POSTTRAUMATIC GROWTH AMONG PARA SPORT ATHLETES WITH ACQUIRED DISABILITIES

by

Christopher Hammer

A dissertation submitted to the faculty of
The University of Utah
in partial fulfillment of the requirements for the degree of

Doctor of Philosophy

in

Exercise and Sport Science

Department of Health, Kinesiology, and Recreation

The University of Utah

May 2018

The University of Utah Graduate School

STATEMENT OF DISSERTATION APPROVAL

The dissertation of **Christopher Hammer**

has been approved by the following supervisory committee members:

Leslie Podlog	, Chair	**1/25/2018** Date Approved
Maria Newton	, Member	**1/25/2018** Date Approved
Nicholas Galli	, Member	**1/26/2018** Date Approved
Ross Wadey	, Member	Date Approved
Anjali Forber-Pratt	, Member	**2/2/2018** Date Approved

and by **Andrew Mark Williams**, Chair/Dean of the Department/College/School of **Health, Kinesiology, and Recreation**

and by David B. Kieda, Dean of The Graduate School.

ABSTRACT

Acquiring a physical disability can be a traumatic event accompanied by a plethora of physical and psychosocial challenges. Despite these challenges, many people who have endured traumatic events also report experiences of positive psychological change, known as posttraumatic growth (PTG). This dissertation sought to understand the phenomenon of PTG amongst para sport athletes with acquired disability, and how their para sport participation may have facilitated these experiences. By conducting semistructured interviews with 14 elite paratriathletes with experiences of PTG, the first study sought to examine the relevance of theoretical tenets of the organismic valuing theory of growth through adversity (OVT) in understanding PTG. Directed content analysis revealed themes largely consistent with the main tenets of OVT. Specifically, paratriathlon participation facilitated PTG by providing experiences of social connection, competence, empowerment, and identity development. The second study sought to understand the cognitive processing that occurs in relation to a disabling life event among para sport athletes, as well as the role of para sport participation in shaping these cognitions, and subsequent perceptions of PTG or distress. Seventy-five para sport athletes completed questionnaires concerning disruption to core beliefs in the aftermath of acquiring a disability, cognitive processing, and perceptions of PTG and distress. A serial multiple mediation analysis revealed that PTG can be achieved through several unique sequences of cognitive processing. Furthermore, these indirect paths revealed the

value of purposefully trying to make sense of a trauma. Informed by study 1's findings demonstrating the importance of psychological needs satisfaction and study 2's findings of the role of cognitive processing in achieving PTG, study 3 sought to examine how deliberate rumination and psychological need satisfaction interact to facilitate PTG for para sport athletes with acquired disability. Seventy para sport athletes completed a survey similar to that of study 2, with the addition of a measure assessing needs satisfaction afforded through para sport participation. Though deliberate rumination and needs satisfaction were both independently associated with PTG, moderated mediation analyses revealed that the interaction between the two constructs was not as hypothesized. Findings from the studies are discussed in terms of their theoretical and practical implications.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ACKNOWLEDGEMENTS

Completion of this dissertation is a testament to the hard work, support, and patience of those who have both directly and indirectly played a role in my educational pursuits. While many people were influential in this process, I would like to specifically acknowledge the contributions made by a few individuals. First, I offer my sincere appreciation for the time and wisdom granted by my committee members. My committee chair and advisor, Dr. Les Podlog, was especially influential in my development as a scholar. Under his guidance and the weight of his expectations, I have become more proficient at critical thinking, conducting research, and communicating my ideas. I would also like to thank my fellow students, Lindsey Greviskes and Morgan Hall, who partook in this journey with me. Not only did Lindsey and Morgan act as a sounding board to bounce ideas off of, but they were also friends who offered levity when it was much needed. Finally, I would like to thank my family and especially my wife, Amy. Throughout this process, Amy has made sacrifices and demonstrated tolerance and patience. Her support made this possible.

CHAPTER 1

INTRODUCTION

Acquired Physical Disability

Acquiring a physical disability can be a traumatic experience resulting in an array of physical, psychosocial, and behavioral consequences. While impaired physical functioning is the most recognizable consequence of physical disability, problems of a clinical nature such as depression or even suicidal ideation may also manifest (Crawford, Gayman, & Tracey, 2014; Day, 2013). Previous research has demonstrated that the psychological consequences of losing a limb, such as feelings of grief and bereavement, are akin to the emotions felt by someone who lost a spouse (Parkes, 1975). The amputation of a lower limb has been shown to result in symptoms related to depression, anxiety, body image, and social discomfort (Horgan & MacLachlan, 2004), while the loss of an upper limb may have a severe psychological impact due to the functionality of the hand to manipulate objects in everyday tasks, as well as its social utility (e.g., gestures) (Saradjian, Thompson, & Datta, 2008). Similarly, individuals with spinal cord injury experience more depression, anxiety, posttraumatic stress disorder, and less life satisfaction compared to the general population (Post & van Leeuwen, 2012). These studies are a sampling of the research that has been conducted on the detrimental impact of an acquired disability on psychosocial well-being. Fortunately, while poor mental

health outcomes may ensue in the disability aftermath, positive changes have also been reported (Chun & Lee, 2008; Dibb, Ellis-Hill, Donovan-Hall, Burridge, & Rushton, 2014; Unwin, Kacperek, & Clarke, 2009).

Positive Changes Resulting From Trauma

In general, the study of trauma resides almost exclusively in the realm of pathological and maladaptive responses, and often fails to recognize the possibility of growth (Linley & Joseph, 2004b; Tedeschi, Park, & Calhoun, 1998). Recently, however, there has been increased attention paid to positive psychology, the goal of which, rather than simply to treat pathologies, is to optimize functioning in all walks of life (Linley & Joseph, 2004a). In the context of trauma, positive psychology acknowledges an individual's propensity for positive adaptation. As such, while the study of growth following adversity is an emerging area of trauma research, evidence of its existence has been observed in varying populations, including combat veterans (e.g., Benetato, 2011), cancer survivors (e.g., Jansen, Hoffmeister, Chang-Claude, Brenner, & Arndt, 2011), the chronically ill (e.g., Milam, 2004), victims of accidents (e.g., Lowe, Manove, & Rhodes, 2013), and even injured athletes (e.g., Wadey, Evans, Evans, & Mitchell, 2011). A variety of terms have been used (often interchangeably) to describe this growth phenomenon, such as adversial growth, stress-related growth, and perceived benefits. However, posttraumatic growth (PTG) has been stated to be the preferred terminology because it clearly emphasizes that, in the aftermath of extremely adverse events, an individual develops beyond their previous level of functioning (Tedeschi et al., 1998). Similarly, Park (2004) recommends the term PTG be used to describe growth that occurs

after an event that truly was traumatic, such as an event that threatens one's life or bodily integrity. As the research described in this dissertation deals strictly with people who have acquired physical disabilities, which is by definition an incursion on bodily integrity, PTG is the chosen terminology.

Physical Activity, Para Sport, and Posttraumatic Growth

Para sport, also sometimes referred to as adaptive or disabled sport, are sports participated in by people with disabilities. These sports are often – but not always – modified to fit the needs of the individual. Additionally, people with disabilities sometimes participate in sport with people without disabilities. In the context of this dissertation, the term *para sport* was used to refer to organized sport specifically for people with disabilities. The term *sport* is used when referring more broadly to sport participation that is not necessarily restricted to people with disabilities. While this distinction may appear trivial or irrelevant, it is necessary as the benefits may be contingent on the context of sport participation.

Much research has been conducted on the physical and psychological health benefits of physical activity and sport for people with disabilities (see Martin, 2013; Smith & Sparkes, 2012). The function of para sport and physical activity as it specifically relates to the development of PTG for people with disabilities, however, has received considerably less attention in the literature. Research involving other traumatized populations, such as breast cancer survivors, has previously demonstrated the value of physical activity on subsequent experiences of PTG (e.g., Burke & Sabiston, 2010; Sabiston, McDonough, & Crocker, 2007). More recently, research has sought to

understand the role that para sport may play in developing PTG for individuals with acquired disabilities. For example, utilizing a sample of individuals with acquired disabilities who identified as 2012 Paralympic hopefuls, Day (2013) found that para sport served to facilitate PTG by allowing participants to create new life meanings, test the boundaries of their physical limitations, and better understand what they were capable of, resulting in opportunities to take risk, accept responsibility, and display personal control. Para sport also provided opportunities to experience success which fortified these new life meanings. In a similar study conducted on a sample of individuals with spinal cord injury who either participated in or attempted para sport, Crawford and colleagues (2014) found that all but one participant reported physical and psychological benefits of para sport involvement. Moreover, themes of PTG could be grouped into dimensions spanning emotional, social, and physical domains. Both of these studies provide support for the utility of para sport as a mechanism through which one may potentially experience PTG. However, as Day and Wadey (2016) assert, our understanding of the potential for positive outcomes of sport and physical activity for trauma survivors exceeds our understanding of how these positive outcomes are achieved. In order to further expand our understanding of how para sport may facilitate PTG, it can be beneficial to ground future research in appropriate theoretical frameworks.

Theoretical Foundations of Posttraumatic Growth

As PTG has been reported in a variety of populations, the mechanisms through which this growth occurs has also been subjected to theorizing. Although multiple theories and models exist to explain how one experiences growth in the aftermath of a

trauma, few researchers have actually employed growth theories in attempting to understand the phenomenon. The functional descriptive model of PTG (Tedeschi & Calhoun, 1995, 2004) and the Organismic Valuing Theory of Growth through Adversity (OVT: Joseph & Linley, 2005) are the two most comprehensive theories of PTG to have emerged (Splevins, Cohen, Bowley, & Joseph, 2010). The assumptions and tenets of each of these theories is described in the paragraphs to follow. Fundamental to both theories, however, is the notion that an event must be disruptive to one's core beliefs about the self and the world in order for PTG to be a possible outcome. These higher order, existential challenges have been referred to as a shattering of one's assumptive world (Janoff-Bulman, 1992). Importantly, it is not the characteristics of the trauma itself, but rather the subjective experience of how the trauma disrupts one's assumptive world which ultimately precipitates PTG, with negative perceptions being necessary for PTG (Calhoun, Cann, & Tedeschi, 2010; Linley & Joseph, 2004b). A number of empirical investigations have found support for this relationship (e.g., Cann et al., 2010; Lindstrom, Cann, Calhoun, & Tedeschi, 2013). Conversely, because resilience prevents an otherwise traumatic event from having a significant impact on one's assumptive world, resilience has been found to be negatively associated with PTG (Levine, Laufer, Stein, Hamama-Raz, & Solomon, 2009; Westphal & Bonanno, 2007). Therefore, if an event does not produce a substantial level of threat, PTG is not a potential outcome.

Functional Descriptive Model of Posttrumatic Growth

The functional descriptive model of PTG equates the experience of trauma to a seismic event, in that the trauma can challenge or even destroy one's fundamental

assumptions and beliefs. Events that cause higher-order challenges and that induce distress initiate cognitive processing, which is posited to reduce distress. In the immediate aftermath of trauma, cognitive processing of the event often occurs automatically and can include the incursion of negative, intrusive thoughts (Tedeschi & Calhoun, 2004). These sorts of thoughts are uncontrollable, flooding one's consciousness with no regard for one's desire to avoid thinking about the traumatic event. Eventually, however, these intrusive thoughts become less abundant and cognitive processing becomes more deliberate and adaptive. This cognitive processing consisting of both intrusive and deliberate thinking has been conceptualized as rumination (Tedeschi & Calhoun, 2004). Within the PTG literature, there have been numerous investigations which demonstrate the positive relationship between the more deliberate ruminative thought and PTG (e.g., Cann et al., 2011; Triplett, Tedeschi, Cann, Calhoun, & Reeve, 2012).

Through the lens of the functional descriptive model, PTG is conceived of as a construct similar to life wisdom brought about through the modification of one's life narrative (Tedeschi & Calhoun, 2004). As such, while PTG may be related to a reduction of distress, reduced distress is not a necessary corollary of PTG. Moreover, personal qualities, such as extraversion or openness to experiences, as well as other factors, such as disclosure, may make PTG more likely to occur. As new findings regarding PTG emerge, the functional descriptive model of PTG has been revised. The current model highlights the role of other factors, both proximal (e.g., social support) and distal (e.g., sociocultural influences), on the development of PTG (Calhoun et al., 2010). Nevertheless, cognitive processing represents the primary mechanism through which

PTG occurs. Figure 1.1 illustrates a recent version of the functional descriptive model (Calhoun et al., 2010).

Organismic Valuing Theory of Growth Through Adversity

While previous models of PTG have garnered empirical support, a criticism is their descriptive rather than explanatory nature, as well as their inability to explain *why* people are motivated towards growth, and why some people experience PTG while others experience PTSD (Joseph & Linley, 2005). The Organismic Valuing Theory of Growth through Adversity (OVT: Joseph & Linley, 2005) is proposed to be a comprehensive theory of PTG based on the assumption that people are naturally inclined towards growth.

As suggested by the name, OVT is founded on the tenets of the humanistic psychology concept of organismic valuing process (OVP). Guided by the assumption that human beings are naturally inclined towards growth, the OVP represents humans' capacity and tendency to recognize what is important in order to lead a fulfilling life. According to OVT theorists, when environmental conditions support the attainment of personal growth, well-being and a fulfilled existence, individuals will act in a way that promotes such growth. However, a traumatic event can impede OVP and obstruct growth and psychological well-being by causing one to question basic assumptions about themselves and the world (i.e., shattered assumptive world). Human nature seeks to integrate the newly acquired trauma information, which is termed the *completion tendency*. However, due to the traumatic nature of the event, the process of integration is accompanied by intrusive and avoidance states reminiscent of PTSD. These states eventually subside indicating that the trauma information has been processed, which

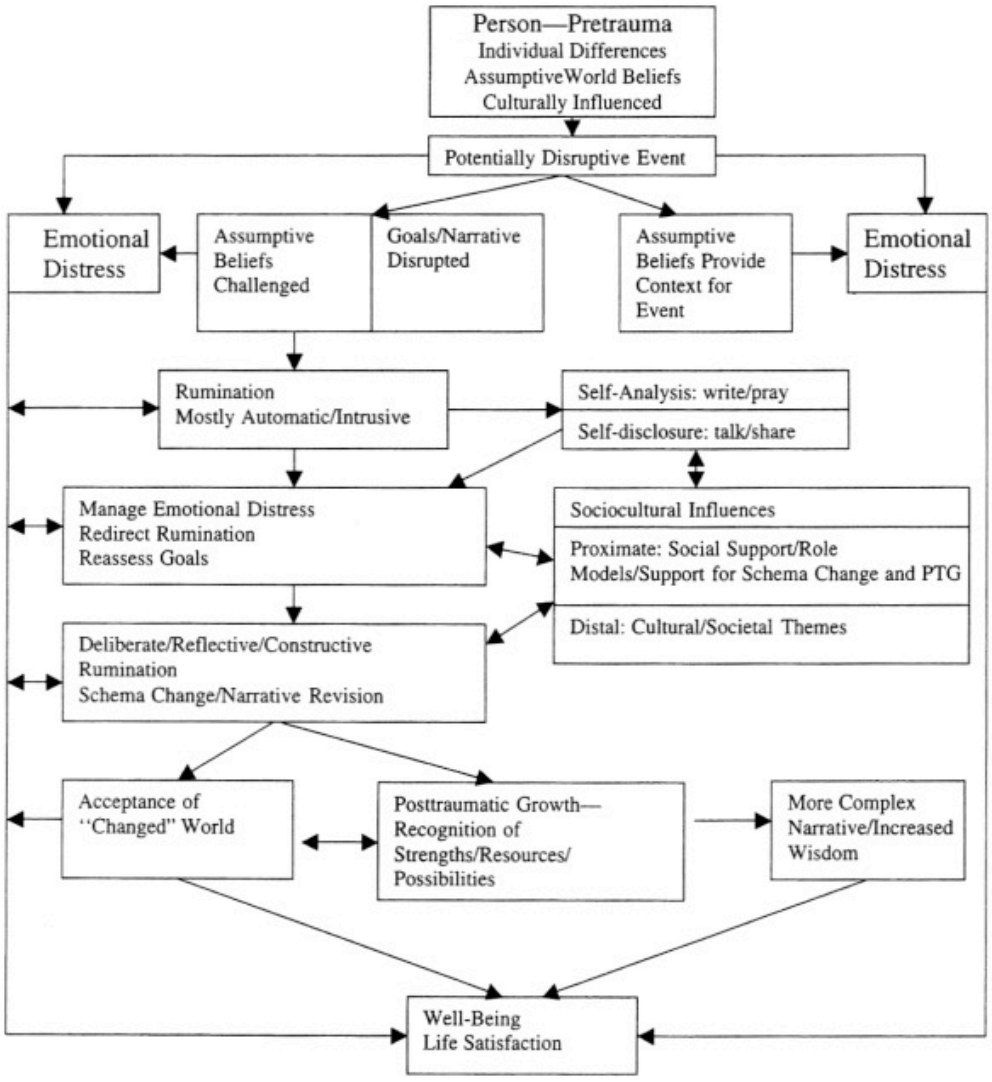


Figure 1.1. Functional descriptive model of posttraumatic growth

results in one of three potential outcomes. The first is assimilation, which is a return to pretrauma baseline by integrating trauma information into existing worldviews. The second outcome is accommodation in a negative direction, which occurs when one's worldview changes for the worse and is often accompanied by distress. The third outcome is accommodation in a positive direction. This outcome can be characterized as PTG.

According to OVT, people are inherently inclined to positively integrate the trauma-related information in a manner consistent with their OVP (Joseph & Linley, 2005). Although accommodation in a positive direction is the desired growth outcome, it is neither automatic nor easily achieved. As Rogers (1964) hypothesized, ''…it is characteristic of the human organism to prefer such actualizing and socialized goals when he is exposed to a growth promoting climate'' (p. 166). That is, while human beings prefer to modify their worldviews to accommodate trauma experiences in a positive direction, it is a challenging process that requires a supportive social environment. According to OVT theorists, a supportive social environment is one that allows for the satisfaction of the fundamental human needs of relatedness, autonomy, and competency (i.e., *needs satisfaction*) both before and after the traumatic event. To the extent that one's psychological needs are satisfied, one's OVP is more or less likely to be given voice, determining if one will tend towards PTG. Lastly, consistent with the functional descriptive model of PTG, OVT is careful not to conflate PTG with reduced distress. Joseph and Linley (2005), however, posit that the psychological well-being characteristic of PTG will eventually give rise to increased subjective well-being.

General Research Aims

Multiple investigations have found evidence to suggest that para sport participation may play a role in facilitating PTG for individuals with acquired disability (e.g., Crawford et al., 2014; Day, 2013). While these studies provide preliminary evidence for the value of para sport, they also highlight the need to understand the specific mechanisms through which this growth occurs, which can effectively be done by employing sound theoretical constructs. This need was addressed in this dissertation. The overarching purpose of this dissertation was to gain a better understanding of the phenomenon of PTG amongst para sport athletes with acquired disability and the role that para sport participation may play in facilitating PTG for these individuals. Informed by the tenets of the aforementioned PTG theories, three separate investigations were conducted.

Study 1 Purpose, Hypothesis, and Analyses

Purpose: In order to better understand how para sport may facilitate PTG, the purpose of study 1 was to examine the relevance of OVT in understanding the phenomenon of PTG amongst a group of elite paratriathletes with acquired disability.

Hypothesis: As the study was qualitative, no formal hypotheses were forwarded.

Analyses: As the purpose of this study was to examine the relevance of OVT in understanding PTG, directed content analysis was utilized. Directed content analysis allows current theory and research to inform initial coding of data before allowing novel themes to emerge, and thus is a method used to validate or expand a theory or conceptual framework (Hsieh & Shannon, 2005)

Study 2 Purpose, Hypothesis, and Analyses

Purpose: The purpose of study 2 was to assess the cognitive processing that occurs in the development of PTG and/or distress in para sport athletes with an acquired disability, as well as the role that para sport participation may have on these cognitions.

Hypothesis: It was hypothesized that the relationship between disruption to one's core beliefs and perceptions of both PTG and distress could be explained by ruminative processes following a trauma, specifically intrusive and/or deliberate rumination occurring in the immediate disability aftermath and rumination brought about by recent para sport participation. Four specific hypotheses were articulated. First, it was hypothesized that deliberate rumination would mediate the relationship between challenged core beliefs and PTG. Second, deliberate rumination was hypothesized to mediate the relationship between intrusive rumination and PTG. Third, it was hypothesized that one means by which para sport would exert its influence on PTG would be by prompting the deliberate ruminations hypothesized to mediate the relationship between core beliefs and PTG, as well as between intrusive rumination and PTG. Lastly, intrusive ruminations were hypothesized to mediate the relationship between challenged core beliefs and current distress.

Analyses: The purpose and accompanying hypotheses were tested via a serial mediation procedure. Serial mediation tests a sequence of variables that are posited to be causally linked, and examines the significance of all possible sequences of indirect effects. Serial mediation was assessed utilizing the PROCESS macros for SPSS (Hayes, 2013). PROCESS utilizes ordinary least squares regression to calculate coefficients of direct and

indirect effects, and provides bias-corrected bootstrap confidence intervals for determining significance.

Study 3 Purpose, Hypothesis, and Analyses

Purpose: Building off of study 2 and the utility of deliberate rumination in fostering PTG, the purpose of study 3 was to examine how deliberate rumination and psychological need satisfaction (afforded through para sport participation) interact to facilitate posttraumatic growth (PTG) for para sport athletes with acquired disability.

Hypothesis: Several hypotheses were advanced in order to build the proposed interaction model between deliberate rumination and psychological needs satisfaction. First, it was hypothesized that challenges to one's core beliefs would be positively related to subsequent PTG. Second, deliberate rumination occurring at two separate time points was hypothesized to mediate the relationship between core belief challenge and PTG. Lastly, it was hypothesized that the strength of this mediating effect would be contingent on the extent to which one's psychological needs were met through para sport participation.

Analyses: The first hypothesis was measured utilizing a simple linear regression. The second and third hypotheses concerning mediation and moderated mediation were assessed using the aforementioned PROCESS macro for SPSS (Hayes, 2013).

References

Benetato, B. B. (2011). Posttraumatic growth among operation enduring freedom and Operation Iraqi Freedom amputees. *Journal of Nursing Scholarship*, *43*(4), 412–420.

Burke, S. M., & Sabiston, C. M. (2010). The meaning of the mountain: Exploring breast cancer survivors' lived experiences of subjective well-being during a climb on Mt. Kilimanjaro. *Qualitative Research in Sport and Exercise*, *2*(1), 1–16.

Calhoun, L. G., Cann, A., & Tedeschi, R. G. (2010). The posttraumatic growth model: Sociocultural considerations. In T. Weiss & R. Berger (Eds.), *Posttraumatic growth and culturally competent practice: Lessons learned from around the globe* (pp. 1–14). Hoboken, NJ: Wiley.

Cann, A., Calhoun, L. G., Tedeschi, R. G., Kilmer, R. P., Gil-Rivas, V., Vishnevsky, T., & Danhauer, S. C. (2010). The Core Beliefs Inventory: A brief measure of disruption in the assumptive world. *Anxiety, Stress, & Coping*, *23*(1), 19–34. https://doi.org/10.1080/10615800802573013

Cann, A., Calhoun, L. G., Tedeschi, R. G., Triplett, K. N., Vishnevsky, T., & Lindstrom, C. M. (2011). Assessing posttraumatic cognitive processes: The Event Related Rumination Inventory. *Anxiety, Stress, & Coping*, *24*(2), 137–156. https://doi.org/10.1080/10615806.2010.529901

Chun, S., & Lee, Y. (2008). The experience of posttraumatic growth for people with spinal cord injury. *Qualitative Health Research*, *18*(7), 877–890.

Crawford, J. J., Gayman, A. M., & Tracey, J. (2014). An examination of post-traumatic growth in Canadian and American ParaSport athletes with acquired spinal cord injury. *Psychology of Sport and Exercise*, *15*(4), 399–406. https://doi.org/10.1016/j.psychsport.2014.03.008

Day, M. C. (2013). The role of initial physical activity experiences in promoting posttraumatic growth in Paralympic athletes with an acquired disability. *Disability and Rehabilitation*, *35*(24), 2064–2072. https://doi.org/10.3109/09638288.2013.805822

Day, M. C., & Wadey, R. (2016). Narratives of trauma, recovery, and growth: The complex role of sport following permanent acquired disability. *Psychology of Sport and Exercise*, *22*, 131–138.

Dibb, B., Ellis-Hill, C., Donovan-Hall, M., Burridge, J., & Rushton, D. (2014). Exploring positive adjustment in people with spinal cord injury. *Journal of Health Psychology*, *19*(8), 1043–1054. https://doi.org/10.1177/1359105313483158

Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. New York, NY: Guilford Press.

Horgan, O., & MacLachlan, M. (2004). Psychosocial adjustment to lower-limb amputation: A review. *Disability and Rehabilitation*, *26*(14/15), 837–850. https://doi.org/10.1080/09638280410001708869

Hsieh, H. F., & Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research*, *15*(9), 1277–1288.

Janoff-Bulman, R. (1992). *Shattered assumptions: Towards a new psychology of trauma*. New York, NY: Free Press.

Jansen, L., Hoffmeister, M., Chang-Claude, J., Brenner, H., & Arndt, V. (2011). Benefit finding and post-traumatic growth in long-term colorectal cancer survivors: Prevalence, determinants, and associations with quality of life. *British Journal of Cancer*, *105*, 1158–1165.

Joseph, S., & Linley, P. A. (2005). Positive adjustment to threatening events: An organismic valuing theory of growth through adversity. *Review of General Psychology*, *9*(3), 262–280. https://doi.org/10.1037/1089-2680.9.3.262

Levine, S. Z., Laufer, A., Stein, E., Hamama-Raz, Y., & Solomon, Z. (2009). Examining the relationship between resilience and posttraumatic growth. *Journal of Traumatic Stress*, *22*(4), 282–286. https://doi.org/10.1002/jts.20409

Lindstrom, C. M., Cann, A., Calhoun, L. G., & Tedeschi, R. G. (2013). The relationship of core belief challenge, rumination, disclosure, and sociocultural elements to posttraumatic growth. *Psychological Trauma: Theory, Research, Practice, and Policy*, *5*(1), 50–55. https://doi.org/10.1037/a0022030

Linley, P. A., & Joseph (Eds.). (2004a). *Positive psychology in practice*. Hoboken, NJ: Wiley.

Linley, P. A., & Joseph, S. (2004b). Positive change following trauma and adversity: A review. *Journal of Traumatic Stress*, *17*(1), 11–21.

Lowe, S. R., Manove, E. E., & Rhodes, J. E. (2013). Posttraumatic stress and posttraumatic growth among low-income mothers who survived Hurricane Katrina. *Journal of Consulting and Clinical Psychology*, *81*(5), 877–889.

Martin, J. J. (2013). Benefits and barriers to physical activity for individuals with disabilities: A social-relational model of disability perspective. *Disability & Rehabilitation*, *35*(24), 2030–2037.

Milam, J. E. (2004). Posttraumatic growth among HIV/AIDS patients. *Journal of Applied Social Psychology*, *34*(11), 2353–2376.

Park, C. L. (2004). The notion of growth following stressful life experiences: Problems and prospects. *Psychological Inquiry*, *15*, 69–76.

Parkes, C. M. (1975). Psycho-social transitions: Comparison between reactions to loss of a limb and loss of a spouse. *British Journal of Psychiatry*, *127*, 204–210.

Post, M., & van Leeuwen, C. (2012). Psychosocial issues in spinal cord injury: A review. *Spinal Cord*, *50*, 382–389. https://doi.org/10.1038/sc.2011.182

Rogers, C. R. (1964). Toward a modern approach to values: The valuing process in the mature person. *Journal of Abnormal and Social Psychology*, *68*(2), 160–167.

Sabiston, C. M., McDonough, M. H., & Crocker, P. R. (2007). Psychosocial experiences of breast cancer survivors involved in a dragon boat program: Exploring links to positive psychological growth. *Journal of Sport and Exercise Psychology*, *29*(4), 419–438.

Saradjian, A., Thompson, A. R., & Datta, D. (2008). The experience of men using an upper limb prosthesis following amputation: Positive coping and minimizing feeling different. *Disability and Rehabilitation*, *30*(11), 871–883. https://doi.org/10.1080/09638280701427386

Smith, B., & Sparkes, A. (2012). Disability, sport, and physical activity. A critical review. In N. Watson, A. Roulstone, & C. Thomas (Eds.), *Routledge handbook of disability studies* (pp. 336–347). London: Routledge.

Splevins, K., Cohen, K., Bowley, J., & Joseph, S. (2010). Theories of posttraumatic growth: Cross-cultural perspectives. *Journal of Loss and Trauma*, *15*, 259–277. https://doi.org/10.1080/15325020903382111

Tedeschi, R. G., & Calhoun, L. G. (1995). *Trauma and transformation: Growing in the aftermath of suffering*. Thousand Oaks, CA: Sage.

Tedeschi, R. G., & Calhoun, L. G. (2004). Posttraumatic growth: Conceptual foundations and empirical evidence. *Psychological Inquiry*, *15*(1), 1–18. https://doi.org/10.1207/s15327965pli1501_01

Tedeschi, R. G., Park, C. L., & Calhoun, L. G. (1998). Posttraumatic growth: Conceptual issues. In R. G. Tedeschi, C. L. Park, & L. G. Calhoun (Eds.), *Posttraumatic growth: Positive changes in the aftermath of crisis* (pp. 1–22). Mahwah, NJ: Erlbaum.

Triplett, K. N., Tedeschi, R. G., Cann, A., Calhoun, L. G., & Reeve, C. L. (2012). Posttraumatic growth, meaning in life, and life satisfaction in response to trauma. *Psychological Trauma: Theory, Research, Practice, and Policy*, *4*(4), 400–410. https://doi.org/10.1037/a0024204

Unwin, J., Kacperek, L., & Clarke, C. (2009). A prospective study of positive adjustment to lower limb amputation. *Clinical Rehabilitation*, *23*, 1044–1050. https://doi.org/10.1177/0269215509339001

Wadey, R., Evans, L., Evans, K., & Mitchell, I. (2011). Perceived benefits following sport injury: A qualitative examination of their antecedents and underlying mechanisms. *Journal of Applied Sport Psychology*, *23*, 142–158.

Westphal, M., & Bonanno, G. A. (2007). Posttraumatic growth and resilience to trauma: Different sides of the same coin or different coins? *Applied Psychology: An International Review*, *56*(3), 417–427.

Wortman, C. B. (2004). Posttraumatic growth: Progress and problems. *Psychological Inquiry*, *15*, 81–90.

CHAPTER 2

STUDY 1: UNDERSTANDING POSTTRAUMATIC GROWTH OF PARATRIATHLETES WITH ACQUIRED DISABILITY

Hammer, C., Podlog, L., Wadey, R., Galli, N., Forber-Pratt, A. J., Newton, M., Hall, M., & Greviskes, L. (2017). Understanding posttraumatic growth of paratriathletes with acquired disability.
With kind permission from Disability and Rehabilitation.

DISABILITY AND REHABILITATION, 2017
https://doi.org/10.1080/09638288.2017.1402961

Taylor & Francis
Taylor & Francis Group

ORIGINAL ARTICLE

Understanding posttraumatic growth of paratriathletes with acquired disability

Chris Hammer[a], Leslie Podlog[a], Ross Wadey[b], Nick Galli[a], Anjali J. Forber-Pratt[c], Maria Newton[a], Morgan Hall[a] and Lindsey Greviskes[a]

[a]Department of Health, Kinesiology, and Recreation, The University of Utah, Salt Lake City, UT, USA; [b]School of Sport, Health and Applied Science, St. Mary's University, Twickenham, London, UK; [c]Department of Human and Organizational Development, Vanderbilt University, Nashville, TN, USA

ABSTRACT

Purpose: To examine the relevance of key components of Organismic Valuing Theory of Growth through Adversity in understanding posttraumatic growth amongst paratriathletes with acquired disability.

Methods: Semi-structured interviews informed by organismic valuing theory of growth through adversity were conducted with 14 elite paratriathletes (eight male, six female). To increase the likelihood that participants had experienced posttraumatic growth, a short form of the Posttraumatic Growth Inventory was completed prior to interview participation. Interview data were analyzed using directed content analysis.

Results: Although the initial response to disability was largely negative, paratriathlon experiences were reported to be a mechanism through which growth was facilitated. In particular, participants suggested that social, competence, empowerment, and identity development processes were instrumental in facilitating posttraumatic growth.

Conclusions: Analysis identified themes largely consistent with the main tenets of organismic valuing theory of growth through adversity, supporting its utility in understanding response to a traumatic event and subsequent growth. These findings also suggest that para sport may be an efficacious means for promoting posttraumatic growth, especially for individuals with severe initial reactions to their disability. Lastly, findings suggest that fostering perceptions of competence, autonomy, and social connection may promote posttraumatic growth.

➤ IMPLICATIONS FOR REHABILITATION

- Acquiring a physical disability may have a detrimental impact on the satisfaction of an individual's fundamental psychological needs.
- In order to foster posttraumatic growth, the para sport environment should allow for participants to feel competent, autonomous, and to have meaningful interactions with fellow athletes and coaches.
- Para sport may be particularly beneficial for individuals with previous sporting backgrounds and for those with severe initial reactions to their disability.

ARTICLE HISTORY
Received 27 January 2017
Revised 3 November 2017
Accepted 6 November 2017

KEYWORDS
Para sport; adaptive sport; organismic valuing theory; physical activity; trauma

Introduction

Acquiring a physical disability that results in the loss of valued functions can be a traumatic experience accompanied by an array of adverse psychosocial and behavioral consequences [1]. Tasks taken-for-granted prior to impairment may subsequently require detailed consideration (e.g., bathing, using the stairs) while the psychological consequences can result in the fracturing of one's social life [2–4]. For these reasons, adjusting to a disability can be an extremely arduous and long-term process [3,4]. For some, positive adjustment may never occur [5]. Problems of a clinical nature such as depression or even suicidal ideation may be pronounced among those experiencing a poor adjustment to disability [2,3]. However, despite the deleterious consequences often associated with acquiring a physical disability, some individuals report positive experiences, such as greater appreciation for life, strengthened social relationships, and enhanced life meanings [2,6]. As Tedeschi and Calhoun state, "the frightening and confusing aftermath of trauma, where fundamental assumptions are severely challenged, can be fertile ground for unexpected outcomes that can be observed in survivors: posttraumatic growth" [7, p. 1]. To this end, Tedeschi and Calhoun [7] defined posttraumatic growth as positive psychological change resulting from the struggle with exceedingly challenging life events.

Although the concept of suffering as an impetus for growth is fundamental to many of the world's religions, cultures, and philosophies, psychological inquiry has traditionally focused almost exclusively on pathological and maladaptive behaviors among those experiencing a negative life event [8]. However, over the past few decades, researchers grounded in a positive psychology framework have devoted increased attention to questions about optimizing human health, well-being and functioning across various life domains [9]. As such, there is a growing body of literature concerned not just with the return to baseline functioning, but with the positive changes that may occur following a traumatic event. Various terms have been utilized, often interchangeably, to describe this concept of positive change following a negative event, such as posttraumatic growth, stress-related growth, perceived benefits, positive adaptation, and adversarial growth.

CONTACT Chris Hammer chris.hammer@utah.edu Department of Health, Kinesiology, and Recreation, 250 S. 1850 E., HPER North, RM 241, Salt Lake City, UT 84112, USA

Park [10] advises that the term posttraumatic growth be reserved for cases where the individual truly suffered a traumatic event, such as an event which results in a threat to life or bodily integrity. Acquiring a physical disability meets this criteria, and therefore the term posttraumatic growth was employed in the present investigation.

Research concerning the role of physical activity on posttraumatic growth is an emerging area of study, with much of the existing work conducted on female cancer survivors [11,12]. While surmounting the challenges of various physical activities (e.g., summiting a mountain) often serves as a metaphor for overcoming cancer, those with an acquired disability likely face a different path, as permanent injury provides enduring reminders of the traumatic event that may prevent one from ever being entirely "posttraumatic" [13]. Although the benefits and barriers to physical activity and sport for individuals with disabilities are well documented [14,15], the role of physical activity and sport participation on posttraumatic growth for this population has received considerably less research attention. Preliminary evidence with seven 2012 Paralympic hopefuls [3] revealed that physical activity and sport participation facilitated posttraumatic growth by affording participants opportunities to create new life meanings, specifically, to test the boundaries of their physical limitations. In doing so, participants better understood their capabilities and thus pursued future opportunities involving taking risks, accepting responsibility, and demonstrating personal control. Experiences of success and other meaningful rewards reinforced these newly constructed life meanings. In another sport specific investigation, Crawford et al. [2] interviewed spinal cord injured individuals to determine if para sport (i.e., sport for people with disabilities) participation influenced perceptions of posttraumatic growth. The researchers uncovered five general dimensions of growth due to para sport, which encompassed emotional (e.g., greater appreciation for life and reestablishment of self-identity), social (e.g., meeting others and sharing experiences), and physical domains (e.g., improved overall health). In addition to the benefits of para sport participation, however, both studies [2,3] found that growth was also accompanied by substantial negative consequences of the trauma, such as depression, feelings of loss, and hopelessness. These findings suggest that the path to achieving posttraumatic growth is not without its challenges, and that experiences of growth and distress are not mutually exclusive. This lack of exclusivity speaks to the notion that posttraumatic growth and posttraumatic stress are not opposite ends of a continuum, but rather distinct constructs that can be experienced concurrently [16]. Moreover, these studies identify not only the existence of posttraumatic growth among those with an acquired disability, but the potential value of sport in facilitating growth.

A number of theoretical frameworks have been proposed to understand posttraumatic growth. For instance, Tedeschi and Calhoun [7] represent posttraumatic growth as an outcome resulting from deliberately ruminating on the trauma. Other scholars however, conceive of posttraumatic growth as a coping strategy, such as a construal for meaning making [17,18]. One theory that seeks to accommodate existing posttraumatic stress theories while explaining why individuals are motivated toward growth is the organismic valuing theory of growth through adversity [19]. Drawing from Janoff-Bulman's [20] model of shattered assumptions, Joseph and Linley [21] state that a traumatic event may thwart personal growth and well-being by shattering an individual's assumptive world (i.e., firmly held core beliefs about the self and the world), leaving the individual in need of integrating the trauma information (i.e., completion tendency). This need for integration causes oscillating phases of *intrusive* and *avoidance* states, during which the individual seeks to process the trauma-related information while simultaneously defending against the distress triggered by such processing. Eventually, the intrusive and avoidant states subside resulting in one of three potential cognitive outcomes – *assimilation* (i.e., integrating the trauma information into an existing worldview), *accommodation in a negative direction* (i.e., changing one's worldview adversely leading to possible psychopathology), *or accommodation in a positive direction* (i.e., posttraumatic growth).

The final outcome can either be facilitated or impeded by one's social environment. A supportive social environment is one that allows for the satisfaction of the fundamental human needs of relatedness (i.e., to feel connected), autonomy (i.e., to feel volitional), and competency (i.e., to feel capable) [19]. According to the theory, satisfaction of these psychological needs will give voice to the organismic valuing process (i.e., one's capacity and tendency to recognize what is important in order to lead a fulfilling life) and facilitate positive accommodation, which is characterized by well-being in the eudaimonic tradition (i.e., psychological well-being) as opposed to the hedonic tradition (i.e., subjective well-being). The distinction is significant, as it is entirely possible that even in circumstances when individuals experience positive accommodation, happiness in terms of subjective well-being will not be an inevitable outcome [19,22]. While the alleviation of distress can be attained either through assimilation or accommodation, only by positively accommodating the trauma information, can one experience growth [21].

Preliminary findings in the para sport and posttraumatic growth literature suggest that para sport participation may play a role in facilitating posttraumatic growth amongst individuals who have acquired a disability [2,3]. There is however, a need to better understand the processes through which this growth occurs. In order to enhance an understanding of *how* para sport may facilitate posttraumatic growth, the purpose of this investigation was to examine the relevance of the organismic valuing theory of growth through adversity in understanding the phenomenon of posttraumatic growth amongst individuals with physical disabilities participating in triathlon (i.e., paratriathletes). A more nuanced understanding of the psychological processes involved in experiencing posttraumatic growth among paratriathletes can provide healthcare specialists (e.g., physiotherapists, psychologists) as well as organizations (e.g., adaptive sport charities, hospitals) with essential information on the development of therapeutic interventions. Further, findings from this investigation can provide coaches and sport administrators with evidence-based knowledge on best practices for developing sport programs that encourage enhanced sport performance as well as a greater likelihood of posttraumatic growth. Finally, from a theoretical standpoint, the present investigation has the potential to examine the utility of the organismic valuing theory of growth through adversity in understanding individuals experience in a sport specific context.

Methods

Participants

The current study utilized the purposive sampling technique of criterion sampling [23], where participants were required to meet predetermined conditions deemed to be important (i.e., experience of posttraumatic growth), in order to glean knowledge of the role of paratriathlon on posttraumatic growth from a population who have experienced the phenomenon. The participant population was delimited broadly to include individuals over the age of 18, who acquired a physical disability yet remained

Table 2.1. Participant characteristics.

Name (pseudonym)	Age (years)	Disability	Cause of disability	Years since acquiring disability	Years involved in para sport
Michael	28	Above knee amputation	Cancer	14	13
Gwen	24	Above knee amputation	Cancer	10	9.5
Carl	35	Above knee amputation	Cancer	12	10.5
Katie	35	Above knee amputation	Military combat	11	8
Allison	46	Below knee amputation	Struck by car	8	6
Matthew	31	Below knee amputation	Motor vehicle accident	2	1.5
Evan	32	Below knee amputation	Military combat	4	4
Jared	43	Below knee amputation	Motor vehicle accident	16	14
Sara	27	Traumatic brain injury, incomplete spinal cord injury, below knee amputation	Delay in diagnosis and treatment of congenital condition	8	7.5
Jenny	39	Visual impairment	Auto immune disease	8	2
Justin	34	Visual impairment	Macular degeneration	25	14
Megan	40	Above elbow amputation	Motor vehicle accident	23	8
Will	35	Below elbow amputation	Military combat	11	5
Ben	35	Brachial plexus injury (paralysis of arm)	Ski accident	8	7

ambulatory, and who participated in the sport of triathlon. These criteria did not include individuals whose disability required permanent use of a wheelchair due to the unique challenges that this population may face compared to those with disability who remain ambulatory (e.g., accessibility, transportation, etc.). Furthermore, individuals with congenital disabilities were not included as their disability did not occur as a result of a personally traumatic event. Of the prospective participants who responded to a contact phone call or email, all agreed to participate in an interview. Recruitment efforts resulted in a sample of 14 national and international level paratriathletes (eight male, six female), including Paralympians, world champions, national champions, and those with other notable accomplishments. The average participant age was 34.6 years (SD = 5.88), and the mean time since acquiring a disability was 11.4 years (SD = 6.21). At the time of data collection, participants were involved in para sport for an average of 7.9 years (SD = 3.91). While only three participants had triathlon experience prior to disability, all participants reported a competitive sport background. For the purpose of anonymity, pseudonyms were selected for all participants and certain demographic information is withheld from the manuscript. A range of disability types, as well as incidents in which disabilities were acquired were represented in the sample. Table 2.1 provides a more detailed description of participants' demographic information.

Instruments

As a criterion for participation was having experienced posttraumatic growth, a short form of the Posttraumatic Growth Inventory [24] was used to screen participants. The inventory is a 10-item survey that provides a global indicator of posttraumatic growth that has shown good reliability and validity across a variety of samples [24,25]. Response options range from 0 (*I did not experience this change as a result of my crisis*) to 5 (*I experienced this change a very great degree as a result of my crisis*). Additionally, a semi-structured interview guide informed by the tenets of the organismic valuing theory of growth through adversity (i.e., shattered assumptive world, intrusive and avoidant states, psychological needs satisfaction) was constructed and subsequently pilot tested with two paratriathletes to further refine items. Sample interview questions included "Describe your thoughts and feelings in the immediate aftermath of acquiring your disability," "Tell me about the relationships you have made during your para sport experiences," and "How have your experiences with paratriathlon changed or evolved, if at all, since your initial experiences as a paratriathlete?"

Data collection

Institutional review board approval was obtained and informed consent was given by all participants prior to participation. As indicated, posttraumatic growth was first screened for by completing a short form of the Posttraumatic Growth Inventory [24]. An *a priori* designated cutoff criteria of a mean score of 2.0 was selected, as this score indicates that participants experienced at least "a small degree of posttraumatic growth." Participants who met the criteria were then interviewed by the first author, a Caucasian male Paratriathlete. Such shared experience facilitated a greater understanding of subcultural norms and values, an expedited and more complete acceptance by participants, and greater openness, trust, and a richer data set [26,27]. While the merits of conducting research on one's own social group have been extensively debated, the first author's congenital impairment, helped him occupy a space on the continuum between that of "insider" and "outsider" [26]. Interviews were conducted at various locations (e.g., Olympic Training Center, hotels, competition venues) to facilitate a convenient and safe environment for participants to share their stories and to address pragmatic considerations such as athletes' training and competition schedules. Audio data from all interviews were recorded and transcribed verbatim. Interviews lasted an average of 43.5 min.

Analysis

Given the aim of examining the applicability of the organismic valuing theory of growth through adversity as an appropriate framework for understanding posttraumatic growth experiences among individuals with an acquired disability, directed content analysis was utilized [28]. Directed content analysis is a specific approach to analyzing qualitative data that utilizes theory or relevant research to inform initial coding before allowing novel themes to emerge from the data. The approach can be used to validate or expand a conceptual framework or theory [28]. Using directed content analysis, the data were analyzed as follows. First, interviews were transcribed verbatim, and the first author further

familiarized himself with the data by reading through each transcript multiple times. Second, operational definitions of the major concepts of the organismic valuing theory of growth through adversity (i.e., shattered assumptive world, psychological needs satisfaction) were developed, and data representative of these concepts were coded and grouped into initial themes in a deductive manner [28]. Data that did not fit within a theoretically derived theme were coded into additional themes in an inductive manner [29]. Third, several authors evaluated the emerging themes and determined if subcategories were necessary. This process consisted of inductively clustering data based on underlying conceptual similarities. For example, the initial reaction to trauma theme was separated into subcategories depending on the psychosocial domain that was impacted (e.g., social consequences, identity crises, feelings of incompetence). Both the inductive and deductive phases of analysis were discursive in nature and involved iterative groupings and classifications of themes, with raw data statements being organized and reorganized following discussion of conceptual similarities between data statements and *a priori*/emergent themes. In order to enhance the rigor of the findings several authors including those with substantial experience publishing qualitative research, an intimate knowledge of organismic valuing theory of growth through adversity, and an insider's and outsider's perspective (i.e., one Paralympian and several non-Paralympians) acted as critical friends [30]. They did so, by questioning the first author's grouping of findings, helping the first author consider personal biases that may have influenced interpretation of the interview data, and by facilitating a reflexive viewpoint. Specifically, the first author presented his interpretations of the data on a regular basis to the coauthors who provided a theoretical sounding board to encourage reflection upon, and exploration of, alternative explanations and interpretations as they emerged in relation to the data. As part of this process of critical dialog, the first author was required to make a defendable case that the available data supported his interpretations. Furthermore, participant reflections on our analytical interpretations were sought [30]. This process involved sharing and dialoging with the participants about the study's findings and providing opportunities for additional data and insight. Member reflections are not to be mistaken with member checking which seeks to find the data credible by matching the participants' and researchers' interpretations of the data.

Results

The average score across participants on the short form of the Posttraumatic Growth Inventory was 3.34 (SD = 0.68), signifying moderate to strong perceptions of posttraumatic growth. Two participants (Matthew and Will), however, had mean responses considerably lower than the rest of the participants (Matthew: 2.1; Will: 2.0), indicating that they experienced posttraumatic growth changes to a small degree. Carl was the next lowest with a mean of 2.7 (i.e., small to moderate degree of growth), while all other participants ranged between 3.2 and 4.4, indicating that they experienced moderate to high levels of posttraumatic growth. All participants met the cutoff criteria of 2.0 and were subsequently interviewed.

As the interviews addressed varying facets of the disability experience, so too the derived themes are diverse in scope. Furthermore, due to the complexity of participant experiences, each theme consists of a number of subthemes in order to further illustrate participants' lived experiences. The first theme highlights participants' initial reactions to trauma and having acquired a physical disability. Perhaps not surprisingly, these reactions were largely negative and illustrate how one's assumptive world can be shattered by a traumatic event such as acquiring a disability. The second theme addresses the organismic valuing theory of growth through adversity assertion that individuals who suffer a trauma experience intrusive and avoidance states while processing the trauma information. The majority of participants reported that having a physical disability had too profound of an effect on their lives to block out, and therefore intrusive thoughts were more prevalent. The third theme focuses on paratriathlon participation. Participants described these experiences in terms of the processes by which para sport helped to facilitate positive outcomes. Finally, the fourth theme pertains to reactions to one's disability status, which appeared to be unrelated to para sport participation.

Initial reaction to trauma/disability: changing beliefs about the "self" and one's "place" in the world

Participants described their initial reactions to their trauma and subsequent disability in predominantly negative terms. A number of subthemes emerged resulting in a range of psychosocial consequences. One such consequence frequently cited was the impact that disability had on one's social life. These social ramifications took on multiple forms. For instance, Carl spoke of a new found "fear of being in society":

> I wouldn't go out into public. I used to study a lot – I was in college at the time – and I would study in the coffee shop. It took me months to actually drive back and forth to the coffee shop, and then, finally, when I parked, I would just leave, and then it took me months until I would actually get out of my car and start to get comfortable being out in public.

Others reported similar feelings, such as believing they no longer fit in with their peers, drifting away from friends, avoiding being out in public, or being more reserved in social situations. One reason for these apprehensions was due to a desire to not attract unwelcome attention or pity, as Allison illustrated:

> I didn't want to be the center of attention, so I wore long pants frequently. I would run and still exercise and things like that, but when I was going into a public place – I remember specifically church, because it was an older congregation – I wouldn't wear a skirt because I didn't want to kind of alarm the other parishioners that would have felt so bad for me.

A perceived loss of control as a result of having acquired a physical disability was another prevalent consequence reported by participants. Acquiring a disability caused many participants to feel less independent or in some cases provoked a realization that they were not as invincible as they once thought they were. Indicative of the sentiments of others, Evan commented:

> I guess I have always thought that I am in control of everything, and when I stepped on the IED [improvised explosive device] – when I got hurt – I quickly realized that I am not in control of everything. It is one of those things that I just couldn't believe it happened to me, that I couldn't go back and change it.

Feelings of incompetence were another salient consequence of acquiring a disability. Many participants reported concerns regarding their ability to function in the world or frustrations related to struggles with tasks once taken for granted. Ben described how these feelings of incompetence led to his frustrations:

> Initially, I was frustrated and annoyed with how much it impacted my life, particularly how slow I was at doing things. Everything seemed to take two or three times longer than it did before, even the simple stuff – like putting toothpaste on a toothbrush was incredibly frustrating. It wasn't necessarily any kind of big thing that was super frustrating; it was those small little things that kind of added up over time. I remember a particular instance with a tube of toothpaste, and I

> couldn't get toothpaste on the toothbrush without getting it all over the counter, and I just got reduced to tears because of that frustration.

Many participants also reported that acquiring a disability resulted in feeling like they lost their identity.

> Pre-injury my purpose in life was to be a phenomenal athlete. And then, immediately post-injury, there was a loss of purpose. To be honest with you, I felt like I didn't know what I was here for. Everything was stripped from me, and all of those things I thought I was supposed to be before were gone. (Carl)

Other participants felt like their disability became their defining feature and that everything else was stripped away. As Allison illustrated, "It was very hard for me to rationalize that I had other gifts besides physical attributes and my physical mobility." Furthermore, depression and other psychopathological responses were also pronounced amongst several participants. Carl credited his loss of identity as the source of his depression:

> I definitely was depressed. I had about three months of depression, and a lot of that stemmed from the fact that everything I had known about myself, defining factors like sports and athleticism, were gone, so I got very depressed for about three months post-amputation.

Several other initial reactions were articulated, albeit to a lesser extent than those described above. Such reactions included denial or a delayed acceptance, anger at having acquired a disability, loss of self-esteem, and negative body image. For example, Ben's comments epitomized the loss of confidence and decrements to self-esteem mentioned by several participants, "I definitely felt like I had less value after the accident, that I couldn't contribute as much [to society]" while Carl's statement provided a powerful demonstration of body image concerns: "I never wanted to really see myself without clothes on. I never wanted to see myself; even in sexual relationships, it was more like hurrying to cover my body up."

Intrusive and avoidance states

Interviews revealed that intrusive thoughts regarding the moment of injury and one's newly acquired disability were far more prevalent than avoidant thoughts. As Katie suggested, "It was very time consuming, and all you do is think about what happened, if anything could have been different." The use of avoidance strategies was far less prevalent, although several examples of this strategy were articulated. As Gwen described, "I think that I tried to repress a lot of it. I definitely wanted to be seen as "normal", and I wanted to just go back to being as normal as possible." However, many participants described how the significant physical and overall life alterations occurring as a result of their disability made it hard to avoid or block out injury-related thoughts. Jared illustrated this point in stating, "It's kind of hard when you need crutches to go to the bathroom. You're constantly reminded about it, so it's kind of hard to block it out." Despite the intrusive thoughts experienced by many, all participants reported that perseveration over their disability, for the most part, eventually subsided.

Para sport participation

When describing their para sport experiences, participants spoke of the processes through which their para sport experiences facilitated growth as well as the explicit experiences of posttraumatic growth resulting from their para sport involvement.

Processes of para sport

Para sport facilitated posttraumatic growth through a variety of mechanisms. One way that para sport accomplished this was by providing opportunities for meaningful social experiences that allowed for feelings of kinship and support, as well as opportunities to learn from others. This sense of community within the para sport environment was highlighted by all participants. As Megan observed, "There's competition, but there's still community and I think that's helpful because you're not alone. You're not alone." In terms of kinship, para sport provided opportunities to relate to individuals with similar circumstances, which was not something that could be experienced in their existing relationships. Jared illustrated this point in commenting:

> Being exposed to all these people – you know, disabled athletes – it's special. It's really, really, special to me. I mean, you don't get to spend time with people who've been through things like you've been through and had some challenges that you've been through. It's something about having that kinship, you know; you don't get that kinship anywhere else.

For some participants, para sport helped them cope with their disability by providing role models of other disabled athletes who had overcome disability related challenges. Such models provided participants with the belief that they too could overcome their challenges.

> Sports have really helped me deal with it [my disability] in that I've been surrounded by a community of other people that have similar disabilities, if not worse disabilities – or disabilities that affect them more, I wouldn't say worse or better – but have a higher impact of how they're affected by their disability. And seeing them being able to cope and still succeed in athletics and life has really made dealing with my disability a lot easier. (Carl)

Another way para sport served to facilitate posttraumatic growth was by providing opportunities for participants to experience competence by setting goals and overcoming challenges. For example, when asked how learning to be a triathlete affected his life, Carl responded:

> I think that's when my life started to change for the better, you know, starting to have a goal, which, might have been small, but learning to run better was a goal, and it gave me purpose to try to really overcome the whole 'this disability owns me' as opposed to 'I own this disability', and I started learning that I could be a good runner. I could be a competitive athlete because of all that, and that really changed my mindset from 'this defines me', and then turnaround to 'I define myself.'

Moreover, many participants mentioned how learning to adapt in sport helped in other aspects of life. As Ben suggested:

> It's taught me to find ways to work around parts of my life. There are certain things that are just much more difficult, or I'm unable to do, and being in sport has taught me ways to be inventive and figure out how to do things that, beforehand, I would just have someone else do for me.

Numerous participants commented on how para sport enabled a sense of empowerment and control. As Jared explained, "The para side of it takes it to a different level. I'm empowered. I'm not less. I'm more." Ben further described how para sport was empowering in terms of assuming control over your life.

> I think that, definitely, para sport is empowering, and it gives you something that is controllable in a world of things that are not controllable, particularly for someone who has recently acquired a disability. The 'put the work in and get something out' that happens in sport is very … comforting, might be a good word. In a situation where you recently acquired a disability and there's still a bunch of unknown, sport is very known and very focused, and there's an aspect of being able to control things that you wouldn't be able to control outside of sport.

The theme of identity was also prominent amongst participants. Para sport participation served as a mechanism to regain

an old identity. For example, in reflecting on her initial experiences with para sport, Gwen illustrated this theme:

> That year of my life was the best year of my life just because I felt like I was constantly, you know, trying – not new things – but trying things [running] that I haven't done in eight years, and just kind of reconnecting with that whole piece of my identity [being an athlete] that I had lost.

Para sport participation also afforded many participants the opportunity to expand upon their previous identity, one which often centered around para sport. As Evan described:

> I think, originally, when I was injured and lost my leg, I immediately felt like I had lost my identity, and now I feel like I have kind of a new identity. Now, I am an athlete. I am an athlete who competes in sports. I think that's pretty cool.

Moreover, as acquiring a physical disability resulted in a loss of identity for many participants, para sport was perceived as a way to overcome feelings of being defined by a disability.

> Sport taught me that I can still do the things I want to do .... like my disability doesn't define me, and I don't feel like I have a "woe is me, things are so rough" attitude that I had in the past before finding para sport. (Ben)

Lastly, several participants mentioned how para sport served as a coping mechanism in which they could focus their energy to help them deal with having acquired a disability. For example, Katie credited para sport for helping her return to functioning: "it got me, in my mind, out of my hospital bed." Similarly, Justin affirmed that:

> Para sports and sports in general basically saved my life because they gave me an outlet in which to filter or eliminate frustrations. ... getting involved in para sports, training, and all the stuff that is associated with para sports has been the [emotional] outlet and the coping mechanism – the main coping mechanism – by which I deal with my disability.

Experiences of posttraumatic growth resulting from para sport participation

In addition to discussing the role that para sport played in the facilitation of growth, participants commented on several experiences of posttraumatic growth which resulted from their para sport participation. One such experience was related to the cultivation of relationships. As indicated previously, the social relationships, camaraderie, and support afforded through para sport participation were factors that facilitated growth. However, participant comments also suggested that cultivating deep and meaningful relationships were part of the posttraumatic growth experience resulting from their para sport involvement. Katie conveyed how para sport experiences led to meaningful relationships:

> In para sport, everyone has overcome some sort of ... whether they were born with a disability, they've had to grow up with it, or they've overcome some trauma or disease, whatever it is, we've all gone through our period, of trying to fit in or trying to figure out what we want to do, and everyone has these amazing stories, and you all come together, and it's just this .... I mean the people are amazing. I have relationships that will last forever that I met during sports.

All participants reported enhancements in their confidence, which they attributed to their involvement in para sport. Beyond their sport confidence, however, participants described how they became more confident in their ability to succeed in life with a disability, regardless of the challenges they faced. As Matthew stated, "It has given me all of the confidence that I have now. Without it, I probably wouldn't be doing half the stuff I'm doing now." Similarly, Ben felt that:

> Sport has given me the ability to trust in myself and trust what I can do. The self-doubt that came along with my disability has been eradicated through my participation in sport. Learning that my disability doesn't mean that my life has to be so different, like I need to walk on egg shells around myself. Competing in sport has given me the ability to feel like I can overcome just about anything that would come my way.

Para sport also helped some participants deal with body image issues after acquiring a disability. As Evan illustrated:

> At first, when I looked in the mirror, I thought I just looked really strange because I'm missing a body part. And that has totally gone away. Now, out in public, I'm fine with taking my leg off or being looked at differently, and I just think getting out there and doing that sport helped.

For many, becoming fit through para sport participation was the reason for enhanced body image, as Carl's experiences demonstrated, "I feel very confident in my body because I can still look good despite the fact that I'm missing a leg. You know, my self-image has really changed since I've become an athlete than it was before." Irrespective of body image, many participants credited sport with various general health benefits, especially considering the challenges they faced as a result of their disabilities (e.g., wearing prosthetics). Other benefits of the para sport experience frequently cited included becoming more selfless (e.g., using one's platform to advocate for para sport and others with disabilities) as well as being afforded unique opportunities specific to para sport participation. Epitomizing the sentiment of others Gwen remarked:

> All the different opportunities that have come my way – that I know never would have happened – and so, overall, it probably has been the best thing that has ever happened to me, just because so much of my life right now, so much of how I see myself, somehow links back to that.

Reactions unrelated to para sport

While the utility of para sport in promoting beneficial outcomes for participants was evident in all interviews, experiences unrelated to para sport were also mentioned. For instance, adjusting to a "new normal" was commonly cited as something that gradually occurred over time and was not necessarily an outcome of sport participation. More than a return to baseline functioning, however, participants also reported having derived benefits from their disability experience, as demonstrated by comments suggesting that acquiring a disability led to greater empathy and acceptance of others:

> I think my view of the world is much more open than it used to be ... my acceptance and tolerance for other people and other views and lifestyles and religions, like, I think all of that, I've become a little more open and accepting, tolerant of different ways of life. (Sara)

Several participants also believed that the process of having acquired a disability highlighted or strengthened elements of their social support network. When asked how acquiring a disability affected her social relationships, Megan replied:

> There was much more connection with friends that I had, most of them. Maybe there were a few outliers, but I was very well supported with my network of friends and relatives, and that definitely supported me – you know, encouraged me. So, yeah, thinking back, there was definitely some that dropped off, because it was high school, but, for the most part, we're still such good friends with most of the girls I went to school with back then because it impacted all of our lives.

Many participants also cited how their experiences of having acquired a disability resulted in a changed perspective and greater appreciation for life. As Sara described:

> This is probably kind of cliché, but I just realized how precious life was. Knowing, for me, at any time, things could change and get much

> worse, and change not only the way I live but how long I live. And so, you know, everyday has become more important than before my disability.

Evan further illustrated how his disability effected his perspective on life:

> It shifted my priorities a little. So, before my injury, I was a marine. I had a plan of what was next, and I was going to get out of the Marine Corps and try to get a job – a corporate position – and I just had this plan in my life, and then, after getting injured, I realized that my priorities were my family and my faith, and I began to let those help me answer any questions or help me dictate how I was going to live my life.

Discussion

Given our aim of examining the relevance of the organismic valuing theory of growth through adversity in understanding posttraumatic growth among paratriathletes with an acquired disability, we highlight areas of consistency and/or novelty between key theoretical tenets and findings from the present investigation. Consistent with the fundamental assumption of organismic valuing theory that an individual's assumptive world (i.e., core beliefs) is shattered in the trauma aftermath, participants in the current study demonstrated how the disability experience negatively influenced beliefs about the self and one's "place" in the social world as agentic beings. Previous research similarly demonstrates the difficulties incurred by those with acquired disability in the disability aftermath [2,3]. Moreover, the organismic valuing theory of growth through adversity posits that individuals have innate psychological needs (i.e., relatedness, competence, autonomy) which must be met for the organismic valuing process to be given voice, and for growth to occur. Evidence from this investigation extends the organismic valuing theory of growth through adversity by illustrating how acquiring a disability may not only elicit challenges to firmly held assumptions about life, but may also thwart the essential psychological needs necessary for growth. That is, participants highlighted the manifold ways in which acquiring a disability weakened their perceived competence, reduced perceptions of volitional control over one's life, and negatively impacted many aspects of their social life. Research similarly shows those with an acquired disability have reported deficiencies in their needs satisfaction [6,31,32]. For example, many persons with an acquired disability have feelings of incompetence as they question their ability to perform tasks done previously [31] and often experience social isolation or dislocation from former peer groups [6].

While acquiring a disability was shown to thwart the psychological needs essential for posttraumatic growth, results from this study suggest that para sport participation may be one mechanism by which to facilitate posttraumatic growth, in part by satisfying these important needs. Specifically, the role that para sport played in fostering growth encompassed five domains, namely, it provided opportunities: for meaningful social experiences, to overcome challenges, to become empowered, to develop one's identity, and it served as a general coping mechanism. Consistent with the contentions of the organismic valuing theory of growth through adversity, these domains relate specifically to the fundamental needs for competence, autonomy, and relatedness. Specifically, meaningful social experiences addressed one's need for relatedness, overcoming challenges is akin to feelings of competency, while becoming empowered (i.e., gaining control over one's body and life) relates to the need for autonomy. The implications of physical activity and sport participation on psychological needs satisfaction has been demonstrated previously, with research suggesting that many of the potential benefits of sport or physical activity may be largely a function of the extent to which environmental supports satisfy individuals' basic needs [33]. According to Deci and Ryan [34], sports provide a valuable opportunity to be self-determining, receive competence feedback, and to be socially involved.

Research has specifically demonstrated the role that para sport can play in satisfying one's psychological needs. For instance, in a study of disabled military service members taking part in a Paralympic sports camp, participants reported that sport strengthened their relationships with family members and other service members (i.e., relatedness) and that their involvement afforded them the opportunity to build and test new skills (i.e., competence) [32]. Similarly, Day [3] suggested that para sport may facilitate posttraumatic growth by providing an environment where individuals could take risks and test their boundaries, and that feelings of success in sport translated to confidence in other areas of life. Furthermore, in a qualitative study of elite para athletes, participants felt that they were viewed as less competent by others because of their disability, however, by participating in sport, these perceptions were negated and one's own feelings of competence were affirmed [35]. Participants also reported how para sport was empowering as well as a source of fitness, the latter of which was important for maintaining physical independence. Similarly, sport and physical activity was found to empower college males with disabilities and wheelchair rugby athletes by giving them a greater sense control over their lives [36,37], and helping the latter feel part of a sport community [37]. The importance of having control over circumstances in one's life is central to the construct of autonomy within organismic valuing theory of growth through adversity. Findings from the present study add to the growing body of research on disabled athlete populations suggesting the value of sport – in particular, salient individuals within the sport context such as teammates and coaches – in satisfying basic psychological needs [38].

In support of the organismic valuing process, an important construct underpinning the organismic valuing theory, participant responses highlight how para sport prompted individuals to restructure the self in such a way that more closely aligns with one's innate self [19]. For some participants, this innate self was aligned with their pre-disability self, while for others, this innate self was quite different. Regardless of whether participants reconnected with an old identity or developed a new one, participants credited their para sport participation for facilitating this outcome. Being forced to adapt a new identity or being able to reconnect with a previously lost identity were cited as benefits of para sport participation in a study of individuals with spinal cord injury [2]. Similarly, Day [3] found that para sport served to help individuals re-build their sense of self, while Perrier et al. [39] found that sport helped some individuals to form an athletic identity after acquiring a physical disability. The notion of restructuring one's self in such a way that more closely aligns with one's innate self speaks to the concept of the organismic valuing process at work [19].

Participants in the current study also revealed findings unconnected with organismic valuing theory and para sport. Although para sport was frequently lauded by participants for its positive impact on their lives, many participants also suggested that acquiring a disability led to growth experiences unrelated to their sport experience (e.g., greater appreciation for life). While these findings do not detract from the efficacy of para sport as a means by which to experience growth after acquiring a physical disability, they demonstrate that para sport is not the only means through which one may experience growth. Indeed, a number of

psychosocial interventions such as cognitive-behavioral therapy [40], expressive writing [41], and mindfulness-based stress reduction programs [42] have been shown to facilitate posttraumatic growth. It is also possible that as participants in this study seem to have achieved growth without such interventions, it may be the case that growth can occur naturally without intervention. Moreover, individuals without an athletic background may be less inclined to participate in para sport or may find less value in it. As Smith and Sparkes comment, "not all disabled people can be, or wish to be, an elite athlete" [15, p. 339]. The fact that all participants in the present study reported involvement in sport prior to acquiring a disability suggests that participants were already predisposed to view sport as a worthwhile coping mechanism, and therefore sport may play a uniquely effective role in facilitating growth for this population. It seems likely that individuals with non-sport interests or those with different athletic backgrounds than those in the current study would report different experiences. It is plausible that even for individuals who report the posttraumatic growth facilitating benefits of para sport, the mechanisms which underlie the development of growth (i.e., supportive social environment) may be fulfilled through avenues besides sport.

Despite the valuable findings emerging from this study, a number of limitations and future research directions should be acknowledged. First, given the *a priori* selection of participants who met pre-defined posttraumatic growth criteria, it is possible that participants with novel experiences of growth might not have been eligible for study participation. Researchers are therefore encouraged to examine the post-disability experiences of a broad range of individuals who do not necessarily meet pre-established criteria for posttraumatic growth [43]. Second, studies that emphasize growth may inadvertently normalize the experience, causing people to expect growth, making those who do not report such experiences feel like "coping failures" [44, p. 89]. It is important to avoid concluding that posttraumatic growth is the only desirable outcome when one is faced with a potentially traumatic event. Third, given the specific characteristics of participants in the current study (e.g., all participants competing in sport pre-disability, only individual sport athletes competing at a high level), future research is needed to examine the impact of previous sport participation, involvement in individual versus team sport, and one's level of para sport participation on experiences of post-traumatic growth. Fourth, future studies would be well served to examine the viability of a para sport intervention for individuals who do not identify as athletes. Fifth, as posttraumatic growth has been conceptualized as both a process and an outcome [45], future studies may consider employing a prospective, longitudinal design in order to gain deeper insight into the process. Finally, the organismic valuing theory of growth through adversity posits that a pre-trauma environment supportive of needs satisfaction can also be important in terms of facilitating the organismic valuing process. Future investigations may consider taking the pre-trauma environment into account.

To the authors' best knowledge, this study is original in that it is the first to qualitatively examine the tenets of the organismic valuing theory of growth through adversity as a framework for understanding growth processes and experiences of posttraumatic growth among para sport athletes. Results from the investigation largely support the theoretical tenets of the organismic valuing theory of growth through adversity, suggesting that future studies may be well served to employ this framework when investigating posttraumatic growth. By acquiring a better understanding of whether and *how* sport facilitates posttraumatic growth, and by recognizing that positive accommodation is not an inevitable outcome of the coping process, a shift toward an environment conducive to needs satisfaction may be constructive. Rehabilitation practitioners may consider educating their patients with disabilities about the opportunities and benefits of engaging in para sport, as physical activity and specifically organized para sport may be an efficacious mechanism by which to facilitate posttraumatic growth, especially for individuals with previous sporting backgrounds.

Disclosure statement

The present study was self-funded. There are no conflicts of interest and no financial benefits to the authors.

References

[1] Livneh H, Antonak RF. Psychosocial adaptation to chronic illness and disability: a primer for counselors. J Couns Dev. 2005;83:12–20.

[2] Crawford JJ, Gayman AM, Tracey J. An examination of posttraumatic growth in Canadian and American ParaSport athletes with acquired spinal cord injury. Psychol Sport Exerc. 2014;15:399–406.

[3] Day MC. The role of initial physical activity experiences in promoting posttraumatic growth in Paralympic athletes with an acquired disability. Disabil Rehabil. 2013;35:2064–2072.

[4] Gallagher P, MacLachlan M. Adjustment to an artificial limb: a qualitative perspective. J Health Psychol. 2001;6:85–100.

[5] Lucas RE. Long-term disability is associated with lasting changes in subjective well-being: evidence from two nationally representative longitudinal studies. J Pers Soc Psychol. 2007;92:717–730.

[6] Chun S, Lee Y. The experience of posttraumatic growth for people with spinal cord injury. Qual Health Res. 2008;18:877–890.

[7] Tedeschi RG, Calhoun LG. Posttraumatic growth: conceptual foundations and empirical evidence. Psychol Inq. 2004;15:1–18.

[8] Tedeschi RG, Park CL, Calhoun LG. Posttraumatic growth: conceptual issues. In: Tedeschi RG, Park CL, Calhoun LG, editors. Posttraumatic growth: positive changes in the aftermath of crisis. Mahwah (NJ): Erlbaum; 1998. p. 1–22.

[9] Linley PA, Joseph S, editors. Positive psychology in practice. Hoboken (NJ): Wiley; 2004.

[10] Park CL. The notion of growth following stressful life experiences: problems and prospects. Psychol Inq. 2004;15:69–76.

[11] Burke SM, Sabiston CM. The meaning of the mountain: exploring breast cancer survivors' lived experiences of subjective well-being during a climb on Mt. Kilimanjaro. Qual Res Sport Exerc. 2010;2:1–16.

[12] Sabiston CM, McDonough MH, Crocker PR. Psychosocial experiences of breast cancer survivors involved in a dragon boat program: exploring links to positive psychological growth. J Sport Exerc Psychol. 2007;29:419–438.

[13] Cordova MJ. Facilitating posttraumatic growth following cancer. In: Joseph S, Linley PA, editors. Trauma, recovery, and growth: positive psychological perspectives on posttraumatic stress. Hoboken (NJ): Wiley; 2008. p. 185–206.

[14] Martin JJ. Benefits and barriers to physical activity for individuals with disabilities: a social-relational model of disability perspective. Disabil Rehabil. 2013;35:2030–2037.

[15] Smith B, Sparkes A. Disability, sport, and physical activity. A critical review. In: Watson N, Roulstone A, Thomas C, editors. Routledge handbook of disability studies. London: Routledge; 2012. p. 336–347.

[16] Zoellner T, Maercker A. Posttraumatic growth in clinical psychology – a critical review and introduction of a two component model. Clin Psychol Rev. 2006;26:626–653.

[17] Davis CG, Nolen-Hoeksema S, Larson J. Making sense of loss and benefiting from the experience: two construals of meaning. J Pers Soc Psychol. 1998;75:561–574.

[18] Janoff-Bulman R, Frantz C. The impact of trauma on meaning: from meaningless world to meaningful life. In: Power M, Brewin C, editors. The transformation of meaning in psychological therapies. New York (NY): Wiley; 1997. p. 91–106.

[19] Joseph S, Linley PA. Positive adjustment to threatening events: an organismic valuing theory of growth through adversity. Rev Gen Psychol. 2005;9:262–280.

[20] Janoff-Bulman R. Shattered assumptions: towards a new psychology of trauma. New York (NY): Free Press; 1992.

[21] Joseph S, Linley PA. Growth following adversity: theoretical perspectives and implications for clinical practice. Clin Psychol Rev. 2006;26:1041–1053.

[22] Linley PA. Positive adaptation to trauma: wisdom as both process and outcome. J Traum Stress. 2003;16:601–610.

[23] Patton MQ. Qualitative research and evaluation methods. Thousand Oaks (CA): Sage; 2002.

[24] Cann A, Calhoun LG, Tedeschi RG, et al. A short form of the Posttraumatic Growth Inventory. Anxiety Stress Coping. 2010;23:127–137.

[25] Kaler ME, Erbes CR, Tedeschi RG, et al. Factor structure and concurrent validity of the Posttraumatic Growth Inventory – Short Form among veterans from the Iraq War. J Traum Stress. 2011;24:200–207.

[26] Dwyer SC, Buckle JL. The space between: on being an insider–outsider in qualitative research. Int J Qual Methods. 2009;8:54–63.

[27] Merton RK. Insiders and outsiders: a chapter in the sociology of knowledge. Am J Sociol. 1972;78:9–47.

[28] Hsieh HF, Shannon SE. Three approaches to qualitative content analysis. Qual Health Res. 2005;15:1277–1288.

[29] Creswell JW. Research design: qualitative, quantitative, and mixed methods approaches. Thousand Oaks (CA): Sage; 2009.

[30] Smith B, McGannon K. Developing rigor in qualitative research: problems and opportunities within sport and exercise psychology. Int Rev Sport Exerc Psychol. 2017;11:1–21.

[31] Lundberg N, Bennett J, Smith S. Outcomes of adaptive sports and recreation participation among veterans returning from combat with acquired disability. Ther Recreation J. 2011;45:105–120.

[32] Hawkins BL, Cory AL, Crowe BM. Effects of participation in a Paralympic military sports camp on injured service members: implications for therapeutic recreation. Ther Recreation J. 2011;45:309–325.

[33] Ryan RM, Deci EL. Active human nature: self-determination theory and the promotion and maintenance of sport, exercise, and health. In: Hagger MS, Chatzisarantis NLD, editors. Intrinsic motivation and self-determination in exercise and sport. Champaign (IL): Human Kinetics; 2007. p. 1–19.

[34] Deci EL, Ryan RM. Intrinsic motivation and self-determination in human behavior. New York (NY): Plenum; 1985.

[35] Page SJ, O'Connor S, Peterson K. Leaving the disability ghetto: a qualitative study of factors underlying achievement motivation among athletes with disabilities. J Sport Soc Issues. 2001;25:40–55.

[36] Blinde EM, Taub DE. Personal empowerment through sport and physical fitness activity: perspectives from male college students with physical and sensory disabilities. J Sport Behav. 1999;22:181–202.

[37] Goodwin D, Johnston K, Gustafson P, et al. It's okay to be a quad: wheelchair rugby players' sense of community. Adapt Phys Act Q. 2009;26:102–117.

[38] Banack HR, Sabiston CM, Bloom GA. Coach autonomy support, basic need satisfaction, and intrinsic motivation of Paralympic athletes. Res Q Exerc Sport. 2011;82:722–730.

[39] Perrier MJ, Smith B, Strachan S, et al. Narratives of athletic identity after acquiring a permanent physical disability. Adapt Phys Act Q. 2014;31:106–124.

[40] Wagner B, Knaevelsrud C, Maercker A. Post-traumatic growth and optimism as outcomes of an internet-based intervention for complicated grief. Cogn Behav Ther. 2007;36:156–161.

[41] Stockton H, Joseph S, Hunt N. Expressive writing and posttraumatic growth: an internet-based study. Traumatol Int J. 2014;20:75–83.

[42] Labelle LE, Lawlor-Savage L, Campbell TS, et al. Does self-report mindfulness mediate the effect of Mindfulness-Based Stress Reduction (MBSR) on spirituality and posttraumatic growth in cancer patients? J Posit Psychol. 2015;10:153–166.

[43] Day MC, Wadey R. Researching growth following adversity in sport and exercise: methodological implications and future recommendations. Qual Res Sport Exerc Health. 2017;9:499–513.

[44] Wortman CB. Posttraumatic growth: progress and problems. Psychol Inq. 2004;15:81–90.

[45] Tedeschi RG, Blevins CL. Posttraumatic growth: a pathway to resilience. In: Kumar U, editor. The Routledge international handbook of psychosocial resilience. New York (NY): Routledge; 2016. p. 324–333.

CHAPTER 3

STUDY 2: COGNITIVE PROCESSING FOLLOWING ACQUIRED DISABILITY FOR PARA SPORT ATHLETES: A SERIAL MEDIATION STUDY

Abstract

Acquiring a physical disability can result in a host of deleterious psychosocial consequences. Researchers, however, have also demonstrated the possibility of positive psychological adaptation following disability, also known as posttraumatic growth (PTG). This study examined the cognitive processing that occurs in relation to a disabling life event among para sport athletes, as well as the role of para sport participation in shaping these cognitions, and subsequent perceptions of PTG or distress. Utilizing a sample of 75 para sport athletes, a serial multiple mediation analysis was conducted to identify the various pathways through which PTG or distress is experienced. Results demonstrated that a disabling event initiated challenges to one's core beliefs which influenced subsequent perceptions of PTG and distress through cognitive processing at two separate time frames. As several unique paths to PTG were found, results suggest that a multitude of paths to PTG may be possible. Moreover, the utility of deliberate rumination (at both time points) was evident in experiencing PTG, while intrusive rumination only appeared beneficial if it prompted deliberate ruminations. The theoretical and practical implications of the findings are discussed.

Introduction

Approximately 14% of the global population is estimated to possess a disability (Mitra & Sambamoorthi, 2014). While the term disability is broad in that it encompasses both physical and mental impairments, a subset of this population are those with acquired physical disabilities, such as the amputation of a limb or spinal cord injury. In the United States, it is estimated that the number of people living with the loss of a limb will exceed 3.6 million by 2050 (Ziegler-Graham, MacKenzie, Ephraim, Travison, & Brookmeyer, 2008). Moreover, the United States has one of the highest annual reported incidence rates of spinal cord injury at 40 per million (Singh, Tetreault, Kalsi-Ryan, Nouri, & Fehlings, 2014). In addition to the obvious impairment in physical functioning, acquiring a physical disability can be accompanied by an array of adverse psychosocial consequences. For example, individuals with lower-limb amputation may experience a range of challenges including depression, anxiety, body image concerns, and social discomfort (Horgan & MacLachlan, 2004). Similarly, loss of an upper limb may have a severe psychological impact due to the functionality of the hand to manipulate objects in everyday tasks, as well as its social utility (e.g., gestures) (Saradjian, Thompson, & Datta, 2008). Individuals with spinal cord injury have also been found to experience elevated levels of depression, anxiety, and posttraumatic stress disorder (PTSD) as well as lower levels of life satisfaction compared to the general population (Post & van Leeuwen, 2012).

Despite the prevalence of deleterious experiences often associated with acquired disability, the literature is also replete with examples of positive adjustment and constructive life changes following an acquired physical disability (e.g., Dibb, Ellis-Hill, Donovan-Hall, Burridge, & Rushton, 2014; Unwin, Kacperek, & Clarke, 2009). One term

used to describe the experience of positive psychological change following extremely stressful or traumatic life circumstances is posttraumatic growth (PTG: Calhoun & Tedeschi, 1999). PTG has been observed in individuals suffering a variety of stressful and traumatic events, including acquired physical disability (e.g., Crawford, Gayman, & Tracey, 2014; Day, 2013).

Fundamental to the concept of PTG is the notion that experiencing a traumatic event has a shattering effect on one's core beliefs about the world, and that these existential threats are necessary antecedents to PTG (e.g., Calhoun, Cann, & Tedeschi, 2010; Janoff-Bulman, 2006). This conceptualization of the relationship between disruption to one's core beliefs and subsequent PTG has received empirical support (e.g., Cann, Calhoun, Tedeschi, Kilmer et al., 2010; Lindstrom, Cann, Calhoun, & Tedeschi, 2013). However, the experience of trauma and the resulting challenge to one's core beliefs is not in and of itself suggested to be sufficient to produce PTG; rather PTG is developed through effortful cognitive processing (Calhoun & Tedeschi, 1998; Tedeschi & Calhoun, 2004). Specifically, the discomfort caused by the discrepancy between one's previous assumptive world and the newly acquired trauma information necessitates the need to engage in cognitive processing to alleviate distress and make sense of the experience (Janoff-Bulman, 1992). Within PTG literature, this cognitive processing has frequently been conceptualized in terms of rumination, that is, repetitive thought about the traumatic event and its consequences (Calhoun & Tedeschi, 1998; Tedeschi & Calhoun, 2004). Rumination has traditionally been conceived of as synonymous with worry (e.g., Michael, Halligan, Clark, & Ehlers, 2007) or as consisting of exclusively negative and intrusive thoughts centered on symptoms of distress (Nolen-Hoeksema,

1991). Watkins (2008), however, identified how various forms of rumination have been linked to effective cognitive processing and problem solving. As such, a broader view of rumination which also takes into account the potential for constructive responses, such as making sense, problem solving, reminiscence, and anticipation, has been recommended (Martin & Tesser, 1996). Consistent with this broader conceptualization of rumination, research has sought to differentiate between rumination forms and their potential influence on PTG. As it is likely that rumination about an event is multifaceted (Calhoun, Cann, Tedeschi, & McMillan, 2000), it is also feasible that the type of rumination may either facilitate or impede constructive responses to a traumatic event. As such, rumination following adversity has been theorized as being either intrusive or deliberate (Calhoun & Tedeschi, 2006; Cann et al., 2011). Whereas intrusive ruminations are unsolicited and unwanted thoughts about an event, deliberate ruminations are voluntary with the purpose of trying to understand and make sense of an event. As these two forms of rumination are conceptually distinct, it is important to examine the relative influences of each in predicting PTG. Research has shown that intrusive ruminations are associated with unfavorable outcomes such as less PTG (e.g., Stockton, Hunt, & Joseph, 2011), negative outlook (e.g., Stockton et al., 2011), and distress (e.g., Triplett, Tedeschi, Cann, Calhoun, & Reeve, 2012). Furthermore, lingering intrusive rumination has been associated with a host of similarly adverse outcomes (Cann et al., 2011; Cann, Calhoun, Tedeschi, & Solomon, 2010; Taku, Calhoun, Cann, & Tedeschi, 2008), suggesting that persisting intrusive ruminations are indicative of difficulty finding meaning or an inability to constructively deal with trauma related challenges (Calhoun et al., 2000; Tedeschi & Calhoun, 2004).

Although intrusive rumination is often assumed to be an unproductive form of cognitive processing (e.g., Stockton et al., 2011), investigators have also demonstrated a positive relationship between intrusive thoughts and PTG (e.g., Taku, Cann, Tedeschi, & Calhoun, 2009, 2015; Wilson, Morris, & Chambers, 2014). While intrusive ruminations may be accompanied by psychological distress in the moment, the experience of such thoughts may signify that the individual is working through and making sense of the stressor (Creamer, Burgess, & Pattison, 1992; Helgeson, Reynolds, & Tomich, 2006). That is, intrusive thoughts may actually initiate the process of PTG by prompting deliberate ruminations (Taku et al., 2009; Triplett et al., 2012). In contrast to the automatic, often distress inducing thoughts characterized by intrusive rumination, the purposeful, reflective, sense-making thoughts characterizing deliberate rumination, are constructive. These sorts of effortful thoughts about a trauma have been linked to PTG in a number of studies (Cann et al., 2011; Cann, Calhoun, Tedeschi, & Solomon, 2010; Stockton et al., 2011; Taku et al., 2008, 2009, 2015). Moreover, the relationship between challenged core beliefs and PTG, as well as intrusive rumination and PTG, has been shown to occur through deliberate rumination (e.g., Triplett et al., 2012). These results indicate that the value of intrusive rumination in facilitating PTG may be in precipitating deliberate rumination.

While a plethora of research has identified the mechanisms through which PTG occurs, surprisingly few studies have examined the role of lifestyle activities in facilitating productive cognitive processing. One such activity, at least for individuals with acquired disability, is para sport participation (i.e., sport for people with disabilities). The efficacy of physical activity and sport in decreasing negative mental states and

promoting healthy outcomes across a variety of domains is well documented (e.g., Rebar et al., 2015). As many individuals with acquired disability report negative experiences (e.g., Horgan & MacLachlan, 2004; Post & van Leeuwen, 2012) the utility of para sport may be acutely apparent. Researchers have reported a range of benefits of para sport participation, including the satisfaction of psychological needs such as meaningful social relationships, and feelings of competence and autonomy (e.g., Banack, Sabiston, & Bloom, 2011; Goodwin et al., 2009; Hammer et al., 2017). Additionally, several qualitative studies have found that para sport may be an efficacious means to promote PTG (Crawford et al., 2014; Day, 2013; Hammer et al., 2017). However, to our knowledge, researchers have yet to quantitatively investigate whether disruption to one's core beliefs is related to PTG, let alone the mechanisms through which this growth may occur. The scant qualitative work that has been done (e.g., Crawford et al., 2014; Day, 2013) has revealed that para sport facilitated PTG by allowing athletes to create life meanings through a process of active rumination, rather than passive reappraising (Day, 2013). Specifically, sport provided opportunities for one to challenge existing assumptions and create a new sense of self by taking risks, demonstrating personal control, and being responsible. Moreover, sport reaffirmed these new life meanings by allowing for experiences of success and meaningful experiences, which in turn encouraged future purposeful rumination. In another study, Crawford (2014) also found that para sport influenced perceptions of PTG, and that para sport facilitated injury relevant processing. However, despite these initial qualitative accounts of para sport facilitating cognitive processing and subsequent PTG, quantitative work is needed to further establish the direction of proposed relationships as well as the generalizability of

these preliminary findings. Furthermore, additional work is needed to examine the implications of specific types of rumination in facilitating PTG and/or alleviating distress among para sport participants.

A more refined understanding of whether particular cognitive processes lead to PTG and/or distress can assist healthcare practitioners and para sport organizations in the development of therapeutic interventions. That is, should PTG for individuals with acquired disability be found to be attained through ruminative processes, interventions can be designed to incite and foster constructive ruminations. Additionally, an understanding of how para sport participation may elicit the cognitive processing posited to be necessary for PTG can have important implications for the utility and efficacy of para sport interventions in promoting these cognitions, and ultimately PTG.

Based on previous theorizing exploring the relationship between rumination and PTG, as well as preliminary research highlighting the role of para sport in promoting PTG, this investigation sought to examine the cognitive processing occurring in relation to a disabling life event among para sport athletes, as well as the role of para sport participation on disability-related ruminations. We hypothesized that the relationship between disruption to one's core beliefs and perceptions of both PTG and distress could be explained by ruminative processes following a trauma, specifically intrusive and/or deliberate rumination occurring in the immediate disability aftermath and rumination brought about by recent para sport participation. In particular, four hypotheses were advanced. First, we predicted that deliberate rumination would mediate the relationship between challenged core beliefs and PTG. This hypothesis was informed by aforementioned research and theory suggesting that disruption to core beliefs is a

necessary antecedent in the experience of PTG, and that PTG is attained through effortful cognitive processing. Second, on the grounds that intrusive rumination has been shown to be constructive when it prompts deliberate rumination, deliberate rumination was hypothesized to mediate the relationship between intrusive rumination and PTG. Third, given the utility of physical activity and para sport participation in the facilitation of PTG for individuals with acquired disability, we hypothesized that one means by which para sport would exert its influence on PTG would be by prompting the deliberate ruminations hypothesized to mediate the relationship between core beliefs and PTG, as well as between intrusive rumination and PTG. Finally, as research has demonstrated the maladaptive consequences of persisting intrusive ruminations that do no incite deliberate rumination, we anticipated that intrusive rumination would mediate the relationship between challenged core beliefs and current distress.

Methods

Participants

After attaining IRB approval, participants were recruited electronically through various adaptive sport organizations and personal contacts. Participants were 75 individuals, aged 18 years and older, with acquired disability who participated in para sport. The sample was primarily male (53.3%) and Caucasian (86.7%), with a mean age of 42.0 years (*SD* = 11.36). Participants were almost exclusively from the United States (98.7%) and came from various regions of the country (29 states). The classification of disability varied greatly across participants (e.g., leg amputation, arm amputation, visual impairment, spinal cord injury, traumatic brain injury), as well as the settings in which

injuries were sustained (e.g., automobile accident, military combat, disease). Participants also participated in a variety of different sports, with the sports most represented being triathlon (29.3%), cycling (25.3%), track and field (10.7%), and ice/sled hockey (6.7%). See Table 3.1 for additional sample characteristics.

Measures

Shattered assumptive world

The notion of a "shattered assumptive world," conceptualized as a significant challenge to core beliefs, was measured using the Core Beliefs Inventory (CBI: Cann, Calhoun, Tedeschi, Kilmer et al., 2010). The CBI is a nine-item instrument, scored on a six-point Likert scale ranging from 0 (*not at all*) to 5 (*to a very great degree*), which prompts individuals to rate the extent to which an event led them to examine their core beliefs (e.g., 'Because of the event, I seriously examined my beliefs about the meaning of my life'). The CBI has demonstrated construct validity (Cann, Calhoun, Tedeschi, & Solomon, 2010) and good internal consistency (e.g., Lindstrom et al., 2013; Triplett et al., 2012). In the present sample, Cronbach's alpha was .85.

Cognitive processing

Cognitive processing, that is, intrusive and deliberate ruminations, was measured using the Event Related Rumination Inventory (ERRI: Cann et al., 2011). The ERRI is a two-factor instrument consisting of 20 items assessing intrusive (e.g., 'I found myself automatically thinking about what had happened.') and deliberate ruminations (e.g., 'I forced myself to deal with my feelings about the event'), rated on a four-point Likert

Table 3.1
Characteristics of sample (*N*=75)

Variables		Values, mean +/- *SD* OR *n* (%)
Age; mean +/- *SD* (years)		42.0 +/- 11.36
Gender		
	Male	40 (53.3%)
	Female	35 (46.7%)
Race		
	White	65 (86.7%)
	Hispanic, Latino, or Spanish	7 (9.3%)
	Black or African American	1 (1.3%)
	Two or more races	1 (1.3%)
	Prefer not to answer	1 (1.3%)
Education		
	High school graduate, diploma, or the equivalent (e.g., GED)	1 (1.3%)
	Some college credit, no degree	9 (12.0%)
	Associates degree	5 (6.7%)
	Bachelors degree	30 (40.0%)
	Advanced degree	30 (40.0%)
Veteran		
	No	49 (65.3%)
	Yes	26 (34.7%)
Years disabled; mean +/- *SD*		14.01 +/- 9.87
How disability was acquired		
	Traumatic accident, nonmilitary	46 (61.3%)
	Acute injury	6 (8.0%)
	Result of military combat	6 (8.0%)
	Degenerative condition or illness	11 (14.7%)
	other	6 (8.0%)
Years of para sport participation; mean +/- *SD*		7.66 +/- 6.28
Weekly hours participating in para sport; mean +/- *SD*		11.09 +/- 7.24
Para sport level of competition		
	Paralympic Games	9 (12.0%)
	International competitions	23 (30.7%)
	National championships	17 (22.7%)
	Regional competitions	4 (5.3%)
	Local/recreational competitions	22 (29.3%)

scale ranging from 0 (*not at all*) to 3 (*often*). The ERRI is designed to assess rumination at two different time frames, "during the weeks immediately after the event" and "during the last couple of weeks." The present investigation retained the first temporal condition for rumination. However, given our interest in how rumination may be brought about by para sport participation, the latter time frame was modified to stipulate that rumination occurred "during and/or due to recent para sport participation." The construct validity, factor structure, as well as the internal consistency of the ERRI has received support (e.g., Cann et al., 2011). In the present sample, Cronbach's alpha was .97 and .91 for the intrusive and deliberate rumination subscales occurring in "the weeks immediately after the event," respectively. For intrusive and deliberate rumination occurring "during and/or due to recent para sport participation," Cronbach's alpha was .96 and .94, respectively.

PTG

The Posttraumatic Growth Inventory (PTGI: Tedeschi & Calhoun, 1996) was used to measure current perceptions of PTG. The PTGI consists of 21 items, rated on a six-point Likert scale from 0 (*I did not experience this change as a result of my crisis*) to 5 (*I experienced this change a very great degree as a result of my crisis*), that provide a total PTG score, as well as scores for each of its five factors: relating to others (e.g., 'I have a greater sense of closeness with others'), new possibilities (e.g., 'I established a new path for my life'), personal strength (e.g., 'I have a greater feeling of self-reliance'), spiritual change (e.g., 'I have a better understanding of spiritual matters'), and appreciation for life (e.g., 'I can better appreciate each day'). The present study employed the composite score as an indicator of PTG. The PTGI has exhibited content validity

(Shakespeare-Finch, Martinek, Tedeschi, & Calhoun, 2013), as well as internal consistency (Tedeschi & Calhoun, 1996). In the current study, Cronbach's alpha was .95.

Current distress

The Impact of Events Scale-Revised (IES-R: Weiss, 2007) was utilized to assess reflections of distress experienced during the past seven days. The IES-R is a 22-item scale that assesses intrusion (e.g., 'Any reminder brought back feelings about it'), avoidance (e.g., 'I tried not to think about it.'), and hyperarousal (e.g., 'I felt irritable and angry'), the cluster of symptoms of PTSD identified by the DSM-IV (American Psychiatric Association, 1994). Results can be interpreted as a total score as well as for the individual subscales. Participants were prompted to rate the degree to which distressful symptoms (with respect to their traumatic event) occurred during the past 7 days on a five-point Likert scale ranging from 0 (*not at all*) to 4 (*extremely*). The present investigation used the total score as an indicator of current distress. The IES-R has demonstrated concurrent and discriminative validity (Beck et al., 2008) while the internal consistency of the total instrument has also received support (Triplett et al., 2012). Cronbach's alpha for the total instrument was .95.

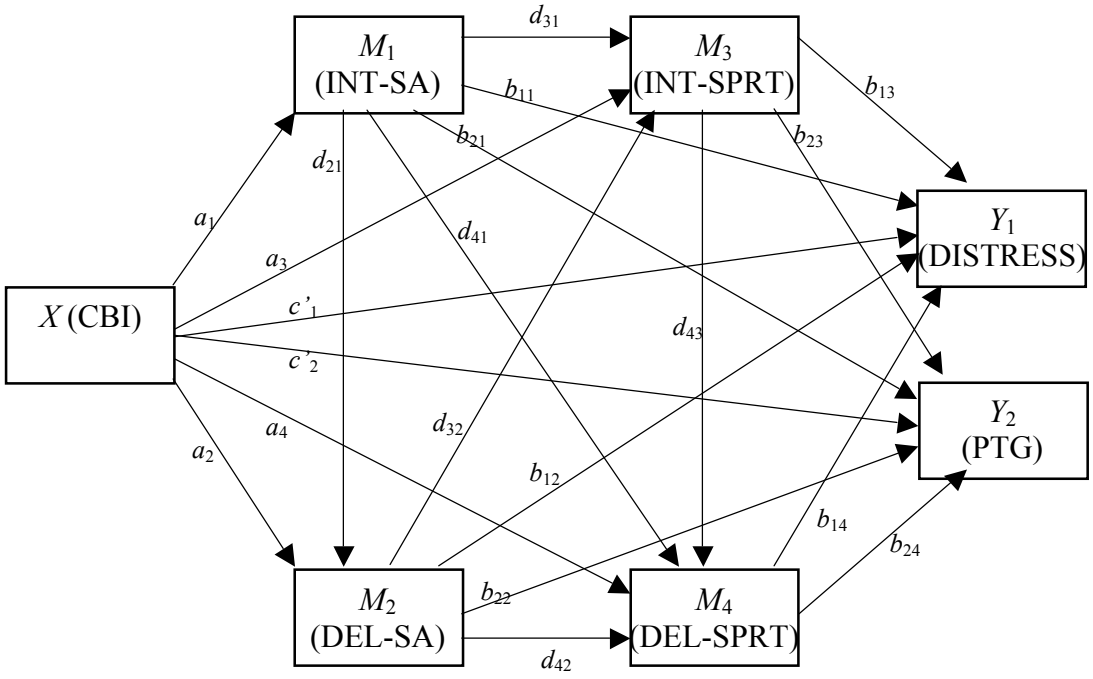
Analysis

All statistical analyses were conducted using IBM SPSS 24. Approximately 8% of the data were missing. Little's MCAR Test revealed that the data were missing completely at random ($\chi^2 = 118.56$, $df = 136$; $p = .857$), so the expectation maximization algorithm was employed to replace missing data. Furthermore, as results of the Shapiro

Wilk test revealed that the assumption of normality was violated by all of the rumination, PTGI and IES-R scales ($p < .05$), the expectation maximization was based on student's t distribution. Bivariate correlations were then conducted on the study variables before a serial multiple mediator model was tested using model 6 of the SPSS macro PROCESS (Hayes, 2013). In contrast to a parallel multiple mediation model, the serial multiple mediation model assumes that mediator variables are causally linked, and allows for the assessment of a specific sequence among the variables. Informed by theory and research, the order of the proposed mediating variables was intrusive rumination (occurring soon after trauma), deliberate rumination (occurring soon after trauma), intrusive rumination (brought about by recent para sport participation), and deliberate rumination (brought about by recent para sport participation). The proposed serial multiple mediator model is illustrated in Figure 3.1. A serial multiple mediation approach allows one to examine multiple indirect effects, that is, the complex pathways between challenges to one's core beliefs following disabling events, rumination, and PTG/current distress. In order to determine the significance of specific direct and indirect paths, PROCESS utilizes ordinary least square regression to calculate coefficients while also providing bias-corrected bootstrap confidence intervals. An effect is significant if the confidence interval does not contain zero.

Results

As indicated in Table 3.2, participants reported a moderate degree of disruption to their core beliefs, as well as moderate amounts of intrusive and deliberate rumination soon after trauma. Moreover, intrusive rumination brought about by recent para sport



Note: CBI = Core Belief Inventory; INT-SA = Intrusive rumination occurring soon after trauma; DEL-SA = Deliberate rumination occurring soon after trauma; INT-SPRT = Intrusive rumination occurring during recent para sport participation; DEL-SPRT = Deliberate rumination occurring during recent para sport participation; PTG = Posttraumatic Growth

Figure 3.1. Serial multiple mediator model

Table 3.2.
Descriptive statistics and correlations among measured variables in the serial mediation model

Variable	1	2	3	4	5	6	7
1. CBI	*.853*						
2. Intrusive – Soon After	.373**	*.971*					
3. Deliberate – Soon After	.475**	.513**	*.907*				
4. Intrusive – Para Sport	.119	.458**	.340**	*.961*			
5. Deliberate – Para Sport	.396**	.225	.328**	.486**	*.939*		
6. PTGI	.425**	.164	.347**	-.044	.287*	*.949*	
7. IES-R	.149	.380**	.094	.624**	.255*	-.083	*.954*
Mean	2.93	1.69	1.83	0.83	1.52	3.36	0.74
SD	1.09	0.97	0.73	0.77	0.82	1.12	0.80

Note: $N = 75$. * denotes significance at $p < .05$; ** denoted significance at $p < .01$.
Cronbach's alphas are shown in italics on the diagonal. CBI = Core Belief Inventory; PTGI = Posttraumatic Growth Inventory; IESR-R = Impact of Events Scale-Revised

participation occurred "rarely," and distress (IES-R scores) was well below the cut-off for a probable diagnosis of PTSD (Weiss, 2007). Participants reported mean PTGI scores indicative of PTG between a "moderate" and "great" degree. Table 3.2 also presents correlations among the measures. Intrusive rumination (at both time points) was significantly associated with current distress, and deliberate rumination (at both time points) was significantly associated with PTG. All rumination subscales, except intrusive rumination occurring soon after and recent deliberate rumination brought about by para sport, were significantly correlated with one another. Challenged core beliefs was positively associated with PTG as well as with three of the rumination subscales including intrusive rumination soon after trauma, deliberate rumination soon after trauma, and deliberate rumination brought about by recent para sport participation. Deliberate rumination brought about by recent para sport participation was associated with current distress.

In describing results from our serial mediation analyses, we try to link specific results to each of the four hypotheses where possible. That said, there are instances where specific indirect effects highlighted below relate to multiple hypotheses simultaneously. Such is the complexity of serial mediation analyses. Consistent with our central hypothesis, the serial multiple mediation analysis revealed that disruption to one's core beliefs indirectly influenced both PTG and current distress through its effect on cognitive processing. Specifically, five significant indirect effects from core beliefs to PTG were detected, while three significant indirect effects from core beliefs to current distress were found. The direct effect of core beliefs on PTG was not significant ($c'_2 = .245$, $SE = .132$, 95% CI: [-.018, .509]). Likewise, the direct effect of core beliefs on distress was not

significant (c'_1 = .123, *SE* = .082, 95% CI: [-.041, .288]). As recommended by Hayes (2013), all regression coefficients remain unstandardized due to the lack of substantive interpretive values of standardized coefficients. Table 3.3 provides path coefficients and model summary statistics for all variables. Additionally, Figure 3.1 serves as a reference for the labels for the variables and individual paths. As can be seen in Table 3.3, not every individual path is significant within every indirect effect. Nonetheless, Hayes and Rockwood (2016) emphasize that the significance of individual paths in mediation is unimportant as it is not pertinent to the significance of the indirect effect. In other words, although individual variables do not always significantly predict subsequent variables, the purpose of serial mediation is to understand the significance of an entire sequence of variables.

For the first of the significant indirect effects from core beliefs to PTG, challenges to core beliefs triggered intrusive rumination occurring soon after the trauma, which in turn led to deliberate rumination occurring soon after the trauma, which subsequently translated into greater PTG (i.e., X → M1 → M2 → Y2). The bias-corrected bootstrap confidence interval for the indirect effect ($a_1d_{21}b_{22}$ = .035, *SE* = .021) was entirely above zero (.006 to .098), indicating that this path leads to greater PTG. This result supports the second hypothesis that deliberate rumination mediates the relationship between intrusive rumination and PTG.

A second indirect effect occurred when challenges to one's core beliefs prompted intrusive rumination occurring soon after trauma, which led to intrusive rumination brought about by recent para sport participation. In turn, this intrusive rumination predicted deliberate rumination brought about by recent para sport participation, which

Table 3.3
Regression coefficients and standard errors for the serial mediation model in Figure 3.1

	Consequent											
	M1 (INT-SA)		M2 (DEL-SA)		M3 (INT-SPRT)		M4 (DEL-SPRT)		Y_1 (IES-R)		Y_2 (PTGI)	
Antecedent	Coeff (*SE*)	*p*	Coeff (*SE*)	*p*	Coeff (*SE*)	*p*	Coeff (*SE*)	*p*	Coeff (*SE*)	*p*	Coeff (*SE*)	*p*
X (CBI)	.334 (.097)	.001	.223 (.069)	.002	-.087 (.085)	.310	.276 (.083)	.001	.123 (.082)	.140	.245 (.132)	.068
M1	-	-	.295 (.077)	<.001	.323 (.098)	.002	-.150 (.101)	.143	.146 (.095)	.128	.035 (.152)	.819
M2	-	-	-	-	.201 (.136)	.145	.084 (.133)	.531	-.299 (.124)	.018	.355 (.198)	.077
M3	-	-	-	-	-	-	.526 (.114)	<.001	.682 (.121)	<.001	-.415 (.194)	.036
M4	-	-	-	-	-	-	-	-	-.078 (.111)	.483	.341 (.177)	.059
Constant	.710 (.304)	.022	.682 (.207)	.002	.171 (.257)	.509	.375 (.248)	.135	.230 (.233)	.328	1.755 (.374)	<.001
	R^2 = .139 F(1,73)=11.787 p=.001		R^2 = .357 F(2,72)=19.976 p<.001		R^2 = .236 F(3,71)=7.302 p<.001		R^2 = .372 F(4,70)=10.382 p<.001		R^2 = .455 F(5,69)=11.526 p<.001		R^2 = .272 F(5,69)=5.153 p<.001	

Note. *SE* = standard error; CBI = Core Belief Inventory; INT-SA = Intrusive rumination occurring soon after trauma; DEL-SA = Deliberate rumination occurring soon after trauma; INT-SPRT = Intrusive rumination occurring during recent para sport participation; DEL-SPRT = Deliberate rumination occurring during recent para sport participation; IESR-R = Impact of Events Scale-Revised; PTGI = Posttraumatic Growth Inventory

then gave rise to greater PTG (i.e., X → M1 → M3 → M4 → Y2). The bias-corrected bootstrap confidence interval for the indirect effect ($a_1d_{31}d_{43}b_{24}$ = .019; *SE* = .013) was entirely above zero (.004 to .069). This finding provides support for the third hypothesis, that deliberate rumination brought about by para sport would mediate the relationship between intrusive rumination and PTG.

In support of the first hypothesis, a third indirect effect of core beliefs on PTG appeared solely through deliberate rumination occurring soon after trauma (i.e., X → M2 → Y2), with the bias-corrected bootstrap confidence interval for the indirect effect (a_2b_{22} = .079; *SE* = .057) not containing zero (.002 to .228). Similarly, the third hypothesis received additional support from a fourth indirect effect of core beliefs on PTG which occurred only through deliberate rumination brought about by recent para sport participation (i.e., X → M4 → Y2), with the bias-corrected bootstrap confidence interval for the indirect effect (a_4b_{24} = .094; *SE* = .054) entirely above zero (.007 to .225). A final indirect effect was evident as higher perceptions of challenged core beliefs were associated with intrusive rumination occurring soon after trauma, which led to intrusive rumination brought about by recent para sport participation, which translated into less PTG (i.e., X → M1 → M3 → Y2). This indirect effect ($a_1d_{31}b_{23}$ = -.045, *SE* = .030) was significantly negative, as the bias-corrected bootstrap confidence interval was below zero (-.138 to -.006).

The serial multiple mediation analysis similarly revealed that disruption to core beliefs indirectly influenced current distress through cognitive processing. Three indirect effects were significant. Two of these causal paths can be interpreted as predictive of less current distress, as their bootstrap confidence intervals were below zero. For the first of

these two indirect effects, participants with challenged core beliefs had greater intrusive rumination occurring soon after trauma, which led to deliberate rumination occurring soon after trauma, the latter of which was predictive of less current distress (i.e., X → M1 → M2 → Y1) ($a_1d_{21}b_{12}$ = -.029; *SE* = .016; 95% CI: [-.082 to -.009]). Similarly, the indirect effect of core beliefs on current distress through deliberate rumination occurring soon after trauma (i.e., X → M2 → Y1) was significant, as the bootstrap confidence interval of the effect (a_2b_{12} = -.067; *SE* = .041) was also negative (-.175 to -.013). In support of the fourth hypothesis, a final indirect effect was evident in that challenged core beliefs were associated with intrusive rumination occurring soon after trauma, which in turn led to intrusive rumination brought about by recent para sport participation, and subsequent greater distress (i.e., X → M1 → M3 → Y1), with the bias-corrected bootstrap confidence interval for the indirect effect ($a_1d_{31}b_{13}$ = .073; *SE* = .043) not containing zero (.019 to .195).

Discussion

The purpose of this investigation was to assess the cognitive processing that occurs in the development of PTG and/or distress in para sport athletes with an acquired disability. We also sought to examine the role that para sport participation may have on these ruminations. Specifically, grounded in PTG theory (e.g., Calhoun et al., 2010; Tedeschi & Calhoun, 2004), the present investigation examined a model in which challenges to one's core beliefs were cognitively processed through two types of rumination, which in turn were hypothesized to predict PTG and/or distress. While relationships between these variables have been investigated in a variety of settings and

populations (e.g., Lindstrom et al., 2013; Taku et al., 2015; Triplett et al., 2012; Wilson et al., 2014), the current investigation, was to the authors' awareness, the first to quantitatively assess the role of cognitive processing in the development of PTG for a sport population with acquired disability. Additionally, a unique contribution of this investigation was an examination of the influence of ruminative thoughts brought about by recent para sport participation on PTG and current distress levels. From a theoretical standpoint, the current study contributed to a deeper understanding of the specific influence of para sport in facilitating postinjury cognitive processing and subsequent PTG for individuals with acquired disability. Furthermore, by employing a serial multiple mediation approach, we were able to examine multiple indirect effects, that is, the complex pathways between challenges to one's core beliefs following disabling events, rumination, and PTG/current distress.

The central hypothesis of this investigation was that challenges to one's core beliefs initiated by a disabling event would indirectly influence subsequent perceptions of PTG as well as distress through cognitive processing. That is, causally linked mediators relating to the characteristics of one's cognitive processing would explain the relationship between challenges to one's core beliefs brought about through acquiring a disability and subsequent perceptions of PTG and distress. This hypothesis was supported by the results of the study, as several indirect effects from core beliefs to PTG and distress were identified. Moreover, as the direct effects of core beliefs on both PTG and distress were insignificant, there is no evidence for an association between core beliefs and PTG/distress when the mechanism through rumination is accounted for. The existence of several indirect paths from core beliefs to PTG suggests that the processes through which

PTG is attained is complex. For example, challenged core beliefs have a significant impact on PTG through deliberate rumination occurring soon after trauma, but also through deliberate rumination brought about by recent para sport participation. These results illustrate that there is no one "right" way to experience PTG. Nonetheless, all paths predictive of PTG have something in common, in that they all travel through deliberate rumination at one of the two time points (i.e., in the immediate aftermath or recently during para sport participation). This finding supports the first hypothesis that deliberate rumination would mediate the relationship between challenged core beliefs and PTG, and is consistent with theory and research that posits the mediating role of deliberate rumination (Tedeschi & Calhoun, 2004; Triplett et al., 2012).

In support of our second hypothesis as well as literature that contends that intrusive rumination may be constructive if it initiates or leads to deliberate rumination (Taku et al., 2009; Triplett et al., 2012), two indirect paths started with intrusive rumination before travelling through deliberate rumination at one of the two time points before PTG was experienced. Interestingly, no paths from core beliefs to PTG included deliberate rumination at both time points. That is, all paths from core beliefs to PTG included *either* deliberate rumination soon after trauma or deliberate rumination brought about by recent para sport participation, but none of the significant indirect effects contained both. Perhaps engaging in deliberate rumination−either occurring soon after trauma *or* recently due to para sport participation−is sufficient for PTG. Once growth is achieved, however, there may no longer be a need to ruminate. On the other hand, one path to PTG consisted of intrusive rumination at both time points before one engaged in deliberate rumination. This path suggests that intrusive ruminations may persist, but as

long as they eventually lead to deliberate rumination, PTG may occur. Taken as a whole, there was no evidence that disruption to core beliefs influenced PTG independent of its effect on cognitive processing. Instead, findings from the current study indicate that challenged core beliefs exert their effect indirectly on PTG through various ruminative processes. In the case of the indirect effect, the utility of deliberate rumination is evident. Consistent with both our first and second hypotheses, all mediated paths ultimately traveled through one of the two deliberate rumination variables. These results support the literature that posit both the precipitating role of challenged core beliefs on PTG, as well as the efficacy of deliberate rumination in facilitating PTG (Calhoun & Tedeschi, 1998, 2006; Cann et al., 2011).

In terms of the influence of para sport on ruminative processes and subsequent PTG, results from this study provide partial support for the third hypothesis that para sport participation would prompt deliberate ruminations, which would then mediate the relationship between core beliefs and PTG. Beginning with the question pertaining to whether or not para sport participation would elicit deliberate ruminations, participants in the current study reported engaging in deliberate ruminations brought about by recent para sport participation at a mean rate between "rarely" and "sometimes." Due to the cross-sectional nature of this design, one cannot conclude whether or not para sport *causes* deliberate ruminations. Nevertheless, this seemingly low rate of engagement in deliberate rumination due to para sport involvement may have a few explanations. For one, it is possible that those who engaged in deliberate rumination in the immediate aftermath of acquiring their disability may no longer have the need to deliberately ruminate. This explanation is supported by the fact that no significant path from core

beliefs to PTG contained deliberate rumination at both time points. However, it is also possible that – for some individuals – para sport participation might not be an efficacious means to evoke deliberate ruminations. It is conceivable that para sport does not necessarily provide benefits beyond allowing for exercise and other social experiences. Future research should consider whether individual traits make it more or less likely that para sport will promote effective cognitive processing. For instance, in a qualitative study of para sport participants, it was posited that para sport may be particularly beneficial for individuals with prior sport backgrounds or who subscribe to an athletic identity (Hammer et al., 2017).

Although occurring at a relatively low rate, deliberate ruminations brought about by para sport participation were found to mediate the relationship between core belief challenge and PTG, as well as between intrusive ruminations and PTG. Specifically, two paths emerged that contained deliberate rumination brought about by para sport participation. These results provide preliminary support that rumination during sport activities may contribute to PTG. However, as other viable paths to PTG occur entirely pre-para sport participation, it must be acknowledged that para sport participation may be only one of several means by which deliberate rumination may facilitate PTG. The utility of para sport may be pronounced, however, if one is unable to deliberately ruminate in the immediate aftermath of the event or if intrusive ruminations persist. In this way, the present investigation substantiates previous qualitative findings that para sport may facilitate active rumination rather than passive reappraising (Day, 2013).

In terms of current distress, only one path significantly predicted greater distress. As expected and consistent with the fourth hypothesis, this path travelled through

intrusive rumination at both time points and did not include deliberate rumination. This same path also led to less PTG. Two indirect effects, however, predicted significantly less distress. These indirect effects, both of which traveled through deliberate rumination occurring soon after trauma, also positively predicted PTG. These findings are intriguing because they seemingly contradict the notion that PTG and distress are conceptually distinct concepts (Baker, Kelly, Calhoun, Cann, & Tedeschi, 2008). Specifically, though it is posited that PTG is not synonymous with the absence of suffering (Joseph & Linley, 2005; Tedeschi & Calhoun, 2004), results from the present investigation demonstrate how the cognitive processing that leads to PTG oftentimes leads to less distress, and vice versa. This is, however, consistent with Joseph and Linley's (2005) contention that PTG would diminish distress symptoms over time. More research is needed to gain a better understanding of the complex relationship between PTG, distress, and the cognitive processing that precipitates these experiences.

In considering the findings of this study, several limitations and cautions need to be acknowledged. First, even though the model hypothesizes temporal and causal sequencing, the cross-sectional nature prohibits inferences regarding causal associations among variables. Future research employing a longitudinal, prospective design is necessary to assess causality and the sequential ordering of variables. Another limitation of the retrospective design is that recall bias may have influenced participant perceptions of past events. Moreover, caution must be taken when asking participants to contemplate PTG, as the perceived desirability of the experience can lead those who do not experience growth to feel like "coping failures" (Wortman, 2004, p. 89). Similarly, the present investigation did not account for other potential responses to trauma such as emotional

regulation and resilience, the latter of which has actually has been shown to be inversely related to PTG (e.g., Levine, Laufer, Stein, Hamama-Raz, & Solomon, 2009). As such, PTG might not be a viable outcome for some individuals. Another caution is the assumption that para sport would be an efficacious means to experience PTG for all individuals with disabilities. It is possible that there is a self-selection bias for those who participate in para sport to be predisposed to deriving PTG benefits from para sport participation. Conversely, those who are not athletically inclined may find less value in participation or choose not to participate altogether. Future research may consider investigating the utility of para sport participation for those individuals who may otherwise not be inclined to participate.

To conclude, these findings provide insight into the ruminative processes experienced by para sport athletes following a traumatic life event. Specifically, this research demonstrates how deliberate rumination may lead to PTG, while its absence, along with persisting intrusive ruminations, may lead to distress. Moreover, this study provides preliminary evidence for the utility of para sport participation in facilitating the deliberate ruminative thinking known to lead to PTG. Based on these results, rehabilitation practitioners and psychologists are encouraged to identify how individuals are ruminating about a traumatic event, and when possible, to encourage effortful, "meaning making" contemplation and reflection. Furthermore, for individuals who struggle to deliberately ruminate in the immediate aftermath of having acquired a disability, para sport participation may be an efficacious means by which to facilitate constructive cognitive processing.

References

American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC.

Baker, J. M., Kelly, C., Calhoun, L. G., Cann, A., & Tedeschi, R. G. (2008). An examination of posttraumatic growth and posttraumatic depreciation: Two exploratory studies. *Journal of Loss and Trauma*, *13*, 450–465.

Banack, H. R., Sabiston, C. M., & Bloom, G. A. (2011). Coach autonomy support, basic need satisfaction, and intrinsic motivation of paralympic athletes. *Research Quarterly for Exercise and Sport*, *82*(4), 722–730.

Beck, J. G., Grant, D. M., Read, J. P., Clapp, J. D., Coffey, S. F., Miller, L. M., & Palyo, S. A. (2008). The Impact to Event Scale-Revised: Psychometric properties in a sample of motor vehicle accident survivors. *Journal of Anxiety Disorders*, *22*(2), 187–198.

Calhoun, L. G., Cann, A., & Tedeschi, R. G. (2010). The Posttraumatic Growth Model: Sociocultural considerations. In T. Weiss & R. Berger (Eds.), *Posttraumatic growth and culturally competent practice: Lessons learned from around the globe* (pp. 1–14). Hoboken, NJ: Wiley.

Calhoun, L. G., Cann, A., Tedeschi, R. G., & McMillan, J. (2000). A correlational test of the relationship between posttraumatic growth, religion, and cognitive processing. *Journal of Traumatic Stress*, *13*(3), 521–527.

Calhoun, L. G., & Tedeschi, R. G. (1998). Posttraumatic growth: Future directions. In R. G. Tedeschi, C. L. Park, & L. G. Calhoun (Eds.), *Posttraumatic growth: Positive changes in the aftermath of crisis* (pp. 215–238). Mahwah, NJ: Erlbaum.

Calhoun, L. G., & Tedeschi, R. G. (1999). *Facilitating posttraumatic growth: A clinician's guide*. Mahwah, NJ: Erlbaum.

Calhoun, L. G., & Tedeschi, R. G. (2006). *Handbook of posttraumatic growth: Research and practice*. Mahwah, NJ: Erlbaum.

Cann, A., Calhoun, L. G., Tedeschi, R. G., Kilmer, R. P., Gil-Rivas, V., Vishnevsky, T., & Danhauer, S. C. (2010). The Core Beliefs Inventory: A brief measure of disruption in the assumptive world. *Anxiety, Stress, & Coping*, *23*(1), 19–34.

Cann, A., Calhoun, L. G., Tedeschi, R. G., & Solomon, D. T. (2010). Posttraumatic growth and depreciation as independent experiences and predictors of well-being. *Journal of Loss and Trauma*, *15*, 151–166.

Cann, A., Calhoun, L. G., Tedeschi, R. G., Triplett, K. N., Vishnevsky, T., & Lindstrom, C. M. (2011). Assessing posttraumatic cognitive processes: The Event Related Rumination Inventory. *Anxiety, Stress, & Coping*, *24*(2), 137–156.

Crawford, J. J., Gayman, A. M., & Tracey, J. (2014). An examination of post-traumatic growth in Canadian and American ParaSport athletes with acquired spinal cord injury. *Psychology of Sport and Exercise*, *15*(4), 399–406.

Creamer, M., Burgess, P., & Pattison, P. (1992). Reaction to trauma: A cognitive processing model. *Journal of Abnormal Psychology*, *101*(3), 452–459.

Day, M. C. (2013). The role of initial physical activity experiences in promoting posttraumatic growth in Paralympic athletes with an acquired disability. *Disability and Rehabilitation*, *35*(24), 2064–2072.

Dibb, B., Ellis-Hill, C., Donovan-Hall, M., Burridge, J., & Rushton, D. (2014). Exploring positive adjustment in people with spinal cord injury. *Journal of Health Psychology*, *19*(8), 1043–1054.

Goodwin, D., Johnston, K., Gustafson, P., Elliott, M., Thurmeier, R., & Kuttai, H. (2009). It's okay to be a quad: Wheelchair rugby players' sense of community. *Adapted Physical Activity Quarterly*, *26*, 102–117.

Hammer, C., Podlog, L., Galli, N., Wadey, R., Forber-Pratt, A. J., Newton, M., … Hall, M. S. (2017). Understanding posttraumatic growth of paratriathletes with acquired disability. *Disability and Rehabilitation*. *Advance online publication*.

Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. New York, NY: Guilford Press.

Hayes, A. F., & Rockwood, N. J. (2016). Regression-based statistical mediation and moderation analysis in clinical research: Observations, recommendations, and implementation. *Behaviour Research and Therapy*, *Advanced online publication*.

Helgeson, V. S., Reynolds, K. A., & Tomich, P. L. (2006). A meta-analytic review of benefit finding and growth. *Journal of Consulting and Clinical Psychology*, *74*(5), 797–816.

Horgan, O., & MacLachlan, M. (2004). Psychosocial adjustment to lower-limb amputation: A review. *Disability and Rehabilitation*, *26*(14/15), 837–850.

Janoff-Bulman, R. (1992). *Shattered assumptions: Towards a new psychology of trauma*. New York, NY: Free Press.

Janoff-Bulman, R. (2006). Schema-change perspectives on posttraumatic growth. In L. G. Calhoun & R. G. Tedeschi (Eds.), *Handbook of posttraumatic growth: Research and practice* (pp. 81–99). Mahwah, NJ: Erlbaum.

Joseph, S., & Linley, P. A. (2005). Positive adjustment to threatening events: An organismic valuing theory of growth through adversity. *Review of General Psychology*, *9*(3), 262–280.

Levine, S. Z., Laufer, A., Stein, E., Hamama-Raz, Y., & Solomon, Z. (2009). Examining the relationship between resilience and posttraumatic growth. *Journal of Traumatic Stress*, *22*(4), 282–286.

Lindstrom, C. M., Cann, A., Calhoun, L. G., & Tedeschi, R. G. (2013). The relationship of core belief challenge, rumination, disclosure, and sociocultural elements to posttraumatic growth. *Psychological Trauma: Theory, Research, Practice, and Policy*, *5*(1), 50–55.

Martin, L. M., & Tesser, A. (1996). Clarifying our thoughts. In R. S. Wyer (Ed.), *Ruminative thoughts: Advances in social cognition* (pp. 189–209). Mahwah, NJ: Erlbaum.

Michael, T., Halligan, S. L., Clark, D. M., & Ehlers, A. (2007). Rumination in posttraumatic stress disorder. *Depression and Anxiety*, *24*, 307–317.

Mitra, S., & Sambamoorthi, U. (2014). Disability prevalence among adults: Estimates for 54 countries and progress toward a global estimate. *Disability and Rehabilitation*, *36*(11), 940–947.

Nolen-Hoeksema, S. (1991). Responses to depression and their effects on the duration of depressive episodes. *Journal of Abnormal Psychology*, *100*, 569–582.

Post, M., & van Leeuwen, C. (2012). Psychosocial issues in spinal cord injury: A review. *Spinal Cord*, *50*, 382–389.

Rebar, A. L., Stanton, R., Geard, D., Short, C., Duncan, M. J., & Vandelanotte, C. (2015). A meta-meta-analysis of the effect of physical activity on depression and anxiety in non-clinical adult populations. *Health Psychology Review*, *9*(3), 366–378.

Saradjian, A., Thompson, A. R., & Datta, D. (2008). The experience of men using an upper limb prosthesis following amputation: Positive coping and minimizing feeling different. *Disability and Rehabilitation*, *30*(11), 871–883.

Shakespeare-Finch, J., Martinek, E., Tedeschi, R. G., & Calhoun, L. G. (2013). A qualitative approach to assessing the validity of the Posttraumatic Growth Inventory. *Journal of Loss and Trauma*, *18*, 572–591.

Singh, A., Tetreault, L., Kalsi-Ryan, S., Nouri, A., & Fehlings, M. G. (2014). Global prevalence and incidence of traumatic spinal cord injury. *Clinical Epidemiology*, *6*, 309–331.

Stockton, H., Hunt, N., & Joseph, S. (2011). Cognitive processing, rumination, and posttraumatic growth. *Journal of Traumatic Stress*, *24*(1), 85–92.

Taku, K., Calhoun, L. G., Cann, A., & Tedeschi, R. G. (2008). The role of rumination in the coexistence of distress and posttraumatic growth among bereaved Japanese university students. *Death Studies*, *32*, 428–444.

Taku, K., Cann, A., Tedeschi, R. G., & Calhoun, L. G. (2009). Intrusive versus deliberate rumination in posttraumatic growth across US and Japanese samples. *Anxiety, Stress, & Coping*, *22*(2), 129–136.

Taku, K., Cann, A., Tedeschi, R. G., & Calhoun, L. G. (2015). Core beliefs shaken by an earthquake correlate with posttraumatic growth. *Psychological Trauma: Theory, Research, Practice, and Policy*, *7*(6), 563–569.

Tedeschi, R. G., & Calhoun, L. G. (1996). The Posttraumatic Growth Inventory: Measuring the positive legacy of trauma. *Journal of Traumatic Stress*, *9*(3), 455–471.

Tedeschi, R. G., & Calhoun, L. G. (2004). Posttraumatic growth: Conceptual foundations and empirical evidence. *Psychological Inquiry*, *15*(1), 1–18.

Triplett, K. N., Tedeschi, R. G., Cann, A., Calhoun, L. G., & Reeve, C. L. (2012). Posttraumatic growth, meaning in life, and life satisfaction in response to trauma. *Psychological Trauma: Theory, Research, Practice, and Policy*, *4*(4), 400–410.

Unwin, J., Kacperek, L., & Clarke, C. (2009). A prospective study of positive adjustment to lower limb amputation. *Clinical Rehabilitation*, *23*, 1044–1050.

Watkins, E. R. (2008). Constructive and unconstructive repetitive thought. *Psychological Bulletin*, *134*(2), 163–206.

Weiss, D. S. (2007). The Impact of Event Scale-Revised. In J. P. WIlson & T. M. Keane (Eds.), *Assessing psychological trauma and PTSD: A practitioner's handbook* (2nd ed., pp. 168–189). New York: Guilford Press.

Wilson, B., Morris, B. A., & Chambers, S. (2014). A structural equation model of posttraumatic growth after prostate cancer. *Psycho-Oncology*, *23*, 1212–1219.

Wortman, C. B. (2004). Posttraumatic growth: Progress and problems. *Psychological Inquiry*, *15*, 81–90.

Ziegler-Graham, K., MacKenzie, E. J., Ephraim, P. L., Travison, T. G., & Brookmeyer, R. (2008). Estimating the prevalence of limb loss in the United States: 2005 to 2050. *Archives of Physical Medicine and Rehabilitation*, *89*, 422–429.

CHAPTER 4

STUDY 3: FROM CORE BELIEF CHALLENGE TO POSTTRAUMATIC GROWTH IN PARA SPORT ATHLETES: MODERATED MEDIATION BY NEEDS SATISFACTION AND DELIBERATE RUMINATION

Abstract

Purpose: To examine how deliberate rumination and psychological need satisfaction interact to facilitate posttraumatic growth (PTG) for para sport athletes with acquired disability. Methods: Utilizing a sample of 70 para sport athletes, the hypothesized mediating role of deliberate rumination was examined via a simple mediation model. The interaction between needs satisfaction and deliberate rumination and their effect on PTG was examined utilizing a moderated mediation procedure. Results: Disruption to one's core beliefs was significantly associated with PTG. This relationship, was in part, explained by the deliberate rumination engaged in soon after the trauma. Needs satisfaction, while a significant predictor of PTG, did not moderate the indirect effect. Conclusions: Although deliberate rumination at both timeframes and needs satisfaction were independently associated with PTG, they did not interact in the hypothesized manner to influence PTG. There remains a need to better understand how the experience of PTG is achieved amongst individuals with acquired disability, and the role that para sport may play in this process.

Introduction

The study of psychological adaptation following an acquired physical disability has largely focused on adverse reactions evident in the disability aftermath. Indeed, acquiring a disability is a traumatic experience often accompanied by deleterious consequences, such as posttraumatic stress disorder (PTSD), depression, anxiety, body image issues, social discomfort, and diminished life satisfaction (Horgan & MacLachlan, 2004; Post & van Leeuwen, 2012). For example, in an investigation examining PTSD symptoms of individuals with spinal cord injury and amputations, mean PTSD scores exceeded levels of clinical significance both in the immediate postinjury period, and during a follow-up occurring at least 1 month later (Moodley & Pillay, 2013). While such responses are neither uncommon nor unexpected, an exclusive focus on undesirable outcomes fails to capture the full breadth of potential reactions to physical disability. In fact, numerous examples illustrate the possibility of experiencing positive psychological changes following an acquired disability, such as a greater appreciation of life, enhanced meaning, and improved social relationships (Chun & Lee, 2008; Crawford, Gayman, & Tracey, 2014; Day, 2013; Hammer et al., 2017).

The notion of positive psychological change occurring as the result of challenging life events has been termed posttraumatic growth (PTG: Tedeschi & Calhoun, 2004). PTG has been observed in a number of populations, such as combat veterans (Benetato, 2011) and cancer survivors (Jansen, Hoffmeister, Chang-Claude, Brenner, & Arndt, 2011). Importantly, PTG scholars have argued that it is not the challenging event itself that precipitates growth, but rather an individual's negative reaction to the event that serves as the catalyst for psychological growth (Joseph & Linley, 2005; Tedeschi &

Calhoun, 2004). Perceptions of helplessness, uncontrollability, and life threat caused by an event are likely to precede PTG (Linley & Joseph, 2004). Conversely, being resilient in the face of trauma has been shown to be inversely related with PTG (Levine, Laufer, Stein, Hamama-Raz, & Solomon, 2009). This finding is likely due to the fact that resilient individuals may experience less disruption than their fragile counterparts, leaving little necessity or opportunity for PTG (Westphal & Bonanno, 2007). Consequently, an event must cause disruption in order to precipitate growth. The terminology often adopted by PTG theorists to describe the disruption that causes one to reexamine fundamental views about how the world works and one's place in it is a *shattering of one's assumptive world*, also referred to as a challenge to one's core beliefs (Janoff-Bulman, 1992).

In support of theorizing that this existential crisis precedes growth, empirical research has demonstrated the link between challenge to core beliefs and PTG (Cann, Calhoun, Tedeschi, Kilmer et al., 2010; Lindstrom, Cann, Calhoun, & Tedeschi, 2013). The experience of PTG, however, is not an inevitable outcome of having one's core beliefs challenged. Rather, growth requires substantial cognitive effort. This cognitive processing has typically been conceptualized in terms of rumination, that is, frequent thoughts concerning the trauma (Calhoun & Tedeschi, 1998; Tedeschi & Calhoun, 2004). Furthermore, ruminative thought occurring in the aftermath of trauma can take multiple forms, including intrusive thoughts which are unsolicited and often undesired, and deliberate thoughts which are purposeful and controlled attempts at making sense of the traumatic experience (Calhoun & Tedeschi, 2006; Cann et al., 2011). Cognitive processing, represented by these two forms of rumination, has received considerable

attention in the PTG literature (Cann et al., 2011; Cann, Calhoun, Tedeschi, & Solomon, 2010; Triplett, Tedeschi, Cann, Calhoun, & Reeve, 2012; Wilson, Morris, & Chambers, 2014). Research illustrates that of these two forms of rumination, the deliberate type is the primary mechanism through which growth is experienced (Triplett et al., 2012). That is, challenged core beliefs that lead to deliberate ruminations are more likely to prompt PTG.

The challenge to one's core beliefs and the important role it plays in the development of PTG, as well as the cognitive processing necessary to experience growth, is embodied in two of the most prominent and comprehensive theories of PTG: the functional-descriptive model of PTG (Tedeschi & Calhoun, 1995, 2004) and the organismic valuing theory of growth through adversity (Joseph & Linley, 2005). Specifically, the functional descriptive model describes how a trauma can act as a "seismic" event which threatens one's core beliefs, resulting in ruminations as one attempts to process the trauma. Similarly, according to organismic valuing theory, a traumatic event resulting in incongruence between one's previous core beliefs and new trauma information prompts a need to process the trauma information in such a way that either assimilates it into an existing worldview or accommodates it to create a new world view. Both theories posit that this initial processing of the trauma can be intrusive and distressful, but psychosocial factors play a role in promoting more constructive processing. For instance, in organismic valuing theory, Joseph and Linley posit that the extent that one's posttrauma social environment satisfies or thwarts an individual's fundamental psychological needs for competence, autonomy, and relatedness will influence the extent to which that individual engages in effortful appraisal processing, a

concept akin to the deliberate ruminative thought conceptualized in the functional-descriptive model. The satisfaction of these innate needs is considered to be essential for psychological growth, integrity, and well-being (Deci & Ryan, 2000).

Research involving individuals with acquired disabilities who participate in para sport (i.e., sport for people with disabilities) has provided support for the major tenets of the functional-descriptive model and organismic valuing theory. For instance, due to difficulties in adjusting to functional impairment, changing social roles, feelings of incompetence, loss of identity, and other psychosocial difficulties, acquiring a physical disability has been shown to disrupt fundamental world views and core beliefs (Day, 2013; Hammer et al., 2017). Para sport participation was also found to facilitate growth outcomes. For example, in a qualitative study of seven Paralympic hopefuls with acquired disability, Day (2013) found that participants sought to discover meaning from their experiences, which was aided by their para sport involvement. In another study, Hammer and colleagues (2017) conducted interviews with 14 elite para triathletes (8 male, 6 female) and found that para sport served to facilitate PTG, in part, by providing an environment in which fundamental needs could be satisfied. Other studies have similarly demonstrated the needs satisfaction role of para sport (Goodwin et al., 2009; Hawkins, Cory, & Crowe, 2011). As sport affords one the opportunity to be self-determining, receive competence feedback, and to be socially involved, the utility of sport in satisfying psychological needs has been established (Deci & Ryan, 1985).

The role of para sport as it relates to cognitive processing has also been illustrated in the literature. Day (2013) found that participants re-created meaning through rumination, which was aided by para sport participation. Specifically, para sport helped

participants to understand the significance of their experiences by providing the opportunity to reestablish predisability identities and to actively create new life meanings, which were reinforced through athletic success and rewards. Likewise, in a study of 12 individuals with spinal cord injury who either participated or attempted to participate in para sport, Crawford and colleagues (Crawford et al., 2014) emphasized the influencing role of para sport participation on injury relevant processing, specifically as it related to the creation of new identities or reestablishment of old ones.

While the literature supports the efficacy of para sport as a means to facilitate PTG, the exact mechanisms through which this growth occurs remain poorly understood. Specifically, the aforementioned studies highlight the utility of para sport in satisfying psychological needs and facilitating trauma-related cognitive processing following challenges to one's core beliefs. However, a gap remains concerning the relationship between these two constructs. Although organismic valuing theory contends that needs satisfaction is a necessary component for engaging in effortful appraisal processing – a concept ostensibly analogous with deliberate rumination – organismic valuing theory is not explicitly clear as to the nature of this relationship. As such, there is a need to develop a comprehensive understanding of the role that these theoretically important concepts play in the development of PTG. Several studies in the PTG literature have previously established the mediating role of deliberate rumination on the experience of growth (Castro, Martinez, & Abarca, 2016; Triplett et al., 2012), yet these same studies frequently disregard variables that may possibly buffer or inflate these posttrauma experiences. As posited by organismic valuing theory, psychological needs satisfaction may be one such variable. The present study sought to address this limitation by taking

into account the potential moderating role of needs satisfaction, allowing for a more comprehensive model of the experience of PTG to emerge. Building on previous literature, the purpose of this investigation was to further understand how needs satisfaction and cognitive processing interact to facilitate PTG for individuals with acquired disability who participate in para sport. To the authors' best knowledge, the constructs of needs satisfaction and cognitive processing as they relate to PTG have yet to be empirically investigated concurrently, a gap we sought to address in the current study.

Consistent with the theoretical tenets of the functional-descriptive model of PTG and the organismic valuing theory, as well as research findings, it was hypothesized that challenges to one's core beliefs would be positively related to subsequent PTG (Hypothesis 1). Furthermore, as many studies in the realm of trauma have found support for the role of cognitive processing as a mediator between challenged core beliefs and PTG, it was hypothesized that deliberate rumination would be the mechanism (i.e., mediator) through which this relationship could be explained in the present investigation. Specifically, based on preliminary research (Hammer et al., under review), deliberate rumination occurring at two separate time points was posited to mediate the relationship between core belief challenge and PTG. That is, deliberate rumination occurring soon after trauma (Hypothesis 2a), as well as deliberate rumination brought about by recent para sport participation (Hypothesis 3a), were hypothesized to mediate the relationship between core belief challenge and PTG. Additionally, we anticipated that the strength of this mediating effect would be contingent on the extent to which one's psychological needs were met through para sport participation. For the case of deliberate rumination occurring soon after trauma, it was hypothesized that needs satisfaction would moderate

the path from deliberate rumination to PTG (Hypothesis 2b), such that a stronger relationship between deliberation rumination (soon after trauma) and PTG would be evident when greater need satisfaction was present (see Figure 4.1). For the indirect effect of challenged core beliefs on PTG through deliberate rumination brought about by para sport, it was hypothesized that psychological needs satisfaction afforded through para sport participation would moderate both the path to and the path from deliberate rumination (Hypothesis 3b). Specifically, we expected that challenges to core beliefs would be more likely to precipitate deliberate rumination brought about by para sport, when para sport was facilitative of basic needs satisfaction. Similarly, deliberate rumination brought about by sport involvement was expected to predict heightened PTG in instances where para sport participation facilitated need satisfaction. The hypothesized moderated mediation model is shown in Figure 4.2.

It is hoped that findings from this study will provide a more nuanced understanding of the factors that facilitate PTG, as well as the potential role of para sport participation. As PTG is not a universal outcome for those who have suffered a trauma, it may be helpful to recognize factors that foster growth so that health care practitioners can identify and work with those who might be ready to experience PTG (Calhoun & Tedeschi, 2013). Moreover, as research suggests that para sport may be an efficacious means to promote PTG, results of this study can foster a deeper theoretical understanding of the mechanisms that make para sport participation effective.

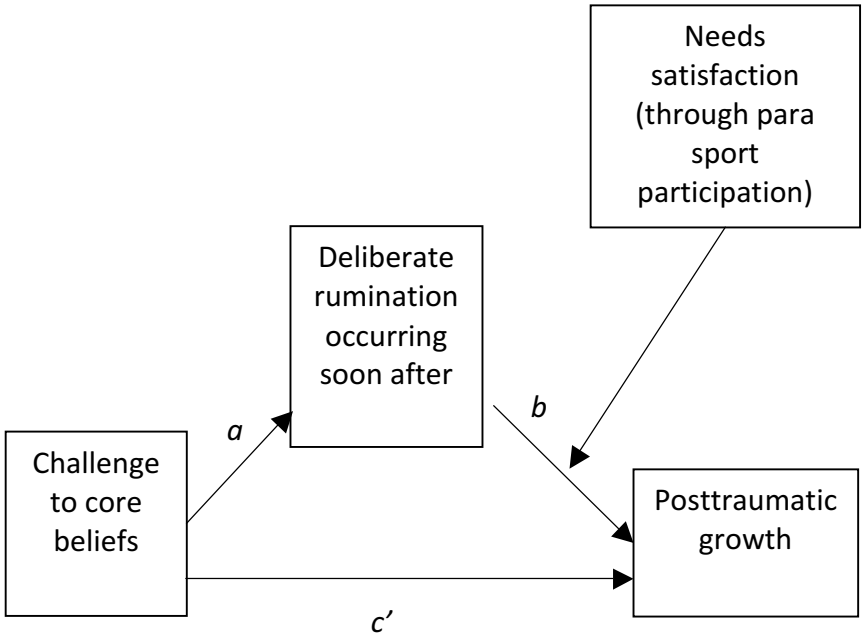


Figure 4.1. A conceptual diagram of a simple mediation model through deliberate rumination occurring soon after trauma with one path moderated by needs satisfaction.

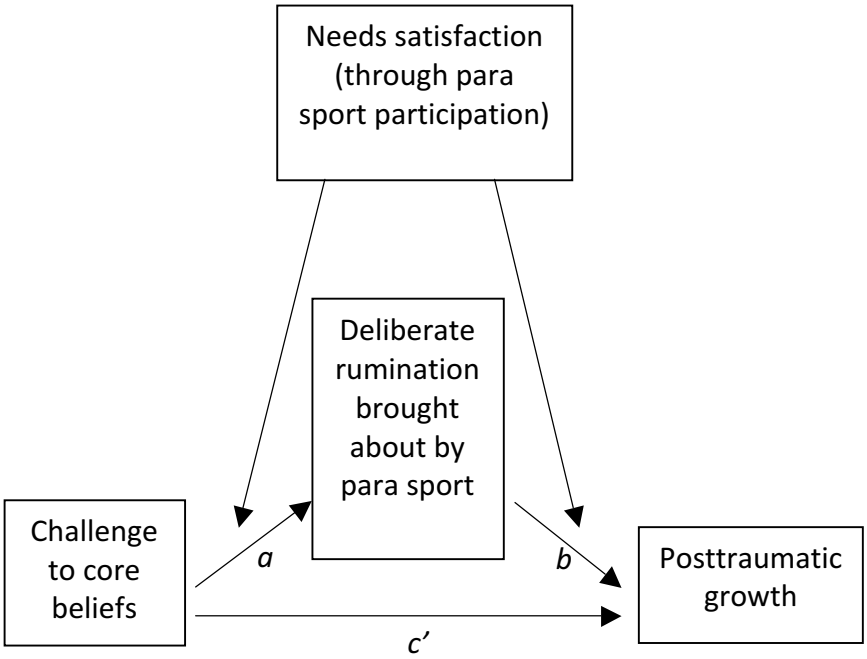


Figure 4.2. A conceptual diagram of a simple mediation model through deliberate rumination brought about by para sport with two paths moderated by needs satisfaction.

Methods

Procedure

Following institutional review board approval, participants were recruited electronically through various disability sport organizations, as well as through the first authors' personal contacts. Participants were initially asked to read an informed consent form before completing an anonymous survey. All measures were completed electronically at the participants' discretion.

Participants

Prospective participants were required to be at least 18 years old, have an acquired disability, and participate in para sport. A total of 70 participants met these criteria and participated in the study. Several different disability classifications (e.g., visual impairment, traumatic brain injury, amputation, spinal cord injury) as well as para sports (e.g., triathlon, cycling, sled hockey, wheelchair basketball) were represented in the sample. Participant demographics and injury characteristics can be seen in Table 4.1.

Measures

Challenge to core beliefs

The Core Beliefs Inventory (Cann, Calhoun, Tedeschi, Kilmer et al., 2010) was utilized to measure challenges to core beliefs experienced following the disabling event. Consisting of nine items scored on a six-point Likert scale ranging from 0 (*not at all*) to 5 (*to a very great degree*), the inventory asks participants to rate the magnitude to which an event led them to examine their core beliefs. The Core Beliefs Inventory has exhibited

Table 4.1. Characteristics of sample (*N*=70)

Variables		Values, mean +/- *SD* OR *n* (%)
Age; mean +/- *SD* (years)		40.7 +/- 11.2
Gender		
	Male	48 (68.6%)
	Female	22 (31.4%)
Race		
	White	61 (87.1%)
	Hispanic, Latino, or Spanish	4 (5.7%)
	Black or African American	2 (2.9%)
	Native Hawaiian and other Pacific Islander	1 (1.4%)
	Two or more races	1 (1.4%)
	Prefer not to answer	1 (1.4%)
Education		
	High school graduate, diploma, or the equivalent (e.g., GED)	6 (8.6%)
	Some college credit, no degree	6 (8.6%)
	Trade, technical, or vocational training	4 (5.7%)
	Associates degree	3 (4.3%)
	Bachelors degree	25 (35.7%)
	Advanced degree	25 (35.7%)
	Prefer not to answer	1 (1.4%)
Veteran		
	No	51 (72.9%)
	Yes	19 (27.1%)
Years disabled; mean +/- *SD*		14.4 +/- 8.9
How disability was acquired		
	Traumatic accident, nonmilitary	39 (55.7%)
	Acute injury	3 (4.3%)
	Result of military combat	6 (8.6%)
	Degenerative condition or illness	10 (14.3%)
	other	12 (17.1%)
Years of para sport participation; mean +/- *SD*		6.8 +/- 6.0
Weekly hours participating in para sport; mean +/- *SD*		11.3 +/- 6.1
Para sport level of competition		
	Paralympic Games	10 (14.3%)
	International competitions	13 (18.6%)
	National championships	25 (35.7%)
	Regional competitions	9 (12.9%)
	Local/recreational competitions	13 (18.6%)

construct validity (Cann, Calhoun, Tedeschi, Kilmer et al., 2010), and multiple studies have provided support for its internal consistency (Lindstrom et al., 2013; Triplett et al., 2012). In the current investigation, Cronbach's alpha was .86.

Cognitive processing

The cognitive processing of the trauma, conceptualized as the ruminations one experiences, was assessed using the Event Related Rumination Inventory (Cann et al., 2011). Rated on a four-point Likert scale ranging from 0 (*not at all*) to 3 (*often*), the Event Related Rumination Inventory is a two-factor, 20-item instrument that provides scores for how often an individual engages in deliberate and intrusive ruminations in the aftermath of a highly stressful or traumatic event. As this study was concerned with the role of deliberate rumination in the attainment of PTG, only the deliberate items were retained. Additionally, the inventory is designed to provide a measure of rumination at two different time frames, "during the weeks immediately after the event" and "during the last couple of weeks." While the wording for the initial time frame was unchanged, the second temporal condition was modified to "during and/or due to recent para sport participation" in order to account for our interest in deliberate ruminations brought about by recent para sport participation. The construct validity, factor structure, as well as the internal consistency of the Event Related Rumination Inventory has received empirical support (Cann et al., 2011; Triplett et al., 2012; Wilson et al., 2014). In the present investigation, Cronbach's alpha was .87 for deliberate rumination occurring "during the weeks immediately after the event," and .94 for deliberate rumination occurring "during and/or due to recent para sport participation."

Needs satisfaction

Needs satisfaction was measured using the Basic Needs Satisfaction in Sport Scale (Ng, Lonsdale, & Hodge, 2011). The Basic Needs Satisfaction in Sport Scale is a 20-item instrument measured on a scale ranging from 1 (*not true at* all) to 7 (*very true*), which provides scores for competence, relatedness, as well as three separate categories of autonomy (i.e., volition, choice, and internal perceived locus of control). Initial psychometric support for the instrument included content, factor, and nomological validity, as well as internal consistency and test-retest reliability (Ng et al., 2011). Although the Basic Needs Satisfaction in Sport Scale is a five-factor instrument, organismic valuing theory does not distinguish between the individual factors of psychological needs in terms of their importance to PTG. Furthermore, according to Self-Determination Theory, psychological needs are considered to be interdependent (Deci & Ryan, 2000). Hence, our interest in the present investigation was to examine a global indicator of needs satisfaction. As such, a composite score of the Basic Needs Satisfaction in Sport Scale items was used. Previous research consistently demonstrates strong intercorrelations between the psychological needs of competence, autonomy, and relatedness, and there is a precedent for assessing needs satisfaction as a unidimensional factor or composite score of the three needs (Deci et al., 2001; Sebire, Standage, & Vansteenkiste, 2009; Weman-Josefsson, Lindwall, & Ivarsson, 2015), including studies utilizing the Basic Needs Satisfaction in Sport Scale (Curran, Hill, Ntoumanis, Hall, & Jowett, 2016; Mahoney, Ntoumanis, Gucciardi, Mallett, & Stebbings, 2016). Cronbach's alpha for the composite instrument was .88.

PTG

Perceptions of PTG were assessed using the Posttraumatic Growth Inventory (Tedeschi & Calhoun, 1996). The Posttraumatic Growth Inventory consists of 21 items that provide a total PTG score, as well as scores for each of its five factors: relating to others, new possibilities, personal strength, spiritual change, and appreciation for life. Items are rated on a six-point Likert scale from 0 (*I did not experience this change as a result of my crisis*) to 5 (*I experienced this change a very great degree as a result of my crisis*). The content validity of the Posttraumatic Growth Inventory has received support (Shakespeare-Finch, Martinek, Tedeschi, & Calhoun, 2013) and the internal consistency of the instrument has been exhibited in multiple studies (Tedeschi & Calhoun, 1996; Wilson et al., 2014). The present investigation utilized only the total Posttraumatic Growth Inventory score. Cronbach's alpha for the total instrument was .93.

Analysis

All analyses were conducted using IBM SPSS 24. Approximately 2.2% of the data were missing. As Little's MCAR Test confirmed that data were missing completely at random ($\chi^2 = 90.82$, $df = 104$; $p = .818$), the expectation maximization algorithm was applied to replace missing data. Results of the Shapiro Wilk test indicated that the assumption of normality was violated by the Basic Needs Satisfaction in Sport Scale, Posttraumatic Growth Inventory, and the deliberate rumination brought about by para sport scale ($p < .05$), so the expectation maximization procedure for items from those scales was conducted based on a student's t distribution. As the Core Beliefs Inventory and deliberate rumination occurring soon after trauma scales did not violate the normal

distribution, the expectation maximization for those scales was based on a normal distribution. We then began the analyses by examining associations between variables of interest by performing bivariate correlations. To test our first hypothesis concerning the relationship between core belief challenge and PTG, we also conducted a simple linear regression. In order to test our second and third hypotheses concerned with mediation and moderated mediation, the PROCESS macro for SPSS developed by Hayes (2013) was employed. PROCESS estimates direct and indirect effects in mediation models, as well as the conditional effects in moderated mediation models, through ordinary least squares regression. For inference about the significance of indirect effects and conditional indirect effects (i.e., moderated mediation), PROCESS produces bias-corrected bootstrap confidence intervals based on a designated number of bootstrap samples (the present investigation used 10,000 bootstrap samples for all analyses). An effect is significant when zero is not contained within the confidence interval. For conditional indirect effects PROCESS provides regression coefficients for all relevant terms, including the interaction, as well as confidence intervals for values of the moderator corresponding to the 10^{th}, 25^{th}, 50^{th}, 75^{th}, and 90^{th} percentile (which can be interpreted as *very low*, *low*, *moderate*, *high*, and *very high*).

Results

Correlations as well as descriptive statistics for the measures used in this study can be found in Table 4.2. Results suggest that acquiring a disability caused participants to challenge their core beliefs to a "moderate" degree. Similarly, participants engaged in intermediate amounts of deliberate rumination at both time points. Participants'

Table 4.2
Descriptive statistics and correlations among measured variables in moderated mediation models

Variable	1	2	3	4	5
1. CBI	*.856*				
2. Deliberate – Soon After	.345**	*.873*			
3. Deliberate – Para Sport	.378**	.359**	*.941*		
4. BNSSS	.218	.102	.165	*.877*	
5. PTGI	.497**	.388**	.255*	.465**	*.932*
Mean	2.90	1.77	1.43	5.98	3.29
SD	1.11	0.71	0.86	0.68	0.98

Note: $N = 70$. * $p < .05$; ** $p < .01$. Cronbach's alphas are shown in italics on the diagonal. CBI = Core Belief Inventory; BNSSS = Basic Needs Satisfaction in Sport Scale; PTGI = Posttraumatic Growth Inventory

perceptions of needs satisfaction through sport, however, was high, while PTG was experienced to a "moderate" to "great" degree. The significant association between challenged core beliefs and deliberate rumination at both time points, as well as between both deliberate rumination scales and PTG, was as expected. Basic needs satisfaction, however, was only significantly associated with PTG. As predicted in hypothesis 1, results of the regression demonstrated that challenged core beliefs significantly predicted PTG (standardized β = .497, $t(68) = 4.719$, $p < .001$). Results of the regression suggest that challenged core beliefs accounted for 24.7% of the variance in PTG ($R^2 = .247$, $F(1,68) = 22.268$, $p < .001$).

Simple Mediation Analyses

To test Hypothesis 2a, that challenged core beliefs would affect PTG indirectly through deliberate rumination occurring soon after acquiring a disability, a simple mediation analysis using PROCESS (Hayes, 2013) was conducted. The indirect effect is conceptualized as the product of the regression coefficient estimating deliberate rumination from challenged core beliefs (path *a* in Figure 4.1) and the regression coefficient estimating PTG from rumination when controlling for core beliefs (path *b* in Figure 4.1). For the present sample, challenged core beliefs was found to influence deliberate rumination occurring soon after acquiring disability ($a = .222$, $p = .003$), and those who engaged in deliberate rumination exhibited greater PTG ($b = .338$, $p = .027$). The bias-corrected bootstrap confidence interval for the indirect effect ($ab = .075$) was completely above zero (.016 to .180), signifying that deliberate rumination occurring soon after acquiring disability mediated the relationship between challenged core beliefs

and PTG. However, the direct effect was significant (c' = .362, p < .001), indicating that challenges to core beliefs may still influence PTG independent of its effect on deliberate rumination occurring soon after acquiring disability. The overall regression model accounted for 30.0% of the variation in PTG (R^2 =.300, F(2,67) = 14.367, p < .001).

The same procedure was used to test Hypothesis 3a, that deliberate rumination brought about by para sport would mediate the relationship between core beliefs and PTG. Similar to the prior mediation analysis, challenged core beliefs influenced deliberate rumination brought about by para sport involvement (a = .292, p = .001). However, deliberate rumination was not associated with PTG when controlling for core beliefs (b = .090, p = .493). Contrary to our hypothesis, the indirect effect of core beliefs on PTG through deliberate rumination brought about by para sport participation (ab = .026) was not significant, as the confidence interval contained zero (-.039 to .117). Once again, the direct effect of core beliefs on PTG was significant (c' = .411, p < .001). The overall regression model accounted for 25.2% of the variation in PTG (R^2 =.252, F(2,67) = 11.287, p < .001)

Moderated Mediation Analyses

The simple mediation analysis indicated that core beliefs had an indirect effect on PTG through deliberate rumination occurring soon after trauma. In Hypothesis 2b, we posited that the magnitude of this indirect effect would be contingent on needs satisfaction experienced through para sport participation (see Figure 4.1). This conditional indirect effect is estimated as the product of the effect of core beliefs on rumination and the conditional effect of rumination on PTG as a function of needs

satisfaction. Utilizing ordinary least squares regression, the PROCESS procedure (Hayes, 2013) calculates the values for each of these regression coefficients (see Table 4.3). Using these values from Table 4.3, the equation for the conditional indirect effect of core beliefs on PTG through deliberate rumination occurring soon after trauma at a specific value of needs satisfaction (BNSSS) was:

$$(.222)(.526 - .033*\text{BNSSS}) \quad (1)$$

PROCESS (Hayes, 2013) provides these conditional indirect effects and conducts an inferential test at five different values of the moderator (i.e., 10^{th}, 25^{th}, 50^{th}, 75^{th}, and 90^{th} percentile) by generating 95% bias-corrected confidence intervals of the full moderated mediation model, as can be seen in Table 4.4. As shown in Table 4.4, the indirect effect of challenged core beliefs on PTG was significant at moderate (.073, *SE* = .041, 95% CI: [.015, .191]), high (.069, *SE* = .036, 95% CI: [.015, .164]), and very high (.067, *SE* = .040, 95% CI: [.007, .169]) levels of needs satisfaction. However, the regression coefficient for the interaction between deliberate rumination and needs satisfaction was not significant in predicting PTG (coeff. = -.033, $p = .851$). While Hayes (2013) contends that the statistically significant moderation of a path in a mediation model is not a prerequisite for moderated mediation to occur, these results nonetheless provide some doubt as to the moderating role of needs satisfaction. This reservation is verified by an insignificant index of moderated mediation (index = -.007, 95% CI: [-.076, .099]). The direct effect remained significant ($c' = .294$, $p = .002$). Furthermore, as can be seen in Table 4.3, the overall regression model was significant, as it accounted for 42.9% of the variation in PTG ($R^2 = .429$, $F(4,65) = 12.207$, $p < .001$).

Table 4.3
Regression coefficients and standard errors for the moderated mediation models

	Figure 4.1		Figure 4.2	
	DEL-SA Coeff (*SE*)	PTGI Coeff (*SE*)	DEL-Sport Coeff (*SE*)	PTGI Coeff (*SE*)
Constant	1.124*** (.227)	-1.611 (1.817)	-1.228 (1.971)	-1.557 (1.467)
CBI	.222** (.073)	.294** (.090)	.742 (.689)	.348*** (.094)
DEL-SA	-	.526 (1.088)	-	-
BNSSS	-	.580^{+} (.298)	.311 (.331)	.630* (.250)
DEL-Sport	-	-	-	.527 (1.025)
DEL-SA x BNSSS	-	-.033 (.175)	-	-
CBI x BNSSS	-	-	-.077 (.113)	-
DEL-Sport x BNSSS	-	-	-	-.079 (.169)
	R^2 = .119 F(1,68)=9.208, p=.003	R^2 = .429 F(4,65)=12. 207, p<.001	R^2 = .156 F(3,66)=4.0 70, p=.010	R^2 = .384 F(4,65)=10. 117, p<.001

Note: $^{+}p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$. *SE* = standard error. CBI = Core Belief Inventory. DEL-SA = Deliberate rumination occurring soon after trauma. DEL-Sport = Deliberate rumination brought about by para sport participation. BNSSS = Basic Needs Satisfaction in Sport Scale; PTGI = Posttraumatic Growth Inventory

Table 4.4
Conditional indirect effects of core belief challenge on posttraumatic growth through deliberate rumination at levels of basic needs satisfaction

	Deliberate rumination occurring soon after			Deliberate rumination brought about by para sport		
BNSSS Percentile	Indirect Effect	Bootstrap *SE*	95% BC Bootstrap CI	Indirect Effect	Bootstrap *SE*	95% BC Bootstrap CI
10th (5.10)	.0793	.0672	[-.0330, .2363]	.0431	.0777	[-.0825, .2370]
25th (5.55)	.0761	.0516	[-.0016, .2130]	.0276	.0482	[-.0518, .1487]
50th (5.95)	.0731	.0409	[.0151, .1906]	.0160	.0356	[-.0442, .1022]
75th (6.50)	.0691	.0363	[.0152, .1636]	.0031	.0422	[-.0680, .1119]
90th (6.80)	.0669	.0403	[.0071, .1693]	-.0024	.0518	[-.1076, .1084]

Note: BNSSS = Basic Needs Satisfaction in Sport Scale. *SE* = standard error. BC Bootstrap CI = Bias corrected bootstrap confidence interval. Number of bootstrap samples for confidence intervals: 10,000.

We used a similar procedure to test Hypothesis 3b. Although there was no evidence of a significant indirect effect of core beliefs on PTG through deliberate rumination brought about by para sport, unmoderated mediation is not a necessary condition for moderated mediation to exist (Hayes, 2013). As the moderated mediation in Figure 4.2 is slightly different from the model represented in Figure 4.1 in that needs satisfaction is proposed to moderate two separate paths, the equation for the estimate of the conditional indirect effect is slightly different. That is, the conditional indirect effect is estimated as the product of the conditional effect of core beliefs on rumination as a function of needs satisfaction and the conditional effect of rumination on PTG as a function of needs satisfaction. Using the values from Table 4.3, the equation for the conditional effect for the conditional indirect effect of core beliefs on PTG through deliberate rumination brought about by para sport at a specific value of needs satisfaction (BNSSS) is:

$$(.742 - .077*\text{BNSSS})(.527 - .079*\text{BNSSS}) \quad (2)$$

As was the case in the previous analysis, the interactions were not significant (see Table 4.3), suggesting that needs satisfaction was not a moderator of hypothesized relationships. Table 4.4 shows conditional indirect effects and 95% bias-corrected confidence intervals of the full moderated mediation model. As all confidence intervals included zero, none of the indirect effects was significant. As was the case with all the other models, the direct effect was significant (c' = .348, $p < .001$). Despite the lack of evidence for moderated mediation, the overall regression model was significant, as it accounted for 38.4% of the variation in PTG (R^2 =.384, $F(4,65) = 10.117$, $p < .001$).

Discussion

The purpose of this investigation was to better understand how needs satisfaction and cognitive processing interact to facilitate PTG for para sport athletes with acquired disability. We begin the discussion by examining the relationships between variables of interest in the study before considering whether or not our hypotheses were supported. As expected, challenged core beliefs were significantly correlated with deliberate rumination at both time points as well as with PTG. PTG was significantly associated with deliberate rumination at both time points, as well as with needs satisfaction. The finding of positive relationships between challenged core beliefs, deliberate rumination, and PTG is consistent with the tenets of the functional-descriptive model of PTG as well as with research in the field (Tedeschi & Calhoun, 2004; Triplett et al., 2012). Additionally, research demonstrates an association between needs satisfaction and PTG (Yeung, Lu, Wong, & Huynh, 2016). Needs satisfaction, however, was not correlated with core belief challenge or with deliberate rumination at either time point. As this investigation was the first study we are aware of that empirically examined the relationship between needs satisfaction and deliberate rumination, we cannot compare our results to those of other studies. However, given that organismic valuing theory suggests that needs satisfaction would support effortful appraisal processing (Joseph & Linley, 2005), the lack of association is unexpected. It may be that need satisfaction occurring in nonsport domains (e.g., interpersonal relationships) is more relevant in promoting the deliberate rumination needed for spurring PTG. Alternatively, it is possible that personal characteristics such as grit, hardiness, or resilience are more salient in stimulating particular forms of cognitive processing and subsequent PTG. Future research is necessary to provide a more

comprehensive understanding of the relationship between needs satisfaction and cognitive processing.

To examine interactions between needs satisfaction and cognitive processing in facilitating growth, we first examined distinct parts of the model before testing the whole moderated mediation model. As theory and research demonstrate that challenges to core beliefs are a necessary antecedent to PTG, the first aim was intended to establish the relationship between core belief challenge and PTG for the present sample. As hypothesized, a simple linear regression demonstrated a significantly positive relationship between challenge to core beliefs and subsequent PTG. Across various populations, the literature is replete with similar findings that core belief challenge and PTG are associated. Interestingly, in the present study, the relationship between core belief challenge and PTG remained intact even when rumination and needs satisfaction variables were introduced into the models. That is, in all of the mediation and moderated mediation analyses we ran, the direct effect of core belief challenge on PTG remained significant. These results imply that the relationship between core beliefs and PTG cannot be completely explained by the other variables in the model (i.e., rumination, needs satisfaction, interactions between variables). Future research may consider investigating additional factors, such as emotional disclosure or challenge appraisal, in explaining the relationship between core belief challenge and PTG.

The second and third hypotheses were concerned with the mediating role of deliberate rumination in the occurrence of PTG following a disruption to core beliefs. Specifically, in the second and third hypotheses we proposed two differing models to explain how PTG is experienced. Hypothesis 2a posited that deliberate rumination

occurring soon after trauma would be the mechanism through which growth is achieved, while Hypothesis 3a proposed that PTG is achieved through deliberate rumination brought about by para sport participation. Only Hypothesis 2a was supported by the results of the study. That is, although deliberate rumination at both time points was significantly correlated with PTG, the relationship between core belief challenge and PTG could only be explained through deliberate rumination occurring soon after trauma. This is in contrast to recent findings that both deliberate rumination occurring soon after trauma and deliberate rumination during recent para sport mediated the relationship between core belief challenge and PTG (Hammer et al., under review).

In line with Hypotheses 2b and 3b, we tested the full moderated mediation model in which it was expected that needs satisfaction would moderate each of the simple mediation models illustrated in Figures 4.1 and 4.2. In relation to Hypothesis 2b, results revealed an insignificant interaction effect, meaning needs satisfaction was not found to moderate the relationship between deliberate rumination and PTG. The same was true for Hypothesis 3b. Therefore, while it was hypothesized that psychological needs satisfaction would maximize the effect of deliberate rumination on PTG, results from the present investigation failed to support this hypothesis. Although Joseph and Linley (2005) contend that effortful appraisal processes are influenced by social support processes such as needs satisfaction, they acknowledge that the nature of the influence is unknown. While it was hypothesized that the relationship would be one of moderation, results from the present investigation suggest that is not the case. Nonetheless, the total regression model predicting PTG from the moderated mediation models tested in Hypothesis 2b and Hypothesis 3b were statistically significant, accounting for 42.9% and 38.4% of the

variance, respectively. Additionally, needs satisfaction was a significant predictor of PTG in both models. Therefore, even though the moderated mediation hypotheses were not supported, there is strong evidence of a significant relationship between the variables of interest and PTG. That is, this study demonstrated the utility of needs satisfaction and deliberate rumination in predicting PTG, but failed to identify the mechanisms through which their influence is exerted on growth. Future investigations should explore alternative models.

Despite the lack of support for one of the simple mediation hypotheses and the two moderated mediations, the collective results of this study are intriguing. First, informed by complex PTG theories, this study sought to understand the processes that produce PTG for individuals with acquired disability who participate in para sport. In utilizing these theories, this was the first study we know of to incorporate both needs satisfaction and deliberate rumination as predictor variables of PTG. While these variables were independently associated with PTG, they did not interact in the hypothesized manner to influence PTG. This finding seemingly contradicts organismic valuing theory (Joseph & Linley, 2005), which posits that needs satisfaction influences effortful appraisal processes, which in turn facilitates PTG. Other studies that did not specifically take into account the deliberative ruminative processes as the present research did, however, have found support for the organismic valuing theory. For instance, in a sample of previously injured athletes, stress related growth mediated the relationship between two of the needs satisfaction domains (i.e., competence and relatedness) and subjective well-being (Wadey, Podlog, Galli, & Mellalieu, 2016). Similarly, a longitudinal study involving cancer patients found autonomy support was a

significant predictor of PTG at the latter time point (Scrignaro, Barni, & Magrin, 2011). Moreover, although previous investigations have found support for the facilitative role of para sport on the experience of PTG, this study was among the first to examine the mechanisms by which para sport facilitates PTG. While results suggest that deliberate rumination brought about by recent para sport participation as well as needs satisfaction afforded through para sports were significantly associated with PTG, there was no evidence that the conceptual models involving these variables were statistically significant. It is possible that these variables exert their influence on PTG through other personality (e.g., hardiness, optimism) or behavioral variables (e.g., proactive coping behaviors).

It is recognized there are a number of possible limitations in the current study. First, the sample was not very large. However, while bootstrapping techniques are not a "cure" for small samples, they are robust to violations of normality assumptions and they provide for higher statistical power. As the population of individuals who possess acquired disabilities and participate in para sport is relatively small compared to the general population, it follows that procuring large samples would be difficult. Of similar concern, the majority of the sample represented a small handful of para sports. Therefore, the generalizability of the findings warrants a degree of caution. Additionally, as with any self-report measure where participants are asked to remember past events, there exists the potential for recall bias. Furthermore, the methodology cannot infer causality due to the cross-sectional nature of the design. It is also possible that the theories informing this study failed to account for relevant variables influencing PTG. Future studies may build off of this study's findings to examine other potential antecedents of PTG among para

sport athletes, such as psychological needs satisfaction prior to the adverse event, personality traits, behavioral variables, or preservation of one's athletic identity during para sport participation. Lastly, a criticism of PTG research is that PTG is often implied to be the most constructive response to trauma, over other responses such as resilience (Westphal & Bonanno, 2007). In contrast to the core belief challenge characteristic of PTG, resilient individuals tend to have the ability to maintain healthy psychological functioning following a trauma (Bonanno, 2004). The stable trajectory of functioning afforded by resilience may be an equally or even more adaptive outcome than PTG. Future studies may consider the utility of PTG versus other potential responses to trauma.

Despite these limitations, the findings from the present investigation provide further insight into how PTG is experienced, particularly for individuals with acquired disability who participate in para sport. This study was among the first to employ quantitative methodologies informed by theory to understand the development of PTG for individuals with acquired disability. In summary, disruption to one's core beliefs was significantly associated with subsequent PTG. This relationship was, in part, explained by the deliberate rumination engaged in soon after the trauma. The role that basic needs satisfaction afforded through para sport participation plays in this relationship, however, is less clear as it was found to be a significant predictor of PTG, but not a moderator of the indirect effect. Similarly, the function of the deliberate cognitive processing prompted by para sport participation on the occurrence of PTG requires further inquiry. As both of these variables were significantly associated with PTG, there remains a need to better understand how the experience of PTG is achieved amongst individuals with acquired disability, and the role that para sport may play in this process.

References

Benetato, B. B. (2011). Posttraumatic growth among Operation Enduring Freedom and Operation Iraqi Freedom amputees. *Journal of Nursing Scholarship*, *43*(4), 412–420.

Bonanno, G. A. (2004). Loss, trauma, and human resilience: Have we underestimated the human capacity to thrive after extremely aversive events? *American Psychologist*, *59*(1), 20–28.

Calhoun, L. G., & Tedeschi, R. G. (1998). Posttraumatic growth: Future directions. In R. G. Tedeschi, C. L. Park, & L. G. Calhoun (Eds.), *Posttraumatic growth: Positive changes in the aftermath of crisis* (pp. 215–238). Mahwah, NJ: Erlbaum.

Calhoun, L. G., & Tedeschi, R. G. (2006). *Handbook of posttraumatic growth: Research and practice*. Mahwah, NJ: Erlbaum.

Calhoun, L. G., & Tedeschi, R. G. (2013). *Posttraumatic growth in clinical practice*. New York, NY: Routledge.

Cann, A., Calhoun, L. G., Tedeschi, R. G., Kilmer, R. P., Gil-Rivas, V., Vishnevsky, T., & Danhauer, S. C. (2010). The Core Beliefs Inventory: A brief measure of disruption in the assumptive world. *Anxiety, Stress, & Coping*, *23*(1), 19–34.

Cann, A., Calhoun, L. G., Tedeschi, R. G., & Solomon, D. T. (2010). Posttraumatic growth and depreciation as independent experiences and predictors of well-being. *Journal of Loss and Trauma*, *15*, 151–166.

Cann, A., Calhoun, L. G., Tedeschi, R. G., Triplett, K. N., Vishnevsky, T., & Lindstrom, C. M. (2011). Assessing posttraumatic cognitive processes: The Event Related Rumination Inventory. *Anxiety, Stress, & Coping*, *24*(2), 137–156.

Castro, M. C., Martinez, M. A., & Abarca, X. F. (2016). Deliberate rumination and positive reappraisal as serial mediators between life impact and posttraumatic growth in victims of state terrorism in Chile (1973-1990). *Journal of Interpersonal Violence*. 1–17.

Chun, S., & Lee, Y. (2008). The experience of posttraumatic growth for people with spinal cord injury. *Qualitative Health Research*, *18*(7), 877–890.

Crawford, J. J., Gayman, A. M., & Tracey, J. (2014). An examination of post-traumatic growth in Canadian and American ParaSport athletes with acquired spinal cord injury. *Psychology of Sport and Exercise*, *15*(4), 399–406.

Curran, T., Hill, A. P., Ntoumanis, N., Hall, H. K., & Jowett, G. E. (2016). A three-wave longitudinal test of self-determination theory's mediation model of engagement and disaffection in youth sport. *Journal of Sport and Exercise Psychology*, *38*, 15–29.

Day, M. C. (2013). The role of initial physical activity experiences in promoting posttraumatic growth in Paralympic athletes with an acquired disability. *Disability and Rehabilitation*, *35*(24), 2064–2072.

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York, NY: Plenum.

Deci, E. L., & Ryan, R. M. (2000). The“ what” and“ why” of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, *11*(4), 227–268.

Deci, E. L., Ryan, R. M., Gagne, M., Leone, D. R., Usunov, J., & Kornazheva, B. P. (2001). Need satisfaction, motivation, and well-being in the work organizations of a former eastern bloc country: A cross-cultural study of self-determination. *Personality and Social Psychology Bulletin*, *27*(8), 930–942.

Goodwin, D., Johnston, K., Gustafson, P., Elliott, M., Thurmeier, R., & Kuttai, H. (2009). It's okay to be a quad: Wheelchair rugby players' sense of community. *Adapted Physical Activity Quarterly*, *26*, 102–117.

Hammer, C., Podlog, L., Galli, N., Wadey, R., Forber-Pratt, A. J., Newton, M., … Hall, M. S. (2017). Understanding posttraumatic growth of paratriathletes with acquired disability. *Disability and Rehabilitation*, *Advance online publication*. https://doi.org/10.1080/09638288.2017.1402961

Hammer, C., Podlog, L., Wadey, R., Galli, N., Forber-Pratt, A. J., & Newton, M. (under review). Cognitive processing following acquired disability for para sport athletes: A serial mediation model.

Hawkins, B. L., Cory, A. L., & Crowe, B. M. (2011). Effects of participation in a Paralympic military sports camp on injured service members: Implications for therapeutic recreation. *Therapeutic Recreation Journal*, *45*(4), 309–325.

Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. New York, NY: Guilford Press.

Horgan, O., & MacLachlan, M. (2004). Psychosocial adjustment to lower-limb amputation: A review. *Disability and Rehabilitation*, *26*(14/15), 837–850.

Janoff-Bulman, R. (1992). *Shattered assumptions: Towards a new psychology of trauma*. New York, NY: Free Press.

Jansen, L., Hoffmeister, M., Chang-Claude, J., Brenner, H., & Arndt, V. (2011). Benefit finding and post-traumatic growth in long-term colorectal cancer survivors: Prevalence, determinants, and associations with quality of life. *British Journal of Cancer*, *105*, 1158–1165.

Joseph, S., & Linley, P. A. (2005). Positive adjustment to threatening events: An organismic valuing theory of growth through adversity. *Review of General Psychology*, *9*(3), 262–280.

Levine, S. Z., Laufer, A., Stein, E., Hamama-Raz, Y., & Solomon, Z. (2009). Examining the relationship between resilience and posttraumatic growth. *Journal of Traumatic Stress*, *22*(4), 282–286.

Lindstrom, C. M., Cann, A., Calhoun, L. G., & Tedeschi, R. G. (2013). The relationship of core belief challenge, rumination, disclosure, and sociocultural elements to posttraumatic growth. *Psychological Trauma: Theory, Research, Practice, and Policy*, *5*(1), 50–55.

Linley, P. A., & Joseph, S. (2004). Positive change following trauma and adversity: A review. *Journal of Traumatic Stress*, *17*(1), 11–21.

Mahoney, J. W., Ntoumanis, N., Gucciardi, D. F., Mallett, C. J., & Stebbings, J. (2016). Implementing an autonomy-supportive intervention to develop mental toughness in adolescent rowers. *Journal of Applied Sport Psychology*, *28*, 199–215.

Moodley, N., & Pillay, B. J. (2013). Post-traumatic stress disorder in patients with spinal-cord injuries. *South African Journal of Psychology*, *43*(2), 182–197.

Ng, J. Y. Y., Lonsdale, C., & Hodge, K. (2011). The Basic Needs Satisfaction in Sport Scale (BNSSS): Instrument development and initial validity evidence. *Psychology of Sport and Exercise*, *12*, 257–264.

Post, M., & van Leeuwen, C. (2012). Psychosocial issues in spinal cord injury: A review. *Spinal Cord*, *50*, 382–389.

Scrignaro, M., Barni, S., & Magrin, M. E. (2011). The combined contribution of social support and coping strategies in predicting post-traumatic growth: A longitudinal study on cancer patients. *Psycho-Oncology*, *20*, 823–831.

Sebire, S. J., Standage, M., & Vansteenkiste, M. (2009). Examining intrinsic versus extrinsic exercise goals: Cognitive, affective, and behavioral outcomes. *Journal of Sport and Exercise Psychology*, *31*, 189–210.

Shakespeare-Finch, J., Martinek, E., Tedeschi, R. G., & Calhoun, L. G. (2013). A qualitative approach to assessing the validity of the Posttraumatic Growth Inventory. *Journal of Loss and Trauma*, *18*, 572–591.

Tedeschi, R. G., & Calhoun, L. G. (1995). *Trauma and transformation: Growing in the aftermath of suffering*. Thousand Oaks, CA: Sage.

Tedeschi, R. G., & Calhoun, L. G. (1996). The Posttraumatic Growth Inventory: Measuring the positive legacy of trauma. *Journal of Traumatic Stress*, *9*(3), 455–471.

Tedeschi, R. G., & Calhoun, L. G. (2004). Posttraumatic growth: Conceptual foundations and empirical evidence. *Psychological Inquiry*, *15*(1), 1–18.

Triplett, K. N., Tedeschi, R. G., Cann, A., Calhoun, L. G., & Reeve, C. L. (2012). Posttraumatic growth, meaning in life, and life satisfaction in response to trauma. *Psychological Trauma: Theory, Research, Practice, and Policy*, *4*(4), 400–410.

Wadey, R., Podlog, L., Galli, N., & Mellalieu, S. D. (2016). Stress-related growth following sport injury: Examining the applicability of the organismic valuing theory. *Scandinavian Journal of Medicine & Science in Sports*, *26*(10), 1132–1139.

Weman-Josefsson, K., Lindwall, M., & Ivarsson, A. (2015). Need satisfaction, motivational regulations and exercise: moderation and mediation effects. *International Journal of Behavioral Nutrition and Physical Activity*, *12*(67). https://doi.org/10.1186/s12966-015-0226-0

Westphal, M., & Bonanno, G. A. (2007). Posttraumatic growth and resilience to trauma: Different sides of the same coin or different coins? *Applied Psychology: An International Review*, *56*(3), 417–427.

Wilson, B., Morris, B. A., & Chambers, S. (2014). A structural equation model of posttraumatic growth after prostate cancer. *Psycho-Oncology*, *23*, 1212–1219.

Yeung, N. C. Y., Lu, Q., Wong, C. C. Y., & Huynh, H. C. (2016). The roles of needs satisfaction, cognitive appraisals, and coping strategies in promoting posttraumatic growth: A stress and coping perspective. *Psychological Trauma: Theory, Research, Practice, and Policy*, *8*(3), 284–292.

CHAPTER 5

CONCLUSION

The purpose of this dissertation was to understand the phenomenon of posttraumatic growth (PTG) as experienced by para sport athletes with acquired disabilities, as well as the potential role of para sport in facilitating the development of PTG. In pursuing these research purposes, the three studies comprising this dissertation were informed by prominent theoretical PTG frameworks. The first study employed a qualitative design in order to assess the appropriateness of one such theoretical framework, the organismic valuing theory of growth through adversity (OVT), in understanding PTG for para sport athletes with acquired disability. The second study, informed by major tenets of the functional descriptive model of PTG, sought to quantitatively assess the cognitive processing that occurs in the development of PTG and/or distress. The third study then sought to further augment understanding of how PTG is experienced by considering a design that incorporates important elements from both OVT and the functional descriptive model of PTG. Specifically, it was proposed that cognitive processing, the mechanism through which the functional descriptive model of PTG posits PTG is achieved, is moderated by needs satisfaction, a construct theorized by OVT to be necessary for PTG. This chapter discusses findings from each of these studies as well as the implications of this research.

Summary

Study 1

The focus of the first study was to understand the experience of PTG for individuals with acquired disability who participate in para sport through the lens of OVT. Specifically, the purpose was to examine if OVT was an appropriate theory to employ when investigating PTG. Utilizing questions informed by the tenets of OVT, fourteen elite paratriathletes participated in semistructured interviews regarding their disability related experiences. Consistent with the notion of shattered assumptive world, participants reported initial experiences in the disability aftermath in predominantly negative ways. Specifically, participants emphasized how they experienced a loss of control, feelings of incompetence and identity confusion, and detriments to their social functioning. Para sport participation, however, was reported as a means through which to not only quell these tribulations, but also as a way that PTG could be achieved. Specifically, by providing opportunities for meaningful social experiences, to feel empowered and competent, and to develop one's identity, para sport was instrumental in facilitating PTG. Several themes that emerged in the data analysis were largely consistent with the fundamental tenets of OVT, particularly as it relates to the importance of psychological needs satisfaction for PTG. As para sport seemingly fostered psychological needs satisfaction, this study suggests that para sport may be an efficacious means for promoting PTG, particularly for individuals with severe initial reactions to disability or those who consider athletics an important part of their identity.

Study 2

The second study sought to understand PTG and distress by gaining insight into the cognitive processing that occurs in the aftermath of acquiring a physical disability, as well as the role of para sport participation in influencing these cognitions. Whereas study 1 was primarily informed by assumptions posited by OVT, study 2's emphasis on PTG achieved through cognitive processing more closely aligns with the functional descriptive model of PTG. Seventy-five para sport athletes completed questionnaires concerning their experiences of core belief challenge, cognitive processing, PTG, and distress. These measures comprised a serial mediation model which implied a causal sequencing from core belief challenge to PTG and distress through two forms of cognitive processing at two separate time points. Specifically, consistent with PTG literature, cognitive processing was conceptualized as being either intrusive (i.e., unsolicited thoughts with no productive purpose) or deliberate (i.e., voluntary thoughts with the purpose of sense making). Moreover, participants were asked to recall these ruminations as they occurred both in the immediate aftermath of having acquired their disability as well as recently during or due to para sport participation.

Results demonstrated that challenges to core beliefs influenced subsequent perceptions of both PTG and distress through cognitive processing. Specifically, several paths emerged that positively predicted PTG, whereas only one path positively predicted distress. As anticipated, all paths predictive of PTG travelled through deliberate rumination at one of the two time points, whereas the path predictive of distress consisted of intrusive rumination at both time points. Intrusive rumination, however, could be conceived of as being constructive if it prompted deliberate rumination, as was evidenced

by multiple indirect effects from core belief challenge to PTG. This study also provided support for the utility of para sport participation in soliciting the deliberate cognitions through which PTG could be achieved. However, as PTG could also be achieved through cognitions occurring exclusively in the immediate aftermath of acquiring disability, participation in para sport is not necessary for growth. Para sport participation may be particularly efficacious, however, if individuals are unable to deliberately ruminate in the immediate aftermath or if intrusive ruminations do not subside.

Study 3

The aim of study 3 was to essentially integrate the findings from study 1 and study 2 in the hopes of advancing a more nuanced and comprehensive understanding of how PTG is experienced for para sport athletes with acquired disability, and the potential role of para sport in this process. Specifically, the purpose was to examine how psychological needs satisfaction and deliberate rumination might interact to facilitate PTG. Seventy para sport athletes completed questionnaires assessing core belief challenge, deliberate rumination (both in the immediate aftermath of disability and recently brought about by para sport participation), needs satisfaction afforded through para sport participation, and PTG. In order to assess the proposed interaction, two variations of a moderated mediation model were utilized. Results revealed that core belief challenge was associated with subsequent PTG. Unlike the findings from study 2, however, deliberate rumination did not entirely account for this relationship. Moreover, needs satisfaction was not found to moderate the relationship. Despite the lack of support for the hypothesized moderated mediation models, deliberate rumination (at both time

points) as well as needs satisfaction were independently associated with PTG, and the regression models comprising all the variables was statistically significant. These results suggest that, although deliberate rumination and needs satisfaction do not interact as proposed, they remain potentially important variables in the experience of PTG.

Conclusions and Implications

The mission of many disability sport organizations is to make sport the vehicle through which individuals with disabilities can enhance their lives. Indeed, the utility of physical activity and sport for promoting positive outcomes for all individuals is well documented. However, while a plethora of research demonstrates the positive potential of physical activity and para sport for people with disabilities, there is still more to be understood in terms of how this positive influence is exerted. This dissertation sought to go beyond understanding *if* para sport facilitates positive change, to discovering *how* para sport facilitates positive change. Specifically, through theory driven research questions and analyses, this dissertation examined how PTG is achieved for individuals with acquired disability who participate in para sport.

PTG is not an inevitable outcome when one acquires a physical disability, nor is it necessarily even the most desirable outcome as compared to other responses such as resilience. However, in cases where core assumptions are severely shattered, precluding the possibility of a resilience response, the value of PTG is conceivably accentuated. This research has demonstrated that, for many, acquiring a physical disability can be highly traumatic and cause one to challenge their core beliefs, perhaps rendering the resilience response uncommon. Fortunately, this research has also demonstrated that the experience

of PTG may be salient amongst those who participate in para sport. As the two quantitative studies (studies 2 and 3) are cross-sectional in nature, the longitudinal direction of effect cannot be inferred. Nevertheless, several implications of this research remain.

First and foremost, results from this dissertation highlight the important role that challenges to one's worldviews and core beliefs plays in the experience of PTG. Not only are these existential questions normal after a traumatic event, but they also are necessary if one is to experience PTG. As such, rehabilitation practitioners ought to normalize these types of experiences when working with individuals with acquired disability. Similarly, practitioners should acknowledge that engaging in intrusive ruminations in the disability aftermath is not only a natural response, but potentially a constructive one, given the propensity for intrusive ruminations to give way to the deliberate ruminations known to elicit PTG. Though practitioners may feel inclined to try to immediately encourage their patients to move beyond their initial intrusive ruminations towards more deliberate ruminative thoughts, it might be more beneficial to allow for the patient to fully engage with their intrusive ruminations before arriving at deliberate ruminations in their own time.

It is important, however, to recognize if an individual's intrusive ruminations continue to persist, as this may be evidence that they are not constructively adjusting which may leave the individual more susceptible to distress. Though this dissertation did not provide a timeline for when ruminations should turn from being intrusive to more deliberate, being able to assess one's cognitive processing is presumably valuable. Practitioners may consider using psychometrically sound instruments, such as the Event

Related Rumination Inventory (Cann et al., 2011), to ascertain the style of rumination a patient is currently engaging in. Doing so may also may allow the practitioner to gain a better understanding of where the patient may be in relation to PTG. Furthermore, if the intrusive ruminations continue to persist, it may become necessary to try to find ways to prompt deliberate ruminations. For those individuals, para sport may be an efficacious means by which to foster the desired deliberate ruminations, particularly if the individual has a natural proclivity towards sport and physical activity.

Additionally, results from this dissertation identify the potential role that psychological needs satisfaction may play in the experience of PTG. Findings particularly highlight the importance of competency progression in building mastery experiences, allowing for individuals to have meaningful relationships with others who have endured similar disability circumstances, and to feel volitional. For instance, rehabilitation practitioners may establish progressively more difficult goals for an individual adapting to using a prosthetic to walk. This may consist of first being able to walk across the room, to eventually being able to run. Additionally, practitioners and para sport organizations may consider establishing a mentorship program wherein individuals with more recent acquisition of disability can be mentored by individuals with similar disabilities who have long since adjusted and experienced PTG. At the very least, rehabilitation specialists may consider educating patients regarding the opportunities for para sport, especially for patients with an athletic identity or a sporting background.

The findings from this study may conceivably have some relevance for individuals with congenital disabilities. That is, as it is likely that many individuals with congenital disabilities also suffer the same sort of detriments to their psychological needs

satisfaction as do those with acquired disabilities, the benefit of para sport involvement may be similar. Specifically, para sport may provide a means for individuals with congenital disabilities to form meaningful social relationships with individuals enduring similar challenges, to feel physically competent, and to feel volitional in their choices. However, given that individuals with congenital disabilities did not necessarily experience a trauma to acquire their disabilities, it can be questioned whether PTG would be a viable outcome. Nevertheless, there remains the opportunity for psychological growth and well-being.

Importantly, it is necessary to urge caution when considering PTG outcomes for all individuals. As previously mentioned, the resilient response to trauma often leaves no need or desire for psychological growth. Trying to push a narrative of growth on someone who has assimilated the trauma in a resilient manner may be counterproductive (Day & Wadey, 2016). Additionally, by normalizing the PTG experience, those unable to experience growth may feel like "coping failures" (Wortman, 2004). Rehabilitation practitioners and para sport administrators should be cognizant that not all individuals are capable of or desire PTG, and tailor para sport participation to the needs of the individual.

In summary, the strong associations between PTG with both deliberate rumination and needs satisfaction is significant. Therefore, para sport participation that cultivates an environment where needs may be satisfied and cognitive processing may be supported is likely an environment conducive to PTG. While it is acknowledged that para sport may not be an efficacious means to facilitate PTG for all individuals with acquired disability, its utility may be acutely apparent for those with an athletic identity or for those who find purpose or value in the physically active lifestyle. For those individuals, confronting the

trauma of having acquired a physical disability through para sport participation may be acutely beneficial.

References

Cann, A., Calhoun, L. G., Tedeschi, R. G., Triplett, K. N., & Vishnevsky, T., & Lindstrom, C. M. (2011). Assessing posttraumatic cognitive processes: The Event Related Rumination Inventory. *Anxiety, Stress, & Coping, 24,* 137-156.

Day, M. C., & Wadey, R. (2016). Narratives of trauma, recovery, and growth: The complex role of sport following permanent acquired disability. *Psychology of Sport and Exercise*, *22*, 131–138.

Wortman, C. B. (2004). Posttraumatic growth: Progress and problems. *Psychological Inquiry*, *15*, 81–90.

APPENDIX A

CONSENT FORM

CONSENT COVER LETTER

Background

You are being asked to take part in a research study. Before you decide, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully. Ask the principal investigator (Chris Hammer – chris.hammer@utah.edu) if there is anything that is not clear or if you would like more information. Take time to decide whether or not to volunteer to take part in this research study. The purpose of the study is to gain a better understanding of the role that para sport participation may play in facilitating posttraumatic growth for individuals with acquired disability. Specifically, the researchers are interested in the notion of cognitive processing and psychological needs satisfaction in the aftermath of having acquired a disability. This study is being conducted by Chris Hammer, a sport psychology doctoral student at the University of Utah.

Study Procedure

As part of this study, you are asked to complete a 25 to 45 minute survey. In addition to a short demographic questionnaire concerning one's disability and para sport experience, questions will be asked about how acquiring a disability challenged core beliefs, the thinking that one engages in following a disability, positive psychological changes that have occurred, current distress still experienced, and the role that para sport played in satisfying fundamental psychological needs.

Risks

There are no foreseeable risks associated with this study. However, participants will be asked to reflect back to emotional states felt in the immediate aftermath of acquiring a disability, which could potentially be distressing. Unforeseeable risk is anticipated to be no greater than that of daily living, but in the event of any pain or discomfort (physical or emotional) associated with the study, contact the researcher immediately (contact information provided below).

Benefits

We hope the information we get from this study may help develop a better understanding of how para sport promotes the development of posttraumatic growth for individuals with acquired disability. This knowledge can be used to promote para sport involvement and to inform physical activity interventions in order to hopefully produce posttraumatic growth and higher quality of life.

Confidentiality

Your data will be kept confidential. No names will be collected with the data. Data and records will be stored on a password protected computer. Only the researcher and members of the study team will have access to this information.

Person to Contact

If you have questions, complaints or concerns about this study, you can contact Chris Hammer at (248)515-0502 or chris.hammer@utah.edu. If you feel you have been harmed

as a result of participation, please contact Chris Hammer or the faculty advisor Dr. Les Podlog at (801) 581-7630 who may be reached from 9am-5pm (MST) Monday-Friday.
Institutional Review Board: Contact the Institutional Review Board (IRB) if you have questions regarding your rights as a research participant. Also, contact the IRB if you have questions, complaints or concerns which you do not feel you can discuss with the investigator. The University of Utah IRB may be reached by phone at (801) 581-3655 or by e-mail at irb@hsc.utah.edu.

Research Participant Advocate: You may also contact the Research Participant Advocate (RPA) by phone at (801) 581-3803 or by email at participant.advocate@hsc.utah.edu.

Voluntary Participation
It is up to you to decide whether to take part in this study. Refusal to participate or the decision to withdraw from this research will involve no penalty or loss of benefits to which you are otherwise entitled. This will not affect your relationship with the investigator.

Costs and Compensation to Participants
There are no costs/compensation for participants in this study.

Consent
By clicking on the "I Accept" button, you confirm that you have read the information in this consent form and have had the opportunity to ask questions, and that you voluntarily agree to take part in this study.

APPENDIX B

DEMOGRAPHIC QUESTIONNAIRE

DEMOGRAPHIC QUESTIONNAIRE

1. Age: ____ years
2. Gender:
    a. Male
    b. Female
    c. Other: _____
3. Race:
    a. Caucasian
    b. Asian
    c. African American
    d. Native American
    e. Pacific Islander
4. Type of acquired physical disability:
    a. Single leg, below knee amputee
    b. Double leg, below knee amputee
    c. Single leg, above knee amputee
    d. Double leg, above knee amputee
    e. Single arm, below elbow amputee
    f. Double arm, below elbow amputee
    g. Single arm, above elbow amputee
    h. Double arm, above elbow amputee
    i. Visual impairment (partial vision loss)
    j. Visual impairment (complete vision loss)
    k. Spinal cord injury (paraplegic)
    l. Spinal cord injury (quadriplegic)
    m. Other:_____
5. Age the disability was acquired: _____ years old
6. How was disability acquired:
    a. Traumatic accident (e.g., car accident) or acute injury (e.g., sport injury)
    b. Result of military combat
    c. Illness (e.g., cancer)
    d. Degenerative condition
    e. Other: _____
7. In a few sentences, describe the circumstances that lead to your acquired disability:_____
8. How long have you been involved in organized para sport?
    a. Less than 6 months
    b. 6 months to 1 year
    c. 1 to 3 years
    d. 3 to 5 years
    e. 5 to 10 years
    f. 10 to 20 years
    g. greater than 20 years

9. What is your primary para sport?
    a. Archery
    b. Canoe
    c. Cycling
    d. Equestrian
    e. Soccer
    f. Goal ball
    g. Judo
    h. Powerlifting
    i. Rowing
    j. Sailing
    k. Shooting
    l. Sitting Volleyball
    m. Swimming
    n. Table tennis
    o. Track and field
    p. Triathlon
    q. Wheelchair basketball
    r. Wheelchair fencing
    s. Wheelchair rugby
    t. Wheelchair tennis
    u. Downhill skiing
    v. Snowboarding
    w. Cross-country skiing
    x. Biathlon
    y. Ice hockey
    z. Other: _____
10. What is your highest level of para sport competition:
    a. Paralympic Games
    b. Para world championships
    c. Para Pan American Games
    d. International world cup or equivalent events
    e. National Championships
    f. Regional competitions
    g. Local/recreational competitions

APPENDIX C

CORE BELIEFS INVENTORY

CORE BELIEFS INVENTORY

Some events that people experience are so powerful that they 'shake their world' and lead them to seriously examine core beliefs about the world, other people, themselves, and their future.

Please reflect upon the event about which you are reporting and indicate **the extent to which it led you to seriously examine each of the following core beliefs**.

1. Because of the event, I seriously examined the degree to which I believe things that happen to people are fair.
2. Because of the event, I seriously examined the degree to which I believe things that happen to people are controllable.
3. Because of the event, I seriously examined my assumptions concerning why other people think and behave the way that they do.
4. Because of the event, I seriously examined my beliefs about my relationships with other people.
5. Because of the event, I seriously examined my beliefs about my own abilities, strengths and weaknesses.
6. Because of the event, I seriously examined my beliefs about my expectations for my future.
7. Because of the event, I seriously examined my beliefs about the meaning of my life.
8. Because of the event, I seriously examined my spiritual or religious beliefs.
9. Because of the event, I seriously examined my beliefs about my own value or worth as a person.

Responses are on a six-point scale (0 5):

(0) not at all; (1) to a **very small** degree; (2) to a small degree; (3) to a moderate degree; (4) to a great degree; (5) to a **very great** degree

Cann, A., Calhoun, L. G., Tedeschi, R. G., Kilmer, R. P., Gil-Rivas, V., Vishnevsky, T, & Danhauer, S. C. (2010). The Core Beliefs Inventory: A brief measure of disruption in the assumptive world. *Anxiety, Stress, & Coping, 23*(1), 19-34.

APPENDIX D

EVENT RELATED RUMINATION INVENTORY (WEEKS IMMEDIATELY AFTER THE EVENT

EVENT RELATED RUMINATION INVENTORY
(weeks immediately after the event)

(0) Not at all; (1) Rarely; (2) Sometimes; (3) Often

Intrusive Rumination Items: After an experience like the one you reported, people sometimes, but not always, find themselves having thoughts about their experience even though they don't try to think about it. Indicate for the following items how often, if at all, you had the experiences described during the weeks immediately after the event.

- I thought about the event when I did not mean to.
- Thoughts about the event came to mind and I could not stop thinking about them.
- Thoughts about the event distracted me or kept me from being able to concentrate.
- I could not keep images or thoughts about the event from entering my mind.
- Thoughts, memories, or images of the event came to mind even when I did not want them.
- Thoughts about the event caused me to relive my experience.
- Reminders of the event brought back thoughts about my experience.
- I found myself automatically thinking about what had happened.
- Other things kept leading me to think about my experience.
- I tried not to think about the event, but could not keep the thoughts from my mind.

Deliberate Rumination Items: After an experience like the one you reported, people sometimes, but not always, deliberately and intentionally spend time thinking about their experience. Indicate for the following items how often, if at all, you deliberately spent time thinking about the issues indicated during the weeks immediately after the event.

- I thought about whether I could find meaning from my experience.
- I thought about whether changes in my life have come from dealing with my experience.
- I forced myself to think about my feelings about my experience.
- I thought about whether I have learned anything as a result of my experience.
- I thought about whether the experience has changed my beliefs about the world.
- I thought about what the experience might mean for my future.
- I thought about whether my relationships with others have changed following my experience.
- I forced myself to deal with my feelings about the event.
- I deliberately thought about how the event had affected me.
- I thought about the event and tried to understand what happened.

Cann, A., Calhoun, L. G., Tedeschi, R. G., Triplett, K. N., & Vishnevsky, T., & Lindstrom, C. M. (2011). Assessing posttraumatic cognitive processes: The Event Related Rumination Inventory. *Anxiety, Stress, & Coping, 24,* 137-156.

APPENDIX E

EVENT RELATED RUMINATION INVENTORY (DURING AND/OR DUE TO RECENT PARA SPORT PARTICIPATION)

EVENT RELATED RUMINATION INVENTORY
(during and/or due to recent para sport participation)

(0) Not at all; (1) Rarely; (2) Sometimes; (3) Often

Intrusive Rumination Items: After an experience like the one you reported, people sometimes, but not always, find themselves having thoughts about their experience even though they don't try to think about it. Indicate for the following items how often, if at all, you had the experiences described during and/or due to recent para sport participation.

- I thought about the event when I did not mean to.
- Thoughts about the event came to mind and I could not stop thinking about them.
- Thoughts about the event distracted me or kept me from being able to concentrate.
- I could not keep images or thoughts about the event from entering my mind.
- Thoughts, memories, or images of the event came to mind even when I did not want them.
- Thoughts about the event caused me to relive my experience.
- Reminders of the event brought back thoughts about my experience.
- I found myself automatically thinking about what had happened.
- Other things kept leading me to think about my experience.
- I tried not to think about the event, but could not keep the thoughts from my mind.

Deliberate Rumination Items: After an experience like the one you reported, people sometimes, but not always, deliberately and intentionally spend time thinking about their experience. Indicate for the following items how often, if at all, you deliberately spent time thinking about the issues indicated during and/or due to recent para sport participation.

- I thought about whether I could find meaning from my experience.
- I thought about whether changes in my life have come from dealing with my experience.
- I forced myself to think about my feelings about my experience.
- I thought about whether I have learned anything as a result of my experience.
- I thought about whether the experience has changed my beliefs about the world.
- I thought about what the experience might mean for my future.
- I thought about whether my relationships with others have changed following my experience.
- I forced myself to deal with my feelings about the event.
- I deliberately thought about how the event had affected me.
- I thought about the event and tried to understand what happened.

Cann, A., Calhoun, L. G., Tedeschi, R. G., Triplett, K. N., & Vishnevsky, T., & Lindstrom, C. M. (2011). Assessing posttraumatic cognitive processes: The Event Related Rumination Inventory. *Anxiety, Stress, & Coping, 24,* 137-156.

APPENDIX F

POSTTRAUMATIC GROWTH INVENTORY

POSTTRAUMATIC GROWTH INVENTORY

Indicate for each of the statements below the degree to which this change occurred in your life as a result of having acquired your physical disability, using the following scale.

0= I did not experience this change as a result of my crisis.
1= I experienced this change to a very small degree as a result of my crisis.
2= I experienced this change to a small degree as a result of my crisis.
3= I experienced this change to a moderate degree as a result of my crisis.
4= I experienced this change to a great degree as a result of my crisis.
5= I experienced this change to a very great degree as a result of my crisis.

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

Note: Scale is scored by averaging all responses. Factors are scored by adding responses to items on each factor. Items to which factors belong are not listed on form administered to participants.

PTGI Factors

Factor I: Relating to Others; Factor II: New Possibilities; Factor III: Personal Strength; Factor IV: Spiritual Change; Factor V: Appreciation of Life

Tedeschi, R.G., & Calhoun, L.G. (1996). The Posttraumatic Growth Inventory: Measuring the positive legacy of trauma, *Journal of Traumatic Stress, 9*, 455-471.

APPENDIX G

THE IMPACT OF EVENTS SCALE-REVISED

THE IMPACT OF EVENTS SCALE-REVISED

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

(0) Not at all; (1) A little bit; (2) Moderately; (3) Quite a bit; (4) Extremely

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

INT: 1,2,3,6,9, 14,16,20

AVD: 5, 7, 8, 11, 12, 13, 17,22

HYP:4, 10, 15, 18,19,21

Weiss, D. S., & Marmar, C. R. (1997). The Impact of Event Scale-Revised. In J. P. Wilson & T. M. Keane (Eds.), *Assessing psychological trauma and PTSD* (pp. 399-411). New York, NY: Guilford Press.

APPENDIX H

THE BASIC NEEDS SATISFACTION IN SPORT SCALE

THE BASIC NEEDS SATISFACTION IN SPORT SCALE

7-point Likert scale (1 = "Not true at all", 7 = "Very true")

Indicate the degree to which the following statements describe your experiences within para sport.

Competence
I can overcome challenges in my sport.
I am skilled at my sport.
I feel I am good at my sport.
I get opportunities to feel that I am good at my sport.
I have the ability to perform well in my sport.

Autonomy – Choice
In my sport, I get opportunities to make choices.
In my sport, I have a say in how things are done.
In my sport, I can take part in the decision-making process.
In my sport, I get opportunities to make decisions.
Autonomy - Internal perceived locus of causality (IPLOC)
In my sport, I feel I am pursuing goals that are my own.
In my sport, I really have a sense of wanting to be there.
In my sport, I feel I am doing what I want to be doing.
Autonomy - Volition
I feel I participate in my sport willingly.
In my sport, I feel that I am being forced to do things that I don't want to do. (Reverse coding)
I choose to participate in my sport according to my own free will.

Relatedness
In my sport, I feel close to other people.
I show concern for others in my sport.
There are people in my sport who care about me.
In my sport, there are people who I can trust.
I have close relationships with people in my sport.

Ng, J.Y.Y., Lonsdale, C., & Hodge, K. (2011). The Basic Needs Satisfaction in Sport Scale (BNSSS): Instrument development and initial validity evidence. *Psychology of Sport and Exercise, 12,* 257–264.