Total				-	.73**	.37*	.34*	0.29	.47**	0.18
5. CBI					-	.33*	0.28	0.27	0.31	0.31
6. USII - Total						-	.95**	.88**	.85**	.84**
7. Distancing							-	.85**	.76**	.71**
8. Bumbling								-	.60**	.64**
9. Minimising									-	.59**
10. Blaming										-

* $p \leq .05$; ** $p \leq .01$

be expected, Deliberate ERRI was also highly correlated with both Intrusive ERRI, and Total ERRI. No specific predictions were made concerning Intrusive ERRI or Total ERRI, however as would be expected, they significantly correlated with each other. Interestingly, they also both significantly correlated with USII and the distancing and minimising subscales. The CBI significantly correlated with all measures apart from two USII subscales; bumbling and blaming.

Mediation

Figure 1 shows the hypothesised model of mediation. For mediation to occur, both paths ‘a’ (from USII to Deliberate ERRI) and ‘b’ (from Deliberate ERRI to PTGI) must be significant (Zhao, Lynch, & Chen, 2010). As was discussed in the section above while the path from Deliberate ERRI to PTG was significant, the path from USII was not. However, if Deliberate ERRI is replaced with Total ERRI (Figure 2), which is correlated with both USII and PTGI, it is still

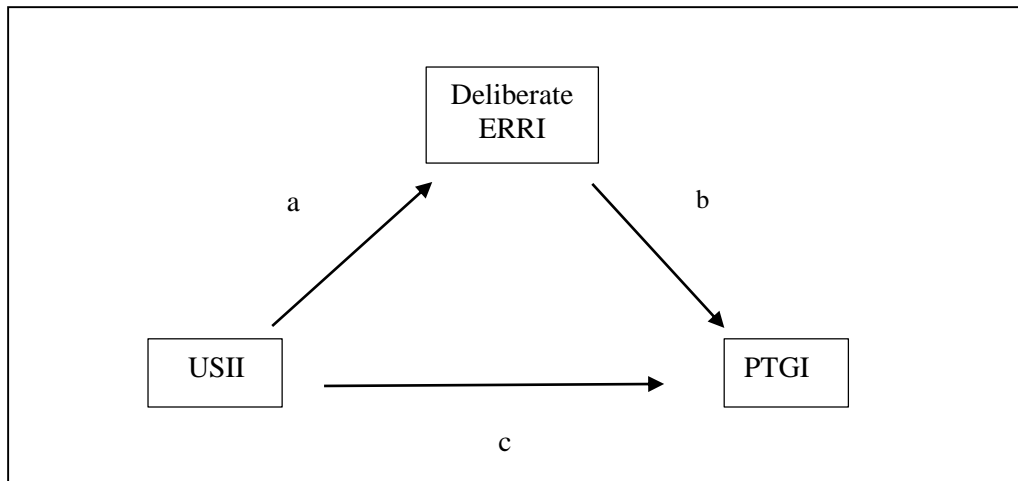


Figure 1: Mediation model (a)

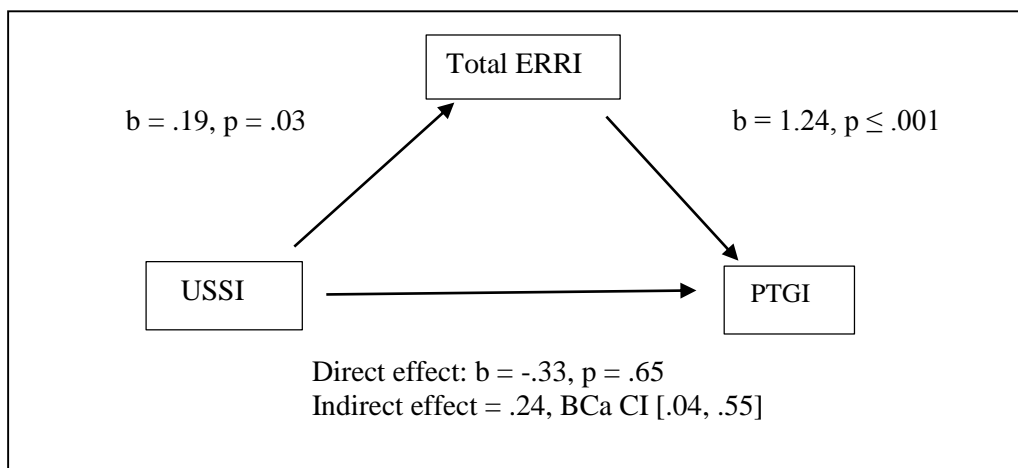


Figure 2: Mediation model (b)

possible for mediation to occur. It should be noted that even in model (b) path ‘c’ (from USII to PTGI) remains non-significant. Although path c being significant was considered necessary for mediation to occur in older theories of mediation (Baron & Kenny, 1986), Hayes, Slater and Snyder (2008) argue that this this is in fact not the case and posit that it is important to move away from binary ‘significant or non-significant’ method of measuring mediation and towards a more complex understanding that focuses on the size of the indirect effect.

The results of the mediation analysis (Figure 2) showed a significant indirect effect of unsupportive interactions on PTG through total rumination (deliberate and intrusive combined), $b = 0.24$, BCa CI [0.04, 0.55] which represents a relatively large effect, $k^2 = 0.26$, CI [0.04, 0.52]. Total ERRI is a composite of deliberate and intrusive ERRI scales and both of these are highly correlated so the possibility of a two mediator model was investigated, see Figure 3. This model suggests that unsupportive reactions are related to intrusive rumination, which in turn is related to deliberate rumination which also correlated with PTG. Results show that the indirect effect is significant, $b = 3.17$, BCa CI [0.39, 9.4]. No k^2 is given for the two mediator model. In fact Preacher and Kelley (2011) highlight that no effect size estimate has yet been designed for use with models with more than one mediator.

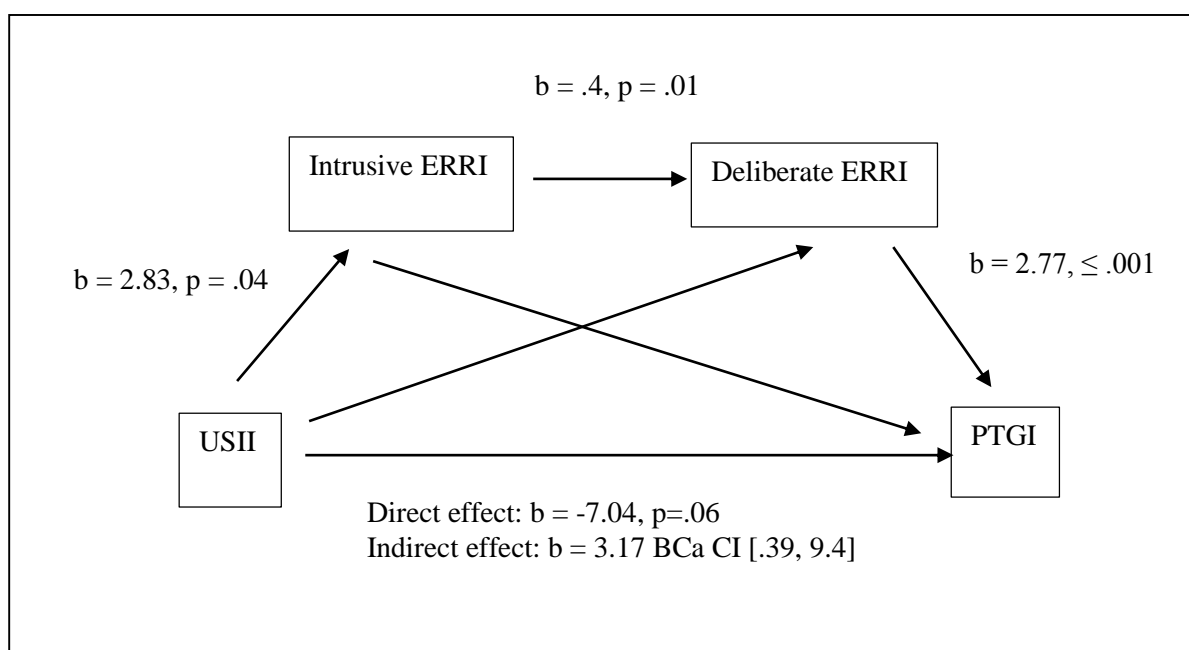


Figure 3: Mediation model (c) Note: non-significant statistics are not included (other than direct effect) to aid clarity of the figure.

As the results are the opposite of what was expected, further analysis was done to investigate which of the USII subscales was driving the relationship between unsupportive

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interactions and cognitive processing. From the correlations reported in Table 3, there are three possible mediation models depicted in Figures 4, 5, and 6.

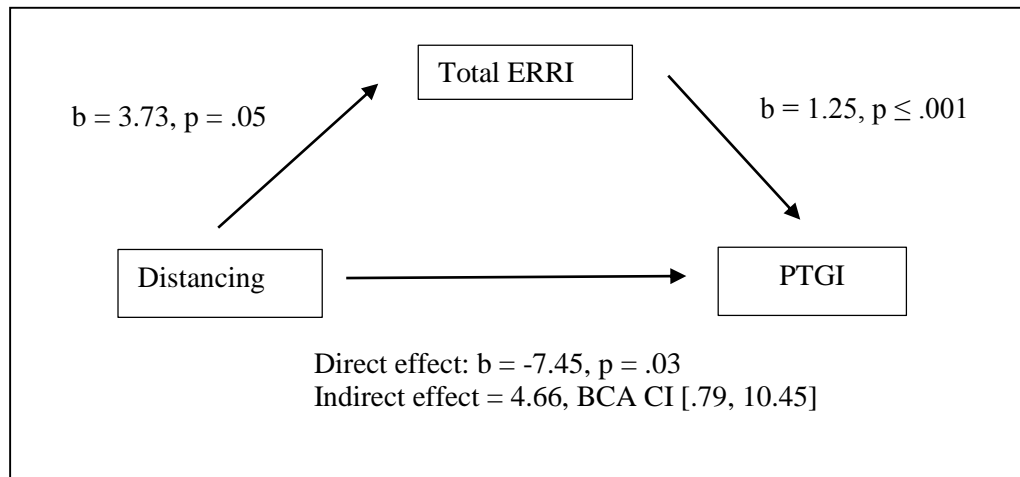


Figure 4: Mediation model (d)

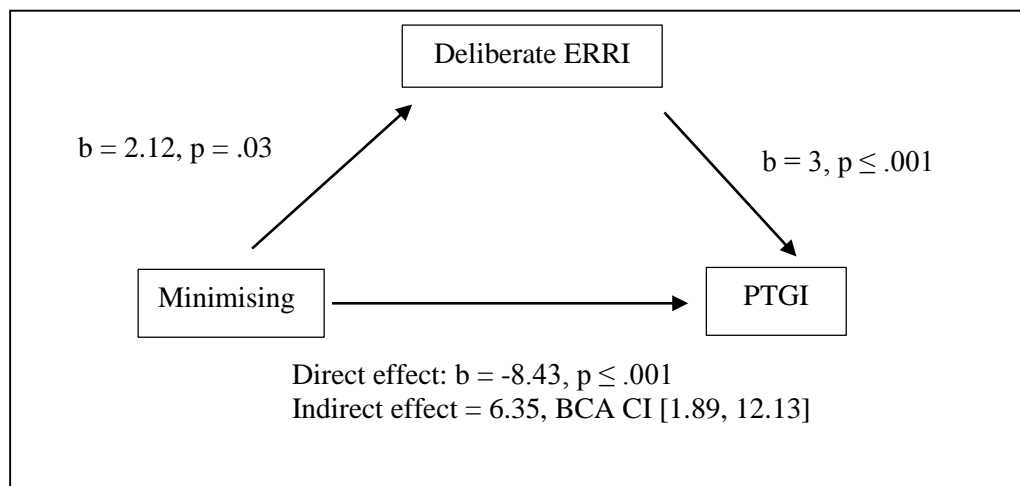


Figure 5: Mediation model (e)

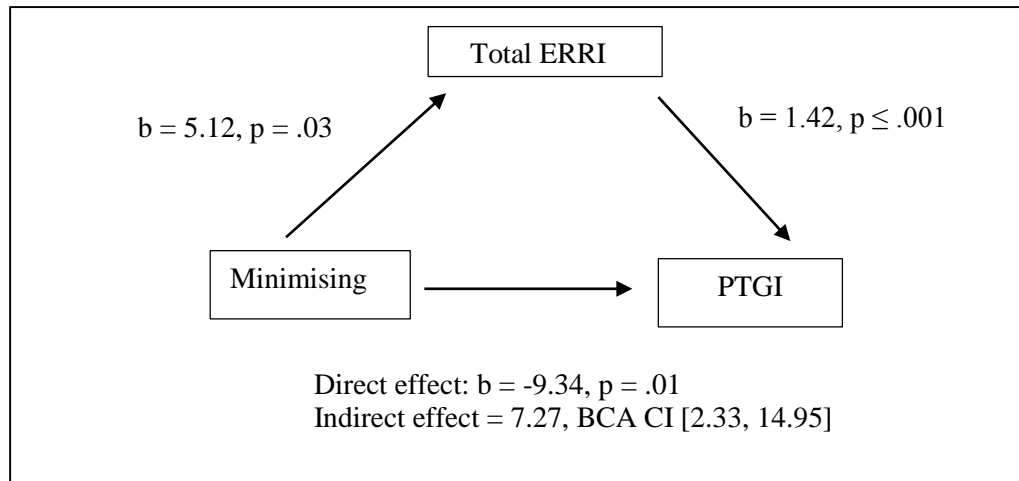


Figure 6: Mediation model (f)

Results showed that there was a significant indirect effect of distancing on PTGI through ERRI Total, $b = 4.66 \text{ BCa CI } [0.79, 10.45]$ which represented a large effect size, $k^2 = 0.25, \text{BCa CI } [0.04, 0.51]$. Interestingly, the direct effect (i.e. the total effect of distancing on PTGI less the indirect effect) became significant, $b = -7.45, p = .03$ and in the direction (negative) originally hypothesised for this relationship. Similar results were found for models e and f. The indirect effects were found to be significant, $b = 6.35, \text{BCa CI } [1.89, 12.13], k^2 = 0.39, \text{BCa CI } [0.13, 0.61]$ and $b = 7.27, \text{BCa CI } [2.33, 14.95], k^2 = 0.36, \text{BCa CI } [.13, .65]$, respectively. When the indirect effects were accounted for, the direct effect of model (e) became significant, $b = -8.34, p \leq .001$ as did the direct effect of model (f), $b = -9.34, p = .01$.

As both models (d) and (f) contain the variable Total ERRI, it is possible the parsimony of the models could be increased by employing a two mediator model (Figures 7 and 8). Model (e) could be understood to be subsumed by model (h), as all individual variables are contained in model (h). Results show a significant effect of

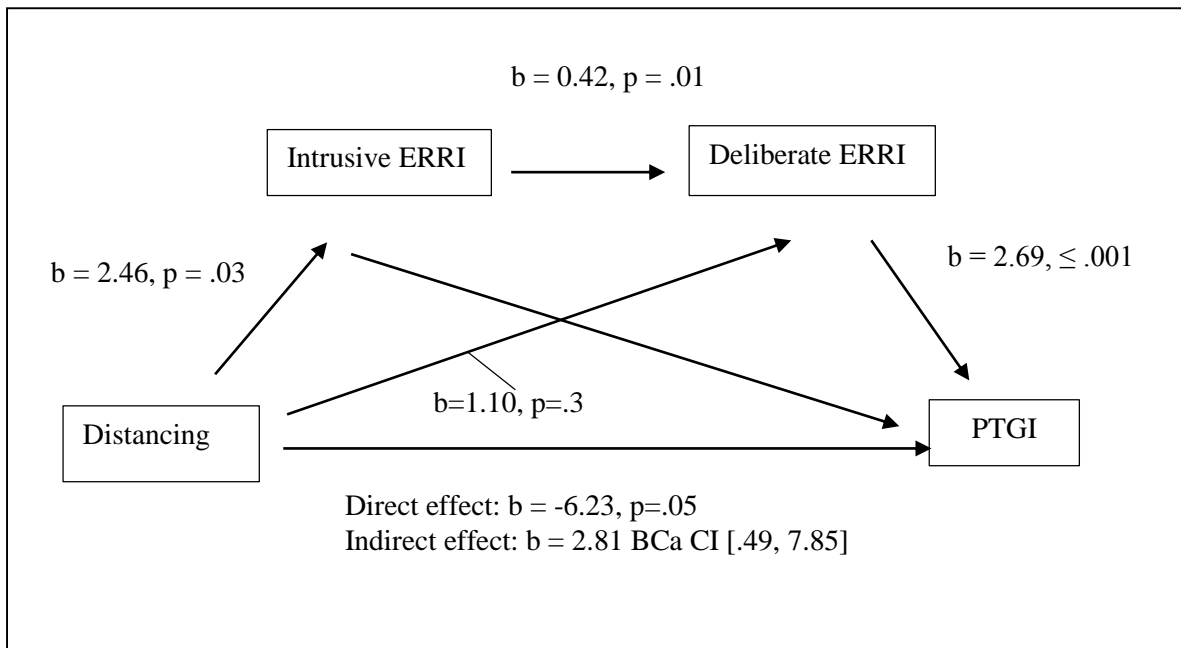


Figure 7: Mediation model (g) Note: non-significant statistics are not included to aid clarity of the figure.

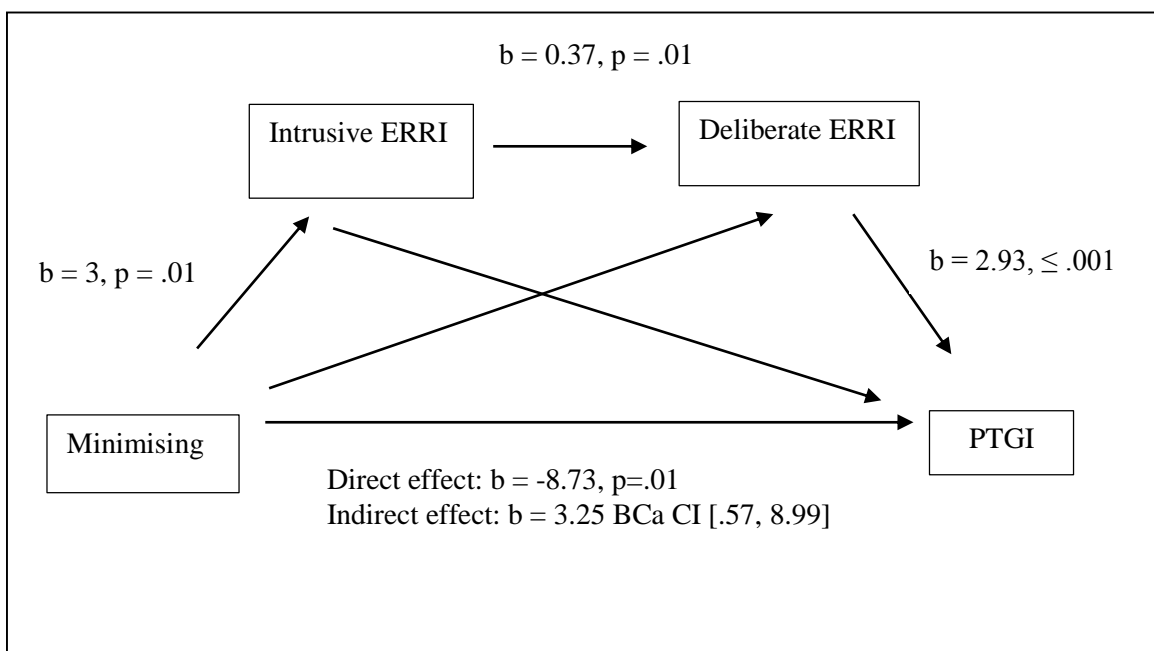


Figure 8: Mediation model (h) Note: non-significant statistics are not included to aid clarity of the figure.

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distancing on PTGI through ERRI Intrusive and ERRI Deliberate, $b = 2.81$, BCa CI [0.49, 7.85]. In this model, the direct effect becomes borderline significant, $b = -6.23$, $p = .05$. Again, this relationship is negative. The results further showed a significant effect of minimising on PTGI through ERRI Intrusive and ERRI Deliberate, $b = 3.25$, BCa CI [0.57, 8.99]. The direct effect was also significant in this model, $b = -8.73$, $p = .01$.

In summary, the hypothesised relationships between USII and Deliberate ERRI or PTGI were not substantiated. However, other models of mediation were found to be significant, the most parsimonious of which are models 'g' and 'h'. These suggest that both distancing and minimising reactions from others trigger intrusive processing, which in turn prompts deliberate processing the leads to PTG. When the indirect effects in these models are accounted for, a significant negative relationship between distancing and minimising becomes apparent. In models with USII as an independent variable, the direct effect is approaching significance, although not actually significant. This direct effect is more in line with the hypothesised relationship between unsupportive reactions and PTG.

Discussion

Sample Characteristics

To the author's knowledge, this is the first quantitative investigation of PTG among people living with HIV in the UK. Results showed that levels of PTG were in the moderate range. This corresponds with previous research among people living with HIV in other countries such Ireland and the United States (Murphy, & Hevey, 2013; Nightingale, Sher, & Hansen, 2010). The mean USII score for the current sample was towards the lower end of the scale, and similar to that reported by Ingram et al. (2001).

The current intrusive and deliberate rumination scores were similar to those reported in some previous studies. For example, Tedeschi, Cann, Calhoun and Reeve (2012) reported that the scores for deliberate and intrusive rumination in the two weeks post-trauma were both at the upper end of the rarely range on the cusp of sometimes. Contrastingly, Wilson et al. (2014) reported deliberate and intrusive rumination scores (covering all processing since the trauma) in the rarely range. However, the CBI in the current study was in the moderate range and higher than that reported in Wilson et al. which was on the cusp of the sometimes range. This suggests that receiving a diagnosis of HIV had a much greater impact on participants' core beliefs than the diagnosis of prostate cancer received by participants in Wilson et al. A diagnosis of ill-health may have been less unexpected by participants in Wilson et al. (2014) as there was a much higher mean age (70.04), thus leading to less disruption of core beliefs. The level of core belief disruption in the current study corresponds to that from other studies such as Cann et al. (2011) who also reported mean CBI to be in the moderate range. The level of disruption to core beliefs is important to establish. Theoretically, PTG is unlikely to develop if there is no disruption to core beliefs.

It is notable that the proportion of Black African participants in the current study's sample is much lower than the national estimate (36%) by Public Health England (PHE)⁹ (2015). PHE also reported that 52% of those living with HIV in the UK are between the ages of 35 and 49. The mean age for the current sample is much lower than this (26.62) which is considerably lower than the national average. This is perhaps a reflection of the high rate of respondents who completed the questionnaires online. It is possible that this could skew the results as age has been found to be negatively associated with PTG (Linley & Joseph, 2004). In terms of physical health markers, the sample's mean CD4 lymphocyte count (a type of white blood considered a key indicator of immunological functioning) was within the normal range of 500 to 1,500mm (NAM, 2015). The mean viral load (the level of the virus present in the blood) was relatively low and the modal value was 'undetectable'. This is in keeping with the high proportion of the sample that was taking antiretroviral medication as maintaining an undetectable viral load is its aim. Taken together, these values suggest that for the majority of the sample, disease progression was not in the advanced stages. Overall, the demographic information suggests that these results apply to a predominantly young, gay, white, male sample with the virus well controlled by medication. Generalisability beyond this demographic may be limited.

The clearest associations between questionnaires and demographics concerned gender and sexuality. Women reported significantly more deliberate rumination and experienced significantly more minimising behaviour, the latter is in line with previous research (Ingram et al., 2001). While gender differences have not been widely reported in the PTG literature, they have been in the depression literature with women reporting higher levels of rumination (e.g. Butler & Nolen-Hoeksema, 1994). However, given the small number of women in the current sample, these results should not be over-interpreted. The results also showed that

⁹ PHE statistics only related to England rather than the UK as a whole, but to the author's knowledge, UK-wide statistics are not available.

those who identified as gay reported significantly less minimising behaviour from others. This may reflect the fact that HIV is more prevalent in the gay community and so there may be more understanding and a greater willingness to discuss it.

Mediation Analysis

As was predicted, PTG correlated highly with deliberate rumination which adds to the growing body of literature in this area (e.g. Phelps et al., 2008; Salsman et al., 2009). However, contrary to the hypothesis no association was found between either PTG or deliberate rumination and unsupportive reactions to disclosure. These findings are in line though with the findings of Cordova et al. (2007), Nenova et al. (2013) and Wilson et al. (2014) none of whom found a correlation between social constraints and PTG. However further analysis suggested that there may indeed be a relationships between these variables, but it may be more complex than hypothesised.

Analysis showed that there was an indirect effect of unsupportive reactions on PTG through total processing. As total processing is a composite of intrusive and deliberate processing, the model was able to be broken down further into a two-mediator model. Results showed that unsupportive reactions to disclosure were related to intrusive processing, which in turn was related to deliberate processing, and this was also correlated with PTG. This indirect relationship between USII and PTGI is positive and thus contrary to the hypothesis.

Further investigations revealed that it was both distancing and minimising behaviour which actually accounted for the indirect relationship between unsupportive reactions and PTG. While there were various mediation models which fit the data, the most parsimonious of these were the two-mediator models, g and h. These models suggested an indirect relationship of distancing and secondly minimising behaviour to PTG through intrusive rumination and deliberate rumination. As effect sizes for mediation models that contain more

than one mediator have yet to be developed, it is not possible to say which model best fits the data. Theoretically, a two-mediator model should be a better fit for the data than a one-mediator model. The latter contains a composite score which, in the two mediator model, is broken down into scales which more accurately reflect the underlying factor structure.

The finding that unsupportive stressor-specific interactions are, indirectly, positively associated with PTG is contrary to the direction of the hypothesised relationship. However, it seems that what may lie at the heart of this unexpected relationship is the relationship between unsupportive reactions and cognitive processing. In general, unsupportive reactions (apart from distancing) were related to increased intrusive rumination, not decreased deliberate rumination. Perhaps the unsupportive reactions serve as another ‘trauma’, which like any other traumatic event leads to intrusive rumination which is then followed by deliberate rumination, eventually generating PTG. Perhaps the unsupportive reactions from others challenged a different set of core beliefs about relationships. The general level of unsupportive responses reported by participants was relatively low. An alternative explanation is that they were simply not ‘unsupportive enough’ to directly alter deliberate processing. This may explain why the distancing subscale was directly related to increased deliberate processing. Perhaps a friend or relative who actively distances themselves from you after disclosure of HIV is the most painful type of possible unsupportive reaction and thus has a more profound effect. It could be, that the more painful the experience, the less it fits with one’s assumptive world and so one is more driven to make sense out of it by thinking about it.

One of the most surprising effects found in the data is that in all models using either distancing or minimising subscales¹⁰, the direct path from distancing or minimising to PTGI became significant (and negative) when the indirect effect was accounted for. In other words,

¹⁰ In models using USII as the independent variable, the direct effect was close to significant.

PTG is less likely to occur when unsupportive reactions to disclosure are experienced. This is the relationship between these variables that was initially hypothesised. However, it only became evident when the effect of cognitive processing was controlled for. Therefore, contrary to the hypothesis, this relationship is not mediated by cognitive processing. In fact, cognitive processing appears to act as a suppressor which ‘cancels out’ the impact of the negative impact of unsupportive reactions to HIV disclosure on PTG. This is a crucial finding as it suggests that there is another important path to PTG that has not, as yet, been identified in the literature.

Limitations

Due to the relatively small sample size, this study is underpowered. This does not affect significant results, however, it might be an issue for non-significant findings, in other words the possibility of Type II error is increased. There may have been a significant relationship between variables such as USII and deliberate ERRI but the sample was not large enough to detect it. Given this, recruitment could have been approached differently from the start. It would perhaps have been more fruitful to design the study in conjunction with a particular charity giving them more of a stake in the success of recruitment and ensuring it was relevant to their service users. Secondly, the sample is not entirely representative of the population living with HIV in the UK, for example, the low mean age and the low percentage of Black African participants. English may be a second language for some of the latter demographic which may have deterred them from participating. Also, online recruitment might explain the lower mean age. Paper copies were offered to try and combat this effect but uptake on these was low. It should also be borne in mind that those recruited via 3rd sector organisations may not be representative of the HIV population. They may have had more opportunity to process their diagnosis and any negative reactions, thereby increasing PTG. As

there was no way of calculating a response rate, it is not clear if there is a bias in responses, in other words, did only those who experienced PTG respond? It is also important to remember that many of the findings were not hypothesised and thus Type I error is increased from so called ‘data mining’. While these findings are important for future research, they do need to be replicated. Finally, as the design is a cross-sectional one, no inferences can be made about causality.

Implications

Theoretical and Research Implications. It is important that future research replicates the current study to ensure robustness in the findings. The research should be extended to include longitudinal designs which allow for more inferences regarding causality. It is also important to establish whether these results hold true for non-HIV populations, for example, are the effects of distancing or minimising as powerful among cancer survivors, or those who have been bereaved? Future studies should also ensure adequate power in their sample. The results suggest that it is the distancing and minimising subscales that account for much of the effect of the USII on other variables. It would thus be valuable to explore these constructs in more detail to ensure that the most relevant constructs are being measured in the most robust way.

In recent years, research regarding cognitive processing has predominated in the field of PTG. The findings from this study suggest that cognitive processing is indeed important in facilitating PTG, but that there are other distinct factors involved which require further investigation. Specifically, the results suggest that there is a direct link between unsupportive reactions and PTG, which is not accounted for by cognitive processing. This is perhaps unsurprising given that it would be expected that affective factors, for example, would also play a role in response to trauma. However, it is not clear from the current literature base what these factors might be and so it may be beneficial for the next step in research in this

area to be qualitative. This would allow new concepts and theories to emerge from people's own experiences and thus be more ecologically valid.

Clinical Implications. The current findings suggest that disclosure may, in itself, be an adverse event possibly triggering a chain of cognitive consequences. It is thus vital that therapists bear in mind the social and disclosure context when working with a client who has experienced trauma. Enquiring about responses to disclosure would be important as it may be a significant aspect of their trauma narrative. Themes of growth may arise from disclosure as well as the trauma itself. Clinicians should be mindful of this and tentatively label growth when it is apparent (Tedeschi & Calhoun, 2013).

The findings suggest that it is distancing and minimising behaviours that are key in the disclosure experience. These are concepts which therapists would ordinarily aim to be attentive to, however it should be borne in mind that these issues may be even more pertinent for those clients who have had difficult disclosure experiences. A validating experience in therapy may, in itself, be a reparative experience. In addition to the clinician being mindful of distancing and minimising behaviours, it is vital that friends and family are aware of the potential impact of these behaviours. Each time a healthcare professional comes into contact with the family and friends of those who have experienced trauma, is an opportunity to model conversations that are validating and less likely to be experienced as distancing. These ideas could also be included in the numerous information guides for family and friends as to how best to support their loved one through a particular crisis.

Conclusion

The hypothesised mediation model of unsupportive stressor-specific interactions being negatively related to PTG via deliberate cognitive processing, was not substantiated by the results. The two models that appeared to best fit the data are two-mediator models in

which distancing, and minimising behaviour are related to intrusive rumination which is in turn related to deliberate rumination, which is also associated with PTG. When the significant indirect effects in these models were accounted for, the direct, negative, relationship between unsupportive stressor-specific interactions and PTG became significant. This suggests that there are additional important pathways to PTG other than cognitive processing.

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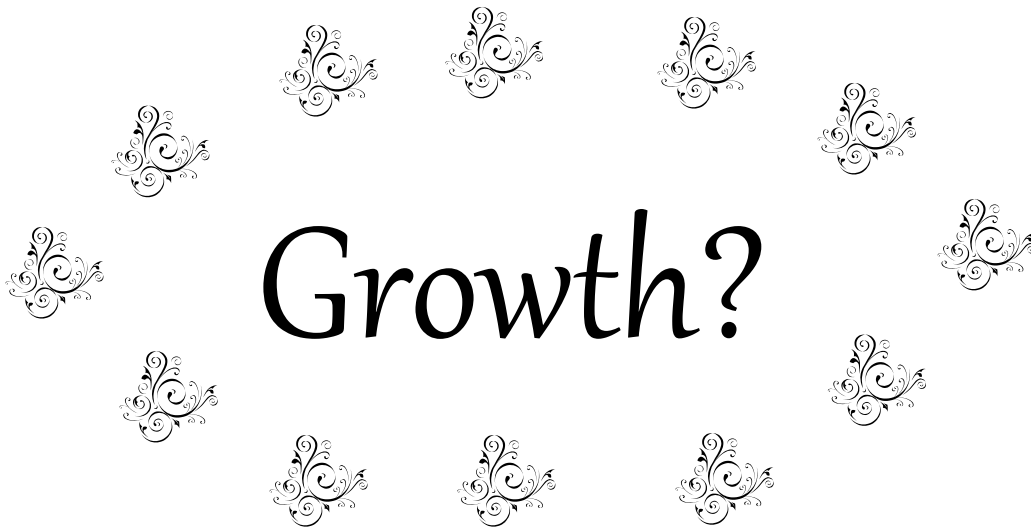
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Section C: Appendix of Supporting Material

Appendix 1:

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Appendix 2:

Many people experience changes after being diagnosed with HIV. Some of them can be good.

I am researching growth during adversity and would like to hear your views.

If you would like to find out more about this study, please follow the link

<https://survey.canterbury.ac.uk/ptgandhiv>

Alternatively you can email me at e.k.noone70@canterbury.ac.uk or leave a message for me on 01892 507673. Please say that the message is for me, Eleanor Noone, and leave a contact number so that I can get back to you.

Tweets:

- Been diagnosed with #HIV for over a year and live in the UK? We'd love to hear from you about personal growth <http://survey.canterbury.ac.uk/ptgandhiv>
- Personal growth after diagnosis with HIV? What's your experience?
<https://survey.canterbury.ac.uk/ptgandhiv>
- We're still looking for people's views to help us understand personal growth after #HIV <http://survey.canterbury.ac.uk/ptgandhiv>
- We're looking for people's views to help us understand personal growth after #HIV
<http://survey.canterbury.ac.uk/ptgandhiv>

Appendix 3

Demographics

Please tick below to indicate your answers. Questions marked with an asterisk (*) are optional.

1) Gender:

Male

Female

2) Age:

.....

Black British Caribbean

Black British Other

Mixed (please specify in box below)

I'd rather not say

Other

3) Please choose your ethnicity

White British

White Irish

White European

White Other

Indian

Pakistani

Bangladeshi

Chinese

Asian other

British Indian

British Pakistani

British Bangladeshi

British Chinese

British Bangladeshi

Black African

Black Caribbean

Black other

Black British African

If other please state:

4) What is your relationship status

Married or in a civil partnership

Divorced, separated or dissolved civil partnership

Widowed

Single

In a relationship (living together)

In a relationship (not living together)

I'd rather not say

Other

If other please state:

If you are in a relationship, to the nearest year, for how long have you been with your partner?

.....

COGNITIVE PROCESSING PATHWAYS TO PTG – SECTION C

5) How many children do you have?

.....

6) How would you describe your sexuality?

- Heterosexual
- Homosexual
- Bisexual
- I'd rather not say
- Other

If other please state:

7) What is your level of education?

- None
- Primary school
- Some secondary school
- GCSEs
- A Levels
- Certificate
- Diploma
- NVQ
- Degree
- Masters
- Doctorate/PhD
- Post doctoral
- I'd rather not say
- Other

If other please state:

8) What is your annual level of income?

- £0 - £10,000
- £10,000 - £20,000
- £20,000 - £30,000
- £30,000 - £40,000
- £50,000 - £60,000
- £60,000 - £70,000
- £70,000 - £80,000
- £80,000 - £90,000
- £90,000 - £100,000
- £100,000+
- N/A
- I'd rather not say

9) Which best describes your religious affiliation?

- Catholic
- Protestant
- Christian - other
- Muslim
- Hindu
- Jewish
- Sikh
- Buddhist
- Agnostic
- Atheist
- I'd rather not say

Other

If other please state:

10) Which best describes your level of spirituality?

- Very spiritual
- Quite spiritual
- Somewhat spiritual
- Not very spiritual
- Not spiritual at all
- I'd rather not say
- Other

If other please state:

11) What is your current employment status?

- Employed full time
- Employed full time - currently on sick leave
- Employed part time
- Employed part time - currently on sick leave
- Unemployed and seeking work
- Unemployed and not seeking work due to health reasons
- Unemployed and not seeking work due to other reasons
- I'd rather not say
- Other

If other please state:

12) In years and months, how long ago were you diagnosed with HIV?

.....

13) Who was the first person you told about having HIV?

- Friend
- Parent
- Sibling
- Other family member
- Colleague
- Healthcare professional
- I'd rather not say
- Other

If other please state:

14) Approximately, how many people have you told about your diagnosis of HIV?

.....

Approximately, what percentage of your social circle have you told about your diagnosis?

.....

15) Are you currently taking medication for HIV?

- Yes
- No

16) * What is your current CD4 count?

.....

17) * What is your current viral load?

.....

18) * Where did you receive the diagnosis of HIV? (e.g. sexual health clinic, community outreach, hospital etc.)

.....

19) * How did you contract HIV?

- Sex without a condom
- Mother to child
- Sharing needles
- I'm not sure
- I'd rather not say
- Other

If other please state:

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Finished!

Thank you for taking the time to complete this study. It's very much appreciated.

Please fill in your details on the next page if you wish to take part in the prize draw, or, receive a summary of the results.

Prize Draw and Summary Report Options

Should you choose to provide your email address, it will be stored separately from the answers you have provided to all previous questions.

- If you would like to be entered into a prize draw to win a £50 Amazon voucher, please enter your email address below:

.....

- If you would like to be emailed a summary of the findings from this study, please enter your email address below:

.....

Appendix 4

Information about the Research

Part 1:

How does telling other people about your HIV diagnosis impact on your personal growth?

Hello, my name is Eleanor Noone and I am a trainee clinical psychologist at Canterbury Christ Church University. I would like to invite you to take part in a research study. Before you decide, it is important that you understand why the research is being done and what it would involve for you. You are welcome to talk to others about the study if you wish.

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.

What is the purpose of the study?

We know that being diagnosed with HIV can be a difficult, if not traumatic experience for some people. However, we also know that people can sometimes experience a feeling of personal growth or ‘posttraumatic growth’ after a difficult experience. For example, sometimes people will say they develop stronger relationships, a sense of new possibilities, an increased sense of spirituality, a greater appreciation of life and feel stronger after a traumatic experience. We would like to know more about how posttraumatic growth develops and what influences it. The more we know about it, the more able healthcare professionals will be to help facilitate it.

Inclusion Criteria:

We want to recruit approximately 70 people to take part. You are invited to take part in the study if:

- 1) You are a working age adult (i.e. between 18 and 65)
- 2) You can read English
- 3) You have been diagnosed with HIV for more than one year
- 4) You have told at least one person about your diagnosis (apart from your healthcare professionals)

Do I have to take part?

It is up to you to decide to participate in the study. If you agree to take part, you will be asked to complete a consent form. You are free to withdraw at any time, without giving a reason. A decision not to participate or to drop out will not affect the service you receive from any organisation, including the ones advertising the study.

What will happen to me if I take part?

You will be asked to fill in some questionnaires, this is likely to take approximately 15 to 20 minutes. If you choose to participate you can also be entered into a prize draw to win a £50 Amazon voucher.

What are the possible benefits of taking part?

You will be asked to think about positive ways in which you and your life may have changed since your diagnosis. Thinking about these may help you realise good things about your life at the moment that you weren't so aware of. However, we cannot promise the study will help you but the information we get from this study will help improve the treatment of people with HIV in the future.

What are the possible disadvantages and risks of taking part?

One of the questionnaires asks about unsupportive ways that people may have responded when you told them about having HIV and you may find this distressing. Another questionnaire asks about ways in which you might have changed since your diagnosis. Although it asks about things that are generally thought of as positive, thinking of the ways things have changed since being diagnosed with HIV may be upsetting. If you do become distressed at any point, you can stop. Also, there will be numbers provided of organisations you can talk to about how you're feeling.

What if there is a problem?

Any complaint about the way you have been dealt with during the study or any possible harm you might suffer will be addressed. Further information on this is given in Part 2.

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. The details are included in Part 2.

This completes part 1.

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:**What will happen if I don't want to carry on with the study?**

If you are completing the questionnaires online you can withdraw at any time without giving a reason. However the answers you have already given will have been automatically stored and as data is stored anonymously, it will not be possible to retrieve and delete it.

If you are completing the questionnaires on paper, you can also stop at any time without giving a reason. However as above, once you submit the questionnaires (i.e. hand them to a charity worker or myself) we will not be able to identify individual data and so will not be able to delete it.

What if there is a problem?

If you have a problem or a complaint, you can leave a message for me on a 24-hour voicemail phone line at **01892 507673**. Please say that the message is for me **Eleanor Noone**, and leave a contact number so that I can get back to you. Alternatively you can email me at **e.k.noone70@canterbury.ac.uk**.

You can also contact my supervisor Stuart Gibson at **stuart.gibson@slam.nhs.uk**.

If you wish to make a formal complaint you can contact Paul Camic, research director for Salomons Centre for Applied Psychology at **paul.camic@canterbury.ac.uk**

Will my taking part in this study be kept confidential?

All information which is collected about you during the course of the research will be kept strictly confidential. Once data has been received it will be entered onto a password-protected database. For the duration of the research, I will store the data. After the study has been completed, Canterbury Christ Church University will continue to store it for 10 years at which point it will be securely disposed of. If you fill in a paper copy, it will be shredded as soon as the data has been transferred to the password-protected database. If you wish to provide contact details to be entered into the prize draw, these will be stored separately from your data. My supervisors, research staff at Canterbury Christ Church University and regulatory authorities will have access to the data.

What will happen to the results of the research study?

Results from the study may be published in a journal. If this is the case you will not be identifiable in any way. If you wish to have a summary of the results, these can be sent to you. You will be asked this at the end of the study. The summary will be of the whole study, not your individual results. It is likely that a summary of results will be available in summer 2015.

Who is organising and funding the research?

The research is being organised and funded by Canterbury Christ Church University.

Who has reviewed the study?

The Research Ethics Committee at Canterbury Christ Church University has reviewed this study to protect your interests and have approved it.

Further information and contact details

For more information on Posttraumatic Growth, please visit:

<http://positivepsychology.org.uk/pp-theory/post-traumatic-growth/105-post-traumatic-growth.html>

If you would like to speak to me and find out more about the study or have questions about it answered, you can leave a message for me on a 24-hour voicemail phone line at **01892 507673**. Please say that the message is for me, **Eleanor Noone**, and leave a contact number so that I can get back to you.

If you would like to participate in this study, please complete the consent form on the next page.

.....

If you feel you need support at any point, here are some options:

- If you are distressed or feel you want to hurt yourself, you can call the Samaritans on **08457 90 90 90**. It is free phone number and they are open 365 days a year.
- If you feel you want to hurt yourself or someone else, you can go to your nearest A&E department where there'll be someone you can talk to.
- If you have questions about your health, you can go to your GP or HIV clinic.
- If you want emotional support or have concerns about living with HIV, you can call the Terrence Higgins Trust on **0808 802 1221**. They are open between 10 am and 8pm Monday to Friday. The number is free from landlines and most mobile providers.

Appendix 5**Consent Form**
(version for questionnaires filled in online)

Title: The relationship between unsupportive stressor-specific interactions, cognitive processing and posttraumatic growth.

Name of Researcher: Eleanor Noone

Please tick each box to agree with the statement:

1. I confirm that I have read and understand the information sheet dated 24/11/13 (Version 1) for the above study.

2. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.

3. 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.

4. I understand that relevant sections of data collected during the study may be looked at by supervisors and research staff. I give permission for these individuals to have access to my data.

5. I agree to take part in the above study.

Consent Form
(version for questionnaires filled in on paper)

Title: The relationship between unsupportive stressor-specific interactions, cognitive processing and posttraumatic growth.

Name of Researcher: Eleanor Noone

Please tick each box to agree with the statement:

1. I confirm that I have read and understand the information sheet dated 24/11/13 (Version 1) for the above study.
2. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.
3. 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.
4. I understand that relevant sections of data collected during the study may be looked at by supervisors and research staff. I give permission for these individuals to have access to my data.
5. I agree to take part in the above study.

Signed.....

Date.....

Appendix 6

Author Guidelines

1. The Journal of Traumatic Stress accepts submission of manuscripts online at:

<http://mc.manuscriptcentral.com/jots>

Information about how to create an account or submit a manuscript may be found online in the "Get Help Now" menu. Personal assistance also is available by calling 434-817-2040, x167.

2. Three paper formats are accepted. All word counts should include references, tables, and figures. Regular articles (no longer than 6,000 words) are theoretical articles, full research studies, and reviews. Purely descriptive articles are rarely accepted. In special circumstances, the editors will consider longer manuscripts (up to 7,500 words) that describe complex studies. Authors are requested to seek special consideration prior to submitting manuscripts longer than 6,000 words. Brief reports (2,500 words) are for pilot studies or uncontrolled trials of an intervention, case studies that cover a new area, preliminary data on a new problem or population, condensed findings from a study that does not merit a full article, or methodologically oriented papers that replicate findings in new populations or report preliminary data on new instruments. Commentaries (1,000 words or less) cover responses to previously published articles or, occasionally, essays on a professional or scientific topic of general interest. Response commentaries, submitted no later than 8 weeks after the original article is published (12 weeks if outside the U.S.), must be content-directed and use tactful language. The original author is given the opportunity to respond to accepted commentaries.

3. The Journal follows the style recommendations of the 2010 Publication Manual of the American Psychological Association (APA; 6th). Manuscripts should use non-sexist language. Files must be formatted using letter or A4 page size, 1 inch (2.54 cm) margins on all sides, Times New Roman 12 point font, and double-spacing for text, tables, figures, and references.
4. The title page should include the title of the article, the running head (maximum 50 characters) in uppercase flush left, author(s) byline and institutional affiliation, and author note (see pp. 23-25 of the APA manual).
5. An abstract no longer than 200 words follows the title page on a separate page.
6. Format the reference list using APA style: (a) begin on a new page following the text, (b) double-space, (c) use hanging indent format, (d) italicize the journal name or book title, and (e) list alphabetically by last name of first author. If a reference has a Digital Object Identifier (DOI), it must be included as the last element of the reference.

Journal Article

Kraemer, H.C. (2009). Events per person-time (incidence rate): A misleading statistic? *Statistics in Medicine*, 28, 1028–1039. doi: 10.1002/sim.3525

Book

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.

Book Chapter

Meehl, P. E. (2006). The power of quantitative thinking. In N.G. Waller, L.J. Yonce, W.M. Grove, D. Faust, & M.F. Lenzenweger (Eds.), *A Paul Meehl reader: Essays on the practice of scientific psychology* (pp. 433–444). Mahwah, NJ: Erlbaum.

7. Tables and figures should be formatted in APA style. Count each full-page table or figure as 200 words and each half-page table or figure as 100 words. Tables should be numbered (with Arabic numerals) and referred to by number in the text. Each table and figure should begin on a separate page. Only black and white tables and figures will be accepted (no color). Figures (photographs, drawings, and charts) should be numbered (with Arabic numerals) and referred to by number in the text. Place figures captions at the bottom of the figure itself, not on a separate page. Include a separate legend to explain symbols if needed. Figures should be in Word, TIFF, or EPS format.

8. Footnotes should be avoided. When their use is absolutely necessary, footnotes should be formatted in APA style and placed on a separate page after the reference list and before any tables.

9. The Journal uses a policy of **unmasked review**. Author identities are known to reviewers; reviewer identities are not known to authors. During the submission process, authors may request that specific individuals not be selected as reviewers; the names of preferred reviewers also may be provided. Authors may request blind review by contacting jots@ucsf.edu prior to submission in order to provide justification and obtain further instructions.

10. Statement of ethical standards: All work submitted to the Journal of Traumatic Stress must conform to applicable governmental regulations and discipline-appropriate ethical

standards. Responsibility for meeting these requirements rests with all authors. Human and animal research studies typically require approval by an institutional research committee that has been established to protect the welfare of human or animal subjects. Data collection as part of clinical services or for program evaluation purposes generally does not require approval by an institutional research committee. However, analysis and presentation of such data outside the program setting may qualify as research (i.e., an effort to produce generalizable knowledge) and require approval by an institutional committee. Those who submit manuscripts to the Journal of Traumatic Stress based on data from these sources are encouraged to consult with a representative of the applicable institutional committee to determine if approval is needed. Presentations that report on a particular person (e.g., a clinical case) also usually require written permission from that person to allow public disclosure for educational purposes, and involve alteration or withholding of information that might directly or indirectly reveal identity and breach confidentiality.

11. Reports of randomized clinical trials should include a flow diagram and a completed CONSORT checklist (available at <http://consort-statement.org/resources/downloads>). The checklist should be designated as a "Supplementary file not for review" during the online submission process. As of 2007, the Journal of Traumatic Stress now follows CONSORT Guidelines for the reporting of randomized clinical trials. Please visit <http://consort-statement.org> for information about the consort standards and to download necessary forms.

12. Submission is a representation that the manuscript has not been published previously and is not currently under consideration for publication elsewhere. A statement transferring copyright from the authors (or their employers, if they hold the copyright) to the International Society for Traumatic Stress Studies will be required before the manuscript can be accepted for publication. Click on the Copyright Transfer Agreement link above for the form. Such a

written transfer of copyright, which previously was assumed to be implicit in the act of submitting a manuscript, is necessary under the U.S. Copyright Law in order for the publisher to carry through the dissemination of research results and reviews as widely and effectively as possible.

13. Pre-Submission English-Language Editing: Authors for whom English is a second language may choose to have their manuscript professionally edited before submission to improve the English. Japanese authors can find a list of local English improvement services at <http://www.wiley.co.jp/journals/editcontribute.html>. All services are paid for and arranged by the author, and use of one of these services does not guarantee acceptance or preference for publication.

14. The author(s) are required to adhere to the "Ethical Principles of Psychologists and Code of Conduct" of the American Psychological Association (visit apastyle.org) or equivalent guidelines in the study's country of origin. If the author(s) were unable to comply, an explanation is requested.

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on article preparation, submission, and more. Corresponding authors: In lieu of a complimentary copy free access to the final PDF offprint of your article will be available via Author Services only. Please therefore sign up for Author Services if you would like to access your article PDF offprint and enjoy the many other benefits the service offers. Should you wish to purchase reprints of your article, please click on the link and follow the instructions provided: <https://caesar.sheridan.com/reprints/redirect.php?pub=10089&acro=JTS>

16. **OnlineOpen** The Journal of Traumatic Stress accepts articles for Open Access publication. Please visit <http://olabout.wiley.com/WileyCDA/Section/id-406241.html> for further information about OnlineOpen.

Appendix 7

Participant Feedback Report

Introduction

Posttraumatic growth (PTG) refers to positive psychological change that can happen to a person after they have experienced a highly stressful life event, such as receiving a diagnosis of HIV.

Actively thinking (also called deliberate thinking) about how your life has changed in positive ways since being diagnosed with HIV is believed to be an important part of how PTG works.

This study investigated how PTG might be influenced by the reactions of family and friends after disclosure. It was predicted that unsupportive reactions would lower the chances of PTG. This was predicted because we believed that active or deliberate thinking about how HIV could be a positive experience, would not be possible if one received negative or unhelpful reactions from others after disclosure.

The Study

In this study, 38 participants completed questionnaires after being recruited in-person from charities or online via twitter. The majority of the participants were young, White, gay men whose HIV was well controlled with medication. Given these characteristics of this group of participants, the study's results may not be the same for other groups of people.

The Results

Generally speaking, the amount of deliberate thinking about the positive implications of being HIV positive, does not depend on whether or not someone experiences unfavourable responses after self-disclosure.

However, we did find some interesting results. It appears that particular types of unsupportive reactions, specifically distancing and minimising, seem to be related to a lot of intrusive thinking. Distancing refers to when people emotionally or practically distance themselves from someone with HIV after disclosure. Minimising refers to when others downplay the concerns of someone with HIV after disclosure. Intrusive thinking is the opposite of deliberate thinking; thinking about something even when you don't want to.

However, we also found that intrusive thinking was related to deliberate thinking, which in turn was related to PTG. So what this means is that PTG *could* be possible after distancing and minimising occurs – but it is an indirect relationship, mediated by how your thoughts about these bad reactions change over time.

This is shown in Figure 1.

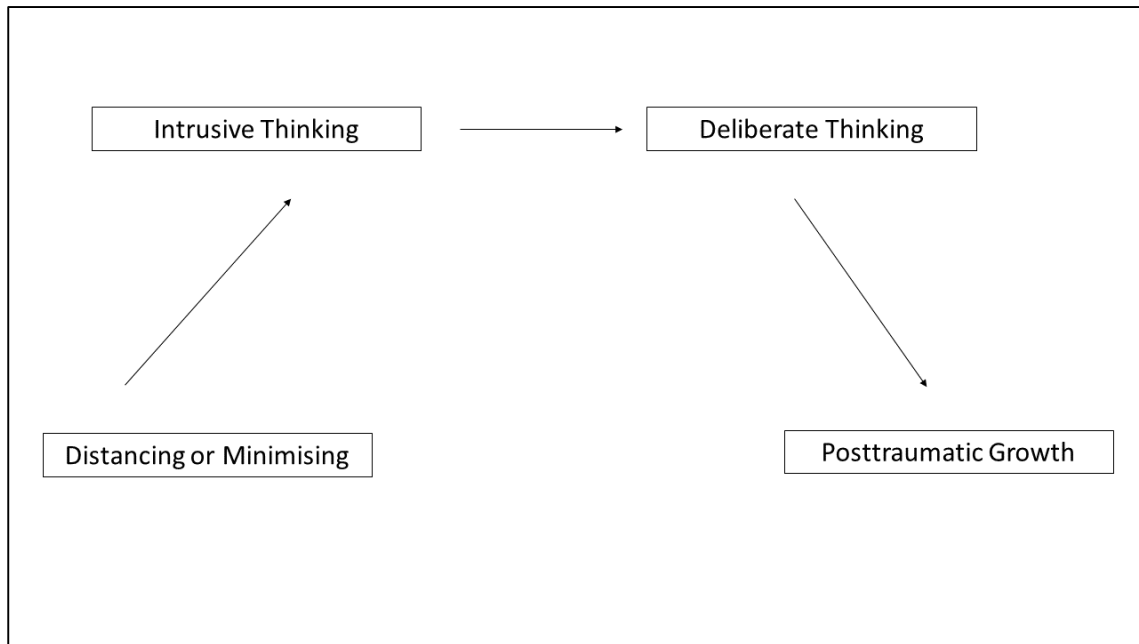


Figure 1: Model of the Results

Conclusion

Overall, the results show a complicated picture. On the one hand, unsupportive reactions result in more intrusive (negative) thinking. However, this can, with time, result in more deliberate (positive) thinking – and this in turn sets the stage for PTG.

