# The Role of Social Support Seeking and Social Constraints on Psychological Outcomes After Trauma: A Social Cognitive Theory Perspective

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## ABSTRACT

Social Cognitive Theory (SCT) posits that survivors of a traumatic event have the ability to influence their own outcomes and do so most aptly when they perceive they can exert control over their outcomes. Posttraumatic growth outcomes are associated with a greater perception of controllability, while posttraumatic stress outcomes can be related to the lack of perceived control. In the context of the Virginia Tech shootings, several social factors were examined three months after the trauma (T1) and one year later (T2) to further explore the dynamic interplay between these factors and psychological outcomes. Social support seeking was conceptualized as both a coping strategy (situational) and as a coping style (dispositional) and was hypothesized to predict greater growth outcomes, while social constraints were hypothesized to predict higher levels of posttraumatic stress outcomes. These variables were also examined as moderators of the relationship between perceived threat and psychological outcomes at both time points. As expected, dispositional social support seeking was negatively related to posttraumatic stress at T1, and positively related to posttraumatic growth at T1 and T2. Social constraints were positively related to posttraumatic stress at T1 and negatively related to posttraumatic growth at T1 and T2. Situational social support seeking served as a moderator for the relationship between perceived threat and posttraumatic stress at T1. Lower levels of situational social support seeking lessened the relationship between perceived threat and posttraumatic stress, while high levels of situational social support seeking exacerbated this relationship.

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# 1. Introduction

On April 16, 2007 Seung Hui Cho shot and killed 32 students and faculty members on Virginia Tech's campus in what would become one of the worst school shooting events in the nation's history (Virginia Tech Review Panel, 2007). Many students witnessed medical personnel treating wounded individuals, while many others were simply aware of the heavy police and emergency response presence on campus. In the days following the shootings, students had to contend with a substantial media presence on campus. Furthermore, a significant number of students knew individuals who were killed. Students experienced numerous potentially traumatic events in association with this event, placing them at risk for developing post-traumatic symptomology (Kessler, Sonnega, Bromet, Hughes, & Nelson, 2010).

Posttraumatic Stress Disorder (PTSD) is the negative psychological outcome most often associated with traumatic events (Kessler et al., 1995). Characterized by symptoms of intrusion, avoidance, and hyperarousal, PTSD results from exposure to a potentially traumatic event that involves perceived fear, helplessness, or horror. PTSD can develop following a variety of traumatic events, including combat exposure, motor vehicle accidents, abuse, violent crime, and experiencing a natural or man-made disaster (Luz et al., 2011). Research supports the notion that the majority of individuals will experience a potentially traumatic event over the course of their lifetimes (Breslau & Kessler, 2001), highlighting the importance of studying potential psychological outcomes of trauma.

## 1.a Mass Shootings

Empirical evidence supports that undergraduate students and adults are vulnerable to experiencing posttraumatic stress following mass shooting events and/or terrorist attacks. Vicary and Fraley (2010) assessed students at Virginia Tech and Northern Illinois University following

the mass shooting events that occurred at each university; two weeks after the shootings, 71% of students exhibited symptoms of depression, and 64% reported symptoms of posttraumatic stress.

Numerous studies report consistent findings following several instances of mass shooting events. Symptoms of posttraumatic stress were reported by nearly all employee witnesses of a courthouse shooting shortly after the event (Johnson, North, & Smith, 2002). Similarly, among a sample of teachers assessed 18 months post-9/11 attacks and sniper shootings, Felix et al. (2010) reported that participants experienced significant posttraumatic stress symptoms. Bystanders of an office building shooting were interviewed and researchers reported that one-third participants met diagnostic criteria for Acute Stress Disorder (ASD), which longitudinally predicted PTSD development (Classen, Koopman, Hales, & Spiegel, 1998). Finally, in the aftermath of a cafeteria school shooting, North, Smith, and Spitznagel (1997) reported that, when assessed between one and two months post-event, nearly half of the witnesses met criteria for PTSD or another Axis I disorder. Follow-up assessment one year later showed that nearly one-third of witnesses met criteria for a disorder—most commonly PTSD, depression, or an alcohol-related disorder. Altogether, these studies lend convincing evidence for the negative psychological sequelae following mass shootings on individuals who were threatened by the event.

Considering this evidence, the current study intends to address the influence of perceived threat following a mass shooting on psychological outcomes, specifically posttraumatic growth and posttraumatic stress. The main focus of the study will be to understand the potential moderating roles of social support seeking and social constraints on these outcomes.

**1.b Social Cognitive Theory**

Social cognitive theory (SCT) is a comprehensive approach to understanding human experience. According to SCT, human beings can act as facilitators of their outcomes when they

perceive that they have the ability to exert control over their own outcomes (Bandura, 1997). This process, also referred to as human agency, suggests that people possess the capacity to shape their goals and outcomes, and is not solely influenced by environmental factors. A central component of agency is the concept of self-efficacy, which refers to the belief that individuals have the capability to exert control over the stressful demands they encounter in their lives.

Experiencing traumatic events can lead to a myriad of adverse psychological consequences. The trauma experience can have a negative effect on an individual's psychological functioning by causing him or her to view the world as dangerous and unpredictable (Kessler et al., 1995). For many individuals, a traumatic experience has the potential to shatter their worldviews (Janoff-Bulman, 1989), resulting in the perception that the world is unsafe and unpredictable. This was nicely demonstrated in a study following the April 16th shootings at Virginia Tech, which concluded that individuals who perceived a lack of control over their outcomes were at greater risk for psychological distress (Grills-Tacquechel, Littleton, & Axsom, 2011).

**1.c Positive Outcomes after Trauma**

In addition to the negative psychological outcomes that can arise after experiencing a traumatic event, positive psychological sequelae can also occur (Kessler, Galea, Jones, & Parker, 2006). A study of individuals affected by Hurricane Katrina found that at least 11% of respondents suffered from mental health concerns following the hurricane; however, a surprising finding was that many individuals reported positive outcomes in the wake of the event (Kessler et al., 2006). This phenomenon—coined *posttraumatic personal growth*—was found to be a protective factor against negative psychological outcomes (e.g., suicide). The individuals who reported posttraumatic personal growth indicated that they believed in their abilities to rebuild their lives,

and they endorsed perceptions of inner-strength following the hurricane. Further examination of this construct is warranted given that neither mediational or moderational factors were discussed.

**1.d Conceptual Framework of Posttraumatic Growth**

Broadly, posttraumatic growth refers to the positive psychological changes, or the ability to create meaning, following major life crises or stressful life circumstances (Tedeschi & Calhoun, 2004). The Posttraumatic Growth Inventory (Tedeschi & Calhoun, 1996) is the most widely used measure to assess posttraumatic growth. The instrument separates the larger construct of posttraumatic growth into five domains: relating to others, new possibilities, personal strength, spiritual change, and appreciation for life. These five factors are indicative of posttraumatic growth as a multidimensional construct; however, the factors have been shown to be highly correlated, suggesting that they are meaningfully related to the broader construct of posttraumatic growth (Taku, Cann, Calhoun, & Tedeschi, 2008).

It is believed that posttraumatic growth results following an event that shatters one's world assumptions (Janoff-Bulman, 1992; Joseph & Linley, 2005; Larner & Blow, 2011). Once assumptive worldviews are shattered, a subsequent period of difficulty ensues before the growth process emerges (Larner & Blow, 2011). Joseph and Linley (2005) suggest one's attempt at rebuilding shattered worldviews can promote growth through the process of accommodating trauma-related information, which stimulates growth when it is done successfully. Furthermore, Cann, Calhoun, Tedeschi, and Solomon (2010) suggest that the amount of growth that occurs is correlated with the degree of challenge to one's core belief system about his or her place in the world. Emotional and cognitive processing (Cohen & Numa, 2011), optimism (Rini et al., 2004), positive reappraisal coping (Sears, Stanton, & Danoff-Burg, 2003), and the quality of social

support and coping strategies (Barkskova & Oesterreich, 2009) are associated with the development of posttraumatic growth.

The degree of perceived threat during trauma exposure has been found to have important implications for posttraumatic growth. Maguen, Vogt, King, King, and Litz (2006) examined posttraumatic growth in a sample of Gulf War veterans who were exposed to combat and concluded that perceived life threat during deployment was predictive of later appreciation of life. In addition, Lykins, Segerstrom, Averill, Evans, and Kemeny (2007) described a study of medical personnel following an earthquake that found perceived life threat influences posttraumatic growth outcomes, and the intensity of perceived threat and mortality salience affect posttraumatic growth through the process of intrinsic goal shifts. In other words, the degree of posttraumatic growth outcomes is influenced by the degree of mortality threat. Therefore, the research suggests that greater perceived threat is more likely to lead to a greater degree of posttraumatic growth.

**1.e Positive Influence of Posttraumatic Growth**

Posttraumatic growth has been shown to reduce distress in samples of people who have experienced war exposure (McLean et al., 2011), cancer and other medical conditions (Barskova & Oesterreich, 2009; Cohen & Numa, 2011; Park, Chmielewski, & Blank, 2010; Sears et al., 2003), and other traumas or stressors (Lindstrom, Cann, Calhoun, & Tedeschi, 2011; Triplett, Tedeschi, Cann, Calhoun, & Reeve, 2011). A study of military medical personnel deployed to war zones found that posttraumatic growth was related to moderate levels of combat and healthcare stress exposure, indicating that military medical personnel can experience growth after exposure to a potentially traumatic experience (McLean et al., 2011).

Posttraumatic growth was also found to have a positive impact on individuals who experienced stressful medical circumstances. Cohen and Numa (2011) examined posttraumatic

growth in a sample of breast cancer survivors who worked as volunteers, compared with those who did not. Both groups reported high levels of posttraumatic growth, and the volunteer group endorsed better health status. In a sample of young adult cancer survivors, posttraumatic growth was found to be related to high levels of intrusive thoughts and better post-cancer adjustment, suggesting that posttraumatic growth is an important factor for influencing thoughts that subsequently lead to more positive adjustment outcomes (Park, Chmielewski, & Blank, 2010). Sears et al. (2003) examined benefit finding, positive reappraisal coping, and posttraumatic growth in women with breast cancer. They found that 83% of the sample reported experiencing at least one benefit from the adversity, with "relating to others" most commonly endorsed. Furthermore, posttraumatic growth at one year was predictive of a positive mood. A review (Barskova & Oesterreich, 2009) of posttraumatic growth and chronic illness yielded further support for the potential benefits of posttraumatic growth.

A study of college students who had experienced a stressful event within the previous two years revealed that many students reported experiencing growth (Lindstrom et al., 2011). Another study with college students concluded that posttraumatic growth was positively related to both meaning-making and general life satisfaction, indicating that it is associated with positive outcomes after trauma (Triplett, et al., 2011).

**1.f Confusion about Posttraumatic Growth**

Notwithstanding the aforementioned positive effects of posttraumatic growth, the posttraumatic growth literature has been inconsistent since its inception. Several researchers report findings that suggest it is not always adaptive in the wake of a traumatic experience (Hobfoll et al., 2007; Zoellner & Maercker, 2006). It has been posited that posttraumatic growth can be positive and functional, though it also has an illusory and dysfunctional side as well (Frazier et al., 2009;

Hobfoll et al., 2007; Zoellner & Maercker, 2006). Hobfoll et al. (2007) found that individuals exposed to terror events who reported posttraumatic growth also had higher levels of posttraumatic stress symptomatology. They concluded that adaptive posttraumatic growth occurs only when accompanied by actions, which they coined as *action growth*. In addition, the illusory side of posttraumatic growth, referred to as *perceived growth*, has been suggested to occur when individuals have growth cognitions that are not followed by actions. The Janus-Face model of posttraumatic growth also makes the distinction between the adaptive side of posttraumatic growth and the illusory, deceptive component of posttraumatic growth. It postulates that perceived posttraumatic growth consists of self-deceptive illusions of growth used to counter emotional distress, whereas the functional side of posttraumatic growth is characterized by reappraisal, active mastery, and problem-focused coping, which are associated with healthy adjustment (Zoellner & Maercker, 2006). Frazier et al. (2009) examined perceived and actual growth in a sample of college students and found that perceived growth (assessed by asking about beliefs regarding growth) was related to higher levels of distress, while actual growth was related to decreased stress.

Notably, it has been suggested that the PTGI measures perceived growth rather than actual growth. Frazier et al. (2009), who altered the wording of the PTGI to measure actual growth by asking participants about current appraisals of PTGI items (e.g. "I have had a sense of closeness with others within the past two weeks"). Based on the results, they concluded perceived growth and actual growth are unrelated and that the PTGI is, in fact, a measure of perceived posttraumatic growth.

Additionally, posttraumatic growth has been found to have a curvilinear relationship with posttraumatic stress exposure and trauma symptoms. This indicates that growth occurs under

moderate levels of distress and not under low or high levels of distress, further adding to the confusion about the conceptualization of posttraumatic growth (McLean et al., 2011; Butler et al., 2005).

**1.g Temporal Course of Posttraumatic Growth**

The current status of longitudinal research in posttraumatic growth is inconclusive due to the dearth of studies conducted on posttraumatic growth over time, though initial evidence suggests that posttraumatic growth can take several months or years to develop following a stressful event. The notion that individuals can experience posttraumatic growth long after the stressful event has occurred is unsurprising due to Tedeschi and Calhoun's (2004) suggestion that posttraumatic growth is a process rather than a static outcome.

One of the early longitudinal studies on posttraumatic growth in cancer survivors indicated greater distress related to the cancer diagnosis was associated with posttraumatic growth one year later, providing support for the idea that more severe appraisals of the event can lead to the subsequent development of posttraumatic growth (Sears et al. 2003). Kleim and Ehlers (2009) found that greater fear, shame, and humiliation experienced by assault survivors during the assault were predictive of higher growth levels six months later. This could suggest that stressful appraisals of a traumatic event may initiate the meaning-making process and lead to subsequent growth, which occurs over time.

A review of positive change following traumatic and adverse life events yielded inconclusive evidence regarding the factors involved in the development of what they refer to as adversarial growth longitudinally; however, possible factors included more severe traumatic experience, positive reinterpretation, and greater positive affect (Linley & Joseph, 2004). Wolchik et al. (2008) concluded that threat appraisal, active coping, avoidant coping, and support seeking

are factors found to be predictive of posttraumatic growth in children and adolescents six years after losing a parent.

There is some uncertainty regarding the length of time required for growth to develop. Stanton, Bower, and Low (2006) suggested that growth may be greatest one to two years following the stressful experience and taper off after several years. However, additional evidence indicates that the trajectory of posttraumatic growth over time is stable (Linley & Joseph, 2004; Tallman, Shaw, Schultz, & Altmaier, 2010), or may even increase over time, such as occurred in a sample of cancer survivors (Tallman et al., 2010).

Linley and Joseph (2004) pointedly stated that longitudinal evidence should be considered more strongly when examining the progressive course of posttraumatic growth over time because as Wolchik and colleagues (2008) remarked, longitudinal data allows us to make stronger conclusions about causal relationships between posttraumatic growth and the factors that may contribute to its development.

Thus, there is a need for further evidence to help clarify the temporal course of posttraumatic growth following traumatic experiences, due to the paucity of empirical longitudinal evidence and inconclusive findings regarding the length of time required for growth to develop. By measuring posttraumatic growth at multiple time points, the present study offers a methodological strength that will contribute to the literature in this area of study.

### 1.h Conceptualizing Posttraumatic Growth from a social cognitive theory perspective

This study poses posttraumatic growth within the theoretical framework of SCT. Human agency is the process through which humans gain control over the environment. At the core of human agency is the concept of self-efficacy, or one's perceived belief in his or her ability to

manage personal functioning following a stressful experience. Management of personal functioning occurs, in part, through mastery experiences, verbal encouragement, and vicarious learning, and can facilitate psychological recovery from traumatic experiences (Bandura, 1997; Benight & Bandura, 2004). Moreover, Bandura (1997) posits that individuals high in self-efficacy are more adept at using their resources to cope and promote resiliency. Thus, this study conceptualizes posttraumatic growth as a dependent variable that can serve as a gauge for understanding a person's sense of human agency and personal growth following a traumatic event. Abstracting posttraumatic growth from a SCT perspective could clarify the explanation behind the posttraumatic growth construct, and allow for consistency in the way researchers explain growth-related outcomes.

The literature has not sufficiently explored the connection between posttraumatic growth and SCT. Hobfoll et al. (2007) investigated the notion that individuals high in self-efficacy may be more likely to exhibit posttraumatic growth, while individuals low in self-efficacy may be less likely to engage in positive action. Hobfoll et al. found that the interaction of self-efficacy and posttraumatic growth was related to avoidance symptoms of PTSD, which is logical when considering that highly efficacious individuals are more likely to tackle adverse life events directly. Furthermore, self-efficacy was related to fewer symptoms of PTSD suggesting that individuals who are better able to achieve mastery over stressful life events are less likely to experience subsequent negative psychological outcomes such as PTSD. Finally, self-efficacy and posttraumatic growth were found to be moderately correlated suggesting some relationship between the ability to achieve mastery over stressful life events and positive outcomes following trauma.

It is proposed that social processes will influence an individual's resulting growth or stress following a traumatic experience. While higher levels of social support seeking may have a positive influence on the later development of growth, similar levels of social constraints may serve as a deterrent for future growth.

**1.i Social Support**

Vast literature documents the benefits of receiving social support, or the "resources provided by other persons" (Cohen & Syme, 1985. p. 3), on both psychological and physical well-being. Social support may have a buffering effect on stressful experiences by protecting individuals from negative outcomes (Cohen & McKay, 1984). The concept of social support has evolved over the past 40 years, from a general construct to one with several distinct components. A primary distinction was made between functional social support and structural social support. Functional social support refers to the quality of supportive social relationships (Cohen & Syme, 1985), whereas structural social support places emphasis on the quantity of such relationships (Cobb, 1976).

Within functional social support, a further distinction was made between received social support and perceived social support. Received social support is the provision of helping behaviors by others while perceived social support is the belief that these helping behaviors would be provided in a time of need (Norris & Kaniasty, 1996). These two aspects of social support are independent constructs and currently predominate in the social support research.

Several large-scale meta-analytic reviews indicate that social support is an important predictor of outcomes in a variety of trauma settings, illustrating its relevance to the study of posttraumatic growth (Brewin, Andrews, & Valentine, 2000; Ozer, Best, Lipsey, & Weiss, 2003).

Furthermore, Schaefer and Moos (1998) declare that social support may be a precursor to growth by influencing coping behavior and promoting adjustment to stressful life processes.

**1.j Social Support Seeking**

Received social support positively correlates with posttraumatic growth and other positive psychological outcomes following stressful experiences. For example, received social support was directly associated with the *relating to others* domain of posttraumatic growth in a sample of Hurricane Katrina survivors with HIV (Cieslak et al., 2009) and was found to help cancer survivors find meaning in their adverse medical experiences (Schroevers, Helgeson, Sanderman, & Ranchor, 2010).

A natural extension of received social support is the relatively new concept of social support seeking. Social support seeking is a social behavior in which individuals actively seek out supportive networks in times of need (Norberg, Lindblad, & Boman, 2006), and can be considered a coping strategy (Carver, Scheier, & Weintraub, 1989). Following a traumatic event, the prospect of adapting traumatic information into one's schema is an intimidating challenge, requiring a supportive environment that encourages the actualization of basic needs (e.g., autonomy, competence, and relatedness). When these basic needs are met, individuals are more likely to recognize the significance of the trauma rather than maintaining pretrauma schemas, which has important implications for meaning-making (Joseph & Linley, 2005). Furthermore, seeking social support could improve psychological well-being if individuals receive sympathy from others, or it could serve an additional purpose of reducing feelings of isolation and loneliness (Schaefer & Moos, 1998).

Empirical evidence supports the positive impact of support seeking on psychological outcomes after trauma. A recent meta-analysis identified seeking social support coping, as well as

social support, as being moderately associated with posttraumatic growth following a traumatic event (Prati & Pietrantoni, 2009). Support seeking was found to be predictive of positive psychological adjustment following a large-scale natural disaster (Tang, 2006), and was found to predict posttraumatic growth in a sample of college students and adults who experienced a stressful or traumatic event (Swickert & Hittner, 2009). A study of adolescents and young adults who experienced the death of a parent concluded that support seeking from the other parent increased the likelihood of future posttraumatic growth (Wolchik, Coxe, Tein, Sandler, & Ayers, 2008). In sum, recent literature provides evidence for the link between social support seeking and growth outcomes after trauma. Thus, social support seeking enables individuals who have experienced trauma to process the event in a supportive context, which may help the individual create meaning from the event and subsequently result in growth.

Moreover, we can further understand the relationship between social support seeking and posttraumatic growth by considering organismic valuing theory, which posits that following trauma, individuals are inherently motivated to repair their assumptive worldviews (Joseph & Linley, 2005). The process of rebuilding worldviews is motivated towards actualization; when the social environment enables actualization, which occurs when the needs for autonomy, competence, and relatedness are met, then growth will result. Social support seeking can be considered a factor in the social environment, specifically in the domain of relatedness that is likely to promote growth. This view is compatible with the conceptualization of social support seeking as an important factor for controllability and achieving growth.

A related construct represents individuals' habitual coping styles in response to stressful events. The literature supports the importance of studying dispositional factors as possible protective factors in the wake of traumatic events, though the evidence for such factors is varied.

However, it has been suggested that coping dispositions may play a complementary role with situational coping (Carver, Scheier, & Weintraub, 1989). For the ease of comprehension of these analyses, this item will be referred to as dispositional social support seeking, and will be used to assess respondents' stable, fixed coping styles used in times of stress, while the previously discussed social support seeking scale will be referred to from here forward as "situational social support seeking", as the items are intended to assess the degree to which individuals engaged in support seeking behaviors in direct response to the shootings. Thus, the two measures of social support seeking are being used to examine situational support seeking and dispositional support seeking behaviors, and their potentially differential effects on psychological outcomes.

**1.k Social Constraints**

A substantial body of literature demonstrates the beneficial impacts of perceived social support following adverse life events. In a review of the social support literature, Wethington and Kessler (1986) concluded that perceived social support, or the perceived ability of social networks to provide support if necessary, is the strongest buffer against negative psychological outcomes following stressful life events. Additionally, a study of hurricane survivors found that perceived social support mediated the relationship between both disaster exposure and received social support on future distress (Norris & Kaniasty, 1996). Therefore, the perception of social support is an important protective factor against negative psychological outcomes.

Even more recent studies conducted with survivors of the April 16$^{th}$ shootings at Virginia Tech provide support for the benefit of perceived social support following trauma. A study of women exposed to the shootings and subsequent sexual trauma found that perceived social support potentially mediated the relationship between experiencing multiple traumas and psychological outcomes (Littleton, Grills-Taquechel, Axsom, Bye, & Buck, 2011). Grills-Taquechel et al. (2011)

surveyed students who were enrolled at Virginia Tech at the time of the shootings and found that perceived family social support prior to the shooting was predictive of better psychological outcomes. Thus, empirical evidence indicates that perceived social support was an important trauma adaptation variable among students enrolled at Virginia Tech at time of shootings.

However, social support does not always serve a beneficial purpose, particularly when individuals do not believe support networks are useful (Clapp & Beck, 2008), or when there is a perceived lack of social support (Brewin et al., 2000). However, despite recent advocacy for the examination of deleterious aspects of social relationships, much of the research has focused on potentially positive properties of social support.

In the early 1990's, the construct of social constraints began to emerge in literature as an effort to measure the potentially adverse aspects of relationships. This concept refers to the idea that social networks do not always respond in ways that might be helpful to an individual who has experienced trauma (Lepore, 1992). Unsupportive, negative, or dismissive responses may create feelings of social constraints (Badr & Taylor, 2006). Social constraints often cause people to inhibit themselves from expressing trauma-related thoughts and feelings to others, which has been associated with negative psychological outcomes (Lepore & Revenson, 2007).

Lepore (1992) examined perceived social support from roommates in a sample of college students and found that roommate conflict lead to greater psychological distress. He concluded that both negative and positive social experiences can impact psychological well-being. Empirical evidence indicates that social constraints are related to increased depression in bereaved mothers, (Lepore, Silver, Wortman, & Wayment, 1996), poorer mental health outcomes following prostate cancer (Lepore & Helgeson, 1998), increased depression and lesser well-being in breast cancer

survivors (Cordova, Cunningham, Carlson, & Andrykowski, 2001), and greater PTSD symptoms in trauma survivors (Belsher, Ruzek, Bongar, & Cordova, 2011).

Feelings of social constraints have been associated with greater stress-related intrusive thoughts and poorer psychological functioning (Braitman et al., 2008). More specifically, social constraints are thought to impact psychological well-being through more frequent intrusive thoughts (Lepore & Helgeson, 1998) and negative posttraumatic cognitions (Belsher et al., 2011). They may also inhibit cognitive and emotional processing of the event (Belsher et al., 2011; Braitman et al., 2008; Cordova et al., 2001), subsequently leading to poorer psychological outcomes. Social constraints may contribute to avoidance of trauma-related thoughts and feelings (Lepore & Helgeson, 1998), which allows for fewer opportunities to cognitively process and make sense of stressful experiences that can lead to distress (Lepore, 1997). Furthermore, social constraints have implications for posttraumatic growth, because supportive social environments are linked to better psychological adjustment (Lepore & Helgeson, 1998) and therefore a greater likelihood of growth. In addition, higher levels of distress are associated with lesser growth following a traumatic event (Gunty et al., 2011).

These perspectives fit nicely with SCT, because they suggest that perceived social constraints negatively impact one's ability to perceive control over outcomes, which in turn reduces the likelihood that individuals will modify their behaviors in a beneficial manner and then effectively manage environmental demands. Under the framework of SCT, the present study proposes to conceptualize social support seeking and social constraints as characteristics that operate in reciprocal causation processes with environmental and behavioral factors. Thus, social support seeking and social constraints can be considered influential factors to human agency, or the perceived ability of an individual to exert control over the environment, which in turn will

produce psychological and behavioral consequences such as posttraumatic stress and posttraumatic growth.

**1.l Posttraumatic stress**

A second goal of this study will be to examine the moderational role of both social support seeking and social constraints on individuals' levels of posttraumatic stress. That is, given that the role of these constructs are yet to be fully examined within the context of college campus shootings, this goal will be pursued.

For many individuals, symptoms of posttraumatic stress can persist over time. Posttraumatic stress is considered to be chronic when symptoms endure for longer than three months (Rothbaum, Foa, Riggs, & Murdock, 1992). A review of the literature regarding posttraumatic stress symptoms over time revealed that an estimated 57% of individuals experienced lingering symptoms one year after the traumatic event (Breslau & Davis, 1992). In the National Comorbidity Survey, Kessler and colleagues (1995) found that almost one-third of individuals who reported experiencing symptoms of posttraumatic stress continued to endorse symptoms years after the trauma, regardless of whether or not they sought treatment for their symptoms.

The dose-response model of exposure has been used to conceptualize the development of PTSD. The model posits that individuals who experience high trauma exposure have worse psychological outcomes than those who experienced a lesser degree of trauma exposure (Dohrenwend & Dohrenwend, 1974; Wyler, Masuda, & Holmes, 1971). More recent support for this model has been noted by several investigators. For example, individuals who were more severely exposed to the 9/11 attacks endorsed more symptoms of PTSD, anxiety disorders, and other Axis I disorders (Henriksen, Bolton, & Sareen, 2010). Similarly, military medical personnel

with more combat exposure were more likely to report clinically significant symptoms of PTSD than their lesser-exposed peers (McLean et al., 2011), and Hurricane Katrina survivors who experienced higher levels of physical adversity reported greater psychological distress (Kessler et al., 2008).

However, the dose-response explanation of PTSD does not adequately explain why certain individuals, but not others, develop symptoms of posttraumatic stress. For instance, only a subset of people who are exposed to trauma go on to develop PTSD (Kessler et al., 1995). Additionally, greater exposure does not always lead to greater distress, questioning the validity of the dose-response explanation of posttraumatic stress (Basoglu & Parker, 1995; McNally, 2009). Thus, evidence suggests that the traditional dose-response model cannot fully account for the development of PTSD in all individuals in the wake of trauma, making it necessary to consider alternative explanations for posttraumatic psychological distress. While the roles of several moderators (i.e. age and race) have been examined within this model, the impacts of social support seeking and social constraints have not. Therefore, the moderational role of each will be ascertained in this investigation.

**1.m Perceived life threat**

Considerable empirical evidence points to perceived threat as an important predictor of psychological outcomes following trauma. Lazarus and Folkman (1984) assert that subjective responses to trauma exposure, such as perceived life threat, do not always correspond with the level of threat determined by objective criteria (i.e., the dose-response model). Furthermore, subjective psychological responses to trauma have been found to be more salient when making determinations about the level of distress caused by the trauma. Ozer et al. (2008) conducted a meta-analytic review of the predictors of PTSD symptoms in adults and concluded that

peritraumatic psychological factors, rather than pretrauma individual characteristics (i.e. adjustment, prior exposure, and/or comorbidity), most strongly predict PTSD. In other words, subjective psychological reactions to trauma, rather than objective pretrauma characteristics, are the strongest predictors of posttraumatic stress. The authors emphasize that psychological responses to trauma, such as individual's evaluation of the event as it is occurring and how the individuals makes meaning of the event in the trauma's aftermath, are more salient predictors of PTSD than the objective factors characterizing the traumatic experience, which might include prior exposure and comorbidity.

Hier, Piatigorsky and Weisaeth (2008) examined PTSD in a sample of disaster survivors over time, and found that perceived life threat was negatively related to PTSD symptom reduction. Survivors of a bus explosion who later met criteria for PTSD reported higher levels of perceived life threat than those who did not develop PTSD (Gil & Caspi, 2006). Laubmeier and Zakowski (2004) found that perceived life threat, and not objective measures of exposure, was significantly related to psychological distress in a sample of individuals with cancer. A study of combat veterans revealed that the level of perceived threat during deployment was associated with a myriad of negative psychological outcomes, including PTSD, anxiety disorders, and mood disorders (Mott, Graham, & Teng, 2011). Moreover, the degree of perceived life threat has been shown to impact neural pathways. Specifically, the amygdala shows increased reactivity to neutral stimuli, implying that threat appraisal leads to decreased amygdala regulation (van Wingen, Geuze, Vermetten, & Fernandez, 2011). Thus, the degree of perceived threat experienced was used in the present study as a predictor of subsequent psychological outcomes, in the forms of posttraumatic growth and posttraumatic stress, three months after the shootings (T1) and one year later (T2). Hypotheses were as follows.

## 1.n Hypotheses

1. Higher perceived threat will relate to greater levels of posttraumatic stress at T1 and T2.

2. Higher perceived threat will relate to greater levels of posttraumatic growth at T1 and T2.

3. Situational social support seeking will be negatively related to posttraumatic stress outcomes at T1 and T2, and positively related to posttraumatic growth outcomes at T1 and T2.

4. The relationship between perceived threat and psychological outcomes will be moderated by situational social support seeking. Specific hypotheses regarding the moderational role of situational social support seeking are as follows.

    a. The association between higher levels of perceived threat and posttraumatic stress at T1 will be stronger for students who engage in fewer situational social support seeking behaviors.

    b. The association between higher levels of perceived threat and posttraumatic stress at T2 will be stronger for students who engage in fewer situational social support seeking behaviors.

    c. The association between higher levels of perceived threat and posttraumatic growth at T1 will be enhanced for students who engage in more situational social support seeking behaviors.

d. The association between higher levels of perceived threat and posttraumatic growth at T2 will be enhanced for students who engage in more situational social support seeking behaviors.

5. Dispositional social support seeking will be negatively related to posttraumatic stress outcomes at T1 and T2, and positively related to posttraumatic growth outcomes at T1 and T2.

6. The relationship between perceived threat and psychological outcomes will be moderated by dispositional social support seeking. Specific hypotheses regarding the moderational role of dispositional social support seeking are as follows.

    a. The association between higher levels of perceived threat and posttraumatic stress at T1 will be stronger for students who engage in fewer dispositional social support seeking behaviors.

    b. The association between higher levels of perceived threat and posttraumatic stress at T2 will be stronger for students who engage in fewer dispositional social support seeking behaviors.

    c. The association between higher levels of perceived threat and posttraumatic growth at T1 will be stronger for students who engage in more dispositional social support seeking behaviors.

d. The association between higher levels of perceived threat and posttraumatic growth at T2 will be stronger for students who engage in more dispositional social support seeking behaviors.

7. Social constraints will be positively related to posttraumatic stress outcomes at T1 and T2, and negatively related to posttraumatic growth outcomes at T1 and T2.

8. The relationship between perceived threat and psychological outcomes will be moderated by social constraints. Specific hypotheses regarding the moderational role of social constraints are as follows.

    a. The association between higher levels of perceived threat and posttraumatic stress at T1 will be stronger for students who perceive more social constraints.

    b. The association between higher levels of perceived threat and posttraumatic stress at T2 will be stronger for students who perceive more social constraints.

    c. The association between higher levels of perceived threat and posttraumatic growth at T1 will be stronger for students who perceive fewer social constraints.

    d. The association between higher levels of perceived threat and posttraumatic growth at T2 will be stronger for students who perceive fewer social constraints.

9. Higher levels of posttraumatic stress at T1 will relate to greater posttraumatic stress at T2.

10. Higher levels of posttraumatic growth at T1 will relate to greater posttraumatic growth at T2.

## 2. Method

### 2.a Measures

The online survey used for data collection was a compilation of questions primarily based on empirically supported questionnaires. A number of focus group interviews were conducted with VT students and employees prior to the survey development.

**2.a.i Perceived threat.** Two items in the T1 dataset intended to determine students' perceptions of trauma severity and threat. Using two items from the data, a composite variable was created to measure perceived life threat. The questions are: "How afraid were you that you might be killed at your worst moment on April 16?" and "How afraid were you that someone you cared about would be seriously hurt or killed?" (see Appendix A). Participants were asked to respond on a 0–10 scale, with higher numbers reflecting higher levels of perceived threat. The perceived threat variable is the total of the participants' responses on both items; the minimum perceived threat value was 0 while the maximum value was 20. Cronbach's alpha coefficient was used to assess the internal consistency of the measure and was found to be .49, suggesting very low internal consistency.

**2.a.ii Posttraumatic stress**. Given the relevance of posttraumatic stress to traumatic events, the T1 survey included eleven items (see Appendix B) designed to assess for symptoms associated with PTS. Items were on a 5-point Likert-type scale (1 = *just about every day*; 5 = *never*). The items were recoded so 0 = *never* and 4 = *just about every day*; thus, the minimum score that could possibly be earned is 0 and the maximum score is 40. A Maximum Likelihood Factor Analysis showed that 10 of the 11 items loaded onto one factor, with 20.32% of variance accounted for by the factor. One item ("you felt bad about something you did or did not do related

to the tragedy") did not load onto the same factor, and was subsequently excluded from the posttraumatic stress measure used in the present study.

The ten remaining items were derived, in part, from the Trauma Screening Questionnaire (TSQ; Brewin et al., 2002), which is a validated PTSD screening tool used with Hurricane Katrina survivors (Kessler et al., 2006). The TSQ uses dimensional response options and is based on a two-week recall period.

Six items used in the posttraumatic stress measure correspond nicely with items on the TSQ, and include: "When something reminded you of the shootings, you got very upset or afraid," "You had dreams about April 16 or other bad dreams," "You had more trouble than usual going to sleep or woke up often during the night," "You had more trouble than usual concentrating or paying attention," "You had upsetting thoughts, pictures, or sounds of what happened come into your mind when you did not want them," and "You felt more irritable or easily angered than usual." Notably, the TSQ includes only re-experiencing and hyperarousal symptoms.

Two additional items ("You tried not to talk about, think about, or have feelings about what happened," and "You tried to stay away from people, places, or things that made you remember what happened") were included in the present measure of posttraumatic stress to represent the avoidance symptom cluster of the PTSD diagnostic criteria as defined by DSM-IV-TR. Another item included in the present measure assessed for a numbing response ("You felt more emotionally distant or not close to other people than usual"), and an additional hyperarousal item ("You worried more than usual about bad things that might happen to you or your loved ones in the future") was added. Thus, the ten items comprising the current posttraumatic stress measure represent the three symptom clusters of PTSD; the scale demonstrated excellent internal consistency (Cronbach's $\alpha = .90$).

This measure was assigned a cut-off score (i.e. ≥20) to dichotomize the variable in an attempt to differentiate between those individuals who had high levels of symptoms and those who had low levels. The cut-off score was based on the modified TSQ used in a study to measure posttraumatic stress symptoms in a sample of hurricane survivors. Galea and colleagues (2007) included 12 questions in their measure that could be answered on a 0-4 scale (0=*never*, 4=*most every day*), yielding a possible range of 0-42 total points. A clinical reappraisal study was conducted to adjust TSQ responses to approximate prevalence rates based on the DSM-IV-TR PTSD criteria, which then informed the selected cut-off point.

The posttraumatic stress measure at T2 was modified to account for the incongruity in the way the posttraumatic stress questions were asked between T1 and T2. Specifically, the posttraumatic stress items, used for the posttraumatic stress measure at T1, are present in T2, though the questions are asked in such a way as to assess for symptoms "in the worst month" since the shootings. Thus, the data does not necessarily reflect respondents' symptoms one year following the tragedy. To assess for symptoms of posttraumatic stress one year later, the T2 measure includes the question, "How often do you have these reactions now?," following the list of posttraumatic stress symptom items. Participants who endorsed ever having at least one symptom more than twice per week had the options of responding, "I still have them at least twice a week", "less than twice a week", and "I have stopped having them." Since only the respondents who reported ever having symptoms twice per week answered this question, the remaining respondents fell into a fourth category of "never having symptoms." Thus, posttraumatic stress at T2 will be measured with one four-level item (see Appendix C) used to identify those individuals who never had symptoms, who no longer have symptoms, who have one symptom per week, and those who have symptoms two or more times per week. Although the sample sizes are discrepant

across groups, all four levels were included in the analyses in order to examine maximal variability of among groups.

**2.a.iii Posttraumatic growth.** The T1 dataset included ten items representing the posttraumatic growth construct, which were derived from the findings of a study looking at mental illness in Hurricane Katrina survivors. The authors found evidence for posttraumatic growth in the areas of: becoming closer to loved ones, developing faith in one's abilities to rebuilt one's life, becoming more spiritual or religious, finding deeper meaning and purpose in life, and discovering inner strength (Kessler et al., 2006). Items are on a 5-point Likert-type scale (1 = *not at all*; 5 = *extremely*).

Three posttraumatic growth items used in the present study ("closer to your loved ones," "more spiritual or religious,", and "more in control of your life") were extracted because they nicely corresponded with items from the Posttraumatic Growth Inventory (PTGI), which was developed by Tedeschi and Calhoun (1996) and is regarded as the superior measure in posttraumatic growth research. The PTGI items that parallel the posttraumatic growth items used in the present study are derived from three of the five domains of the PTGI and include: "I have a greater sense of closeness with others", part of the Relating to Others domain (the corresponding item used to construct the present measure of posttraumatic growth is "Closer to loved ones"); "I have a stronger religious faith", part of the Spiritual Change domain ("More spiritual or religious"); and "I have a feeling of self-reliance", part of the Personal Strength domain ("More in control of your life.")

Additionally, a Maximum Likelihood Factor Analysis showed that the "Less afraid of the future" item loaded onto the same factor as the "More in control of your life" item with 4.69% of variance accounted for by the factor, indicating that "Less afraid about the future" may also serve

as an important indicator of one's growth within the Personal Strength domain despite the fact that a similarly worded item was not included in the PTGI.

Thus, in order to best represent one's possible growth in multiple domains four items are used to construct the posttraumatic growth measure (see Appendix D). In the absence of a validated posttraumatic growth measure, the items comprising this scale were selected to represent a range of possible domains in which an individual may experience growth. These items are fairly representative of the PTGI domains. Tedeschi and Calhoun (1996) reported excellent internal consistency (Cronbach's $\alpha = .90$) for the 21-item PTGI; the present measure demonstrated questionable internal consistency (Cronbach's $\alpha = .60$), which is not uncommon in circumstances when the scale's items are selected to represent a wide range of possible indicators of growth, rather than items that are highly correlated with one another. The posttraumatic growth variable was created by totaling participants' responses to the four items included in the measure; thus, the minimum score that could be earned is a 4 and the maximum value is a 20.

The posttraumatic growth measure at T2 was created using the same items as are included in the T1 posttraumatic growth scale (see Appendix E). Scores on the four items were totaled. The measure showed questionable internal consistency (Cronbach's $\alpha = .60$).

Notably, since the measurement of posttraumatic growth is derived from the PTGI, which has been suggested to assess perceived posttraumatic growth, the present conceptualization of posttraumatic growth will represent perceived posttraumatic growth.

**2.a.iv Situational Social Support Seeking.** The T1 dataset included five items representing the situational social support seeking construct. Items are on a 4-point Likert-type scale and were reverse coded for the purpose of the analyses (1 = *never*; 4 = *good*). Items included dataset were: (Since April 16, how often have you engaged in the following behaviors…) "Sought

advice or comfort from family", "Sought advice or comfort from friends", "Participated in Internet discussions of the tragedy", "Attended memorial events", and "Phoned or emailed friends to discuss your feelings about the tragedy." Notably, these items represent respondents' social support seeking behaviors in response to the specific event, and were conceptualized as the situational social support seeking construct.

A Maximum Likelihood Factor Analysis showed that 4 of the 5 items loaded onto the same factor, with 49.28% of variance accounted for by the factor. One item ("participated in Internet discussions of the tragedy") did not load onto the factor, and was subsequently excluded from the situational social support seeking measure used in the present study. Furthermore, the "attended memorial events" item was not deemed to be conceptually related to the three other items used to construct the situational social support seeking measure. For instance, it is possible that an individual may have attended memorial events to grieve the deceased rather than being motivated by sharing the presence of others. The situational social support seeking variable was created by totaling participants' responses to the three items included in the measure (see Appendix F); the minimum score that could be earned is a 3 and the maximum value is a 12.

Measurement of social support seeking is varied and inconsistent in the literature, though a recent study used the Coping Strategy Indicator (CSI) to measure social support seeking (Swickert & Hittner, 2009). Several items from the CSI (Amirkhan, 1990), specifically from the support seeking subscale of the CSI, overlapped with the items selected from the T1 datasets, and include: "sought reassurance from those who know you best", "talked to people about the situation because talking about it made you feel better", and "went to a friend for advice on how to change the situation". Amirkhan (1990) reported excellent internal consistency for the support seeking

subscale (Cronbach's α = .93) of the CSI. The present measure demonstrated acceptable internal consistency (Cronbach's α = .78).

**2.a.v Dispositional Social Support Seeking**. One item present in the T1 dataset ("When you have a problem or worry, how often do you let someone in your personal life know about it?") was selected to measure dispositional social support seeking (see Appendix G). The item is on a 5-point Likert-type scale and was reverse coded for the purpose of the analyses (1 = *never*; 5 = *always*). As discussed, multiple constructs have been proposed that represent individuals' habitual coping responses to stressful events. The present study used the COPE inventory as a basis for conceptualizing dispositional social support seeking. The COPE inventory measures a number of different coping strategies (e.g. active coping, restraint coping, and denial), and can be worded in such a way as to assess for habitual, stable coping patterns. The item selected from the COPE ("I talk to someone about how I feel"), is slightly different from the item used in the present analyses, though both items represent support seeking coping strategies that are fixed over time.

**2.a.vi Social constraints.** The dataset included four items (see Appendix H) covering the proposed criteria of social constraints. Four of the items are on a 4-point Likert-type scale (1 = *a lot*; 4 = *not at all*).

The social constraints items used in the present study correspond nicely with items from Social Constraints Scale, which was developed by Lepore and Ituarte (1999), and is the most widely used measure of social constraints. The Social Constraints Scale items that parallel the social constraints items used in the present study are derived from the spousal version of the Social Constraints measure, and include: "How often did your spouse let you down by not showing you as much love and concern as you would have liked?", "How often did you get the idea that your spouse didn't want to hear about your cancer?", "How often did it seem that your

spouse did not understand your situation?", and "How often did your spouse make you feel as though you had to keep your feelings about your cancer to yourself, because they made him feel uncomfortable?". Lepore (2003) reported excellent internal consistency (Cronbach's $\alpha = .90$) for the 15-item Social Constraints Scale; the present measure was found to have acceptable internal consistency (Cronbach's $\alpha = .77$).

# 3. Results

## 3.a Analyses

Empirical evidence has shown that perceived life threat during a traumatic event, and social factors in the aftermath of the trauma, are related to psychological outcomes, such as posttraumatic stress and posttraumatic growth. To examine these relationships, the first set of analyses used hierarchical multiple regression explore the predictive roles of perceived threat, situational social support seeking, dispositional social support seeking, and social constraints on posttraumatic stress at T1, and posttraumatic growth at T1 and T2. Before conducting the analyses, perceived threat and age were centered to eliminate problematic multicollinearity effects between first-order terms and the higher order terms (Holmbeck, 1997).

Examination of the predictive roles of perceived threat, situational social support seeking, dispositional social support seeking, and social constraints on posttraumatic stress at T2 were conducted using ordinal logistic regression analyses. This method of analysis was selected because posttraumatic stress at T2 is measured with a four-level variable rather than a continuous variable. Ordinal logistic regression analyses assume that the relationship between each pair of outcome groups is the same, or in other words, the odds ratio is assumed to be constant for all categories. This is known as the proportional odds assumption. The present analyses will report common odds ratios and confidence intervals to indicate significance or insignificance. The common odds ratio refers to the ratio of the odds of an event occurring in one group to the odds of it occurring in another group.

Furthermore, it was also hypothesized that situational social support seeking, dispositional social support seeking, and social constraints would moderate the effects of perceived threat on the four outcome variables (see Figure 1). When the hypothesized moderator value and the

independent variable are continuous, moderation can be examined by regressing the outcome variables on the independent variable and the interaction term (independent variable X moderator variable). If the interaction between the independent variable and the potential moderator variable is significant, it can be concluded that a significant moderation effect exists (Baron and Kenney, 1986). If a significant interaction is found for social support seeking or social constraints, a post-hoc probing of the interaction will be conducted in order to further explore the directional effect of the moderator on the relationship between the independent variable and outcome variable.

Additionally, two potentially confounding variables, age and gender, were included in the analyses as covariates. Posttraumatic stress at T1 and posttraumatic growth at T1 were included in the analyses as covariates when conducting analyses on posttraumatic stress at T2, and posttraumatic growth at T2, respectively. It is important to statistically control for these variables to ensure that they do not have an effect on the analyses.

**3.b Descriptive Statistics**

Statistical analyses were run on all the variables to obtain frequencies and descriptive statistics. At T1, 88.5% of respondents identified themselves as White/Caucasian, 8.2% as Asian, and 3.0% as Black/African American. The sample was 45.4% male and the mean age was 21.83 years.

Furthermore, 11.1% of individuals were classified as having significant levels of posttraumatic stress symptoms, while 88.9% of respondents were classified as having low levels of symptoms. These percentages are similar to those of Hughes and colleagues (2011) who found, using a diagnostic approximation of PTSD, that 15.4% of students in the same sample met criteria for probable PTSD. At T2, 52.2% of respondents reported having at least one current symptom of

posttraumatic stress, while 47.8% of respondents reported not experiencing any symptoms of posttraumatic stress.

**3.c Relationships among Variables**

A demographic summary of variables with their means and standard deviations is included (see Table 1). Frequencies, means, standard deviations, and internal consistency coefficients were obtained for each variable in the present study (see Table 2).

Correlations were computed among scores of the perceived threat, situational social support seeking, dispositional social support seeking, social constraints, posttraumatic stress at T1 and T2, and posttraumatic growth at T1 and T2 measures, as well as for gender and age (see Table 3). Among the demographic variables, gender was significantly related to all other variables, indicating that female respondents reported higher levels of perceived threat ($r = .32$, $p < .001$), posttraumatic stress at T1 ($r = .24$, $p < .001$), posttraumatic stress at T2 ($r = .29$, $p < .001$), posttraumatic growth at T1 ($r = .13$, $p < .001$), posttraumatic growth at T2 ($r = .13$, $p < .001$), situational social support seeking ($r = .23$, $p < .001$), and dispositional social support seeking ($r = .24$, $p < .001$). Male respondents reported higher levels of social constraints ($r = -.09$, $p < .05$).

Younger respondents perceived higher levels of threat ($r = -.24$, $p < .001$) and symptoms of posttraumatic stress at T2 ($r = -.08$, $p < .05$). Older students reported perceiving more social constraints ($r = .09$, $p < .05$).

Respondents who endorsed high levels of perceived threat reported higher levels of posttraumatic stress at T1 ($r = .38$, $p < .001$), posttraumatic stress at T2 ($r = .29$, $p < .001$), more situational social support seeking ($r = .28$, $p < .001$), and more frequent dispositional social support seeking ($r = .10$, $p < .05$).

Situational social support seeking was significantly positively correlated with posttraumatic stress at T1 ($r$ = .25, $p$ <.001), indicating that respondents who reported engaging in more social support seeking behaviors also reported higher levels of posttraumatic stress at T1. Individuals who engaged in high levels of situational social support seeking reported fewer symptoms of posttraumatic stress at T2 ($r$ = -.22, $p$ <.001).

Respondents who endorsed more frequent dispositional social support seeking endorsed lower levels of posttraumatic stress at T1 ($r$ = -.10, $p$ <.01).

Social constraints are significantly positively correlated with posttraumatic stress at T1 ($r$ = .16, $p$ <.001), indicating that respondents who perceived higher levels of social constraints also reported high levels of posttraumatic stress at T1.

Situational social support seeking was significantly negatively correlated with social constraints ($r$ = -.25, $p$ <.001), indicating that those who engaged in higher levels of social support seeking behaviors after the tragedy perceived lower levels of social constraints. Individuals who exhibit more habitual support seeking patterns perceived lower social constraints ($r$ = -.48, $p$ <.001). Individuals who used support seeking as a coping strategy in response to the shootings were also more likely to have a disposition inclined toward social support seeking ($r$ = .31, $p$ <.001).

Individuals who endorsed higher levels at posttraumatic stress at T1 were more likely to have frequent symptoms of posttraumatic stress at T2 ($r$ = .43, $p$ <.001). Individuals who experienced more posttraumatic growth at T1 were more likely to experience more growth at T2 ($r$ = .58, $p$ <.001). Posttraumatic stress at T2 and posttraumatic growth at T2 were also positively related ($r$ = .16, $p$ <.001).

**3.d Prediction of Outcomes and Moderator Model Tests**

**3.d.i Perceived threat**. With regards to hypothesis 1, the overall model testing the predictive ability of students' perceived threat on their levels of reported posttraumatic stress symptoms at T1 was significant $F(3, 4635) = 347.66$, $p < .001$, controlling for the effects of gender and age. The overall model explained 18.4% of the total variance. The perceived threat variable was statistically significant, $B = .66$, $p < .001$, indicating that the students who perceived higher threat levels were more likely to endorse higher levels of posttraumatic stress symptoms (see Table 4).

The overall model examining the relationship between perceived threat and posttraumatic stress at T2, controlling for the effects of gender, age, and posttraumatic stress at T1 was significant $F(4, 857) = 22.70$, $p < .001$ (see Table 5). The perceived threat variable was not significantly associated with posttraumatic stress at T2 (common odds ratio 1.04, 95% CI .99 – 1.09; p=.087).

With regards to hypothesis 2, the overall model testing the predictive ability of students' perceived threat on their levels of reported posttraumatic growth at T1 was significant $F(3, 4635) = 181.51$, $p < .001$, controlling for the effects of gender and age. The overall model explained 10.5% of the total variance. The perceived threat variable was statistically significant, $B = .19$, $p < .001$, indicating that the students who perceived higher threat levels were more likely to report more perceived growth (see Table 6).

The overall model testing the relationship between students' perceived threat and perceived posttraumatic growth symptoms at T2 was significant $F(4, 847) = 117.82$, $p < .001$, controlling for the effects of gender, age, and T1 posttraumatic growth. Perceived threat and the covariates collectively accounted for 37.9% of the variance in T2 posttraumatic growth. The model indicated a significant relationship between perceived threat and posttraumatic growth at

T2, $B = .05$, $p < .05$, indicating that the students who perceived higher threat levels were more likely to report more perceived growth indicators one year after the shootings (see Table 7).

**3.d.ii Situational social support seeking.**

With regards to hypothesis 3, the overall model testing the predictive ability of students' situational social support seeking behaviors on their levels of reported posttraumatic stress symptoms at T1 was significant $F(3, 4635) = 194.07$, $p < .001$, controlling for the effects of gender and age. The overall model explained 11.2% of the total variance. The situational social support seeking variable was statistically significant, $B = .58$, $p < .001$, indicating that the students who engaged in more social support seeing behaviors following the shootings were more likely to endorse higher levels of posttraumatic stress symptoms (see Table 8).

The overall model examining the relationship between situational social support seeking and posttraumatic stress at T2, controlling for the effects of gender, age, and posttraumatic stress at T1 was significant $F(4, 856) = 17.90$, $p < .001$ (see Table 9). The situational social support seeking variable was not significantly associated with posttraumatic stress at T2 (common odds ratio 1.06, 95% CI .99 – 1.14; p=.096).

The overall model testing the predictive ability of students' situational social support seeking behaviors on their levels of reported posttraumatic growth at T1 was significant $F(3, 4635) = 284.13$, $p < .001$, controlling for the effects of gender and age. The overall model explained 15.5% of the total variance. The situational social support seeking was statistically significant, $B = -.35$, $p < .001$, indicating the students who engaged in more situational social support seeking behaviors were less likely to report posttraumatic growth at T1 (see Table 10).

The overall model testing the relationship between students' situational social support seeking behaviors and perceived posttraumatic growth symptoms at T2 was statistically significant

$F(4, 846) = 115.46$, $p < .001$, controlling for the effects of gender, age, and T1 posttraumatic growth; the model explained 37.4% of the variance in T2 posttraumatic growth. The relationship between situational social support seeking and posttraumatic growth at T2 was non-significant, $B = -.02$, $p = .640$ (see Table 11).

With regards to hypothesis 4, the overall model testing the moderational role of situational social support seeking on the relationship between perceived threat and posttraumatic stress at T1 was significant $F(5, 4634) = 180.57$, $p < .001$, while controlling for gender and age; the model explained 19.73% of the total variance (see Table 12). A significant interaction was found between perceived threat and situational social support seeking $B = .04$, $p < .01$, suggesting that situational social support seeking is a moderator between perceived threat and posttraumatic stress symptoms at T1. Post-hoc probing of the interaction revealed that the slope was significant for high levels of situational social support seeking $B = .68$, $p < .001$ as well as for low levels of situational social support seeking $B = .48$, $p < .001$ (see Figure 2).

The overall model testing the moderational role of situational social support seeking on the relationship between perceived threat and posttraumatic stress at T2 was significant $F(5, 4634) = 16.27$, $p < .001$, while controlling for gender, age, and posttraumatic stress at T1. A significant interaction was found between perceived threat and situational social support seeking (common odds ratio 0.98, 95% CI .97–1.00; $p < .05$), suggesting that situational social support seeking is a moderator between perceived threat and posttraumatic stress symptoms at T2 (see Table 13). That is, for a one unit increase in situational social support seeking, the odds ratio for perceived threat decreases by a factor of 0.98. Post-hoc probing of the interaction revealed that the slope was significant for low levels of situational social support seeking $B = .73$, $p < .05$ but not for high levels of situational social support seeking $B = -.01$, $p = .801$. However, the perceived threat

variable did not have a significant direct relationship with posttraumatic stress at T2 (common odds ratio 1.04, 95% CI .99–1.09; p = .087), nor was it significantly related to posttraumatic stress at T2 in the moderational analysis (common odds ratio 1.03, 95% CI .98–1.08; p = .188). Given these insignificant relationships, the statistically significant interaction between perceived threat and situational social support seeking is considered to be inconsequential and further analysis of this interaction will not be explored.

The overall model testing the moderational role of situational social support seeking on the relationship between perceived threat and posttraumatic growth at T1 was significant $F(5, 4634) = 152.58$, $p < .001$, while controlling for gender and age; the model explained 19.41% of the total variance. No significant interaction was found $B = .00$, $p = .874$, suggesting that situational social support seeking does not moderate the relationship between perceived threat and posttraumatic growth at T1 (see Table 14).

The overall model testing the moderational role of situational social support seeking on the relationship between perceived threat and posttraumatic growth at T2 was significant $F(6, 845) = 23.36$, $p < .001$, while controlling for gender, age, and posttraumatic growth at T1; the model explained 37.92% of the total variance. No significant interaction was found $B = .00$, $p = .636$, suggesting that situational social support seeking does not moderate the relationship between perceived threat and posttraumatic growth at T2 (see Table 15).

**3.d.iii Dispositional social support seeking.**

With regards to hypothesis 5, the overall model testing the predictive ability of students' dispositional social support seeking behaviors on their levels of reported posttraumatic stress symptoms at T1 was significant $F(3, 4635) = 142.72$, $p < .001$, controlling for the effects of gender and age. The overall model explained 8.5% of the total variance. The dispositional social

support seeking variable was statistically significant, $B$ = -1.23, $p$ < .001, indicating that the students who are dispositionally more likely to seek social support were more likely to endorse lower levels of posttraumatic stress symptoms at T1 (see Table 16).

The overall model examining the relationship between dispositional social support seeking and posttraumatic stress at T2, controlling for the effects of gender, age, and posttraumatic stress at T1 was significant $F(4, 857) = 18.21$, $p < .001$ (see Table 17). The dispositional social support seeking variable was not significantly associated with posttraumatic stress at T2 (common odds ratio 1.00, 95% CI .83 – 1.20; p=.980).

The overall model testing the predictive ability of students' dispositional social support seeking on their levels of reported posttraumatic growth at T1 was significant $F(3, 4635) = 58.56$, $p < .001$, controlling for the effects of gender and age. The overall model explained 3.70% of the total variance. The dispositional social support seeking variable was statistically significant, $B$ = .38, $p < .001$, indicating that the students who are dispositionally more inclined to seek social support endorsed more growth at T1 (see Table 18).

The overall model testing the relationship between students' dispositional social support seeking and perceived posttraumatic growth symptoms at T2 was significant $F(4, 846) = 117.04$, $p < .001$, controlling for the effects of gender, age, and T1 posttraumatic growth. Dispositional social support seeking and the covariates collectively accounted for 37.7% of the variance in T2 posttraumatic growth. The model indicated a significant relationship between dispositional social support seeking and posttraumatic growth at T2, $B$ = .13, $p$ <.001 (see Table 19).

With regards to hypothesis 6, the overall model testing the moderational role of dispositional social support seeking on the relationship between perceived threat and posttraumatic stress at T1 was significant $F(5, 4634) = 153.01$, $p < .001$, while controlling for gender and age;

the model explained 19.01% of the total variance. The interaction term between perceived threat and dispositional social support seeking was insignificant $B = -.07$, $p = .052$, suggesting that dispositional social support seeking does not moderate the relationship between perceived threat and posttraumatic stress symptoms at T1 (see Table 20).

The overall model testing the moderational role of dispositional social support seeking on the relationship between perceived threat and posttraumatic stress at T2 was significant $F(5, 4634) = 16.27$, $p < .001$, while controlling for gender, age, and posttraumatic stress at T1. No significant interaction was found between perceived threat and dispositional social support seeking (common odds ratio .98, 95% CI .94–1.03; p=.399), suggesting that dispositional social support seeking does not moderate the relationship between perceived threat and posttraumatic stress symptoms at T2 (see Table 21)

The overall model testing the moderational role of dispositional social support seeking on the relationship between perceived threat and posttraumatic growth at T1 was significant $F(5, 4634) = 82.05$, $p < .001$, while controlling for gender and age; the model explained 11.75% of the total variance. No significant interaction was found $B = .01$, $p = .448$, suggesting that dispositional social support seeking does not moderate the relationship between perceived threat and posttraumatic growth at T1 (see Table 22).

The overall model testing the moderational role of dispositional social support seeking on the relationship between perceived threat and posttraumatic growth at T2 was significant $F(6, 845) = 24.77$, $p < .001$, while controlling for gender, age, and posttraumatic growth at T1; the model explained 38.22% of the total variance. No significant interaction was found $B = -.02$, $p = .339$, suggesting that dispositional social support seeking does not moderate the relationship between perceived threat and Posttraumatic growth at T2 (see Table 23).

**3.d.iv Social constraints.**

With regards to hypothesis 7, the overall model testing the relationship between social constraints and levels of reported posttraumatic stress symptoms at T1 was significant $F(3, 4567) = 149.95$, $p < .001$, controlling for the effects of gender and age. The overall model explained 9.0% of the total variance. The social constraints variable was statistically significant, $B = .62$, $p < .001$, indicating that the students who perceived more social constraints were more likely to endorse higher levels of posttraumatic stress symptoms at T1 (see Table 24).

The overall model examining the relationship between social constraints and posttraumatic stress at T2, controlling for the effects of gender, age, and posttraumatic stress at T1 was significant $F(4, 852) = 19.79$, $p < .001$ (see Table 25). The social constraints variable was not significantly associated with posttraumatic stress at T2 (common odds ratio 1.06, 95% CI .97 – 1.16; p=.183).

The overall model testing the predictive ability perceived social constraints on students' levels of reported posttraumatic growth at T1 was significant $F(3, 4567) = 59.53$, $p < .001$, controlling for the effects of gender and age. The overall model explained 3.7% of the total variance. The social constraints variable was statistically significant, $B = -.19$, $p < .001$, indicating that the students who perceived higher levels of social constraints were less likely to report posttraumatic growth at T1 (see Table 26).

The overall model testing the relationship between students' reports of social constraints and perceived posttraumatic growth symptoms at T2 was statistically significant $F(4, 843) = 117.21$, $p < .001$, controlling for the effects of gender, age, and T1 posttraumatic growth; the model explained 37.9% of the variance in T2 posttraumatic growth. The relationship between social constraints and posttraumatic growth at T2 was significant $B = -.12$, $p < .01$, indicating that

students' who perceived themselves as being more socially constrained endorsed less growth at T2 (see Table 27).

With regards to hypothesis 8, the overall model testing the moderational role of social constraints on the relationship between perceived threat and posttraumatic stress at T1 was significant $F(5, 4566) = 165.12$, $p < .001$, while controlling for gender and age; the model explained 19.30% of the total variance (see Table 28). The interaction term between perceived threat and social constraints was significant $B = .04$, $p < .05$, suggesting that social constraints moderates the relationship between perceived threat and posttraumatic stress symptoms at T1. Post-hoc probing of the interaction revealed that the slope was significant for high levels of social constraints $B = .72$, $p < .001$ as well as for low levels of social constraints $B = .58$, $p < .001$ (see Figure 3). However, further exploration of this relationship indicated that this significant moderation between perceived threat and posttraumatic stress at T1 is inconsequential due to the limited variability of responses ($M = 5.7$, $SD = 1.9$) of the social constraints items. Thus, further analysis of this relationship will not be explored.

The overall model testing the moderational role of social constraints on the relationship between perceived threat and posttraumatic stress at T2 was significant $F(6, 851) = 16.55$, $p < .001$, while controlling for gender, age, and posttraumatic stress at T1. No significant interaction was found between perceived threat and social constraints (common odds ratio 1.00, 95% CI .97–1.02; p=.748), suggesting that the social constraints variable does not moderate the relationship between perceived threat and posttraumatic stress symptoms at T2 (see Table 29).

The overall model testing the moderational role of social constraints on the relationship between perceived threat and posttraumatic growth at T1 was significant $F(5, 4566) = 82.49$, $p < .001$, while controlling for gender and age; the model explained 12.11% of the total variance. No

significant interaction was found $B$ = -.00, $p$ = .212, suggesting that the social constraints variable does not moderate the relationship between perceived threat and posttraumatic growth at T1 (see Table 30).

The overall model testing the moderational role of social constraints on the relationship between perceived threat and posttraumatic growth at T2 was significant $F(6, 842) = 30.27$, $p <$ .001, while controlling for gender, age, and posttraumatic growth at T1; the model explained 38.39% of the total variance. No significant interaction was found $B$ = -.00, $p$ = .814, suggesting that the social constraints variable does not moderate the relationship between perceived threat and posttraumatic growth at T2 (see Table 31).

**3.d.v Temporal course of outcome variables.**

With regards to hypothesis 9, the overall model examining the relationship between posttraumatic stress at T1 and posttraumatic stress at T2, controlling for the effects of gender, and age was significant $F(4, 857) = 29.3$, $p < .001$. The occurrence of higher levels of posttraumatic stress at T1 is associated with an increased risk of higher levels of posttraumatic stress at T2, (common odds ratio 1.09, 95% CI 1.07 – 1.12; p < .001). That is, for a one unit increase in posttraumatic stress at T1, the odds of experiencing a higher level of posttraumatic stress symptoms at T2, are 1.09 times greater, given that the other variables are held constant in the model (see Table 32).

With regards to hypothesis 10, the overall model testing the predictive ability perceived posttraumatic growth symptoms at T1 on students' levels of posttraumatic growth at T2 was significant $F(4, 857) = 154.02$, $p < .001$, controlling for the effects of gender and age. The overall model explained 61.2% of the total variance. The posttraumatic growth at T1 variable was

statistically significant, $B = .60$, $p < .001$, indicating that the students who endorse higher levels of posttraumatic growth at T1 also endorsed higher levels of growth at T2 (see Table 33).

### 3.d.vi Supplementary Analyses

A series of independent samples t-tests were conducted in order to fully explore group differences between those individuals at T1 who responded to the T2 survey and those who did not. Significant group differences emerged, t(4633) = -.44, p < .001, with regards to gender. The T1 group ($M = 10.58$, $SD = 4.42$) significantly differed from the T2 group ($M = 10.58$, $SD = 4.42$), t(4633) = 2.12, p < .05 with regards to perceived threat. A significant difference also emerged between the T1 group ($M = 7.74$, $SD = 2.58$) and T2 group ($M = 7.71$, $SD = 2.48$), t(4633) = -.326, p < .01 in their levels of situational social support seeking. No significant differences between groups emerged with regards to age t(4633) = .33, p = .75; dispositional social support seeking t(4633) = 1.03, p = .31; social constraints t(4565) = -.94, p = .35; posttraumatic stress at T1 t(4633) = 1.12, p = .26; and posttraumatic growth at T1 t(4633) = .92, p = .36.

Additionally, correlations were computed between the predictor variables and each domain of posttraumatic growth. The relating to others ($r = .33$, $p < .001$), spiritual change ($r = .23$, $p < .001$), and personal strength domains ($r = .16$, $p < .001$) were all significantly positively correlated with perceived threat. The relating to others ($r = -.44$, $p < .001$), spiritual change ($r = -.30$, $p < .001$), and personal strength variables ($r = -.16$, $p < .001$) were all significantly negatively correlated with situational social support seeking. The relating to others ($r = .20$, $p < .001$), spiritual change ($r = .13$, $p < .001$), and personal strength variables ($r = .03$, $p < .05$) were all significantly positively correlated with dispositional social support seeking. Relating to others ($r = -.20$, $p < .001$) and spiritual change ($r = -.12$, $p < .001$) were significantly related to social constraints, though personal strength was not significantly related ($r = -.02$, $p = .15$). With the

exception of an insignificant relationship between relating to others and dispositional social support seeking ($r$ = .02, $p$ = .28), relationships among variables at T2 followed the same pattern.

Moreover, t-tests were conducted examining differences among the domains of posttraumatic growth included in the present analyses (i.e. relating to others, spiritual change, and personal strength). The means of each domain at T1 significantly differed from one another: relating to others ($M$ = 3.05, $SD$ = 1.17,) t(4638) = 177.23, p < .001; spiritual change ($M$ = 2.08, $SD$ = 1.17,) t(4638) = 121.26, p < .001; and personal strength ($M$ = 2.80, $SD$ = 1.33,) t(4638) = 142.76, p < .001. The same pattern of significant group differences observed at T1 posttraumatic growth was observed at T2.

Paired samples t-tests were conducted to look at the change within each domain between the T1 survey and T2. There was a statistically significant decrease in spiritual change from T1 ($M$ = 2.08, $SD$ = 1.17,) to T2 ($M$ = 1.98, $SD$ = 1.13,) t(857) = 4.38, p < .001. No significant differences emerged between the relating to others domain between time points t(856) = .45, p = .65, or between the personal strength domains from T1 to T2 t(851) = 1.47, p = .14.

Notably, preliminary distribution explorations yielded a normally distributed relating to others variable, both at T1 and T2. The spiritual change and personal strength domains had limited variabilities and both demonstrated a positive skew.

## 4. **Discussion**

This study attempted to examine the role of perceived threat in predicting mental health outcomes following the April 16th tragedy at Virginia Tech. In particular, it tested whether or not perceived threat significantly predicted posttraumatic stress and posttraumatic growth, both cross-sectionally and longitudinally. Additionally, the study aimed to determine the predictive abilities of situational social support seeking, dispositional social support seeking, and social constraints on mental health outcomes, cross-sectionally and longitudinally. It was hypothesized that greater levels of situational and dispositional social support seeking would predict higher levels of posttraumatic growth outcomes and lower levels of posttraumatic stress outcomes. Furthermore, it was predicted that high levels of social constraints would be positively related to high levels of posttraumatic stress symptoms and lower levels of posttraumatic growth outcomes.

With the exceptions of insignificant relationships between both situational and dispositional social support seeking and posttraumatic growth at T2, as well as an unexpected positive relationship between situational social support seeking and posttraumatic stress outcomes, the findings supported the hypotheses. These results have important implications for understanding how these variables can be applied to the principles of social cognitive theory.

Furthermore, the study aimed to evaluate the moderational roles of situational social support seeking, dispositional social support seeking, and social constraints on the relationship between perceived threat and posttraumatic stress and posttraumatic growth outcomes. Contrary to hypothesized relationships, only one significant interaction was found in the present study; situational social support seeking moderated the relationship between perceived threat and posttraumatic stress at T1.

**4.a Perceived threat**

The present study found a significant relationship between perceived threat and posttraumatic stress symptoms at T1, but not at T2. Given considerable empirical support for negative psychological outcomes following the perception of threat during a traumatic experience, the positive relationship between perceived threat and posttraumatic stress at T1 was expected. Ehlers and Clark (2000) proposed a Cognitive Model of PTSD that suggests that symptoms of posttraumatic stress endure for months or even years after the trauma when individuals' appraisals of the event involved the perception of serious life threat. This perspective is well-regarded and is supported in a recent meta-analysis, which concluded that peritraumatic factors during the trauma strongly predict subsequent PTSD (Ozer et al., 2008).

However, the relationship between perceived threat and posttraumatic stress at T2 was insignificant, indicating that perception of life threat at T1 did not predict posttraumatic stress symptoms one year after the event, despite the claim by Ehlers and Clark (2000) that threatening appraisals of the trauma can lead to persistent symptoms of PTSD years later. It is interesting that individuals who perceived high levels of threat during the shootings did not endorse higher levels of traumatic stress symptoms one year later, particularly given the evidence that supports anniversary reactions (Morgan, Hill, Fox, Kingham, & Southwick 1999).

On the other hand, it is possible that memorializing the event at the one-year anniversary served as a protective factor for the individuals who reported posttraumatic stress symptoms at T1. One year after the shootings, Virginia Tech organized a "Day of Remembrance" which included a commemoration and candlelight vigil. System-level processes can promote social integration and support. Large group membership, such as being a member of a university community, can

provide a sense of belonging and security (Felton & Shinn, 1992). Moreover, other people who were also directly experienced the traumatic event can play an important role in the coping process, as they are able to provide coping assistance that is closely tailored to the specific traumatic event. Receiving advice and encouragement from these people can reinforce individuals' coping efforts and promote a greater sense of control over outcomes, which in turn, may ameliorate some of the symptoms of posttraumatic stress (Suitor & Pillemer, 2000). The role of the hypothesized moderators will also be discussed with reference to their relative impact on this relationship.

A significant relationship was found between perceived threat and posttraumatic growth both at T1 and T2. The relationship between perceived threat and posttraumatic growth at T1 is consistent with the existing literature positing that posttraumatic growth occurs following an event that shatters one's worldviews (Larner & Blow, 2011; Joseph & Linley, 2005; Kessler et al., 2006). Furthermore, Cann and colleagues (2010) claim that the level of growth experienced after a trauma is analogous to the degree of challenge to one's belief system about his or her place in the world. It is logical that increased awareness of mortality, both personally and vicariously, provides such a challenge to individuals' beliefs about their place in the world. This sense of mortality threat may be an important part of the growth process because without it, individuals would not have a basis for meaning-making and reappraisal following trauma.

Tedeschi and Calhoun (2004) posited that posttraumatic growth is a process rather than a static outcome, but little is known about the temporal course of growth. Thus, the current results demonstrate that the predictive role of perceived threat on posttraumatic growth at T2 is important for learning more about possible contributors leading to the development of growth after trauma. Consistent with these findings, previous studies have suggested that higher levels of threat

appraisal are related to posttraumatic growth over time (Sears et al., 2003; Kleim & Ehlers, 2009; Wolchik et al., 2008). It may be the case that individuals experienced growth in the first three months after the shootings and continued to gradually make sense of the threatening situations they experienced, which may have then lead to intrinsic goal shifts and subsequent growth. This process may occur over the period of several months or longer, as individuals need time to process trauma-related information and reappraise their worldviews (Lykins et al., 2007).

**4.b Moderator Variables**

**4.b.i Situational social support seeking and posttraumatic stress**. Situational social support seeking was significantly related to posttraumatic stress at T1, though the relationship to posttraumatic stress at T2 was insignificant. Furthermore, situational social support seeking served as a moderator between perceived threat and posttraumatic stress at both time points.

The positive relationship between situational social support seeking and posttraumatic stress at T1 is somewhat surprising, as a considerable body of literature supports the buffering effect of social support on negative psychological outcomes (Prati & Pietrantoni, 2009). However, a possible explanation for these findings builds on Thoits's work regarding social support as a form of coping assistance (Thoits, 1986). According to this conceptualization, distressed individuals are likely to seek social support in an effort to cope with their stress related to the traumatic event. Support providers may attempt to employ positive coping strategies that they themselves might find helpful in order to help the distressed individuals to the extent they are able. Coping assistance can be effective when the coping "helpers" provide efficacious support strategies (i.e. encouraging positive appraisal of threatening situations), and when the support providers can exhibit compassion and an empathetic perspective.

As such, individuals who are experiencing distress or negative psychological sequelae following a trauma may be more likely to seek coping "helpers" because they are having difficulty managing their own symptoms. These findings suggest that social support seeking in response to a traumatic event may serve as a coping strategy, instigated in the aftermath of a potentially traumatic event that exceeds the typical stressors of individuals' lives thereby challenging their coping abilities (Lazarus & Folkman, 1984).

Regarding the moderational role of situational social support seeking between perceived threat and posttraumatic stress at T1, the present findings indicate that lower levels of situational social support seeking slightly lessened the effect of perceived threat on posttraumatic stress, which is consistent with other findings (Shisana & Celetano, 1987). Unexpectedly, higher levels of situational social support seeking strengthened the positive relationship between situational social support seeking and posttraumatic stress at T1.

In an attempt to offer an explanation for this unexpected finding, it is possible that the support received when individuals sought social support was ineffective for mitigating their symptoms of posttraumatic stress. Social support satisfaction is associated with positive psychological outcomes after experiencing a stressful event, though the mere presence of social support is not (Linley & Joseph, 2004). Social support has been found to mitigate the relationship between experiencing trauma and posttraumatic stress when emotional support is provided (Stephens & Long, 1999), suggesting that the presence of emotional support is a critical component for lessening symptoms of posttraumatic stress. It may be the case that individuals who sought social support in the aftermath of the shootings did not receive emotional support from support providers. The present study did not evaluate the degree to which individuals received

emotional support, thus, this possible explanation should be interpreted with caution. Nevertheless, this interesting topic of study warrants further research.

High self-efficacy may play a role in this relationship. It is possible that when students' sought support or comfort from friends, particularly those friends who also experienced the shootings, the friends were unable to provide effective support due to their own damaged self-efficacy (Steffen, McKibbin, Zeiss, Gallagher-Thompson, & Bandura, 2002). Indeed, Littleton and colleagues (2011) emphasized the importance of having social support from friends and family members who were not directly impacted by the shootings. The quality of social support has been shown to be a stronger predictor of positive psychological outcomes than quantity of social support (Franks, Cronan, & Oliver, 2004).

In addition, it may be the case that some individuals feel they are required to ask for support from their primary support group members (Thoits, 2011). Individuals may not be ready to discuss their thoughts and feelings immediately following an event, but their concerned support group members may strongly encourage them to do so. In these situations, individuals may experience feelings of anger and bitterness, which contribute to continued negative trauma-related symptomatology. In other cases, feeling obliged to seek social support may negate the potentially beneficial effects of seeking social resources, as individuals could feel like their identities or ability to manage their trauma-related distress is compromised (Grove, Style, & Hughes, 1990).

Interestingly, situational social support seeking was not related to posttraumatic stress at T2, suggesting that the relationship between situational social support seeking and posttraumatic stress at T1 dissipated over time. Factors other than situational social support seeking may be contributing to the maintenance of posttraumatic stress over time such as peritraumatic factors (e.g. dissociation), premorbid functioning, and a family history of psychopathology (Thrasher,

Power, Morant, Marks, & Dalgleish, 2010; Ozer et al., 2008). Further examination into the possible contributors of persistent posttraumatic stress symptoms in the current sample is warranted.

Contrary to hypotheses, situational social support seeking did not serve as a meaningful moderator between perceived threat and posttraumatic stress at T2. This finding is surprising given the literature indicating that higher levels of seeking social support can be an effective coping strategy and reduce the relationship between perceived threat and situational social support seeking. Thus, it appears that factors other than situational social support seeking contributed to the maintenance of posttraumatic stress over time. Instead of relying on support seeking, it is possible that students used alternative coping strategies, including denial and alcohol use. Denial and alcohol use can be effective coping strategies in the immediate aftermath of trauma but, over time, tend to have harmful consequences (Clark, 1994). It could be the case that individuals, who utilized denial and alcohol consumption as coping strategies, which is possible given the college-aged sample, experienced intensified symptoms of posttraumatic stress at T2.

**4.b.ii Situational social support seeking and posttraumatic growth.** Situational social support seeking was significantly related to posttraumatic growth at T1, but not at T2. The moderational role of situational social support seeking between perceived threat and posttraumatic growth outcomes was not supported by the data.

Contradictory to the hypothesis, situational social support seeking was negatively related to posttraumatic growth at T1. The literature provides support for the benefits of engaging in social support seeking behaviors following a trauma. Social support seeking is shown to predict improved psychological functioning, and increase the likelihood for growth in the year after

trauma (Tang, 2006; Swickert & Hittner, 2009). However, given the unexpected relationship between situational social support seeking and posttraumatic stress at T1, it seems possible that the individuals who seek support are enduring a certain level of distress, and are using support seeking as a coping strategy. Prior to experiencing growth after a traumatic event, individuals undergo a period of difficulty (Larner & Blow, 2011). Individuals who sought social support three months after the trauma may have been motivated by their level of distress, and subsequently were not psychologically well enough to begin the growth process.

The insignificant relationship between situational social support seeking and posttraumatic growth at T2 was unexpected, given the literature that supports the benefits of social support seeking on positive psychological outcomes after trauma. In light of the limited research examining social support seeking in the aftermath of trauma and posttraumatic growth, an explanation for this unanticipated finding is offered. One of the possible outcomes of support seeking is emotional support, and the research has shown that receiving emotional support is not associated with posttraumatic growth over time. Emotional support has been shown to be associated with the use of denial, which may explain the insignificant relationship between emotional support and posttraumatic growth over time (Carver et al., 1989). That is, emotional support may not be a form of adaptive coping when individuals are using others as an outlet to vent their feelings. While social support seeking does not necessarily mean that individuals will receive emotional support, many individuals who engage in social support behaviors are motivated by the desire to receive emotional support (Carver et al., 1989).

Contrary to expectations, situational social support seeking did not moderate the relationship between perceived threat and posttraumatic growth at T1 or T2. It was predicted that higher levels of situational social support seeking would enhance the relationship between

perceived threat and posttraumatic growth outcomes, a hypothesis that was supported by the literature (Swickert & Hittner, 2009). A possible explanation for these surprising findings is that students may not have received the social support that is associated with greater posttraumatic growth. Studies have found that particular types of social support, such as the provision of reassurance, comfort, and problem-solving, are effective for promoting growth after trauma (Schroevers et al., 2010). Thus, it is possible that, if social support was received, the specific type of social support provided by others was not conducive for promoting positive psychological outcomes. Thus, students who sought out social support in an attempt to become immersed in a supportive environment may not have experienced subsequent growth because their social resources were unable to provide them with the specific support needed.

**4.b.iii Dispositional social support seeking and posttraumatic stress**. Dispositional social support seeking was related to posttraumatic stress at T1, but not significantly related to posttraumatic stress longitudinally. The significant negative relationship between dispositional social support seeking and posttraumatic stress at T1 is consistent with existing literature on the protective effects of social support against psychological outcomes after trauma. An explanation of this finding is individuals who habitually seek out social support may have identified support resources that are consistently helpful in the coping process. The difference between the positive and negative relationships between dispositional and situational social support seeking and posttraumatic stress at T1 may be a function of the quality of support received. That is, individuals who sought situational support in the immediate aftermath of the shootings may differ from those who habitually seek support in times of stress, whereas situational support seekers may not receive quality support. Thus, those who have a pattern of seeking support may be more likely to access supportive social resources because of their previous identification of supportive resources.

A related concept, that may help understand more about those individuals who exhibit fixed patterns of seeking social support, is belonging, which refers to an individual's inclusion in a supportive social group. By earning acceptance into a group, individuals become part of a network that places value on communication and mutual obligation (Cobb, 1976). Individuals who belong to a group have a greater sense of security in knowing that their needs will be taken care of by the group. Individuals who have a pattern of seeking out others in times of need may very well experience feelings of belonging, which enable them to continually seek assistance from others. The sense of security that comes from being accepted into a group is a powerful factor for deterring negative psychological outcomes in the wake of trauma.

Additionally, it is important to discuss a related construct to dispositional social support seeking, namely hardiness. Hardiness has been conceptualized as a personality characteristic of individuals who are highly motivated to successfully cope with stressors. Hardy individuals believe that life's challenges are controllable. Evidence has shown that hardy individuals are less likely to experience negative stress-related outcomes (Zakin, Solomon, & Neria, 2003), and that hardiness is associated with greater use of social support seeking strategies, which in turn, is related to lower levels of posttraumatic stress symptoms (Maddi, 2002).

Interestingly, dispositional social support seeking was not significantly related to posttraumatic stress at T2, indicating that the strength of the relationship between dispositional social support seeking and levels of posttraumatic stress becomes insignificant over time. This is interesting because the literature supports the positive influence of quality social interaction on symptoms of posttraumatic stress over time (Robinaugh et al., 2011). However, some evidence suggests that posttraumatic stress can have a deleterious effect on hardiness. For men in particular, stressful events can be associated with decreased hardiness over time (Vogt, Rizvi, Shiperd, &

Resick, 2008), and subsequent vulnerability to later trauma. This notion is supported by Hobfoll (1989) within the context of his conservation of resource theory. Notably, this relationship was not found to exist for women. Thus, it is possible that the significant negative relationship between dispositional social support seeking and posttraumatic stress was mitigated at T2 because individuals may have become less hardy over time. Further research should explore the interplay between posttraumatic stress and hardiness over time.

Dispositional social support seeking did not serve as a moderator between perceived threat and posttraumatic stress outcomes at T1 or T2. This finding is surprising given the evidence for the protective role of dispositional factors on the relationship between perceived threat and posttraumatic stress (Bartone, 1999). It could be the case that individuals chose to engage in other types of coping, including avoidant or distractive.

**4.b.iv Dispositional social support seeking and posttraumatic growth**. Dispositional social support seeking was related to posttraumatic growth at T1 and at T2. The significant positive relationship between dispositional social support seeking and posttraumatic growth at T1 supports the hypothesis and is unsurprising given the existing literature. A supportive social environment can facilitate the process of rebuilding shattered worldviews and promote adaptation of trauma-related information into current schemas (Joseph & Linley, 2005). Certain dispositional factors such as positive affectivity have been shown to predict posttraumatic growth (Lelorain, Bonnaud-Antignac, & Florin, 2010). Those who have a pattern of seeking social support tend to have a higher locus of control (Lakey & Edmundson, 1993), which, from the perspective of social cognitive theory, indicates that these individuals perceive more control over their outcomes, and are more likely to modify their behaviors appropriately to meet environmental demands.

Perceiving control over outcomes and engaging in active coping behaviors are highly associated with growth outcomes after trauma.

Furthermore, hardy individuals are likely to be those who maintain existential courage in the face of stressful events, and the ability to face stressors directly due to strong perceptions of controllability (Linley & Joseph, 2004). Thus, hardy individuals are more likely to be associated with problem-solving, seeking supportive social resources, and growth outcomes after trauma (Maddi et al., 2011), consistent with the present finding that dispositional social support seeking is positively related to posttraumatic growth outcomes.

The relationship between dispositional social support seeking and posttraumatic growth at T2 was significant suggesting that students' perceived growth at T1 was stable one year later. This finding is consistent with the literature, which supports the potential of individuals who are dispositionally inclined to seek social support, to actively cope with stressors, thereby increasing the likelihood for positive psychological outcomes, such as growth. Further, this finding provides support for the idea that growth is stable over time, which is important considering the uncertainty in the literature regarding the length of time required for growth to develop. Some evidence suggests that growth may taper off over time (Stanton et al., 2006), while other evidence indicates that growth remains relatively stable over time (Linley & Jospeh, 2004).

Dispositional social support seeking did not serve as a moderator between perceived threat and posttraumatic growth outcomes. Contrary to predicted findings, higher levels of dispositional social support seeking did not enhance the relationship between perceived threat and posttraumatic growth outcomes. In an attempt to explain these unexpected findings, it is important to consider gender differences. Gender differences may be able to account for this insignificant relationship,

as women are more likely to use social support resources and seek emotional support from others, than are men (Felsten, 1998). Thus, if men and women have innate differences in their tendencies to seek out others in times of stress, it is possible that including both genders in this analyses made it difficult to truly assess the relationship between perceived threat and posttraumatic stress outcomes at varying levels of dispositional social support seeking.

**4.b.v Social constraints and posttraumatic stress**. Social constraints were found to be related to posttraumatic stress at T1, consistent with the predictive relationships, but not significantly related to posttraumatic stress at T2. Empirical evidence supports the deleterious effects of perceived social constraints on psychological outcomes after trauma that can occur when people do not express their trauma-related thoughts and feelings to others. Social constraints are associated with negative cognitions, which are, in turn, associated with negative psychological outcomes following trauma (Lepore & Revenson, 2007; Belsher et al., 2011). Perceiving social constraints may inhibit the ability to cognitively and emotionally process the trauma. Proposed changes to DSM-V (Friedman, Resick, Bryant, & Brewin, 2011), emphasize the importance of recognizing that many individuals with PTSD have persistent negative expectations about the world and their social relationships, as well as negative appraisals about past, present, and future circumstances. Thus, it seems possible that individuals, who perceive higher levels of constraints, and the accompanying negative cognitions and appraisals, experience symptoms characteristic of posttraumatic stress. Further, a perceived lack of social ties may create added stress for individuals; a lack of social ties has been associated with loneliness, a lack of identity, and behavioral deregulation (Rook, 1984).

Social constraints did not meaningfully moderate the relationship between perceived threat and posttraumatic stress at T1 or T2, contrary to expectations. This finding is surprising given the

existing literature on the deleterious effect of perceived social constraints on psychological outcomes. Individuals report feeling socially constrained when they perceive that social resources are unavailable, or unsupportive. The limited variability of students' responses to the social constraints items also likely contributed to the inconsequential moderating effect of social constraints on the relationship between perceived threat and posttraumatic stress at both time points.

**4.b.vi Social constraints and posttraumatic growth**. Social constraints were found to be related to posttraumatic growth at T1 and T2, consistent with the hypothesized relationships. A significant, negative relationship emerged between social constraints and posttraumatic growth at T1 following the shootings. Social constraints are associated with poor psychological functioning and more frequent intrusive thoughts after a stressful event; in turn, higher levels of distress are associated with lower levels of posttraumatic growth (Braitman et al., 2008; Lepore & Helgeson, 1998; Gunty et al., 2011). Furthermore, individuals who perceive availability of social support resources, and endorse feeling less socially constrained, are more likely to expression emotions (Zakowski et al., 2003). Engaging in what is known as the social sharing of emotion can facilitate the process of reorganizing of individuals beliefs about the self and the world, thereby facilitating the meaning-making and self-esteem enhancement processes, which are associated with posttraumatic growth (Rimé, Páez, Basabe, & Martínez, 2010).

Furthermore, as predicted, those who reported high levels of social constraints three months following the trauma reported fewer posttraumatic growth indicators one year after the trauma. This is consistent with the perceived social support literature that suggests individuals who perceive the ability of social resources, or those who do not feel constrained, are more likely

to report posttraumatic growth outcomes over time, following a mass trauma event (Ai, Tice, Terrence, Lemieux, & Huang, 2011).

Social constraints did not serve as a moderator between perceived threat and posttraumatic growth outcomes, either at T1 or at T2. It was expected that low levels of social constraints would enhance the relationship between perceived threat and posttraumatic growth outcomes because individuals who perceive fewer constraints are generally more likely to have access to social support resources. Evidence supports the beneficial effects of the perceived availability of social support resources following trauma, as social support provision can assist individuals in processing and making-meaning of the trauma, which subsequently can increase posttraumatic growth outcomes.

In light of this evidence, it is possible that lower levels of social constraints did not enhance the relationship between perceived threat and posttraumatic growth outcomes due to the measurement of the posttraumatic growth construct. As previously mentioned, measuring perceived posttraumatic growth may not be a true representation of growth because it relies on retrospective subjective appraisals rather than specific actions.

**4.b.vii Temporal course of outcome variables.** As expected, higher levels of posttraumatic stress three months after the shootings significantly predicted higher levels of posttraumatic stress one year later. This finding is consistent with the literature indicating that posttraumatic stress symptoms persist over time for many people. Perceived threat has been identified as a factor that contributes to the likelihood of experiencing chronic posttraumatic stress symptoms (Breslau & Davis, 1992). The results of the present study provide support for existing evidence suggesting that perceived life threat is a factor contributing to the development of

posttraumatic stress symptoms and that posttraumatic stress symptoms can persist over time. This finding is important to consider because the literature has shown that individuals who experience symptoms of posttraumatic stress for longer than three months after a traumatic event are less likely to be able to lessen their symptoms over time.

The significant positive relationship between posttraumatic growth three months and one year after the shootings is important because it contributes to the conflicting literature about the sustainability of posttraumatic growth over time. Some studies have shown that the level of reported growth increases with time, while other studies have not found evidence for this temporal progression of posttraumatic growth (Linley & Joseph, 2004). However, the present study's longitudinal analysis of posttraumatic growth suggests that there is a significant relationship between levels of posttraumatic growth three months after the traumatic event and again one year after the event. This finding is important to consider in light of the inconclusive evidence regarding the temporal course of posttraumatic growth. The results of the present study provide support for the claim made by Tedeschi and Calhoun (2004) that posttraumatic growth is a process rather than an outcome.

**4.c Control Variables**

The relationships among the demographic variables that were statistically controlled for in the present study were examined. Gender was significantly related to posttraumatic stress at T1 and T2, as well as posttraumatic growth at T1. Gender was not significantly related to posttraumatic growth at T2. The relationship between gender and posttraumatic stress was expected given the breadth of research indicating that women are more susceptible to developing

symptoms of posttraumatic stress than are men (Kessler et al., 1995) in the immediate aftermath trauma, as well as one year following the trauma (Ehlers, Mayou, & Bryant 1998).

Posttraumatic growth literature consistently supports the tendency for females to report higher levels of growth following a trauma than males. Social support seeking has been found to partially mediate this relationship, suggesting that it may help explain the greater likelihood of growth in females. Gender was not significantly related to posttraumatic growth at T2, which is surprising given the literature documenting the relationship between female gender and experiencing growth outcomes over time (Tallman et al., 2010). Further research is needed to examine the effect of gender on posttraumatic growth outcomes over time.

Unsurprisingly, age was not found to be related to posttraumatic stress or posttraumatic growth at either time point following the shootings. While some studies have suggested that children are more susceptible to experiencing posttraumatic stress symptoms (Bokszczanin, 2007), the evidence does not support significant age differences in the development of symptoms among adult samples. Posttraumatic growth literature has suggested that age differences in the growth experience may exist. Particularly, elderly individuals may be less likely to perceive high levels of growth because they may be more focused on grappling with issues related to their own mortality (Linley & Joseph, 2004). However, due to the relatively homogenous ages of the sample, it is unsurprising that significant age differences in psychological outcomes were not identified.

### 4.d Posttraumatic Growth by Domain

An exploration among posttraumatic growth domains yielded information about the present study's posttraumatic growth construct. Interestingly, while the relationship between perceived threat and posttraumatic growth at T1 was insignificant, each of the three posttraumatic

growth domains demonstrated a significant relationship with perceived threat. These findings were consistent with the relationships between posttraumatic growth domains and other predictor variables (i.e. situational and dispositional social support seeking and social constraints), with the exception of personal strength and social constraints, which was insignificant. That is, while the overall posttraumatic growth construct was not significantly related to predictor variables, each domain alone was significantly related to the variables, suggesting that examining posttraumatic growth as a unitary construct may be masking some of the existing relationships within the construct.

Additionally, it appears that individuals may grow in one or two posttraumatic growth domains at the exclusion of other domain(s). Furthermore, in both T1 and T2, more people endorsed high levels of growth in the relating to others domain compared to the spiritual change and personal strength domains. This is consistent with the literature indicating that the relating to others domain is most commonly endorsed, and is associated with positive outcomes following trauma (Sears et al, 2003). The directionality of the relationships between relating to others and the predictor variables, as well as the relatively high levels of which it is endorsed, indicates that the relating to others domain of posttraumatic growth may be an important indicator of positive growth.

Moreover, the spiritual change domain was significantly less highly endorsed at T2, compared to T1. This suggests that individuals may engage in more spiritual or religious behaviors, or perceive more cognitions at T1, and that this increase dissipates at T2. It is possible that individuals may become more involved in religion or spirituality at T1, as a coping strategy. While previous literature supports the important role of religious coping on posttraumatic growth, this relationship has not shown to weaken over time (Prati & Pietrantoni, 2009), unlike the present

findings. One possible explanation for this finding in the current sample is that three months following the shootings, students were at home with their parents and may have been more likely to attend religious services or be more engaged in spirituality or religion-related pursuits. One year after the tragedy, most students were back in school and may have been less likely to be involved in religion. The relating to others and personal strength domains did not have significant group differences between T1 and T2, suggesting these domains of growth are relatively stable over time.

However, it should be noted that the discussion of the spiritual change and personal strength domains should be interpreted with caution due to the limited variability of responses.

**4.e Social Cognitive Theory Discussion**

It is important to revisit the present findings under the framework of social cognitive theory in an effort to better understand the dynamic processes occurring among social factors and how they interact to shape human agency. Social cognitive theory posits that, in the wake of traumatic events, individuals are able to exert control over outcomes through readjustment of behaviors. In the context of traumatic stress, individuals may make primary and secondary appraisals in order to effectively readjust behaviors intended to meet the recovery demands posed by the stressor. Self-control is primary to production of behaviors directed towards positive psychological outcomes; an individual's perceived ability to manage personal functioning in light of traumatically stressful events may allow for increased intrapersonal resource availability that can be directed towards recovery behaviors (Benight & Bandura, 2004).

The present study sought to explore the relationships among situational and dispositional social support seeking and social constraints, and how they might interact with one another as well

as the individual to promote positive or negative psychological health. Social constraints refer to the idea that social resources do not always respond in helpful ways following a trauma. People who experience such constraints may be more likely to perceive that fewer coping resources are available to them during secondary appraisal processes (i.e., appraising what resources are available to meet the demands of the index stressor). A sense of constrained social relationships may increase the likelihood for individuals to engage in avoidance or emotion-focused coping, which may influence negative outcomes. Findings from the present study support this conceptualization of social constraints; high constraints predicted higher levels of posttraumatic stress and lower levels of posttraumatic growth.

Further, within the social cognitive theory framework, individuals with high self-esteem and perceived control may be more likely to engage in active coping behaviors, which are related to dispositional traits to seek social support. Personal agency relies on the ability to initiate action for a specific purpose, and those who are adept at doing so will likely experience beneficial outcomes. The current study supports this notion, as dispositional social support seeking predicted lower levels of posttraumatic stress and higher le vels of posttraumatic growth.

It is also important to discuss the possible role of situational social support seeking under this framework. Social cognitive theory maintains that intentionality is an important factor for enhancing personal agency. Seeking social support in response to a stressful situation would qualify as an intentional action. However, it is crucial to examine how social factors may interact with one another to affect one's sense of agency. An individual's success with utilizing a particular coping strategy can subsequently affect self-esteem. For example, individuals who successfully seek social support habitually are more likely to have high levels of self-esteem and are more likely to perceive control over their outcomes. However, an individual who does not

receive sought social support is likely to have damaged self-esteem which can then lead to a greater sense of uncontrollability over outcomes. As higher levels of situational social support seeking positively predicted posttraumatic stress outcomes, the findings from the present study suggest individuals' attempts to seek support in response to the trauma may have been unsuccessful and led to a sense of uncontrollability.

Thus, the findings from the present study suggest that situational and dispositional social support seeking, and social constraints are three factors that contribute to an individual's ability exert control over outcomes when attempting to manage personal functioning in the aftermath of a stressful event. Depending on the level to which individuals are capable of preserving self-esteem and maintaining controllability, these factors can play beneficial or harmful roles with regard to the outcome.

**4.f Benefits and Implications of the Current Findings**

This study has important implications for understanding more about the social support variables that can affect psychological outcomes in the wake of trauma, and can add to the emergent body of literature about the factors contributing to the development of posttraumatic growth. Notably, a strength of the present study is its longitudinal design, which allows for examination of the temporal course of outcomes variables and suggestion of causal inferences.

Primarily, the data suggest that higher levels of social support seeking in the aftermath of trauma are predictive of higher levels of posttraumatic stress symptoms. This finding implies that, contrary to expectations, seeking out others in stressful times is not always an effective strategy for mitigating symptoms of distress. Individuals whose social group consists of members who experienced the same tragedy may not be able to rely as heavily on these support resources because of those individuals' own reactions to the event. Other trauma survivors might feel

pressure from loved ones to discuss thoughts and feelings related to the trauma when they would rather not. In sum, the findings from the present study highlight the distinction between receiving beneficial support from loved ones and receiving either lower quality support or no support.

Further, it may be that individuals who attempt to seek social support from others in the aftermath of trauma are driven to seek the support due to their high levels of symptomatology. For instance, individuals may rely on coping assistance from others because they do not feel capable of handling their symptoms of psychological distress independently.

Higher levels of situational social support seeking at T1, but not at T2, moderated the relationship between perceived threat and posttraumatic stress. This finding is interesting because it suggests that seeking social support to deal with symptoms directly related to the shootings exacerbates this relationship only in the direct aftermath of the event and not after one year following the trauma. It may be the case that relying on coping assistance can be a helpful strategy for significantly lessening the relationship between perceived threat and posttraumatic stress over time. This finding suggests that coping assistance may be an effective means of social support seeking, though it may take several months to be effective.

Additional insight was gained from this study with regards to the confusion about perceived and actual posttraumatic growth. Empirical evidence has suggested that the items on the PTGI, on which the present measure are based, measure perceived growth rather than actual posttraumatic growth. Interestingly, no significant interactions were found between the interaction and potentially moderating variables, on growth outcomes, despite hypotheses. It may very well be the case that the present measure of posttraumatic growth did not measure actual growth, but rather assessed only growth-related cognitions, or perceived posttraumatic growth. However, perceived posttraumatic growth has been shown to be related to positive reinterpretation coping,

suggesting that perceived posttraumatic growth may also represent a positive process in the wake of trauma despite not reflecting true growth.

Finally, the present study contributed to the existing literature by demonstrating a positive relationship between posttraumatic growth at T1 and T2. Recent literature has called for further examination into the longitudinal nature of posttraumatic growth. These findings demonstrated that perceived threat, situational and dispositional social support seeking, and social constraints were found to significantly predict posttraumatic growth at T1. Perceived threat and posttraumatic growth at T1 were significantly associated with posttraumatic growth at T2.

**4.g Limitations of the Current Study**

Significant group differences were present in the T1 analysis between those individuals who responded to the survey at T2 and those who did not. Specifically, the individuals who responded at T2 were more likely to be male, perceived higher levels of life threat, and endorsed more situational social support seeking. It is important to address these differences, as they may have presented a validity threat. Male gender was significantly negatively correlated with support seeking (situational and dispositional), and positively related to social constraints, indicating that gender significantly relates to social support variables. It is possible that these gender differences, and their effects on social variables, affected outcome variables at T2. Additionally, the literature supports the relationship between perceived life threat and higher levels of distress and posttraumatic stress symptoms. The significant positive relationship between perceived threat and posttraumatic stress at T2 provides support for the idea that the individuals who responded at T2 were experiencing greater distress. Furthermore, individuals who engaged in more situational social support seeking behaviors at T1 were more likely to respond at T2, adding support for the idea that those individuals who responded at T2 were experiencing greater distress. Thus, it is

possible that the analyses conducted at T2 were slightly biased by a more distressed sample. Therefore, it is possible that the T2 analyses may not be generalizable to individuals who perceived less life threat and those who experienced less distress.

Although the present study's findings add to the body of literature regarding the impact of social variables on positive and negative posttraumatic outcomes, a more in-depth exploration into each of these constructs and the manner in which they were measured is necessary. The survey used in the present study is retrospective; as such, students' responses may have been susceptible to recall bias. Two questions were included in the dataset to measure perceived life threat. One question assessed the degree to which students perceived personal life threat, while the other question measures the degree to which they perceived life threat to a close other; these questions were conceptualized as a unitary construct. Assessments of each item separately, to measure the possible differences between perceived personal threat and perceived vicarious threat, may have been more suitable.

The current study also used a continuous scale aimed at assess specific symptoms of PTSD, as defined by DSM-IV-TR diagnostic criteria. However, this scale is not a structured diagnostic instrument and cannot yield information about clinically significant levels of PTSD, or symptom breakdown among the three clusters. Thus, a continuous measure of posttraumatic stress symptoms is used to assess high and low levels of symptomatology. Interpretations of this measure should be made with caution; that is, high levels of posttraumatic stress symptoms on the present scale do not necessarily imply clinically significant symptoms of PTSD.

Similarly, posttraumatic stress symptoms at T2 were not used with the same scale as was used to assess symptoms at T1, which may have led to a number of problems when making comparisons between levels of posttraumatic stress at T1 and T2. The posttraumatic stress item at

T2 measure was a single, forced-choice item, asking individuals to report how often they experience symptoms now. This item could pose several potential problems. One, individuals may have interpreted "now" differently. It is possible that a subset of individuals evaluated symptom presence within the past month, while others reported on the past week. The variety of possible interpretations of this question with regards to the time frame in which it evaluates, may have been problematic.

Furthermore, the survey did not include validated measure of posttraumatic growth. While items approximated questions included in the PTGI, only three of the five domains represented in the PTGI were included in the present measure of posttraumatic growth. Thus, it is possible that individuals experienced growth in ways (i.e. within greater appreciation of life, and open to new possibilities domains) other than those specifically measured in the current scale. The domains represented in the present measure, only included one or two items, which limits the scale's ability to assess for multiple indicators of growth.

The posttraumatic growth scales at both T1 and T2 report low internal consistency, which can be explained by the measure design, which was intended to compensate for the limited numbers of growth items included in the survey. The scale was created to assess for a wide range of growth indicators across multiple domains in order to increase the likelihood that respondents will endorse at least one item of posttraumatic growth. Thus, the scale's items do not have high internal consistency.

Similarly, the survey did not contain a validated measure of situational social support seeking, which presents limitations to the interpretation of this construct. The small number of items included in the scale do not adequately represent the broader of support seeking, as it would

it would have been informative to include items representing individuals' motivations for seeking support.

Similarly, the social constraints measurement is limited by the restricted number of items that comprise the scale. Using the validated Social Constraints Scale as a basis, the present items do not assess for aspects of the overall construct such as the significant other's avoidance of stressor-related issues or minimization of the individual's distress. Furthermore, examination of bivariate scatter plots yielded additional concerns about the measurement of social constraints; the data showed limited sufficient variation within the scale making it more challenging to distinguish differences with regard to this variable.

As stated earlier explained early, a single item was used to assess dispositional social support seeking, which may have jeopardized the validity of the construct measurement. A more complete measure of dispositional social support seeking would have allowed respondents to consider multiple strategies they may use to seek support, which may have provided a more well-rounded assessment of the construct. Finally, the survey demonstrated a low response rate from students, suggesting that a sample bias may be present.

**4.h Recommendations for Future Research**

Given the complex nature of understanding the factors contributing to psychological outcomes after trauma, future studies should continue to explore the positive and negative aspects of social variables and how they may interact with perceived life threat to contribute to psychological functioning in the short and long-term periods of time following trauma.

The findings from the current study indicate that social support seeking was not consistently related to either positive or negative posttraumatic outcomes, suggesting that other factors involved in the social support interactions were at play. One suggestion for understanding

the findings was that certain individuals were better able to provide helpful support than were others. For example, in a mass trauma situation such as the shootings at Virginia Tech, many students shared their traumatic experiences with others friends. Seeking these friends for support may have been helpful, as they shared a sense of true understanding, or harmful, as they may not have had the personal resources to provide such support. On the other hand, seeking and subsequently receiving social support from family members and friends outside of the Virginia Tech community also has consequences and benefits. As previously speculated, family members and other friends may not always serve as adequate sources of support, which can occur when they attempt to rush the coping process for the distressed individual in an effort to relieve some of their own negative emotional reactions to the tragedy. Furthermore, individuals who were not directly affected by the traumatic experience may not be able to offer specific, non-generic words of support because they did not truly understand the nature of the trauma. As such, future research would benefit from more closely investigating the differences in the quality of support provision provided by the various sources of support that individuals may receive in their attempts to seek the support of others in distressing circumstances.

As discussed, gender differences may contribute to our understanding of students' tendencies to seek social support in the aftermath of experiencing trauma. Previous research has suggested that gender differences may vary across the specific types of trauma experienced. Women tend to experience higher levels of posttraumatic stress symptoms in the aftermath of assaultive violence (Breslau & Davis, 1992), while men tend to have more negative reactions to the unexpected death of a loved one and witnessing violence against others.

Although the present study makes a significant contribution to understanding more about the impact of social factors on psychological outcomes after a mass trauma event, further research

is necessary to expand upon this information and how it might be used to promote psychological well-being in the aftermath of a large-scale trauma.

### 4.i Conclusion

The current study aimed to understand the impact of perceived threat, situational and dispositional social support seeking, and social constraints on posttraumatic outcomes three months and one year following the April 16th shootings at Virginia Tech. The findings indicate that the degree of perceived life threat experienced predict posttraumatic stress at T1 and posttraumatic growth at T1 and T2, but did not significantly predict posttraumatic stress at T2. The study also found that higher levels of situational social support seeking predicts higher levels of posttraumatic stress at T1 and lower levels of posttraumatic growth at T1, but did not predict psychological outcomes at T2. Dispositional social support seeking significantly predicted lower levels of posttraumatic stress at T1 and higher levels of posttraumatic growth at T1 and T2. Social constraints were found to predict higher levels of posttraumatic stress at T1 but not at T2, and lower levels at posttraumatic growth, both at T1 and T2. Further, situational social support seeking served to moderate the relationships between perceived threat and posttraumatic stress at T1. This study sought to elucidate several of the complex trauma-related factors involved in the psychological aftermath of trauma, and examine possible differences in how these factors interact longitudinally.

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Table 1

*Means and Standard Deviations of Gender and Age*

| Variable | N◊ | Mean◊ | SD◊ | Range◊ |
|---|---|---|---|---|
| Gender | - | - | - | - |
| Male | 2718 | - | - | - |
| Female | 1921 | - | - | - |
| Age | 4639 | 21.89 | 4.331 | 18 – 68 |

◊Weighted data

Note: For unweighted data, N (males) = 2107 and N (females) = 2532. With regards to unweighted age information, *M*=21.83, *SD*=4.42, and the age range was 18-68.

Table 2

*Means, Standard Deviations, and Internal Consistencies of Measures*

| Variable | N | Mean | SD | Range | Alpha |
|---|---|---|---|---|---|
| Perceived Threat | 4639 | 10.64 | 4.41 | 0 – 20 | .49 |
| Situational Social Support Seeking | 4639 | 7.68 | 2.57 | 3 – 12 | .78 |
| Dispositional Social Support Seeking | 4639 | 2.66 | 0.91 | 1 – 5 | -- |
| Social Constraints | 4570 | 5.70 | 1.86 | 4 – 16 | .77 |
| Posttraumatic Stress T1 | 4639 | 8.49 | 8.75 | 0 – 40 | .90 |
| Posttraumatic Growth T1 | 4639 | 7.93 | 2.72 | 4 – 20 | .60 |
| Posttraumatic Stress T2 | 861 | -- | -- | -- | -- |
| Never symptoms | 145 | -- | -- | -- | -- |
| Stopped having symptoms | 299 | -- | -- | -- | -- |
| One symptom per week | 360 | -- | -- | -- | -- |
| Two symptoms per week | 57 | -- | -- | -- | -- |
| Posttraumatic Growth T2 | 851 | 7.7309 | 2.61790 | 4 – 20 | .60 |

Table 3

*Zero-Order Correlations among Variables*

| Variables | 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. | 10. |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. Gender | 1 | | | | | | | | | |
| 2. Age | -.07 | 1 | | | | | | | | |
| 3. PT | .32‡ | -.24‡ | 1 | | | | | | | |
| 4. SSSS | .23‡ | -.00 | .28‡ | 1 | | | | | | |
| 5. DSSS | .24‡ | -.00 | .10◊ | .31‡ | 1 | | | | | |
| 6. SC | -.09* | .09* | -.05 | -.25‡ | -.48‡ | 1 | | | | |
| 7. PTS T1 | .24‡ | -.06 | .38‡ | .25‡ | -.10* | .16‡ | 1 | | | |
| 8. PTG T1 | .13‡ | -.03 | .01 | -.01 | .04 | .01 | -.03 | 1 | | |
| 9. PTS T2 | .29‡ | -.08* | .29‡ | -.22‡ | .02 | .05 | -.43‡ | .12◊ | 1 | |
| 10. PTG T2 | .13‡ | -.04 | .04 | -.03 | .03 | -.02 | -.01 | .58‡ | .16‡ | 1 |

‡Correlation is significant at the 0.001 level; ◊Correlation is significant at the 0.01 level;
*Correlation is significant at the 0.05 level

Table 4

*Summary of Hierarchical Regression Analyses for Predictive Ability of Perceived Threat on Posttraumatic Stress at T1*

| Variable | *R2†* | *ΔR2†* | *F†* | *p†* | *B* | *p* |
|---|---|---|---|---|---|---|
| Step 1 | .070 | .070 | 174.42 | .000 | | |
| Gender | | | | | .25 | .000 |
| Age | | | | | -.07 | .000 |
| Step 2 | .184 | .114 | 347.66 | .000 | | |
| Gender | | | | | .15 | .000 |
| Age | | | | | .01 | .465 |
| Perceived threat | | | | | .66 | .000 |

† = values were obtained for the entire model

Table 5

*Predictive Ability of Perceived Threat on Posttraumatic Stress at T2*

| Variable | *F*† | *p*† | *OR** | *p* | *CI (95%)*◊ |
|---|---|---|---|---|---|
| Overall Model | 22.70 | .000 | | | |
| Gender | | | 1.77 | .001 | 1.25, 2.52 |
| Age | | | .97 | .146 | .94, 1.01 |
| Posttraumatic stress T1 | | | 1.09 | .000 | 1.06, 1.11 |
| Perceived threat | | | 1.04 | .087 | .99, 1.09 |

† = values were obtained for the entire model

*Odds ratio

◊ Confidence Interval

Table 6

*Summary of Hierarchical Regression Analyses for Predictive Ability of Perceived Threat on Posttraumatic Growth at T1*

| Variable | *R2†* | *ΔR2†* | *F†* | *p†* | *B* | *p* |
|---|---|---|---|---|---|---|
| Step 1 | .021 | .021 | 50.56 | .000 | | |
| Gender | | | | | .14 | .000 |
| Age | | | | | -.02 | .141 |
| Step 2 | .105 | .084 | 181.51 | .000 | | |
| Gender | | | | | .05 | .000 |
| Age | | | | | .03 | .051 |
| Perceived threat | | | | | .19 | .000 |

† = values were obtained for the entire model

Table 7

*Summary of Hierarchical Regression Analyses for Predictive Ability of Perceived Threat on Posttraumatic Growth at T2*

| Variable | *R2†* | *ΔR2†* | *F†* | *p†* | *B* | *p* |
|---|---|---|---|---|---|---|
| Step 1 | .015 | .015 | 6.01 | .000 | | |
| Gender | | | | | .12 | .001 |
| Age | | | | | -.03 | .410 |
| Step 2 | .374 | .359 | 154.02 | .000 | | |
| Gender | | | | | .07 | .013 |
| Age | | | | | -.05 | .061 |
| Posttraumatic growth T1 | | | | | .19 | .000 |
| Step 3 | .379 | .005 | 117.82 | .000 | | |
| Gender | | | | | .05 | .085 |
| Age | | | | | -.04 | .159 |
| Posttraumatic growth T1 | | | | | .19 | .000 |
| Perceived threat | | | | | .05 | .013 |

† = values were obtained for the entire model

Table 8

*Summary of Hierarchical Regression Analyses for Predictive Ability of Situational Social Support Seeking on Posttraumatic Stress at T1*

| Variable | *R2†* | *ΔR2†* | *F†* | *p†* | *B* | *p* |
|---|---|---|---|---|---|---|
| Step 1 | .070 | .070 | 174.42 | .000 | | |
| Gender | | | | | .25 | .000 |
| Age | | | | | -.07 | .000 |
| Step 2 | .112 | .042 | 194.07 | .000 | | |
| Gender | | | | | .19 | .000 |
| Age | | | | | -.07 | .000 |
| Situational social support seeking | | | | | .58 | .000 |

† = values were obtained for the entire model

Table 9

*Predictive Ability of Situational Social Support Seeking on Posttraumatic Stress at T2*

| Variable | *F†* | *p†* | *OR* | *p* | *CI (95%)* |
|---|---|---|---|---|---|
| Overall Model | 17.90 | .000 | | | |
| Gender | | | 1.68 | .005 | 1.17, 2.41 |
| Age | | | .97 | .106 | .93, 1.01 |
| Posttraumatic stress T1 | | | 1.09 | .000 | 1.06, 1.11 |
| Perceived threat | | | 1.03 | .175 | .99, 1.09 |
| Situational social support seeking | | | 1.06 | .096 | .99, 1.14 |

† = values were obtained for the entire model

Table 10

*Summary of Hierarchical Regression Analyses for Predictive Ability of Situational Social Support Seeking on Posttraumatic Growth at T1*

| Variable | *R2†* | *ΔR2†* | *F†* | *p†* | *B* | *p* |
|---|---|---|---|---|---|---|
| Step 1 | .021 | .021 | 50.58 | .000 | | |
| Gender | | | | | .14 | .000 |
| Age | | | | | -.02 | .141 |
| Step 2 | .155 | .134 | 284.13 | .000 | | |
| Gender | | | | | .04 | .013 |
| Age | | | | | -.02 | .079 |
| Situational social support seeking | | | | | -.35 | .000 |

† = values were obtained for the entire model

Table 11

*Summary of Hierarchical Regression Analyses for Predictive Ability of Situational Social Support Seeking on Posttraumatic Growth at T2*

| Variable | *R2†* | *ΔR2†* | *F†* | *p†* | *B* | *p* |
|---|---|---|---|---|---|---|
| Step 1 | .015 | .015 | 6.01 | .000 | | |
| Gender | | | | | .12 | .000 |
| Age | | | | | -.03 | .410 |
| Step 2 | .374 | .359 | 154.02 | .000 | | |
| Gender | | | | | .07 | .013 |
| Age | | | | | -.05 | .061 |
| Posttraumatic growth T1 | | | | | -.35 | .000 |
| Step 3 | .374 | .000 | 115.46 | .000 | | |
| Gender | | | | | .07 | .023 |
| Age | | | | | -.05 | .060 |
| Posttraumatic growth T1 | | | | | -.35 | .000 |
| Situational social support seeking | | | | | -.02 | .640 |

† = values were obtained for the entire model

Table 12

*Summary of Hierarchical Regression Analyses of Situational Social Support Seeking as a Potential Moderator for Posttraumatic Stress at T1*

| Variable | *R2†* | *ΔR2†* | *F†* | *p†* | *B* | *p* |
|---|---|---|---|---|---|---|
| Step 1 | .194 | .10 | 198.41 | .000 | | |
| Gender | | | | | 2.08 | .000 |
| Age | | | | | .00 | .097 |
| Perceived threat | | | | | .57 | .000 |
| Situational social support seeking | | | | | .52 | .000 |
| Step 2 | .197 | .003 | 180.57 | .000 | | |
| Gender | | | | | 2.10 | .000 |
| Age | | | | | .00 | .985 |
| Perceived threat | | | | | .58 | .000 |
| Situational social support seeking | | | | | .51 | .000 |
| PT x SSSS* | | | | | .04 | .002 |

† = values were obtained for the entire model

*Situational social support seeking

Table 13

*Situational Social Support Seeking as a Potential Moderator on Posttraumatic Stress for T2*

| Variable | *F†* | *p†* | *OR* | *p* | *CI (95%)* |
|---|---|---|---|---|---|
| Overall Model | 16.27 | .000 | | | |
| Gender | | | 1.64 | .008 | 1.14, 2.35 |
| Age | | | .97 | .094 | .93, 1.01 |
| Posttraumatic stress T1 | | | 1.09 | .000 | 1.06, 1.11 |
| Perceived Threat (PT) | | | 1.03 | .188 | .98, 1.08 |
| Situational social support seeking | | | 1.06 | .116 | .99, 1.14 |
| PT x SSSS | | | .98 | .041 | .97, 1.00 |

† = values were obtained for the entire model

Table 14

*Summary of Hierarchical Regression Analyses of Situational Social Support Seeking as a Potential Moderator for Posttraumatic Growth at T1*

| Variable | *R2†* | *ΔR2†* | *F†* | *p†* | *B* | *p* |
|---|---|---|---|---|---|---|
| Step 1 | .194 | .194 | 184.30 | .000 | | |
| Gender | | | | | -.08 | .408 |
| Age | | | | | .01 | .484 |
| Perceived threat | | | | | .14 | .000 |
| Situational social support seeking | | | | | .34 | .000 |
| Step 2 | .194 | .000 | 152.58 | .000 | | |
| Gender | | | | | -.08 | .410 |
| Age | | | | | .01 | .485 |
| Perceived threat | | | | | .14 | .000 |
| Situational social support seeking | | | | | .34 | .000 |
| PT x SSSS | | | | | .00 | .874 |

† = values were obtained for the entire model

Table 15

*Summary of Hierarchical Regression Analyses of Situational Social Support Seeking as a Potential Moderator for Posttraumatic Growth at T2*

| Variable | *R2†* | *ΔR2†* | *F†* | *p†* | *B* | *p* |
|---|---|---|---|---|---|---|
| Step 1 | .379 | .379 | 28.00 | .000 | | |
| Gender | | | | | .27 | .132 |
| Age | | | | | -.03 | .191 |
| Posttraumatic growth T1 | | | | | .56 | .000 |
| Perceived threat | | | | | .05 | .030 |
| Situational social support seeking | | | | | .00 | .998 |
| Step 2 | .379 | .000 | 23.36 | .000 | | |
| Gender | | | | | .27 | .130 |
| Age | | | | | -.03 | .192 |
| Posttraumatic growth T1 | | | | | .56 | .000 |
| Perceived threat | | | | | .05 | .029 |
| Situational social support seeking | | | | | .00 | .992 |
| PT x SSSS | | | | | .00 | .636 |

† = values were obtained for the entire model

Table 16

*Summary of Hierarchical Regression Analyses for Predictive Ability of Dispositional Social Support Seeking on Posttraumatic Stress at T1*

| Variable | *R2†* | *ΔR2†* | *F†* | *p†* | *B* | *p* |
|---|---|---|---|---|---|---|
| Step 1 | .070 | .070 | 174.42 | .000 | | |
| Gender | | | | | .25 | .000 |
| Age | | | | | -.07 | .000 |
| Step 2 | .085 | .015 | 142.72 | .000 | | |
| Gender | | | | | .29 | .000 |
| Age | | | | | -.06 | .000 |
| Dispositional social support seeking | | | | | -.12 | .000 |

† = values were obtained for the entire model

Table 17

*Predictive Ability of Dispositional Social Support Seeking on Posttraumatic Stress at T2*

| Variable | *F†* | *p†* | *OR* | *p* | *CI (95%)* |
|---|---|---|---|---|---|
| Overall Model | 18.21 | .000 | | | |
| Gender | | | 1.77 | .003 | 1.22, 2.57 |
| Age | | | .97 | .150 | .94, 1.01 |
| Posttraumatic stress T1 | | | 1.09 | .000 | 1.06, 1.11 |
| Perceived threat | | | 1.04 | .093 | .99, 1.10 |
| Dispositional social support seeking | | | 1.00 | .980 | .83, 1.20 |

† = values were obtained for the entire model

Table 18

*Summary of Hierarchical Regression Analyses for Predictive Ability of Dispositional Social Support Seeking on Posttraumatic Growth at T1*

| Variable | *R2†* | *ΔR2†* | *F†* | *p†* | *B* | *p* |
|---|---|---|---|---|---|---|
| Step 1 | .021 | .021 | 50.58 | .000 | | |
| Gender | | | | | .14 | .000 |
| Age | | | | | -.02 | .141 |
| Step 2 | .037 | .015 | 58.56 | .000 | | |
| Gender | | | | | .11 | .000 |
| Age | | | | | -.03 | .059 |
| Dispositional social support seeking | | | | | .38 | .000 |

† = values were obtained for the entire model

Table 19

*Summary of Hierarchical Regression Analyses for Predictive Ability of Dispositional Social Support Seeking on Posttraumatic Growth at T2*

| Variable | *R2†* | *ΔR2†* | *F†* | *p†* | *B* | *p* |
|---|---|---|---|---|---|---|
| Step 1 | .015 | .015 | 6.01 | .000 | | |
| Gender | | | | | .12 | .000 |
| Age | | | | | -.03 | .410 |
| Step 2 | .374 | .359 | 154.02 | .000 | | |
| Gender | | | | | .07 | .013 |
| Age | | | | | -.05 | .061 |
| Posttraumatic growth T1 | | | | | .38 | .000 |
| Step 3 | .377 | .003 | 117.04 | .000 | | |
| Gender | | | | | .06 | .052 |
| Age | | | | | -.06 | .042 |
| Posttraumatic growth T1 | | | | | .38 | .000 |
| Dispositional social support seeking | | | | | .13 | .000 |

† = values were obtained for the entire model

Table 20

*Summary of Hierarchical Regression Analyses of Dispositional Social Support Seeking as a Potential Moderator for Posttraumatic Stress at T1*

| Variable | *R2†* | *ΔR2†* | *F†* | *p†* | *B* | *p* |
|---|---|---|---|---|---|---|
| Step 1 | .189 | .189 | 190.13 | .000 | | |
| Gender | | | | | 3.20 | .000 |
| Age | | | | | .03 | .342 |
| Perceived threat (PT) | | | | | .67 | .000 |
| Dispositional social support seeking | | | | | -1.22 | .000 |
| Step 2 | .190 | .001 | 153.01 | .000 | | |
| Gender | | | | | 3.20 | .000 |
| Age | | | | | .03 | .362 |
| Perceived threat | | | | | .67 | .000 |
| Dispositional social support seeking | | | | | -1.22 | .000 |
| PT x DSSS* | | | | | -.07 | .052 |

† = values were obtained for the entire model

*Dispositional social support seeking

Table 21

*Dispositional Social Support Seeking as a Potential Moderator for Posttraumatic Stress at T2*

| Variable | *F†* | *p†* | *OR* | *p* | *CI (95%)* |
|---|---|---|---|---|---|
| Overall Model | 16.27 | .000 | | | |
| Gender | | | 1.77 | .003 | 1.22, 2.57 |
| Age | | | .97 | .128 | .94, 1.01 |
| Posttraumatic stress T1 | | | 1.09 | .000 | 1.06, 1.11 |
| Perceived threat | | | 1.04 | .100 | .99, 1.09 |
| Dispositional social support seeking | | | 1.00 | .997 | .83, 1.21 |
| PT x DSSS | | | .98 | .399 | .94, 1.03 |

† = values were obtained for the entire model

Table 22

*Summary of Hierarchical Regression Analyses of Dispositional Social Support Seeking as a Potential Moderator for Posttraumatic Growth at T1*

| Variable | *R2†* | *ΔR2†* | *F†* | *p†* | *B* | *p* |
|---|---|---|---|---|---|---|
| Step 1 | .117 | .117 | 102.37 | .000 | | |
| Gender | | | | | .12 | .232 |
| Age | | | | | .01 | .196 |
| Perceived threat | | | | | .19 | .000 |
| Dispositional social support seeking | | | | | .34 | .000 |
| Step 2 | .118 | .001 | 82.05 | .000 | | |
| Gender | | | | | .12 | .235 |
| Age | | | | | .01 | .190 |
| Perceived threat | | | | | .19 | .000 |
| Dispositional social support seeking | | | | | .34 | .000 |
| PT x DSSS | | | | | .01 | .448 |

† = values were obtained for the entire model

Table 23

*Summary of Hierarchical Regression Analyses of Dispositional Social Support Seeking as a Potential Moderator for Posttraumatic Growth at T2*

| Variable | *R2†* | *ΔR2†* | *F†* | *p†* | *B* | *p* |
|---|---|---|---|---|---|---|
| Step 1 | .382 | .382 | 27.08 | .000 | | |
| Gender | | | | | .21 | .274 |
| Age | | | | | -.03 | .138 |
| Posttraumatic growth T1 | | | | | .56 | .000 |
| Perceived threat | | | | | .05 | .024 |
| Dispositional social support seeking | | | | | .17 | .085 |
| Step 2 | .382 | .000 | 24.77 | .000 | | |
| Gender | | | | | .21 | .282 |
| Age | | | | | -.03 | .116 |
| Posttraumatic growth T1 | | | | | .56 | .000 |
| Perceived threat | | | | | .04 | .034 |
| Dispositional social support seeking | | | | | .18 | .069 |
| PT x DSSS | | | | | -.02 | .339 |

† = values were obtained for the entire model

Table 24

*Summary of Hierarchical Regression Analyses for Predictive Ability of Social Constraints on Posttraumatic Stress at T1*

| Variable | *R2†* | *ΔR2†* | *F†* | *p†* | *B* | *p* |
|---|---|---|---|---|---|---|
| Step 1 | .071 | .071 | 174.45 | .000 | | |
| Gender | | | | | .26 | .000 |
| Age | | | | | -.07 | .000 |
| Step 2 | .090 | .018 | 149.95 | .000 | | |
| Gender | | | | | .27 | .000 |
| Age | | | | | -.07 | .000 |
| Social constraints | | | | | .62 | .000 |

† = values were obtained for the entire model

Table 25

*Predictive Ability of Social Constraints on Posttraumatic Stress at T2*

| Variable | *F*† | *p*† | *OR* | *p* | *CI (95%)* |
|---|---|---|---|---|---|
| Overall Model | 19.79 | .000 | | | |
| Gender | | | 1.81 | .001 | 1.27, 2.59 |
| Age | | | .97 | .157 | .94, 1.01 |
| Posttraumatic stress T1 | | | 1.08 | .000 | 1.06, 1.11 |
| Perceived threat | | | 1.04 | .076 | 1.00, 1.10 |
| Social constraints | | | 1.06 | .183 | .97, 1.16 |

† = values were obtained for the entire model

Table 26

*Summary of Hierarchical Regression Analyses for Predictive Ability of Social Constraints on Posttraumatic Growth at T1*

| Variable | *R2†* | *ΔR2†* | *F†* | *p†* | *B* | *p* |
|---|---|---|---|---|---|---|
| Step 1 | .021 | .021 | 48.93 | .000 | | |
| Gender | | | | | .14 | .000 |
| Age | | | | | -.02 | .245 |
| Step 2 | .037 | .015 | 59.53 | .000 | | |
| Gender | | | | | .13 | .000 |
| Age | | | | | -.01 | .356 |
| Social constraints | | | | | -.19 | .000 |

† = values were obtained for the entire model

Table 27

*Summary of Hierarchical Regression Analyses for Predictive Ability of Social Constraints on Posttraumatic Growth at T2*

| Variable | *R2†* | *ΔR2†* | *F†* | *p†* | *B* | *p* |
|---|---|---|---|---|---|---|
| Step 1 | .016 | .014 | 6.39 | .000 | | |
| Gender | | | | | .12 | .001 |
| Age | | | | | -.03 | .401 |
| Step 2 | .374 | .358 | 153.41 | .000 | | |
| Gender | | | | | .07 | .010 |
| Age | | | | | -.05 | .061 |
| Posttraumatic growth T1 | | | | | -.19 | .000 |
| Step 3 | .379 | .005 | 117.21 | .000 | | |
| Gender | | | | | .07 | .018 |
| Age | | | | | -.05 | .064 |
| Posttraumatic growth T1 | | | | | -.19 | .000 |
| Social constraints | | | | | -.11 | .016 |

† = values were obtained for the entire model

Table 28

*Summary of Hierarchical Regression Analyses of Social Constraints as a Potential Moderator for Posttraumatic Stress at T1*

| Variable | *R2†* | *ΔR2†* | *F†* | *p†* | *B* | *p* |
|---|---|---|---|---|---|---|
| Step 1 | .192 | .192 | 205.27 | .000 | | |
| Gender | | | | | 2.93 | .000 |
| Age | | | | | .00 | .878 |
| Perceived threat | | | | | .65 | .000 |
| Social constraints | | | | | .63 | .000 |
| Step 2 | .193 | .001 | 165.12 | .000 | | |
| Gender | | | | | 2.95 | .000 |
| Age | | | | | .00 | .915 |
| Perceived threat | | | | | .65 | .000 |
| Social constraints | | | | | .64 | .000 |
| PT x SC* | | | | | .04 | .023 |

† = values were obtained for the entire model

*Social constraints

Table 29

*Social Constraints as a Potential Moderator for Posttraumatic Stress at T2*

| Variable | *F*† | *p*† | OR | *p* | CI (95%) |
|---|---|---|---|---|---|
| Overall Model | 16.55 | .000 | | | |
| Gender | | | 1.81 | .001 | 1.27, 2.59 |
| Age | | | .97 | .162 | .94, 1.01 |
| Posttraumatic stress T1 | | | 1.08 | .000 | 1.06, 1.11 |
| Perceived threat | | | 1.04 | .075 | 1.00, 1.10 |
| Social constraints | | | 1.06 | .202 | .97, 1.16 |
| PT x SC | | | 1.00 | .748 | .97, 1.02 |

† = values were obtained for the entire model

Table 30

*Summary of Hierarchical Regression Analyses of Social Constraints as a Potential Moderator for Posttraumatic Growth at T1*

| Variable | *R2†* | *ΔR2†* | *F†* | *p†* | *B* | *p* |
|---|---|---|---|---|---|---|
| Step 1 | .121 | .121 | 101.16 | .000 | | |
| Gender | | | | | .20 | .038 |
| Age | | | | | .02 | .032 |
| Perceived threat | | | | | .19 | .000 |
| Social constraints | | | | | -.19 | .000 |
| Step 2 | .121 | .000 | 82.49 | .000 | | |
| Gender | | | | | .20 | .041 |
| Age | | | | | .02 | .030 |
| Perceived threat | | | | | .19 | .000 |
| Social constraints | | | | | -.19 | .000 |
| PT x SC | | | | | -.00 | .212 |

† = values were obtained for the entire model

Table 31

*Summary of Hierarchical Regression Analyses of Social Constraints as a Potential Moderator for Posttraumatic Growth at T2*

| Variable | *R2†* | *ΔR2†* | *F†* | *p†* | *B* | *p* |
|---|---|---|---|---|---|---|
| Step 1 | .384 | .384 | 25.18 | .000 | | |
| Gender | | | | | .26 | .183 |
| Age | | | | | -.03 | .199 |
| Posttraumatic growth T1 | | | | | .55 | .000 |
| Perceived threat | | | | | .05 | .015 |
| Social constraints | | | | | -.11 | .018 |
| Step 2 | .384 | .000 | 30.27 | .000 | | |
| Gender | | | | | .26 | .182 |
| Age | | | | | -.03 | .203 |
| Posttraumatic growth T1 | | | | | .55 | .000 |
| Perceived threat | | | | | .05 | .017 |
| Social constraints | | | | | -.11 | .021 |
| PT x SC | | | | | -.00 | .814 |

† = values were obtained for the entire model

Table 32

*Summary of Hierarchical Regression Analyses for Predictive Ability of Posttraumatic Stress at T1 on Posttraumatic Stress at T2*

| Variable | *F†* | *p†* | *OR* | *p* | *CI (95%)* |
|---|---|---|---|---|---|
| Overall Model | 29.30 | .000 | | | |
| Gender | | | 1.88 | .000 | 1.33, 2.64 |
| Age | | | .97 | .054 | .93, 1.00 |
| Posttraumatic stress T1 | | | 1.09 | .000 | 1.07, 1.12 |

† = values were obtained for the entire model

Table 33

*Summary of Hierarchical Regression Analyses for Predictive Ability of Posttraumatic Growth at T1 on Posttraumatic Growth at T2*

| Variable | *R2†* | *ΔR2†* | *F†* | *p†* | *B* | *p* |
|---|---|---|---|---|---|---|
| Step 1 | .124 | .015 | 6.01 | .01 | | |
| Gender | | | | | .12 | .001 |
| Age | | | | | -.03 | .410 |
| Step 2 | .612 | .372 | 154.02 | .000 | | |
| Gender | | | | | .07 | .013 |
| Age | | | | | -.05 | .061 |
| Posttraumatic growth T1 | | | | | .60 | .000 |

† = values were obtained for the entire model

Figure 1

*Summary of Moderational Analyses*

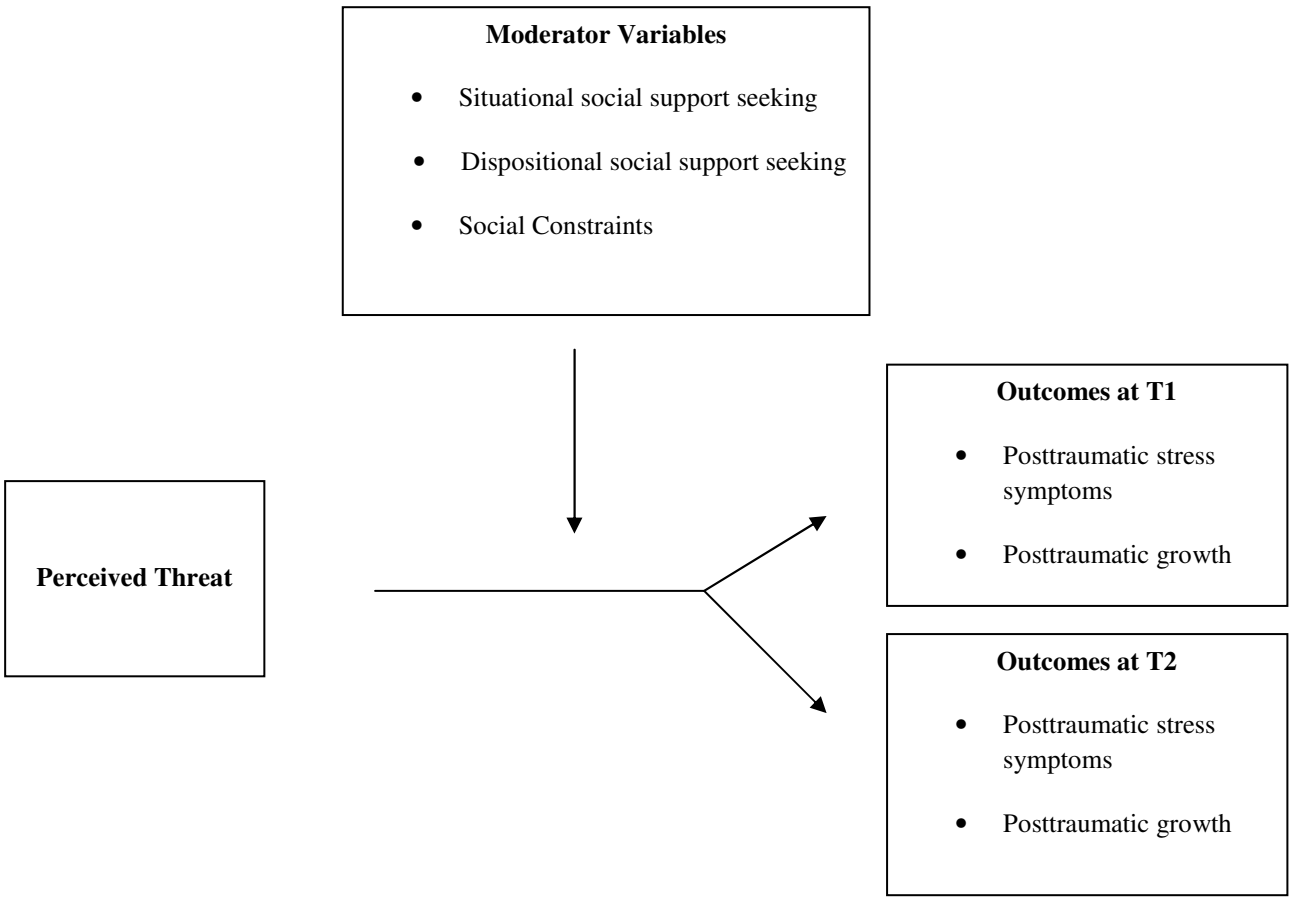
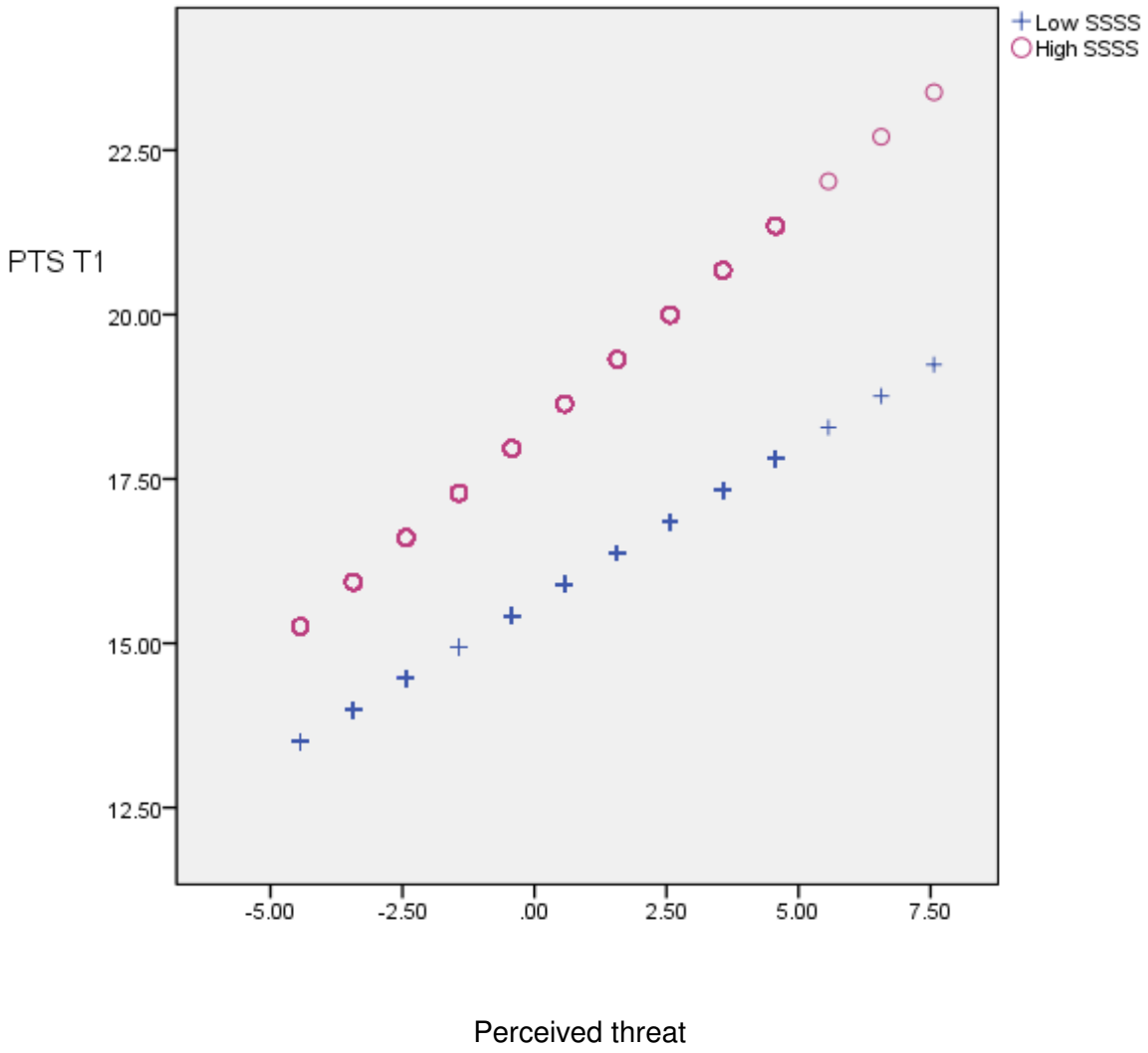


Figure 2

*Effects of Perceived Threat on Posttraumatic Stress T1 (PTS T1) by Situational Social Support Seeking*



# Appendix A

Perceived Threat

Items rated on a scale from 0-10, with higher numbers indicating high levels of perceived life threat.

1. How afraid were you that you might be killed at your worst moment on April 16?
2. How afraid were you that someone you cared about would be seriously hurt or killed?

Appendix B

Posttraumatic Stress at T1

Items rated on a 5-point Likert-type scale (0 = *never*; 4 = *just about every day*).

Here is a list of problems people sometimes have after exposure to violent events. How often did each problem happen to you over the past two weeks?

1. When something reminded you of the shootings, you got very upset or afraid.
2. You felt more irritable or easily angered than usual.
3. You had dreams about April 16 or other bad dreams.
4. You felt more emotionally distant or not close to other people than usual.
5. You tried not to talk about, think about, or have feelings about what happened.
6. You had more trouble than usual going to sleep or often waking up during the night.
7. You tried to stay away from people, places, or things that made you remember what happened.
8. You had more trouble than usual concentrating or paying attention.
9. You had upsetting thoughts, pictures, or sounds of what happened some into your mind when you did not want them.
10. You worried more than usual about bad things that might happen to you or your loved ones in the future.

Appendix C

Posttraumatic Stress at T2

How often do you have these emotional reactions now?

1. I still have them at least twice a week.
2. Less than twice a week.
3. I have stopped having them.
4. I never had symptoms more than twice a week.

Appendix D

Posttraumatic Growth at T1

Items rated on a 5-point Likert-type scale (1 = *not at all*; 5 = *extremely*).

A tragedy like the events of April 16 can challenge people's basic beliefs and feelings. How much did the April 16 tragedy cause you to feel:

1. Closer to your loved ones.
2. More spiritual or religious.
3. Less afraid about the future.
4. More in control of your life.

# Appendix E

Posttraumatic Growth at T2

Items rated on a 5-point Likert-type scale (1 = *not at all*; 5 = *extremely*).

A tragedy like the events of April 16 can challenge people's basic beliefs and feelings. How much did the April 16 tragedy cause you to feel:

1. Closer to your loved ones.
2. More spiritual or religious.
3. Less afraid about the future.
4. More in control of your life.

Appendix F

Situational Social Support Seeking

Items rated on a 4-point Likert-type scale (1 = *often*; 4 = *never*).

Since April 16, how often have you engaged in each of the following behaviors?

1. Sought advice or comfort from family.
2. Sought advice or comfort from friends.
3. Phoned or emailed friends to discuss your feelings about the tragedy.

Appendix G

Dispositional Social Support Seeking

Items rated on a 4-point Likert-type scale (1 = *always*; 5 = never), and will be reverse-coded.

When you have a problem or worry, how often do you let someone in your personal life know about it?

Appendix H

Social Constraints

Items rated on a 4-point Likert-type scale (1 = *a lot*; 4 = *not at all*), and will be reverse-coded.

Think about all the people in your personal life, including your friends and relatives, in answering the next questions.

1. How much do any of these people really care about you?
2. How much can you rely on any of them for help if you need it?
3. How much do any of them understand the way you feel about things?
4. How much can you open up to any of them if you need to talk about your problems?