FACTORS ASSOCIATED WITH POSTTRAUMATIC GROWTH IN TRAUMA PATIENTS AND ICU FAMILY MEMBERS

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by

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Each year in the United States, over three million people are hospitalized for traumatic injuries and five million are admitted to intensive care units (ICUs) as a result of traumatic injury or critical illness. Although the traditional benchmark for successful care in these settings has been patient survival, there has been an increased awareness of psychosocial issues that continue to impact patients' and family members' quality of life beyond the hospital stay.

The experience of a traumatic injury or serious illness, for patients or their families, can be challenging to recover from both physically and psychologically.

Extensive literature shows that presence of a psychological disorder can lead to or exacerbate negative physical health outcomes in patients, including increased risk of re-hospitalization, greater healthcare costs, and poorer quality of life. From the perspective of family members, psychological strain may hinder carrying out necessary caregiving activities for the patient, and this strain may continue unchecked since the majority of support and resources are directed at patients, not their caregivers.

The primary emphasis of psychology, medicine, and related disciplines tends to be on ways in which traumatic events are precursors to distress and, potentially, severe psychological and physical dysfunction. Although this focus is understandable given the prevalence of research and clinical training on the topic, substantially less literature describes the influence of positive psychological outcomes. *Posttraumatic growth* (PTG) describes positive change resulting from a struggle with highly challenging events, such as sustaining a traumatic injury or witnessing a family member in the ICU.

To date, no studies have examined factors associated with PTG in a heterogeneous sample of trauma patients or in the families of trauma/critical care ICU patients. The present studies sought to fill these gaps in the literature. The first study determined factors associated with PTG in a mixed trauma patient population one year post-injury. The second study did the same, but examined PTG in family members of trauma/critical care ICU patients one year post-hospitalization. By identifying variables related to growth, clinical interventions may be targeted to bolster those areas in hopes of improving outcomes in patients and their family members.

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Roden-Foreman, K., Robinson, R., Bennett, M., Roaten, K., Petrey, L., Powers, M., & Warren, A.M. (2017). Posttraumatic growth in family members of traumatically injured and critically ill patients. Under review.

Roden-Foreman, K., Robinson, R., Bennett, M., Roaten, K., Petrey, L., Powers, M., & Warren, A.M. (2017). Posttraumatic growth in a heterogeneous sample of traumatically injured patients one year after injury. Under review.

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Family members – "two or more persons who are related in any way - biologically, legally, or emotionally" (Institute for Patient and Family Centered Care, 2015)

Intensive care unit (ICU) – "Intensive care units serve patients with severe and life-threatening illnesses and injuries, which require constant, close monitoring and support in order to ensure normal bodily function." (Takrouri, 2004)

Posttraumatic growth (PTG) – "Positive change experienced as a result of the struggle with a major life crisis or a traumatic event" (Tedeschi & Calhoun, 1996)

Trauma patient – "Someone who has suffered a serious or life threatening injury as a result of an event such as a car wreck, gunshot wound or fall. Traumatic injuries may affect many parts of the body, including the brain, the extremities and internal organs. The severity of injuries can range from minor to life-threatening." (Trauma Survivors Network, retrieved from http://www.traumasurvivorsnetwork.org/traumapedias/19)

Traumatic event – "An event in which an individual is exposed to "actual or threatened death, serious injury, or sexual violence" (American Psychiatric Association, 2013)

CHAPTER ONE
Review of the Literature

POSTTRAUMATIC GROWTH

Background

Each year in the United States, over 3 million people are hospitalized and 27 million people are treated in emergency rooms for traumatic injuries (Centers for Disease Control and Prevention, 2015). Further, approximately five million patients are admitted to an intensive care unit (ICU) each year as a result of traumatic injury or critical illness (National Quality Forum, 2012). Although the traditional mark of successful care was patient survival, recently there has been an increase in awareness of psychosocial issues that extend beyond the hospital stay and continue to impact patients' and family members' quality of life after injury (Rainey, Petrey, Reynolds, Agtarap, & Warren, 2014; Warren et al., 2014; Warren et al., 2016; Zatzick et al., 2008).

When studying traumatic experiences, research in psychology, medicine, and related disciplines tends to emphasize that these events are precursors to distress and, potentially, severe psychological and physical dysfunction (Tedeschi & Calhoun, 2004). Although this focus is understandable given its clinical relevance, there is substantially less literature describing the influence of positive psychological factors on outcomes after a stressor. The term *posttraumatic growth* (PTG), coined by Tedeschi and Calhoun (1996), refers to positive change that occurs as a result of a struggle with challenging or traumatic life events.

As defined by the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* (DSM-5) a traumatic event is an event in which an individual is exposed to

"actual or threatened death, serious injury, or sexual violence" (American Psychiatric Association, 2013). This can occur through directly experiencing the event, witnessing the event as it occurred to others, or learning that the event occurred to a close family member or close friend. Previous research on PTG, discussed in depth below, has shown evidence of growth resulting from a variety of traumatic events in a range of populations. However, none have studied variables associated with PTG in a heterogeneous sample of patients who have experienced traumatic injury, nor has it been examined it in loved ones of patients hospitalized in an ICU for traumatic injuries or critical illnesses. Based upon the DSM-5 definition, both of these groups have experienced a traumatic event, and therefore may be capable of experiencing growth as a result.

Although PTG is closely related to other concepts associated with coping, such as resilience, hardiness, and optimism, there are important distinctions to be made among them. Resilience is typically thought of as an ability to bounce back from or resist the effects of adversity, allowing an individual to return to their pre-stressor baseline (American Psychological Association, 2014). Hardiness consists of a tendency towards attitudes of commitment, control, and challenge in response to life events that allows a person to maintain their baseline level of functioning in the face of a stressful experience. These attitudes allow the individual to be involved with the stressor that is occurring, actively work to influence outcomes, and view stressors and changes as opportunities for learning (Maddi, 2002). Finally, optimism involves an individual's expectations that events will have a positive outcome (Scheier & Carver, 1987). In contrast to these concepts, PTG refers to a change greater than the ability to resist or not be damaged by intensely stressful events. Rather than simply maintaining or returning to pre-trauma

levels of functioning, PTG involves positive psychological change that enhances how well the person was functioning beforehand (Zoellner & Maercker, 2006a).

Calhoun and Tedeschi (2006) suggest a curvilinear relationship between PTG and these other coping capacities, stating that individuals with moderate coping abilities are the most likely to exhibit PTG. On the other hand, those with deficient coping skills are likely to encounter only negative outcomes in the face of a stressor due to feeling overwhelmed; those who possess highly adaptive coping before a trauma are less likely to be strongly affected by it, instead appearing resilient. Calhoun and Tedeschi (1996) posit that it is the struggle to deal with and overcome the trauma that is crucial for PTG to occur, and people who already possess the ability to cope effectively with stressors will be less challenged than someone who exhibits moderate resilience, hardiness, or optimism.

PTG is most commonly measured using the Posttraumatic Growth Inventory (PTGI). The PTGI assesses growth in two ways. An individual's total score on the measure represents their level of overall, global growth. The scores can also be broken down and examined as five specific domains in which a person may experience growth: increased appreciation for life, more meaningful interpersonal relationships, an increased sense of personal strength, changed priorities, and richer existential and spiritual life (Tedeschi & Calhoun, 1996).

Models of PTG

In their 2004 paper, Tedeschi and Calhoun proposed a model for the process of PTG, the functional-descriptive model. Within this framework, cognitive processing and schema reconstruction play crucial roles in determining a person's outcome after a

traumatic event. They state that traumatic events serve as "seismic challenges" (Tedeschi & Calhoun, 2004, p. 5) to individuals' pre-trauma schemas by shattering their goals, beliefs, and ways of coping with emotional distress. This results in rumination as people try to comprehend and manage their emotional reactions to the trauma. Although this rumination can be distressing, it indicates that schemas are being rebuilt. As a result, individuals develop new schemas that incorporate both the trauma and other possible negative future events, which are more resistant to being shattered. These cognitive changes are experienced by the individual as growth (Tedeschi & Calhoun, 2004).

Joseph and Linley (2005) put forth another explanatory model for PTG, known as the organismic valuing process theory. This model posits that human beings resolve the experience of a trauma in one of three ways: assimilation, which allows the person to return to his or her pre-trauma baseline; negative accommodation, which tends to result in poor psychological outcomes, such as PTSD; or positive accommodation, which is likely to lead to PTG. The way in which a person resolves the trauma is dependent on individual factors, such as personality (Joseph & Linley, 2005). Other theories explaining the process of PTG exist, but these two are the most widely regarded (Joseph & Butler, 2010).

Factors Associated with PTG

It is important to note that the majority of existing studies examining PTG have been cross-sectional; only recently have high quality longitudinal studies begun to emerge (Joseph & Buckner, 2010). As a result, little can be concluded about what factors truly predict PTG, versus those that are simply associated with it. PTG has been examined in a number of populations, including individuals with cancer (Bellizzi, 2004;

Cordova, Cunningham, Carlson, & Andrykowski, 2001; Weiss, 2002;), survivors of natural disasters (McMillen, Smith, & Fisher, 1997), bereaved parents and spouses (Cadell, Regehr, & Hemsworth, 2003; Polatinsky & Esprey, 2000), assault survivors (Frazier, Conlon, & Glaser, 2001; Snape, 1997), veterans (Aldwin, Levenson, & Spiro, 1994; Waysman, Schwazwald, & Solomon, 2001), and caregivers (Cadell, 2003; McCausland & Pakenham, 2003). Based upon this research, several factors are thought to influence PTG, including personality characteristics, cognitive processing and appraisal, coping style, social support, and sociodemographic variables.

Personality Characteristics

Personality differences have been shown across numerous studies to contribute to PTG. For instance, McCrae and John (1992) found that of the Big Five personality variables, extraversion, openness, agreeableness, and conscientiousness were all positively associated with growth. Others have confirmed this, while adding that neuroticism is negatively associated with PTG (Linley & Joseph, 2004; Tedeschi & Calhoun, 2004). Given that personality characteristics are thought to capture stable aspects of an individual, the study of individual differences in this area is promising in terms of informing the research as to why some, but not all, people experience PTG.

Cognitive Processing and Appraisal

Several studies suggest that higher levels of perceived threat and harm resulting from the traumatic event are associated with higher levels of PTG (Calhoun & Tedeschi, 2006; Linley & Joseph, 2004). In other words, if an individual appraises the situation as being significantly damaging, they will likely experience growth. Furthermore, rumination, intrusions, and avoidance related to the traumatic event were also positively

associated with PTG (Linley & Joseph, 2004). These findings support Tedeschi and Calhoun's model of PTG, which requires that the traumatic experience present a significant enough threat to preexisting schemas that the necessary cognitive processing occurs in order to construct a revised worldview. However, if the individual perceives the event as too difficult to process, it may overwhelm the person's coping ability, leading to distress rather than growth (Helgeson, Reynolds, & Tomich, 2006; Tedeschi & Calhoun, 2004).

Coping Style

A meta-analysis by Linley and Joseph (2004) also found that a person's coping style influences the level of growth after a traumatic event. They described that people who utilize problem- or emotion-focused coping immediately following the trauma were more likely to experience PTG. Additionally, factors influenced by optimism, such as positive reappraisal and positive self-talk also tend to result in more growth. Conversely, those whose coping style was characterized by denial, repression, and emotion suppression had poorer outcomes (Helgeson et al., 2006).

Social Support

Findings on the interaction between social support and PTG have been mixed. Linley and Joseph (2004) found that merely the presence of social support did not tend to be associated with growth, but level of satisfaction with social support was positively associated with PTG. On the other hand, in a study of PTG in patients with HIV/AIDS, those with more social support experienced higher levels of PTG (Cadell et al., 2003). These findings are also seen in studies of breast cancer survivors. (Cordova et al., 2001).

Sociodemographic Variables

A meta-analysis performed by Helgeson, Reynolds, and Tomich (2006) found that women, people with minority racial background, and younger people appeared to experience the most growth. Women and younger people were also found to report more PTG when examined by Calhoun, Cann, and Tedeschi (2010), in addition to people with higher educational levels. Additional demographic factors, such as marital and socioeconomic status, have yielded mixed results in their effects on growth (Helgeson et al., 2006; Stanton, Bower, & Low, 2006).

The difference between sexes found in PTG research is consistent with a previous review of studies examining coping, which showed that women tend to engage in more positive reappraisal and positive self-talk than men (Tamres, Janicki, & Helgeson, 2002). As discussed above, these approaches to coping with a challenging or traumatic situation are associated with higher levels of PTG. Regarding racial and ethnic background, it is hypothesized that minority race or ethnicity contributes to PTG because growth following adversity may be more adaptive for minorities or, alternatively, minority persons' greater experience with adversity may lead to a pattern of deriving something good from bad situations (Helgeson et al., 2006).

PTG and Psychological Distress

A common misunderstanding in the topic of positive psychology, especially regarding PTG, is the idea that positive outcomes and psychological distress are mutually exclusive. Although it may at first seem paradoxical, in fact, it is not uncommon for an individual to experience both. The literature clearly states that those who experience PTG also acknowledge the negative aspects of the traumatic event (Tedeschi, Calhoun, & Cann, 2007). Although there is little research focused on this specific topic, previous

studies, when examining growth alongside measures of psychological distress, including depression, anxiety, and posttraumatic stress, have not consistently found negative associations between these variables (Joseph & Butler, 2010; Linley & Joseph, 2004). If growth and distress were truly opposing ends of a single continuum, this inconsistency would not be expected. Instead, researchers suggest that they may be viewed as separate constructs that may or may not coexist in a single individual (Helgeson et al., 2006; Linley & Joseph, 2004; Tedeschi & Calhoun, 2004).

Additionally, there is some evidence of a curvilinear relationship between distress and growth (Kleim & Ehlers, 2009; Lechner, Antoni, & Carver, 2006). Some trauma survivors may not perceive the event as traumatic and experience neither distress nor growth, a second group may experience primarily distress rather than growth, and a third group may report more growth and less distress. This fits with the models of PTG discussed above, which requires that the traumatic event be sufficiently jarring to shatter previously held beliefs and schemas, though not so overwhelming that the distress cannot be accommodated. This shattering serves as the starting point for rebuilding and developing new perspectives, which is perceived as growth (Calhoun & Tedeschi, 2006). They posit that the more an individual has to mentally work through a traumatic event, which may be experienced as distress, the more that person will ultimately benefit from the experience (Tedeschi & Calhoun, 2004).

Opponents of PTG

Despite the extensive literature supporting PTG, the concept is not without its critics. One of the primary criticisms is of the reliance on individuals' retrospective self-report in examining PTG. Doing so requires individuals to evaluate their current feelings,

recall their previous feelings, compare the two, assess the extent that a change has occurred, and determine what degree of that change can be attributed to the stressor (Coyne & Tennen, 2010). This process requires complex cognitive operations and can be subject to a number of biases (Ford, Tennen, & Albert, 2008). Although this concern is legitimate and presents difficulties for researchers examining many constructs, not just PTG, there is evidence for the presence of positive change in prospective studies that administered measures before and after a traumatic event, indicating that the presence of growth cannot be fully discounted on this issue alone (Joseph & Butler, 2010).

Additional concerns have been raised by some who suggest that reports of positive change may be illusory, rather than reflective of actual change (Park & Helgeson, 2006; Tedeschi, Calhoun, & Cann, 2007; Wortman, 2004). Some literature has suggested that self-reported growth may be exaggerated by respondents in an effort to depict their outcomes as being more positive than they actually are (Wortman, 2004). This may be due to pressure from a person's social network, which may react negatively to the person's expression of distress, but positively to expressions of growth and wellbeing (Silver, Wortman, & Crofton, 1990). Others have posited that reports of growth after a trauma are a result of defensive illusions or self-enhancing cognitive biases (McFarland & Alvaro, 2000; Cheng, Wong, & Tsang, 2006). In other words, given the stress and loss that is associated with the traumatic event, the survivor may attempt to convince him- or herself that positive changes have taken place (Wortman, 2004). Proponents of the construct of PTG have responded to these criticisms by demonstrating that reports of growth are not related to social desirability (Weinrib, Rothrock, Johnsen, & Lutgendorf, 2006; Wild & Paivio, 2003), people acknowledge both growth and

negative aspects of the traumatic experience (Powell, Rosner, Butolla, Tedeschi, & Calhoun, 2003), and the majority of those who report positive change are not also engaging in defensive denial (Dohrenwend et al., 2004). Additionally, a study by Rabe and colleagues (2006) found neurological correlates of PTG, indicating potential biological evidence for reports of growth. Thus, while it is important to consider the concerns raised regarding PTG, overall the evidence gives credence to the validity of the construct.

Clinical Relevance of PTG

Little research exists regarding the relationship between PTG and psychotherapy outcomes. It remains unclear whether growth is influenced by therapy interventions, whether the reverse is true, or if the interaction is bidirectional. Traditionally, the primary focus of psychotherapy has been on alleviating the negative aspects of a patient's experience by working towards symptom reduction with the ultimate goal of assisting the patient to return to his or her prior level of functioning (Zoellner & Maercker, 2006b). This is understandable given that patients generally request psychotherapy when they are struggling with issues they cannot resolve on their own, and their motivation for treatment is typically to reduce or eliminate this struggle. Patients rarely seek assistance from a therapist with the sole goal of personal growth, though this is often part of the therapeutic process (Zoellner & Maercker, 2006b). However, lately there has been a shift towards incorporating aspects of positive psychology into therapy by enhancing patients' strengths in treatment, rather than simply targeting deficits (Padesky & Mooney, 2012; Tedeschi & Kilmer, 2005).

While proponents of PTG do not suggest basing a new form of treatment on the concept, especially given the complexity of trauma-focused interventions, they do advocate for integrating it into other evidence-based approaches to therapy for trauma survivors (Tedeschi & Calhoun, 2006). Theoretically speaking, PTG is easily congruent with traditional therapeutic aims. For instance, cognitive processing and adaptive coping are common emphases in therapy, while maladaptive or avoidant coping strategies are often discouraged (Zoellner & Maercker, 2006b). In other words, mechanisms that are believed to lead to PTG are enhanced and supported in therapy, which makes growth more likely to occur than it might without therapeutic intervention.

In the limited research that is available, it has been shown that PTG can increase from pre- to post-treatment (Frazier et al., 2001; Hagenaars & van Minnen, 2010), though the methodology of these studies was such that no causal attributions could be made. The impact of PTG on treatment is still being investigated, though studies examining its effect have found that individuals experiencing growth were less likely to develop PTSD and those with higher levels of PTG had better treatment outcomes (Frazier et al., 2001; Hagenaars & van Minnen, 2010; McMillen, Smith, & Fisher, 1997). In summary, the evidence suggests that reducing distress through psychotherapy may or may not promote growth, but the experience of growth does act to improve post-trauma coping and to alleviate distress (Linley & Joseph, 2004). Therefore, clinicians may wish to consider the various dimensions of growth as a focus of therapy; working to strengthen those areas may promote growth and, as a result, further reduce distress.

PSYCHOLOGICAL IMPACT OF TRAUMATIC INJURY AND CRITICAL ILLNESS

Impact on Patients

Traumatic injuries lead to varying degrees of subsequent disability, the severity and duration of which can be furthered with comorbid psychological issues. The presence of psychiatric symptoms after injury, specifically those of PTSD and depression, are becoming increasingly recognized as both a significant preventable morbidity and a major determinant of overall outcome (Rainey et al., 2014; Warren et al., 2014; Zatzick et al., 2008). A recent literature review by Wiseman, Foster, and Curtis (2013) found reports of post-injury depression in 28-42% of trauma patients and PTSD in 30-93%. These are compared with the United States 12 month prevalence rates of 7% and 8%, respectively (American Psychiatric Association, 2013). As a result, the ACS-COT now recommends that Level I trauma centers screen for PTSD symptoms during the acute phase of injury, as well as noting that it would be prudent for centers to screen for depression due to the high rate of comorbidity between the two disorders (ACS-COT, 2014).

There is an extensive body of literature showing that the presence of a psychological disorder can lead to or exacerbate negative physical health outcomes in patients, including increased risk of re-hospitalization, delays in returning to work (Zatzick et al., 2008), limitations in daily activities (Holtslag et al., 2007), greater healthcare costs (Cameron et al., 2006), increased pain levels (Zatzick et al., 2003), and poorer quality of life (Dowdy et al., 2005; Osenbach et al., 2014). The presence of depressive symptoms following a traumatic injury may place patients at increased risk for suicide, poor treatment compliance, and poor health outcomes (DeSousa, 2010; Zatzick,

Russo, & Katon, 2003). Additionally, depression and PTSD are both associated with increased risk of substance use, and the two disorders are highly comorbid (Bryant et al., 2010; Shalev et al., 1998; Warren et al., 2014; Zatzick et al., 2004).

Posttraumatic Growth in Trauma Patients

As mentioned above, PTG has been widely studied in a number of medical patient populations, including those with specific types of traumatic injuries. Patients with traumatic brain injury (TBI) (Collicutt-McGrath & Linley, 2006; Powell, Ekin-Wood, & Collin, 2006) and spinal cord injury (SCI) (Chun & Lee, 2008; Kalpakjian et al., 2014; Pollard & Kennedy, 2007) are the most commonly studied though there is also research on survivors of motor vehicle collisions (Zoellner, Rabe, Karl, & Maercker, 2008) and assault (Kleim & Ehlers, 2009; Snape, 1997). While there is some variation in exact findings across each of these studies, all have found evidence of growth after traumatic injury.

Impact on Family Members

The patients are not the only ones who experience stress and difficulties; often overlooked is the burden on loved ones, especially those whose patient is hospitalized in an ICU. In this context, family members not only have to witness their loved one in a critically ill state, they also have to balance their time and resources to accommodate this new stressor in addition to their lives outside the hospital, which often results in reduced self-care and increased distress (Warren et al., 2016). Numerous studies have reported anxiety, depression, acute stress disorder, and complicated grief in the loved ones of ICU patients (Davidson, Jones, & Bienvenu, 2012). A literature review by Davidson and colleagues (2012) revealed rates of generalized anxiety disorder from 21-56%, depression

from 8-42%, and PTSD from 13-56%. In fact, the pattern is so significant and consistent that the Society of Critical Care Medicine (SCCM) coined the term *post-intensive care syndrome-family* (PICS-F) to describe this cluster of mental health issues resulting from exposure to the critical care setting (SCCM, 2010).

In addition to the acute distress experienced while the patient is hospitalized, family members often become the de facto caregivers once the patient is discharged, despite potentially being underprepared and overwhelmed (van den Born-van Zanten et al., 2016). The stress of this responsibility may lead to caregiver burden over time, which refers to "the extent to which caregivers perceive that caregiving has had an adverse effect on their emotional, social, financial, physical, and spiritual functioning" (Zarit, Todd, & Zarit, 1986, p. 260). Caregiver burden has been associated with poor self-care (Hoffman, Lee, & Mendez-Luck, 2012), social isolation (Rodakowski, Skidmore, Rogers, & Schulz, 2012), decreased quality of life (Johnson, Chaboye, Foster, & van der Vooren, 2001), increased mortality (Schultz & Beach, 1999), depression (van den Born-van Zanten et al., 2016), and suicide (Adelman, Tmanova, Delgado, Dion, & Lachs, 2014). The psychological strain family members endure may hinder their ability to carry out necessary caregiving activities for the patient, potentially resulting in detrimental outcomes for both patient and caregiver (Johnson, Chaboyer, Foster, & van der Vooren, 2001; van den Born-van Zanten et al., 2016).

Posttraumatic Growth in Family Members of ICU Patients

There do not appear to be any studies that have examined PTG in the loved ones of patients hospitalized in the ICU for a traumatic injury or critical illness. However, it has been examined in other caregiver groups, such as those caring for a loved one with

cancer (Ochoa, Castejon, Sumalla, & Blanco, 2013), HIV (Cadell, 2007), or multiple sclerosis (Ackroyd et al., 2011). In addition to caregivers, researchers have found evidence of PTG in other populations who experience indirect trauma exposure, such as mental health providers and first responders, leading to the use of the term *vicarious posttraumatic growth* (Arnold, Calhoun, Tedeschi, & Cann, 2005; Manning-Jones, de Terte, & Stephens, 2015). Given the findings of previous research, and given the known distress associated with having a loved one admitted to the ICU, it is likely that growth will be seen in this population.

OVERALL AIMS

Although researchers have examined PTG in specific groups of trauma patients, none, it seems, have attempted to identify factors associated with PTG in a heterogeneous trauma patient population. Additionally, there does not appear to be any existing literature examining PTG in family members of trauma/critical care ICU patients. This dissertation will be comprised of two studies, the aims of which are to gain a better understanding of PTG in trauma patients and family members of ICU patients. The first study plans to determine factors associated with PTG in a mixed trauma patient population one year post-injury based on demographic, injury-related, and psychological variables. It is believed that this study will be the first to do so, as others have focused on more specific injury populations. The second study will propose to do the same, but will instead examine PTG in family members of trauma/critical care ICU patients one year post-hospitalization. There does not appear to be existing research into this topic in this population, so it is believed that this study will provide new insight and fill a gap in the literature. It is hoped that the findings of these studies may be translated into clinical

application. By identifying variables related to growth, clinical interventions may be targeted to bolster those areas in hopes of improving outcomes in patients and their family members.

CHAPTER TWO
Study One

POSTTRAUMATIC GROWTH IN A HETEROGENEOUS SAMPLE OF TRAUMATICALLY INJURED PATIENTS ONE YEAR POST-INJURY

Abstract

Objective: Posttraumatic growth (PTG) describes positive change resulting from challenging life events. The current study examined factors associated with PTG in traumatically injured patients one year post-injury.

Methods: Participants (N=221) in this prospective cohort study included adults admitted to a Level I trauma center. Over half the participants (60%) were male, with a mean age of 47. Participants completed baseline measures during hospitalization. PTG was assessed at 12-month follow-up.

Results: Greater PTG was associated with minority race/ethnicity, lower income, automotive collision, premorbid psychological disorder, and positive baseline posttraumatic stress (PTS) screen. These variables are also known to predict PTS in trauma patients. Analysis confirmed that greater PTS at follow-up was associated with more growth.

Conclusions: Participants with the most growth also experienced the most distress. This finding demonstrates the importance of implementing psychological screening and intervention for trauma patients in the acute care setting to reduce PTS and facilitate growth.

Posttraumatic Growth in a Heterogeneous Sample of Traumatically Injured Patients One Year Post-Injury

Introduction

A traumatic event is defined in the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* as an event in which an individual is exposed to "actual or threatened death, serious injury, or sexual violence" (American Psychiatric Association, 2013). Each year, over 3 million people are hospitalized and 27 million people are treated in emergency rooms for traumatic injuries, such as those sustained in motor vehicle collisions, shootings, assaults, falls, and other mechanisms (Centers for Disease Control and Prevention, 2015). Level I trauma centers, verified by the American College of Surgeons – Committee on Trauma (ACS-COT), are equipped to provide the highest level of care to patients experiencing life threatening injuries resulting from such traumatic events (American College of Surgeons, 2014). Although the typical benchmark for successful care in these settings has been patient survival, there is a recent increase in awareness of psychosocial issues that extend beyond the hospital stay and continue to impact patients' quality of life after injury (Rainey, Petrey, Reynolds, Agtarap, & Warren, 2014; Warren et al., 2014; Zatzick et al., 2008). The experience of a traumatic injury or serious illness can be challenging to recover from both physically and psychologically. An extensive literature review shows that negative psychological factors can lead to or exacerbate negative physical health outcomes in patients, including increased risk of re-hospitalization, greater healthcare costs, and poorer quality of life (Dowdy et al., 2005; Osenbach et al., 2014; Rosenberger, Peter, & Ickovics, 2006).

When studying traumatic experiences, research in psychology, medicine, and related disciplines tends to emphasize that these events are precursors to distress and, potentially, severe psychological and physical dysfunction (Tedeschi & Calhoun, 2004). While understanding these negative outcomes is an important clinical goal, there is substantially less literature describing the influence of positive psychological factors on outcomes after a stressor. The term *posttraumatic growth* (PTG), coined by Tedeschi and Calhoun (1996), describes positive change that occurs as a result of a struggle with challenging or traumatic life events. It is typically measured using the Posttraumatic Growth Inventory, which examines growth across five primary domains: increased appreciation for life, more meaningful interpersonal relationships, an increased sense of personal strength, changed priorities, and richer existential and spiritual life (Tedeschi et al., 1996).

It is generally accepted that PTG occurs through cognitive processing and schema reconstruction (Tedeschi & Calhoun, 1996). Traumatic events are viewed as seismic challenges to individuals' pre-trauma schemas by shattering their goals, beliefs, and ways of coping with emotional distress. This results in rumination as people try to comprehend and manage their emotional reactions to the trauma. Although this rumination can be distressing, it indicates that schemas are being rebuilt. As a result, individuals develop new schemas that incorporate both the trauma and other possible negative future events, which are more resistant to being shattered. These cognitive changes are experienced by the individual as growth (Tedeschi & Calhoun, 2004).

Despite extensive literature supporting PTG, the concept is not without its critics. The primary concern is that reports of positive change may be illusory, rather than

reflective of actual change (Park & Helgeson, 2006; Tedeschi, Calhoun, & Cann, 2007; Wortman, 2004). Some have suggested that self-reported growth may be exaggerated in an effort to depict outcomes as being more positive than they actually are (Wortman, 2004). Others have posited that reports of growth after a trauma are a result of defensive illusions or self-enhancing cognitive biases (Cheng, Wong, & Tsang, 2006; McFarland & Alvaro, 2000). Proponents of the construct of PTG have responded to these criticisms by demonstrating that people acknowledge growth in addition to negative aspects of the traumatic experience (Powell, Rosner, Butolla, Tedeschi, & Calhoun, 2003), and the majority of those who report positive change are not engaging in defensive denial (Dohrenwend et al., 2004). Additionally, a study by Rabe and colleagues (2006) found neurological correlates of PTG, indicating potential biological evidence for reports of growth. Thus, while it is important to consider the concerns raised regarding PTG, overall the evidence lends credence to the validity of the construct.

PTG has been examined in a number of populations, including individuals with cancer (Bellizzi, 2004; Cordova, Cunningham, Carlson, & Andrykowski, 2001; Weiss, 2002), survivors of natural disasters (McMillen, Smith, & Fisher, 1997), bereaved parents and spouses (Cadell, Regehr, & Hemsworth, 2003; Polatinsky & Esprey, 2000), assault victims (Frazier, Conlon, & Glaser, 2001; Snape, 1997), veterans (Aldwin, Levenson, & Spiro, 1994; Waysman, Schwazwald, & Solomon, 2001), and caregivers (Cadell, 2003; McCausland & Pakenham, 2003). Based upon this research, several factors are thought to influence PTG, including personality characteristics, cognitive processing and appraisal, coping style, social support, and sociodemographic variables.

Regarding personality, McCrae and John (1992) found that of the Big Five personality variables, extraversion, openness, agreeableness, and conscientiousness were all positively associated with growth. Others have confirmed this, while adding that neuroticism is negatively associated with PTG (Linley & Joseph, 2004; Tedeschi & Calhoun, 2004). In the domain of cognitive processing and appraisal, several studies suggest that higher levels of perceived threat and harm resulting from the traumatic event are associated with higher levels of PTG (Calhoun & Tedeschi, 2006; Linley & Joseph, 2004). In other words, if an individual appraises the situation as being significantly damaging, they will likely experience growth. Furthermore, rumination, intrusions, and avoidance related to the traumatic event were also positively associated with PTG (Linley & Joseph, 2004). Linley and Joseph (2004) also found that a person's coping style influences the level of growth after a traumatic event. They described that people who utilize problem- or emotion-focused coping immediately following the trauma were more likely to experience PTG. Conversely, those whose coping style was characterized by denial, repression, and emotion suppression had poorer outcomes (Helgeson, Reynolds, & Tomich, 2006). Findings on the interaction between social support and PTG have been mixed. Linley and Joseph (2004) found that merely the presence of social support did not tend to be associated with growth, but level of satisfaction with social support was positively associated with PTG. On the other hand, in a study of PTG in patients with HIV/AIDS, those with more social support experienced higher levels of PTG (Cadell, Regehr, & Hemsworth, 2003). Regarding demographic variables, a meta-analysis performed by Helgeson, Reynolds, and Tomich (2006) found that women, people with minority racial background, and younger people appeared to experience the most growth.

Women and younger people were also found to report more PTG when examined by Calhoun, Cann, and Tedeschi (2010), in addition to people with higher educational levels. Additional demographic factors, such as marital and socioeconomic status, have yielded mixed results in their effects on growth (Helgeson et al., 2006; Stanton, Bower, & Low, 2006).

Researchers have examined PTG in specific groups of individuals after severe physical injury, including those with a traumatic brain injury (TBI) (Powell, Ekin-Wood, & Collin, 2007), traumatic spinal cord injury (SCI) (Chun & Lee, 2008; Pollard & Kennedy, 2007), and survivors of motor vehicle collisions (Rabe, Zoellner, Maercker, & Karl, 2006; Zoellner, Rabe, Karl, & Maercker, 2008) and physical assaults (Snape, 1997). However, none have studied variables associated with PTG in a heterogeneous trauma patient population. The aim of the present study was to examine factors associated with PTG in trauma patients one year post-injury.

Study measures spanned demographic variables, injury-related variables, and psychological variables. Based on existing literature, it was hypothesized that participants who were female, younger age, and/or of minority racial or ethnic background would experience greater growth. Additionally, it was believed that higher PTG would be associated with greater injury severity, higher pain rating, longer ICU length of stay, and longer hospital length of stay. These variables were used as an indication of the severity of the participants' injury event. Further, regarding psychological variables, it was predicted that PTG would be positively associated with social support at baseline. Finally, although the current study did not include measures specific to personality or coping styles, participants' level of resilience was assessed. Given that resilience has

previously been found to positively correlate with extraversion, conscientiousness, and problem-focused coping, and negatively correlate with neuroticism (Campbell-Sills, Cohan, & Stein, 2006; Secades et al., 2016), it was hypothesized that individuals with higher resilience would experience greater growth.

Methods

Participants and Procedure

The medical center's Institutional Review Board approved the study protocol. Data from this study were part of a prospective longitudinal study of patients in an urban Level I trauma center in the Southwest United States (Agtarap, Scott, Warren, & Trost, 2016; Powers et al., 2014; Rainey et al., 2014; Roden-Foreman et al., 2016; Trost et al., 2015; Warren et al., 2014; Warren et al., 2015; Warren et al., 2016a; Warren et al., 2016b). Participants were enrolled between March 2012 and May 2014 and included patients 18 years and older admitted to the trauma service for at least 24 hours with a traumatic injury, as defined by ICD-9 coding. Other inclusion criteria included lack of cognitive deficits that would prevent ability to provide informed consent (e.g., effects of severe TBI, dementia), ability to provide at least one form of contact information, and ability to understand English or Spanish.

Participants who met inclusion criteria for the study were voluntarily consented and enrolled at the bedside during their inpatient hospitalization. Reasons for nonparticipation by patients included change in mental status preventing valid consenting procedures, inability to accurately answer questions assessing orientation (e.g., date, time, location), and discharge prior to being approached for participation, as well as patients who reported experiencing too much pain, fatigue, or nausea to participate. After

obtaining informed consent, baseline measures were administered as a semi-structured interview that took between 30-45 minutes. At the conclusion of the interview, participants were provided a copy of the informed consent and a list of community mental health referrals including resources for counseling, substance abuse, and local support groups.

Follow-up occurred 12 months later. Twelve month follow-ups were conducted over the phone using contact information provided by the participant at baseline. The follow-up calls took place during a 2-month window around the participant's due date (i.e., 1 month before the due date to 1 month after) with a maximum number of 12 attempts for successful contact over the course of the 2-month window. Participants received reminder postcards or e-mails based on their indicated preference one week before their follow-up window opened. The 12-month follow-up calls followed a similar protocol to baseline regarding the questionnaires that were administered.

Measures

Posttraumatic Growth. PTG was assessed using the Posttraumatic Growth Inventory (PTGI). This 21-item scale is comprised of five domains: New Possibilities (5 items), Relating to Others (7 items), Personal Strength (4 items), Spiritual Change (2 items), and Appreciation of Life (3 items). Participants rate their experience of growth using a 5-point response format ranging from 0 (not at all) to 4 (very strongly), resulting in a range of scores from 0 to 84. The PTGI appears to have utility in determining how successful individuals are in coping with the aftermath of trauma and in reconstructing or strengthening their perceptions of self, others, and the meaning of events (Tedeschi & Calhoun, 1996). Both the full scale and the separate subscales of the PGTI have been

shown to have good internal reliability (.90 and .67–.85, respectively). Test–retest reliability of the scale has been reported to be adequate (Cohen, Hettler, & Pane, 1998; Tedeschi & Calhoun, 1996).

Associated Variables. Study measures were organized into the following domains: demographic variables, injury-related variables, and psychological variables. Data for these variables were gathered during initial hospitalization and 12 months later.

Demographic variables. Demographic variables were gathered using a self-report form and included age, gender, racial background, marital status, education level, insurance status, and employment.

Injury-related variables. Injury-related information was obtained from the hospital's trauma registry (TraumaBase© Clinical Data Management, Conifer, CO) and included variables such as trauma type (i.e., blunt or penetrating), mechanism of injury, presence of a TBI, and Injury Severity Score (ISS). The ISS is an anatomic scoring system that provides an overall score for patients with multiple injuries (Baker, O'Neill, & Haddon, 1974).

Participants were also given the Numeric Rating Scale (NRS) to assess pain severity. The NRS is one of the most common measures for assessing pain, and has been a validated outcome measure of pain intensity (Breivik, Björnsson, & Skovlund, 2000; Breivik et al., 2008). The NRS asks patients to rate their pain severity on a 0 to 10 scale, with 0 being "no pain" to 10 being "so severe that you can't stand it." A score of 0 is considered no pain, 1-3 mild, 4-6 moderate, and 7-10 is classified as severe pain (Jones, Vojir, Hutt, & Fink, 2007).

Psychological Variables

Depression. The Patient Health Questionnaire 8-Item (PHQ-8) is a brief self-report measure of major depressive disorder (Kroenke, Spitzer, & Williams, 2001). The PHQ-8 is considered to be a valid measure of depression for population-based studies and clinical populations (Kroenke et al., 2009), with a cut off score of equal to or greater than 10 considered diagnostic for current depression. The PHQ-8 is derived from the PHQ-9 by removing the last question regarding suicidality. In a study of 1,165 subjects with chronic medical conditions, the PHQ-8 was found to have adequate internal consistency reliability (Cronbach's $\alpha = .86$).

Posttraumatic Stress. Symptoms of posttraumatic stress were assessed using the Primary Care–Posttraumatic Stress Disorder Screen (PC-PTSD), a four-item screen designed for use in medical settings and is the instrument used in the Veterans Affairs (VA) system to screen for PTSD. It is considered a psychometrically sound screen for determining the presence and absence of PTSD in the VA setting, and it has also been used in civilian primary care populations (Freedy et al., 2010) as well as with patients admitted to a Level I trauma center following injury (Hanley, deRoon-Cassini, & Brasel, 2013). With a cut-off score of 3, the PC-PTSD has shown 85% diagnostic efficiency, 78% sensitivity, and 87% specificity (Prins et al., 2003). As PTSD cannot be diagnosed until symptoms exist for at least 30 days after the traumatic exposure, in the current study, a score of 3 or higher on the PC-PTSD at baseline was considered a positive screen for clinical levels of posttraumatic stress symptoms, rather than a diagnosis of PTSD.

Resilience. The Connor-Davidson Resilience Scale 10-Item (CD-RISC 10) is a measure of resilience with sound psychometric properties (Campbell-Sills & Stein, 2007; Connor & Davidson, 2003) and has been used in populations who have sustained

traumatic injuries (Rainey et al., 2014; White, Driver, & Warren, 2010). The scale has been developed and tested as a measure of degree of resilience; as a predictor of outcome to treatment with medication or psychotherapy, stress management, and resilience-building; as a marker of progress during treatment; and as a marker of biological (i.e., physical) changes in the brain (CD-RISC Frequently Asked Questions, retrieved from http://www.cd-risc.com/faq.php).

Social Support. The Social Provisions Scale (SPS) is a 24-item measure that assesses perceived social support received within the context of interpersonal relationships. It measures six dimensions of social support: guidance (receiving advice and/or information), reliable alliance (feeling assured that one can rely on certain others for concrete assistance if necessary), reassurance of worth (feeling important to or valued by others), opportunity for nurturance (feeling needed to provide nurturing attention to others), attachments (receiving a sense of emotional security from close relationships), and social integration (feeling a sense of belonging in a group, which includes others with similar interests, values, or ideas). It has demonstrated adequate internal consistency reliability (Cronbach's α ranging from .653 to .706) (Cutrona & Russell, 1987).

Alcohol Use. The Alcohol Use Disorder Identification Test-Consumption (AUDIT-C) is a three-item alcohol screen that can identify problematic alcohol use. The AUDIT-C has been extensively validated to detect problem drinking and has been a recommended screening tool for alcohol screening (Bradley et al., 2007; Frank et al., 2008; Rose et al., 2008).

Premorbid Psychiatric History. The participant's history of psychiatric illness was assessed by self-report, with subjects answering "yes", "no", or "unknown" to

having ever been diagnosed with or treated for psychological conditions including depression, bipolar disorder, PTSD, generalized anxiety disorder, phobias, and/or schizophrenia or other psychotic disorders.

Data Analysis

Linear regression was used to determine which factors were most associated with posttraumatic growth. Initially, separate regression models were run for each group of variables: demographic, injury-related, and psychological measures. Variables such as depression and PTSD were dichotomized to represent a positive or negative symptom screen based on standardized, validated cutoff scores. Two-way interactions were then evaluated within each group. Significant interactions were then included in a model with each factor that did not have a significant interaction. From this model, any variables that were significant at the 10% level were included in the final regression model that combined significant factors from each variable group. Continuous variables were centered around the mean for ease of interpretation.

Due to some missing data for the SPS (16%) and the CD-RISC (3%), multiple imputation was used to provide estimates for the missing values. Estimates were based on a regression analysis using demographic factors as predictors of SPS and CD-RISC scores. There were 20 imputed datasets created with regression models run for each dataset. The resulting estimates were pooled to determine the final model. All analysis was generated using SAS 9.4 (SAS Institute, Cary, NC).

Results

A total of 230 participants completed the PTGI. Of these, nine were removed from the analysis due to missing trauma registry data, leaving a total of 221 participants.

The sample consisted of predominantly Caucasian (71%) males (60%) with a mean age of 47.4 (*SD*=16.7), consistent with the demographics of the hospital's trauma population. The most common cause of injury was motor vehicle collision (38%), followed by fall (29%). The mean PTGI score was 56.7 (*SD*=28.6). Table 1 summarizes patient demographic, injury-related, and psychological characteristics at baseline. Tables 2 and 3 provide correlations between continuous and ordinal variables and categorical variables, respectively.

Among the demographic variables, there were no significant interactions. Three variables were significant enough to be included in the final model: Hispanic ethnicity, race, and income. Cause of injury was the only injury-related variable significant at the 10% level. History of psychological disorder (not including depression or PTSD, as they were considered separately), positive baseline PTSD screen, and the interaction between positive PTSD screen and the SPS total score were included from the psychological variables. The results of the final regression model are given in Table 4.

Of the demographic variables, Hispanic ethnicity (*p*=.004), African American race (*p*=.005), and annual income of <$50,000 (*p*=.002) were associated with greater PTG. Regarding injury-related variables, participants with injuries sustained as a result of a motorcycle collision (MCC) or motor vehicle collision (MVC) were significantly more likely to score higher on the PTGI (*p*=.026). Psychological variables of significance included positive baseline PTSD screen (*p*=.002) and history of psychological disorder other than depression or PTSD (*p*=.024). Disorders in this category consisted of bipolar disorder (*n*=11, 22%), panic disorder (*n*=13, 25%), generalized anxiety disorder (*n*=23, 45%), obsessive compulsive disorder (*n*=4, 8%), specific phobia (*n*=10, 20%), and

psychotic disorders (*n*=5, 10%). Note, participants could endorse more than one premorbid psychological diagnosis, which is why the percentages add to greater than 100. Finally, when PTSD screen was positive at baseline, higher SPS scores were significantly associated with higher PTG scores (*p*=.017) relative to higher SPS scores and a negative PTSD screen. The coefficient of determination (R^2) ranged from 0.22 to 0.26 for the 20 imputed models. The overall model F values ranged from 4.23 to 5.10.

Given that the variables found to be associated with growth also tend to be associated with posttraumatic stress in trauma patients (Alarcon et al., 2001; Powers et al., 2014), a t-test was performed to examine if there was a difference in PTGI scores for participants who screened positive versus negative for PTSD at 12 months. This analysis revealed that the average score on the PTGI was significantly higher for participants who were positive for PTSD at 12 months (66.4±22.1 vs. 54.3±29.5, *p*=0.003).

Discussion

Based on existing literature, it was hypothesized that PTG would be positively associated with female gender, younger age, minority racial/ethnic background, injury severity, pain severity, social support, and resilience. However, of these variables, minority race/ethnicity was the only one found to be associated with PTG in this sample. Other findings included higher PTG being associated with MCC or MVC, positive baseline PTSD screen, history of psychological disorder other than depression or PTSD, and higher social support in conjunction with positive baseline PTSD screen (as opposed to high social support without positive screen). Although different than expected, the findings are somewhat consistent with what has been found in other study populations.

Regarding demographic variables, as mentioned, minority racial and ethnic background have previously been demonstrated to have a positive association with PTG. Although the current study found that lower income was associated with higher PTG, findings have been mixed in the literature. Some studies found higher income to be associated with higher PTG, while others, including the current study, have found the opposite to be true (Helgeson, Reynolds, & Tomich, 2006; Stanton, Bower, & Low, 2006).

As regards injury-related variables, it was hypothesized that participants who were more severely injured (as measured by ISS) and those with higher pain severity would experience more growth. This was posited due to findings of previous studies, which indicated that the perceived threat and harm of the traumatic event were positively associated with PTG (Calhoun & Tedeschi, 2006; Linley & Joseph, 2004). This result was not seen in the data, which instead found that subjects who were involved in an MCC or MVC were significantly more likely to demonstrate PTG than if injured by another mechanism. Given that the present study appears to be the first to compare PTG among a heterogeneous group of injuries, it is unclear if this finding is consistent with previous literature. However, a previous study of PTG in MVC survivors found the average PTGI score to range from 38.4 (*SD*=15.8) to 40.2 (*SD*=18.4), depending on whether or not the participant also had symptoms of PTSD (Zoellner et al., 2008). Compared to the mean PTGI score in the current study, which was 56.7 (*SD*=28.6), their scores were much lower, indicating those MVC survivors experienced less growth than participants in the present study. It is unclear why participants in the current study had greater growth if they were injured in an MCC or MVC.

Finally, it was hypothesized that high resilience and social support would be associated with higher PTG, but this was not the case with either variable. However, the interaction between social support and positive PTSD screen was significant. Higher SPS scores (i.e., more perceived social support) along with a positive baseline PTSD screen were significantly associated with higher levels of growth, relative to higher SPS scores and negative PTSD screen. While findings on the interaction between social support and PTG are mixed (Cadell, Regeher, & Hemsworth, 2003; Cordova, Cunningham, Carlson, & Andrykowski, 2001; Linley & Joseph, 2004), this finding makes more sense in light of what is known about the relationship between social support and PTSD. Social support is typically viewed as a protective factor and is thought to contribute to improved outcomes in persons treated for PTSD (Thrasher, Power, Morant, Marks, & Dalgleish, 2010). Regarding the relationship between this interaction and PTG, it is possible that these participants who screened positive for PTSD at baseline and had strong social support were aided in the processing of the trauma and the rebuilding of schemas through discussing what had occurred with friends and family. This finding on the interaction between social support and positive PTSD screen indicates the importance of involving family members and friends of these patients in the treatment and recovery process.

The study's most interesting findings came outside of any of the hypotheses. Positive baseline PTSD screen was associated with higher PTGI scores, as was positive PTSD screen at 12 months. Additionally, participants who reported a premorbid psychological diagnosis other than depression or PTSD were more likely to experience growth than those who did not. Psychological disorders included in this category were bipolar disorder, panic disorder, generalized anxiety disorder, obsessive compulsive

disorder, psychotic disorders, and phobias. Generalized anxiety disorder was endorsed by 45% of participants who fell into this category. Anxiety and posttraumatic stress are very closely linked and often comorbid, even being classified in the same category in previous versions of the *Diagnostic and Statistical Manual of Mental Disorders* (American Psychiatric Association, 2000). Given that positive PTSD screen was also associated with higher PTG, the presence of an anxiety disorder may be playing a similar role.

While this seems paradoxical, a common misunderstanding in the topic of positive psychology, especially regarding PTG, is the idea that positive outcomes and psychological distress are mutually exclusive. In fact, it is not uncommon for an individual to experience both. Previous studies examining growth alongside measures of psychological distress including depression, anxiety, and posttraumatic stress, have not consistently found negative associations between these variables (Joseph & Butler, 2010; Linley & Joseph, 2004). If growth and distress were truly opposing ends of a single continuum, this inconsistency would not be expected. Instead, researchers suggest that they may be viewed as separate constructs that may or may not coexist in a single individual (Helgeson et al, 2006; Tedeschi & Calhoun, 2004). Additionally research is needed to better understand the relationship between these variables. Furthermore, it is important to note that the growth seen in these participants does not outweigh the distress they are also endorsing. Instead, this highlights the importance of providing treatment to those who are experiencing distress in order to reduce symptoms and prevent chronic pathology.

The mean PTGI score in the current study, which can range from 0-84, was 56.7 (*SD*=28.6). This study was the first to examine PTG in a heterogeneous traumatic injury

patient population, therefore no normative data have been published that provide for a direct comparison between scores. However, there have been studies with more specific trauma patient populations. A study by Pollard & Kennedy (2007) of individuals 10 years after traumatic spinal cord injury found much lower PTGI scores, with an average of 45.7 (*SD*=21.5). Similarly, in a study of individuals following traumatic brain injury, participants 1.7 years post-injury had a mean score of 36.5 (*SD*=18.7) and those 11.6 years post-injury had a mean score of 68.1 (*SD*=16.6) (Powell et al., 2007). Snape (1997) studied PTG in individuals two months and four months after being physically assaulted. The mean PTGI score in this sample was 53.4 (*SD*=20.1). In the context of these findings, the results of the current study appear to be approximately consistent with what would be expected in this patient population.

This study was not without limitations. Results were obtained from a convenience sample at a single Level I trauma center and, therefore, may not be generalizable. Additionally, subjects who qualified for the study had to be able to provide informed consent in order to participate, which excluded patients with very high injury severity, such as those with severe TBI. A number of variables which could inform the outcome of the study were not assessed, such as participants' prior exposure to trauma and whether or not they received any type of psychological intervention following their injury. Additionally, although the Posttraumatic Growth Inventory is the most widely used measure of PTG, it has been noted to have a weakness in that it does not allow participants to report negative growth. Furthermore, since there is some concern from critics of the concept of PTG that growth is illusory or cannot be accurately captured through self-report, it has been suggested that obtaining third party corroboration of the

participants' self-report data (e.g., from a spouse, close friend, or parent) may add to the reliability of results (Linley & Joseph, 2000; Powell et al., 2007). Future studies should take these limitations into consideration and attempt to replicate these results. Additionally, further investigation is needed into the relationship between growth and distress.

Research into predictors of PTSD in patients who have sustained traumatic injuries has yielded fairly consistent results, and the current study indicates that many of the same predictors are associated with growth (Alarcon et al., 2001; Powers et al., 2014; Warren et al., 2014). Based on these findings, it is recommended that psychological screening and intervention be implemented in the acute care setting in order to reduce symptoms of posttraumatic stress and facilitate PTG in trauma patients. Additionally, considering the findings regarding the interaction between social support and PTSD, interventions involving family members and friends should be considered in order to ensure that patients who screen positive for PTSD receive adequate social support to assist them in processing and overcoming the physical and psychological challenges presented by their injury. It is also important to keep in mind the well-established connection between physical and mental health; negative psychological factors often lead to or exacerbate negative physical health outcomes. Therefore, an added benefit of early psychological screening and intervention could be improved physical health in patients, in addition to increased psychological wellbeing. This could lead to outcomes such as decreased length of hospital stay, fewer readmissions, fewer complications, lower risk of substance use, faster return to work and pre-injury functioning, and lower morbidity and mortality (Warren et al., 2014; Zatzick et al., 2008; Zatzick et al., 2013). Based on the

recent increased emphasis on patient-centered care, such interventions and outcomes would be beneficial not only for patients and their families, but for hospitals as well.

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Table 1: Summary of demographic, injury-related, and psychological characteristics

Characteristics	N=221
Demographic Variables	
Age at Injury, mean±sd	47.4±16.7
Male Gender	132 (60%)
Race	
Caucasian	157 (71%)
African American	50 (23%)
Other	14 (6%)
Hispanic Ethnicity	35 (16%)
Married	87 (39%)
College Degree	90 (41%)
Employed	123 (56%)
Income	
<50k	81 (37%)
>50k	91 (41%)
Not provided	49 (22%)
Injury-Related Variables	
Cause of Injury	
Motor vehicle/cycle collision	84 (38%)
Fall	64 (29%)
Gunshot Wound/Aggravated Assault	30 (14%)
Other	43 (19%)
Blunt Injury	200 (91%)
Traumatic Brain Injury	65 (30%)
Injury Severity Score, median (IQR)	9 (5 ,16.5)
Ventilator Use	25 (11%)
ICU Days	
0	140 (63%)
1-2	47 (21%)
3-7	24 (11%)
>7	10 (5%)
Length of stay, median (IQR)	5 (3 ,9)
Psychological Variables	
SPS (n=186)	81.0±20.3
CD-RISC Total (n=215)	31.7±6.4
PHQ-8 positive	65 (29%)

PC-PTSD positive	52 (24%)
History of Depression	69 (31%)
History of PTSD	15 (7%)
History of other Psychological Disorder	51 (23%)

Table 2: Correlations between continuous and ordinal variables

	PTGI	Age at Injury	Injury Severity Score	ICU Days	Length of Stay	CD-RISC Total	SPS Total	PCS Total
PTGI Total	-							
Age at Injury	-0.20^	-						
Injury Severity Score	0.11	-0.08	-					
ICU Days	0.07	-0.13	0.40*	-				
Length of Stay	0.19^	-0.09	0.32*	0.43*	-			
CD-RISC Total	-0.02	0.01	-0.03	-0.06	-0.05	-		
SPS Total	-0.05	-0.09	0.02	0.01	0.04	0.33*	-	
PCS Total	-0.08	-0.32*	-0.01	0.04	-0.07	0.18^	0.21^	-

*p<.0001; ^p<0.01

Table 3: Cramer's V measure of association between categorical variables.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 - Gender	-															
2 - Hispanic	0.08	-														
3 - Race	0.09	0.24^	-													
4 - Married	-0.13	-0.02	0.17‡	-												
5 - College Degree	-0.09	-0.01	0.19‡	0.26+												
6 - Employment	0.07	0.09	0.08	0.12	0.13	-										
7 - Income	0.10	0.16	0.20^	0.35*	0.39*	0.31*	-									
8 - History of Depression	-0.18^	-0.21^	0.16	0.04	0.00	-0.13	0.08	-								
9 - History of PTSD	-0.11	0.03	0.02	0.00	0.07	-0.05	0.12	0.25+	-							
10 - History of Other Psych Disorder	0.01	-0.12	0.16	-0.02	0.01	-0.22‡	0.07	0.44*	0.28*	-						
11 - Cause of Injury	0.30+	0.20‡	0.21^	0.26^	0.19‡	0.17	0.14	0.20‡	0.06	0.20‡	-					
12 - Trauma Type	0.14‡	0.07	0.27+	-0.10	-0.14‡	-0.08	0.16	0.01	0.04	0.12	0.73*	-				
13 - TBI	0.04	-0.08	0.02	-0.08	0.05	-0.02	0.10	0.11	0.08	0.10	0.18	-0.21^	-			
14 - Ventilator use	0.12	-0.04	0.05	-0.08	-0.06	-0.08	0.06	0.16‡	0.13	0.11	0.20‡	0.13	0.21^	-		

15 - PHQ-8 positive	0.12	-0.04	0.17‡	-0.03	-0.03	-0.26*	0.15	0.27*	0.10	0.31*	0.12	0.13	0.02	0.21^	-	
16 - Audit-C positive	0.12	0.07	0.04	-0.11	0.00	0.03	0.03	-0.15‡	-0.05	-0.02	0.21‡	0.02	0.03	0.04	-0.02	-
17 - PC-PTSD positive	-0.04	-0.01	0.12	0.03	-0.03	-0.04	0.13	0.25+	0.36*	0.30*	0.12	0.04	0.12	0.21^	0.30*	0.04

*p<.0001; +p<0.001; ^p<0.01; ‡p<0.05

Table 4: Results of final regression model for posttraumatic growth index score.

Variable	**Beta (std. error)**	***p*-value**
Race		
Caucasian	(reference)	
African American	14.2 (5.2)	**0.0074**
Other	0.69 (8.6)	0.9360
Hispanic Ethnicity	16.4 (5.6)	**0.0038**
Income		
>50k	(reference)	
<50k	17.1 (4.8)	**0.0005**
Cause of Injury		
Fall	(reference)	
Motor vehicle/cycle collision	11.5 (4.9)	**0.0205**
Gunshot Wound/Aggravated Assault	-0.85 (6.8)	0.9014
Other	6.0 (6.0)	0.3193
History of other Psychological Disorder	12.3 (5.1)	**0.0176**
SPS total	-0.11 (0.2)	0.6168
PC-PTSD positive	-113.7 (36.5)	**0.0022**
SPS total x PC-PTSD positive	1.49 (0.45)	**0.0011**

CHAPTER THREE
Study Two

POSTTRAUMATIC GROWTH IN FAMILY MEMBERS OF TRAUMATICALLY INJURED AND CRITICALLY ILL PATIENTS

Abstract

Background: Numerous studies have reported anxiety, depression, posttraumatic stress, and complicated grief in family members of patients in intensive care units (ICUs); substantially less literature describes potential positive psychological outcomes after such a stressor. Posttraumatic growth (PTG) refers to positive change that occurs from struggling with challenging life events. No studies have examined factors associated with PTG in families of trauma/critical care ICU patients. The current study aimed to fill this gap in the literature.

Methods: This prospective cohort study included 68 adult (≥18 years) family members of adult patients admitted to a trauma/critical care ICU of a Level I trauma center. Participant demographics, patient-related variables (e.g., primary ICU diagnosis), and psychosocial measures (e.g., depression, social support) were obtained during patients' ICU hospitalization. PTG was assessed 12 months later., Individual linear regression models were used for each variable to determine which factors were most associated with PTG. Variables significant at the 10% level were included in the final regression model.

Results: Race, ethnicity, income, and history of PTSD were the only variables with significant associations to PTG from the individual models. Hispanic ethnicity ($p=0.016$) and African American race ($p=0.007$) were significantly associated with greater PTG. Having a history of PTSD was associated with less PTG ($p=0.019$). Income was no longer significant in the final model.

Conclusions: Results indicate that African American and Hispanic family members experience more PTG resulting from their loved one's hospitalization, while those with a history of PTSD have less. Though it is logical that previous poor outcomes after a stressor (i.e., PTSD) would be at odds with growth, interestingly, minority racial and ethnic background are typically considered risk factors for worse outcomes after a stressful event, such as seeing a family member in an ICU. Additional study is warranted to further understand this relationship and translate this research into clinical application.

POSTTRAUMATIC GROWTH IN FAMILY MEMBERS OF TRAUMATICALLY INJURED AND CRITICALLY ILL PATIENTS

Introduction

Each year in the United States, approximately five million patients are admitted to an intensive care unit (ICU) as a result of traumatic injury or critical illness (National Quality Forum, 2012). Although the practice of patient-centered care has become the standard in healthcare in recent years (Epstein & Street, 2011), patients are not the only ones who experience difficulties. Often overlooked is the psychological effect on loved ones, especially those whose patient is hospitalized in an ICU. There is increasing evidence of the significant impact that critical illness has on family members of the critically ill (Davidson et al., 2016). As defined by the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition*, exposure to trauma includes "learning that the traumatic event(s) [actual or threatened death, serious injury, or sexual violence] occurred to a close family member or close friend" (American Psychiatric Association, 2013). Based on this definition, learning of a loved one's critical illness or injury (perhaps even witnessing the event which led to the patient's hospitalization), in addition to repeatedly seeing a loved one in an ICU setting, which often involves the patient being attached to life-sustaining devices, such as a ventilator, would qualify as a traumatic event. During this event, families have to balance their time and resources to accommodate this new stressor in addition to managing their routines outside of the hospital, which commonly results in reduced self-care and increased distress (Warren et al., 2016). In addition to the acute distress experienced while the patient is hospitalized, family members often become the de facto caregivers once the patient is discharged, despite potentially being

underprepared and overwhelmed (van den Born-van Zanten et al., 2016). The psychological strain family members endure may hinder their ability to carry out necessary caregiving activities for the patient, potentially resulting in detrimental outcomes for both patient and caregiver (Johnson, Chaboyer, Foster, & van der Vooren, 2001; van den Born-van Zanten et al., 2016).

Numerous studies have reported the negative impact of trauma including anxiety, depression, acute stress disorder, and complicated grief in the loved ones of ICU patients (Davidson, Jones, & Bienvenu, 2012). While understanding these negative outcomes is an important clinical goal, there is substantially less literature describing the influence of positive psychological factors on outcomes after a stressor. The term *posttraumatic growth* (PTG), coined by Tedeschi and Calhoun (1996), describes positive change that occurs as a result of a struggle with challenging or traumatic life events, such as having a loved one in the ICU. The construct is measured with the Posttraumatic Growth Inventory across five primary domains: increased appreciation for life, more meaningful interpersonal relationships, an increased sense of personal strength, changed priorities, and richer existential and spiritual life (Tedeschi et al., 1996).

It is generally accepted that PTG occurs through cognitive processing and schema reconstruction (Tedeschi & Calhoun, 1996). Traumatic events are viewed as seismic challenges to individuals' pre-trauma schemas by shattering their goals, beliefs, and ways of coping with emotional distress. This results in rumination as people try to comprehend and manage their emotional reactions to the trauma. Although this rumination can be distressing, it indicates that schemas are being rebuilt. As a result, individuals develop new schemas that incorporate both the trauma and other possible

negative future events, which are more resistant to being shattered. These cognitive changes are experienced by the individual as growth (Tedeschi & Calhoun, 2004).

PTG has been examined in a number of populations, including individuals with cancer (Bellizzi, 2004; Cordova, Cunningham, Carlson, & Andrykowski, 2001; Weiss, 2002), survivors of natural disasters (McMillen, Smith, & Fisher, 1997), bereaved parents and spouses (Cadell, Regehr, & Hemsworth, 2003; Polatinsky & Esprey, 2000), assault victims (Frazier, Conlon, & Glaser, 2001; Snape, 1997), and veterans (Aldwin, Levenson, & Spiro, 1994; Waysman, Schwazwald, & Solomon, 2001). There has also been a substantial amount of research on the topic of vicarious posttraumatic growth, though this literature focuses on the experiences of those who are exposed to trauma survivors and the stories of their trauma (e.g., mental health clinicians) (Brockhouse, Msetfi, Cohen, & Joseph, 2011; Hyatt-Burkhart, 2014; Manning, de Terte, & Stephens, 2015). While this type of exposure has similarities to what individuals go through when a loved one has a traumatic experience, such as a severe illness, it lacks the components of witnessing the illness and its consequences firsthand, as well as having a personal attachment to the individual who is going through it. Although some studies have examined PTG in loved ones of individuals who experienced a traumatic event, the vast majority of the literature on this specific topic has focused on those who were formal caregivers, and almost exclusively on caregivers of individuals with cancer or HIV/AIDS (Ackroyd et al., 2011; Cadell, 2003, 2007; Carver, 2007; McCausland & Pakenham, 2003). None have studied variables associated with PTG in close family members and friends of patients hospitalized in an ICU for traumatic injury or critical illness.

Based upon research of PTG in general, as well as PTG more specifically in loved ones and caregivers, several factors are thought to influence growth, including social support, sex, age, race, ethnicity, and resilience. In their meta-analysis, Linley and Joseph (2004) found that level of satisfaction with social support was positively associated with PTG. This was also true in studies of caregivers of patients with HIV/AIDS (Cadell, 2003; Cadell, 2007), caregivers of patients with cancer (Kim, Schultz, & Carver, 2007), and husbands of breast cancer survivors (Weiss, 2004). Regarding demographic variables, a meta-analysis performed by Helgeson, Reynolds, and Tomich (2006) found women, people with minority racial background, and younger people appeared to experience the most growth. Women and younger people were also found to report more PTG when examined by Calhoun, Cann, and Tedeschi (2010). Additional demographic factors, such as marital and socioeconomic status, have yielded mixed results in their effects on growth (Helgeson et al., 2006; Stanton, Bower, & Low, 2006). Finally resilience has been found to positively correlate with PTG (Bensimon, 2012; Nishi, Matsuoka, & Kim, 2010; Oginska-Bulik 2014).

Despite extensive literature supporting PTG, the concept is not without its critics. The primary concern is that reports of positive change may be illusory, rather than reflective of actual change (Park & Helgeson, 2006; Tedeschi, Calhoun, & Cann, 2007; Wortman, 2004). Some have suggested that self-reported growth may be exaggerated in an effort to depict outcomes as being more positive than they actually are (Wortman, 2004). Others have posited reports of growth after a trauma are a result of defensive illusions or self-enhancing cognitive biases (Cheng, Wong, & Tsang, 2006; McFarland & Alvaro, 2000). Proponents of the PTG construct have responded to these criticisms by

demonstrating that individuals acknowledge growth in addition to negative aspects of the traumatic experience (Powell, Rosner, Butolla, Tedeschi, & Calhoun, 2003), and the majority of those who report positive change are not engaging in defensive denial (Dohrenwend et al., 2004). Additionally, a study by Rabe and colleagues (2006) found neurological correlates of PTG, indicating potential biological evidence for reports of growth. Thus, while it is important to consider the concerns raised regarding PTG, overall the evidence lends credence to the validity of the construct.

The aim of the present study was to examine factors associated with PTG in loved ones of trauma/critical care ICU patients one year post-hospitalization. Variables in the study spanned participant demographic variables, patient-related variables, and psychological variables. Based on existing literature, it was hypothesized that participants who were female, younger age, and/or of minority racial or ethnic background would experience greater growth. Additionally, it was believed that higher PTG would be associated with patient-related variables including admission for traumatic injury (versus critical illness) and presence of a traumatic brain injury due to these being indicative of a more sudden, severe traumatic event. Regarding psychological variables, it was predicted that PTG would be positively associated with social support at baseline, as well as with caregiver burden at 12-month follow-up. Finally, it was hypothesized that individuals with higher resilience would experience greater growth.

Methods

Participants

Participants were part of the prospective Family Longitudinal Outcomes After Trauma (FLOAT) project at an urban Level I trauma center. Enrollment occurred

between March 2013 and July 2015. The present study included only those who completed both baseline and 12-month follow-up. Participants included the adult (i.e., age 18 or older) family members of adult patients admitted to the trauma/critical care ICU who anticipated spending time with the patient in a caregiver or supportive role (e.g., emotional, social, financial) after the patient was discharged. For the purposes of this study, family members were defined according to the Institute of Patient and Family Centered Care as "two or more persons who are related in any way - biologically, legally, or emotionally," and could therefore include close friends as well (Institute for Patient and Family Centered Care, 2015). Other inclusion criteria required that the patient be admitted to the ICU for greater than 48 hours with an expected survival greater than 96 hours. Exclusion criteria included the inability to understand written or spoken English at the 8th grade level and the inability to provide at least two forms of contact information for follow up.

Procedure

Approval was obtained from the medical center's Institutional Review Board. Recruitment occurred in the ICU waiting room. Participants who met the criteria to be approached for inclusion in the study were voluntarily consented and enrolled in private rooms reserved for research activities and other consultation. Baseline measurements were collected during the patient's admission to the trauma/critical care ICU. After obtaining informed consent, baseline measures were administered as a semi-structured interview that took 30-45 minutes. At the conclusion of the interview, participants were provided a copy of the informed consent, as well as a business card for the study staff,

and a list of community mental health referrals including resources for counseling, substance abuse, and local support groups.

Follow-ups occurred 12 months later via phone using contact information provided by the participant at baseline. The follow-up calls took place during a 2-month window around the participant's scheduled assessment date (i.e., 1 month before the due date to 1 month after) with a maximum number of 12 attempts for successful contact over the course of the 2-month window. Participants received reminder postcards or e-mails based on their indicated preference one week before their follow-up window opened. The 12-month follow-up calls followed a similar protocol to baseline regarding the questionnaires that were administered, and continued consent was obtained before completing the measures. Participants received the list of community referrals again, if requested. Following completion of the study, a thank you card was sent to the subject in appreciation for their participation.

For those family members whose patient expired between baseline and follow-up, a bereavement protocol was used to assess for psychological response these participants may have experienced. The bereavement protocol included many of the same measures as the standard interview, but questionnaires regarding caregiver burden were removed and a measure examining complicated grief was added. Due to the low number of participants who received the bereavement protocol, their data were not included in the current study.

Measures

Posttraumatic growth. PTG was assessed using the Posttraumatic Growth Inventory (PTGI). This 21-item scale is comprised of five domains: New Possibilities (5

items), Relating to Others (7 items), Personal Strength (4 items), Spiritual Change (2 items), and Appreciation of Life (3 items). Participants rate their experience of growth using a 5-point response format ranging from 0 (not at all) to 4 (very strongly), resulting in a range of scores from 0 to 84. The PTGI appears to have utility in determining how successful individuals are in coping with the aftermath of trauma and in reconstructing or strengthening their perceptions of self, others, and the meaning of events (Tedeschi & Calhoun, 1996). Both the full scale and the separate subscales of the PGTI have been shown to have good internal reliability (.90 and .67–.85, respectively). Test–retest reliability of the scale has been reported to be adequate (Cohen, Hettler, & Pane, 1998; Tedeschi & Calhoun, 1996).

Associated variables. These measures were organized into the following domains: participant demographic variables, patient-related variables, and psychological variables. Data for these variables were gathered during initial hospitalization and 12 months later.

Participant demographic variables. Participant demographic variables were gathered using a standard self-report form and included age, gender, racial background, marital status, education level, insurance status, employment, and relationship to the patient.

Patient-related variables. Patient demographics and hospital-related variables were extracted from a variety of sources including the hospital's electronic medical record, information provided during ICU multidisciplinary rounds, and from participant self-report. These variables included date of birth, etiology of injury (if applicable),

primary ICU diagnosis (i.e., trauma vs non-trauma), date of ICU admission, insurance status, and the presence of a TBI.

Psychological variables.

Depression. The Patient Health Questionnaire 8-Item (PHQ-8) is a brief self-report measure of depressive symptoms (Kroenke, Spitzer, & Williams, 2001). The PHQ-8 is considered to be a valid measure of depression for population-based studies and clinical populations (Kroenke et al., 2009), with a cut off score of equal to or greater than 10 considered diagnostic for current depression. The PHQ-8 is derived from the PHQ-9 by removing the last question regarding suicidality. In a study of 1,165 subjects with chronic medical conditions, the PHQ-8 was found to have adequate internal consistency reliability (Cronbach's $\alpha = .86$).

Posttraumatic stress. Symptoms of posttraumatic stress were assessed using the Primary Care–Posttraumatic Stress Disorder Screen (PC-PTSD), a four-item screen designed for use in medical settings and is the instrument used in the Veterans Affairs (VA) system to screen for PTSD. It is considered a psychometrically sound screen for determining the presence and absence of PTSD in the VA setting, and it has also been used in civilian primary care populations (Freedy et al., 2010) as well as with patients admitted to a Level I trauma center following injury (Hanley, deRoon-Cassini, & Brasel, 2013). With a cut-off score of 3, the PC-PTSD has shown 85% diagnostic efficiency, 78% sensitivity, and 87% specificity (Prins et al., 2003). As PTSD cannot be diagnosed until symptoms exist for at least 30 days after the traumatic exposure, in the current study, a score of 3 or higher on the PC-PTSD at baseline was considered a positive screen for clinical levels of posttraumatic stress symptoms, rather than a diagnosis of PTSD.

Resilience. The Connor-Davidson Resilience Scale 10-Item (CD-RISC 10) is a measure of resilience with sound psychometric properties (Connor & Davidson, 2003) and has been used in populations who have sustained traumatic injuries (Rainey et al., 2014; White, Driver, & Warren, 2010). The scale has been developed and tested as a measure of degree of resilience; as a predictor of outcome to treatment with medication or psychotherapy, stress management, and resilience-building; as a marker of progress during treatment; and as a marker of biological (i.e., physical) changes in the brain.

Social support. The Social Provisions Scale (SPS) is a 24-item measure that assesses perceived social support received within the context of interpersonal relationships. It measures six dimensions of social support: guidance (receiving advice and/or information), reliable alliance (feeling assured that one can rely on certain others for concrete assistance if necessary), reassurance of worth (feeling important to or valued by others), opportunity for nurturance (feeling needed to provide nurturing attention to others), attachments (receiving a sense of emotional security from close relationships), and social integration (feeling a sense of belonging in a group, which includes others with similar interests, values, or ideas). It has demonstrated adequate internal consistency reliability (Cronbach's α ranging from .653 to .706) (Cutrona & Russell, 1987).

Alcohol use. The Alcohol Use Disorder Identification Test-Consumption (AUDIT-C) is a three-item alcohol screen to identify problematic alcohol use. The AUDIT-C has been extensively validated to detect problem drinking and has been a recommended screening tool for alcohol screening (Bradley et al., 2007; Frank et al., 2008; Rose et al., 2008).

Caregiver burden. Caregiver burden was assessed at 12-month follow-up using the Caregiver's Burden Scale (CBS). This 22-item scale assesses subjectively experienced burden by caregivers of chronically disabled persons. The instrument comprises five factors: general strain, isolation, disappointment, emotional involvement and environment (Macera, Eaker, Jannarone, Davis, & Stoskopf, 1993). The instrument has now been used among caregivers of patients with a variety of diagnoses including dementia, stroke, Parkinson's Disease, orthopedic injuries, and individuals living in a variety of care settings. It has demonstrated adequate internal consistency reliability, with an alpha coefficient of 0.87 (Macera et al., 1993).

Premorbid psychiatric history. The participant's history of psychiatric illness was assessed by self-report, with subjects answering "yes", "no", or "unknown" to having ever been diagnosed with or treated for psychological conditions including depression, bipolar disorder, PTSD, generalized anxiety disorder, phobias, and/or schizophrenia or other psychotic disorders.

Data Analysis

Linear regression was used to determine which factors were most associated with posttraumatic growth. Variables such as depression and PTSD were dichotomized to represent a positive or negative symptom screen based on standardized, validated cutoff scores. Initially, separate regression models were run for each group of variables: participant demographic, patient-related, and psychological measures. To determine which factors were most associated with growth, individual simple general linear regression models were used for each variable. Variables that were significant at the 10%

level were included in the final regression model that combined significant factors. All analysis was generated using SAS 9.4 (SAS Institute, Cary, NC).

Results

A total of 69 participants completed the PTGI. The sample consisted of predominantly Caucasian (65%) females (78%) with a mean age of 48.8 (*SD*=14.2). Thirty percent of participants were the spouse of the ICU patient, 29% were parents, and 41% were "Other" relations (e.g., sibling, close friend, adult child, etc.). At the time of 12-month follow-up, 52% of participants identified themselves as the primary caregivers for their patients. Of the patients, 63% were admitted to the ICU due to traumatic injury, while the remaining 37% were admitted for critical care (i.e., non-trauma). Of the patients hospitalized with traumatic injury, 44% had a TBI. Table 1 summarizes the participant demographic and ICU patient variables. Tables 2 and 3 provide correlations between continuous and ordinal variables and categorical variables, respectively.

Race, ethnicity, education, income, and history of PTSD were the only variables with significant associations to PTGI from the individual models. The results of the multiple regression model are given in Table 4. The overall F-statistic was 3.87 (p=0.002) with a coefficient of determination of 0.31. African American race (p=0.007) and Hispanic ethnicity (0.016) were significantly associated with a higher PTGI score (i.e., more growth). Having a history of PTSD was associated with a lower PTGI score (i.e., less growth; p=0.018). Income and education level were no longer significant after controlling for the other factors.

Discussion

Based on existing literature, it was hypothesized that PTG would be positively associated with female gender, younger age, minority racial/ethnic background, patient ICU admission for traumatic injury, patients sustaining a TBI, participant social support and resilience at baseline, and participant caregiver burden at follow-up. However in our sample, of these variables, only minority race/ethnicity was found to be associated with PTG. The only other study variable with a significant relationship to PTG was participant history of PTSD, which was negatively associated with growth. These results indicate African American and Hispanic family members experience more PTG resulting from their loved one's ICU hospitalization, while family members with a history of PTSD have less.

Previous researchers have speculated as to the reason that minority race or ethnicity is consistently associated with higher levels of growth across a variety of study populations. Although minority racial and ethnic background is often cited as a risk factor for poor psychosocial outcomes (Dunlop, Song, Lyons, Manheim, & Chang, 2003; Mays, Cochran, & Barnes, 2007; McGuire & Miranda, 2008; Pinquart & Sörensen, 2005; Roberts, Gilman, Breslau, Breslau, & Koenen, 2011), there is a growing body of literature focused on the role of race/ethnicity in building resilience. For instance, despite exposure to racial discrimination, many people with minority racial or ethnic backgrounds endorse significant racial and ethnic pride, which is related to positive mental health outcomes (Neville & Lilly, 2000; Wilson & Constantine, 1999; Utsey, Ponterotto, Reynolds, & Cencelli, 2000). Along these lines, some have postulated PTG may be more adaptive for people with a minority racial or ethnic background because minority persons tend to have greater experience with adversity; thus, they may have a

stronger pattern of deriving something good from negative experiences (Constantine & Sue, 2006; Helgeson et al., 2006). Others have cited religiosity as a moderating variable in the relationship between growth and race/ethnicity (Shaw, Joseph, & Linley, 2005). Unfortunately, there was not a measure of religiosity in the current study. Additional research is needed to better understand the relationship between race/ethnicity and growth.

Less clear is the reason for the negative association between participants' history of PTSD and PTG. Although it seems logical that previous poor outcomes after a stressor (i.e., PTSD) would be at odds with growth, other literature on PTG points to the fact that growth and distress are not mutually exclusive (Joseph & Butler, 2010; Linley & Joseph, 2004). In fact, previous studies have found that measures of distress (e.g., PTSD, depression, anxiety, caregiver burden) were positively associated with PTG (Helgeson et al., 2006; Roden-Foreman et al., 2017), though this is not always the case. Additional study is warranted to further understand the relationship between growth and distress in order to determine who is prone to one, the other, or both.

In the current study, the mean PTGI score, which can range from 0-84, was 65.5 (*SD*=27.4). This study was the first to examine PTG in family members of trauma/critical care ICU patients, therefore no normative data have been published that provide for a direct comparison between scores. However, there have been studies of other caregiver and family member populations, most of which found much lower PTGI scores. For instance, a study by Weiss (2004) of husbands of women who survived breast cancer found an average score of 53.6 (*SD*=23.4). Other studies of caregivers of patients with cancer found even lower scores, with means of 42.9 (*SD*=18.6) (Chambers et al., 2012)

and 46.4 (SD=24.6) (Cormio et al., 2014). Similarly, research by Hallam and Morris (2014) found that caregivers of patients following a stroke experienced lower PTGI scores than those seen in the current study sample (*M*=52.8, *SD*=25.2). Finally, a study by Ackroyd et al. (2011) of partners of patients diagnosed with multiple sclerosis found the lowest average PTGI score, with a mean of 35.6 (*SD*=20.2). On the other hand, research by Cadell (2003) examining PTG in caregivers of patients with HIV/AIDS found scores more similar to those in the current study, with a mean of 61.5 (*SD*=23.7). In the context of these findings, it appears that family members of adult patients hospitalized in the trauma/critical care ICU experience more growth than do family members and caregivers of patients with other serious illnesses.

This study was not without limitations. Results were obtained from a convenience sample in a single hospital's ICU and, therefore, may not be generalizable. Additionally, in order to meet inclusion criteria for the study, participants had to be able to read and speak English, which excluded non-English speaking families. Given that minority race/ethnicity was associated with growth in this study and others, inclusion of diverse participants will be important for future research. A number of variables that could inform the outcome of the study were not assessed, such as participants' religiosity, prior exposure to trauma, and whether or not they received any type of psychological intervention following their loved one's ICU hospitalization. Additionally, although the Posttraumatic Growth Inventory is the most widely used measure of PTG, it has been noted to have a weakness as it does not allow participants to report negative growth. Furthermore, since there is some concern from critics of the PTG concept that growth is illusory or cannot be accurately captured through self-report, it has been suggested

obtaining third party corroboration of the participants' self-report data (e.g., from a spouse, close friend, or parent) may add to the reliability of results (Linley & Joseph, 2000; Powell et al., 2007). Future studies should take these limitations into consideration and attempt to replicate these results. Additionally, further investigation is needed to translate this work into clinical application.

Although there is increasing evidence of the negative impact that ICU hospitalization has on families of critically ill patients, the findings of the current study indicate that there may be positive outcomes as well. One of the recommendations published by Davidson et al (2017) to promote family-centered care in the ICU setting includes providing support to family members through means such as family education programs and peer-to-peer support. The inclusion of information about PTG and how to facilitate growth, in addition to psychoeducation regarding potential negative psychological sequelae, may lead to more positive outcomes in this population. Additionally, given the known connection between caregiver and patient wellbeing, an added benefit of providing caregiver support could include improved outcomes in patients as well, such as fewer readmissions, fewer complications, and fewer physical and psychological morbidities, and lower mortality (Hodges, Humphris, & Macfarlane, 2004; Lau et al., 2010; Litzelman, Kent, Mollica, & Rowland, 2016; Northouse, Katapodi, Schafenacker, & Weiss, 2012; Segrin, Badger, Dorros, Meek, & Lopez, 2006; van Ryn et al., 2010). Based on the recent increased emphasis on patient- and family-centered care, such interventions and outcomes would be beneficial not only for patients and their families, but for healthcare systems as well.

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Table 1: Summary of participant and ICU patient characteristics

Characteristic	**N=69**
Age, mean±sd	48.8±14.2
Male Gender	15 (22%)
Race	
Caucasian	45 (65%)
African American	17 (25%)
Other	7 (10%)
Hispanic Ethnicity	11 (16%)
Married	41 (59%)
Post-Secondary Education	40 (58%)
Employed	37 (54%)
Income	
>50k	27 (39%)
<50k	26 (38%)
Not provided	16 (23%)
History of Depression	22 (32%)
History of PTSD	5 (7%)
History of other Psychological Disorder	16 (23%)
Relationship to Patient	
Parent	20 (29%)
Spouse	21 (30%)
Other	28 (41%)
Trauma Patient	48 (70%)
ICU Reason	
Medical (non-trauma)	21 (30%)
Motor vehicle/motor cycle collision	18 (26%)
Gunshot wound/assault	14 (20%)
Other trauma	16 (23%)
Traumatic brain injury	36 (52%)

Table 2: Correlations between continuous and ordinal variables.

	Age	CD-RISC Total	SPS Total	PHQ-8 Total	PC-PTSD Total	AUDIT-C Total	Caregiving at 12 months
Age	-						
CD-RISC Total	0.16	-					
SPS Total	-0.05	0.38^{+}	-				
PHQ-8 Total	-0.25‡	-0.48*	-0.09	-			
PC-PTSD Total	-0.27‡	-0.32^{+}	-0.16	0.48*	-		
AUDIT-C Total	-0.41^	-0.10	0.05	0.05	-0.06	-	
Caregiving at 12 months	-0.05	-0.09	0.12	0.01	-0.16	0.03	-

*p<0.0001; ^p<0.001; $^{+}$p<0.01; ‡p<0.05

Table 3: Cramer's V correlations between categorical variables.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1-Gender	-																
2-Race	0.07	-															
3-Hispanic	-0.04	0.32‡	-														
4-Married	0.15	0.22	-0.12	-													
5-Education	-0.12	0.27	-0.19	0.13	-												
6-Employment	0.21	0.09	0.25‡	-0.06	0.03	-											
7-Income	0.13	0.22	0.14	0.36‡	0.32‡	0.37+	-										
8-Relation to Patient	0.12	0.17	0.20	0.39+	0.06	0.18	0.10	-									
9-History of PTSD	-0.15	0.11	0.12	0	0.12	-0.19	0.12	0.19	-								
10-History of Depression	-0.29‡	0.11	-0.04	-0.07	0.20	-0.05	0.10	0.31‡	0.29‡	-							
11-History of Other Psych Disorder	-0.12	0.16	-0.15	-0.11	0.12	-0.11	0.15	0.17	0.38+	0.58*	-						
12-Trauma Patient	-0.19	0.32‡	0.12	0.03	0.27‡	0.02	0.15	0.36‡	0.18	0.05	0.21	-					
13-ICU Reason	0.26	0.32‡	0.25	0.40‡	0.34	0.17	0.20	0.27	0.29	0.19	0.33	1*	-				

14-Traumatic Brain Injury	-0.13	0.34‡	0.10	0.10	0.18	0.16	0.09	0.29	0.16	0.09	0.18	0.69*	0.77*	-			
15-PHQ-8 positive	-0.45^	0.29	0.11	0.05	0.07	0.09	0.22	0.17	0.22	0.43^	0.16	0.18	0.19	0.11	-		
16-PC-PTSD positive	-0.07	0.10	0.09	-0.15	-0.07	-0.08	0.35‡	0.11	0.33+	0.20	0.28‡	0.13	0.14	0.01	0.20	-	
17-Audit-C positive	0.09	0.25	0.13	0.12	0.14	0.08	0.20	0.23	-0.07	0.07	-0.01	0.11	0.27	0.16	0.11	-0.07	-
18-Primary Caregiver	0.08	0.10	-0.06	0.27‡	-0.05	-0.13	0.12	0.46^	-0.07	0.09	-0.02	-0.07	0.11	-0.10	0.11	-0.06	-0.03

*p<0.0001; ^p<0.001; +p<0.01; ‡p<0.05

Table 4: Results of multiple regression models for posttraumatic growth index score.

Variable	PTGI score (mean±std)	Beta (std. error)	p-value
Race			
Caucasian	60.7±27.3	reference	-
African American	80.0±22.1	21.7 (7.7)	**0.0068**
Other	61.0±30.5	7.3 (10.2)	0.4838
Ethnicity			
Non-Hispanic	62.6±28.3	reference	-
Hispanic	80.8±14.4	21.9 (8.8)	**0.0160**
Education			
Secondary or less	71.9±25.6	reference	-
Post-Secondary	60.8±27.9	2.0 (6.6)	0.7686
Income			
>50k	55.8±31.2	reference	-
<50k	69.8±23.1	12.0 (7.0)	0.0931
Not provided	73.9±24.0	13.3 (8.3)	0.1137
History of PTSD			
No	67.7±26.1	reference	-
Yes	36.8±29.6	-28.0 (11.5)	**0.0181**

CHAPTER FOUR
Integrated Conclusions and Recommendations

The aim of the present dissertation was to better understand PTG in traumatically injured patients and family members of ICU patients. The first study comprising the dissertation determined factors associated with PTG in a mixed trauma patient population one year post-injury. The second study did the same, but examined PTG in family members of trauma/critical care ICU patients one year post-hospitalization. There does not appear to be existing research into this topic in these populations, so it is believed that these studies will provide new insight and fill gaps in the literature.

In the first study, regarding growth following traumatic injury, it was hypothesized that PTG would be positively associated with female gender, younger age, minority racial/ethnic background, injury severity, pain severity, social support, and resilience. However, of these variables, minority race/ethnicity was the only one found to be associated with PTG in this sample. Other findings included higher PTG being associated with MCC or MVC, positive baseline PTSD screen, history of psychological disorder other than depression or PTSD, and higher social support in conjunction with positive baseline PTSD screen (as opposed to high social support without positive screen). Additionally, study participants who screened positive for PTSD at 12-month follow-up were also more likely to experience growth. While this seems paradoxical, a common misunderstanding in the topic of positive psychology, especially regarding PTG, is the idea that positive outcomes and psychological distress are mutually exclusive. In fact, it is not uncommon for an individual to experience both. Previous studies examining growth alongside measures of psychological distress including depression, anxiety, and

posttraumatic stress, have not consistently found negative associations between these variables (Joseph & Butler, 2010; Linley & Joseph, 2004). If growth and distress were truly opposing ends of a single continuum, this inconsistency would not be expected. Instead, researchers suggest that they may be viewed as separate constructs that may or may not coexist in a single individual (Helgeson et al, 2006; Tedeschi & Calhoun, 2004).

The study was not without limitations. Results were obtained from a convenience sample at a single Level I trauma center and, therefore, may not be generalizable. Additionally, subjects who qualified for the study had to be able to provide informed consent in order to participate, which excluded patients with very high injury severity, such as those with severe TBI. Furthermore, since there is some concern from critics of the concept of PTG that growth is illusory or cannot be accurately captured through self-report, it has been suggested that obtaining third party corroboration of the participants' self-report data (e.g., from a spouse, close friend, or parent) may add to the reliability of results (Linley & Joseph, 2000; Powell et al., 2007).

The results of the second study were somewhat similar to those of the first. Based on existing literature, it was hypothesized that PTG in family members of ICU patietns would be positively associated with female gender, younger age, minority racial/ethnic background, patient ICU admission for traumatic injury, patient sustaining a TBI, participant social support and resilience at baseline, and participant caregiver burden at follow-up. However, of these variables, minority race/ethnicity was the only found to be associated with PTG in this sample. The only other study variable that had a significant relationship with PTG was participant history of PTSD, which was negatively associated with growth. These results indicate that African American and Hispanic family members

experience more PTG resulting from their loved one's ICU hospitalization, while family members with a history of PTSD have less.

Again, this study was not without limitations. Results were obtained from a convenience sample in a single hospital's ICU and, therefore, may not be generalizable. Additionally, in order to meet inclusion criteria for the study, participants had to be able to read and speak English, which excluded non-English speaking families. Given that minority race/ethnicity was associated with growth in this study and others, inclusion of diverse participants will be important for future research. Furthermore, the concern mentioned above regarding the difficulty of accurately capturing PTG through self-report (versus through third-party corroboration) applies here as well.

Considering these outcomes together, as well as with other literature on the topic, it seems that minority racial and/or ethnic background is consistently associated with more growth. This finding is interesting given the large body of literature that identifies individuals of minority races or ethnicities as being at increased risk for negative psychosocial outcomes (Dunlop, Song, Lyons, Manheim, & Chang, 2003; Mays, Cochran, & Barnes, 2007; McGuire & Miranda, 2008; Pinquart & Sörensen, 2005; Roberts, Gilman, Breslau, Breslau, & Koenen, 2011). However, as demonstrated in the findings of the first study, the presence of growth does not exclude the presence of distress. The two can, and often do, co-occur, and it is important that the growth seen in these individuals does not outweigh the distress they are also endorsing. Instead, this highlights the importance of providing treatment to those who are experiencing distress in order to reduce symptoms and prevent chronic pathology.

There are many directions that could be undertaken in future research based on the present studies. First, future studies should take the limitations of the current studies into consideration and attempt to replicate these results. Additionally, previous research has found that growth seen in family members or caregivers was positively associated with growth reported by their patients. Unfortunately, the current study samples did not overlap in terms of including patients and family members associated with each other (i.e., none of the subjects in the second study were family members of the patients in the first study). Future studies examining these populations should consider enrolling patients and their associated family members to further investigate this connection. Furthermore, additional investigation is needed into the relationship between growth and distress. Although the findings of the first study are consistent with results from previous research (i.e., growth and distress can be present concurrently), the potential reasons and mechanisms underlying this relationship are not fully understood. Finally, there is limited research into how this work can be translated into clinical application. Additional study is needed to determine how best to provide psychological interventions that utilize or target PTG.

As noted in each study, patient- and family-centered care is becoming more and more emphasized across healthcare systems. Part of this focus involves highlighting the psychological outcomes of patients and families, in addition to improving their physical wellbeing. Based on the findings of the present studies, it is recommended that psychological screening and intervention be implemented in the acute care setting in order to reduce symptoms of posttraumatic stress and facilitate PTG in trauma patients. Additionally, considering the findings of the first study regarding the interaction between

social support and PTSD, interventions involving family members and friends should be considered in order to ensure that patients who screen positive for PTSD receive adequate social support to assist them in processing and overcoming the physical and psychological challenges presented by their injury. Given that one of the recommendations by Davidson et al (2017) for promoting family-centered care includes providing support to family members through education programs and peer-to-peer support, such an intervention is likely to be mutually beneficial for patients and families.

It is also important to keep in mind the well-established connection between physical and mental health; negative psychological factors often lead to or exacerbate negative physical health outcomes. In addition, there is a strong connection between caregiver and patient wellbeing. Therefore, an added benefit of early psychological screening and intervention for patients and families could be improved physical health outcomes in patients, such as fewer readmissions, fewer complications, fewer physical and psychological morbidities, and lower mortality (Hodges, Humphris, & Macfarlane, 2004; Lau et al., 2010; Litzelman, Kent, Mollica, & Rowland, 2016; Northouse, Katapodi, Schafenacker, & Weiss, 2012; Segrin, Badger, Dorros, Meek, & Lopez, 2006; van Ryn et al., 2010).

Although studies of evidence-based interventions incorporating PTG are limited so far, it is hoped that the findings of the current studies may assist in translating the topic into clinical application. By identifying variables related to growth, clinical interventions may be targeted at those most in need in hopes of improving outcomes in patients and their family members. Because of the pressure to improve patient- and family-centered

care, such interventions and outcomes would be beneficial not only for patients and their families, but for healthcare systems as well.

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