The Relationships of Social Support, Rumination, Posttraumatic Growth, and the Length of Time Following a Combat-Related Amputation Among Operation Enduring Freedom and Operation Iraqi Freedom Veterans

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The Relationships of Social Support, Rumination, Posttraumatic Growth, and the Length of Time Following a Combat-Related Amputation Among Operation Enduring Freedom and Operation Iraqi Freedom Veterans

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As the U.S. enters its sixth year of ongoing military operations in Iraqi and Afghanistan, the U.S. is witnessing a new generation of injured veterans. Sixty-five percent of military injuries result from improvised explosive devices (IEDs). Combat-injured amputees are typically young and physically fit, and have an optimistic prognosis for having a normal life expectancy and returning to near preinjury levels of physical activity.

*Posttraumatic growth* (PTG) is the positive psychological change experienced as a result of the struggle with highly challenging life circumstances or crises. This study explores the relationships between and among time post amputation, social support, and rumination with PTG among Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF) amputees using a mailed survey methodology. A sample of OEF and OIF amputees (n = 39) was obtained from 210 surveys mailed nationwide from March to July, 2007. Rumination was the only predictor variable that significantly correlated with PTG, $r(37) = .48, p < 0.01$.

Rumination can take the form of writing, talking, journaling, or other forms of self-expression. A clinical intervention includes encouraging patients to explore the
meaning of the injury. A practice recommendation for nurses working with combat-injured soldiers includes providing time for patients to describe or recount their traumatic events; to assist them explore the changes in their life goals; and to seek new opportunities.

The cross-sectional research design does not allow one to detect temporal direction or changes in PTG over time. Another limitation was the low response rate. A strength was the national scope, with surveys mailed to all known VA OEF and OIF amputees in the second quarter of FY07.

This study provides direction for additional research and may provide pilot data for a future study among OEF and OIF veterans with battle-injuries.
This dissertation by Bonnie B. Benetato fulfills the dissertation requirement for the
doctoral degree in nursing approved by Sister Mary Jean Flaherty, Ph.D., R.N., F.A.A.N.,
as Director, and by Janice Agazio, Ph.D., C.R.N.P., R.N., and by
Clare M. Mahan, Ph.D. as Readers.
Dedication

I respectfully dedicate these pages to the U.S. and other Coalition military service members, and to the civilians of Afghanistan, Iraq, the United States and other countries that have or will suffer a war-related amputation during Operation Enduring Freedom or Operation Iraqi Freedom. It is my fervent hope that both individuals and society are able to discover the transformative qualities of posttraumatic growth, and, in the process, foster peace with one another and within ourselves.
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Operation Enduring Freedom and Operation Iraqi Freedom

Operation Enduring Freedom (OEF) began in December 2001 with military operations in Afghanistan as part of the Global War on Terrorism (Lin, et al., 2004). Two years later with a presidential order in March 2003, Operation Iraqi Freedom (OIF) commenced and included the invasion of Iraq and all successive operations in Iraq (Department of Veterans Affairs, 2003). OIF is the largest sustained ground military operation since the Vietnam War (Hoge, Auchterlonie, & Milliken, 2006), and initial military operations focused on ending the regime of Saddam Hussein; eliminating Iraq's weapons of mass destruction; and capturing and driving out terrorists from Iraq (Deployment Health Clinical Center, 2005).

Between 2001 and 2006, there have been approximately 865,674 service members deployed to Iraq and Afghanistan (Armed Forces Health Surveillance Center, 2007). Of these U.S. Armed Forces, 89.4 percent were male vs. 10.6 percent female; Active Duty service members represented 69.8 percent vs. 30.2 percent Reserve. Other characteristics of the 865,674 deployed OEF and OIF U.S. Armed Forces include the breakdown of service component: Army (62.2%), Air Force (18.8%), Marine Corps (12.7%), and Navy (6.4%). According to the Armed Forces Health Surveillance Center (2007), of the deployed troops from 2001 and 2006, 68.8 percent were White, Black (17.8%), Hispanic (9.8%), and Other (5.7%). The breakdown of ages were less than 20 years of age (6.8%), 20-24 years (36.4%), 25-29 years (19.5%), 30-34 years (13.8%), 35-39 years (11.7%),
and 40 years and older (11.7%). Half of the deployed personnel were married (50.4%), single, never married (45.0%), and divorced or separated (4.6%).

Reports as of October 27, 2007: U.S. military killed: 3,387 and U.S. military wounded: 28,327. Allied military killed: 303; U.S. civilian fatalities: 158. Iraqi fatalities are between 75,771 and 82,556 (Partlow, 2007). The magnitude of the number killed or wounded is beyond the scope of this dissertation research study and report. The focus of this study was on a relatively small sub-set of battle-injured, the U.S. OEF and OIF amputee.
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My husband, Michael Benetato, encouraged me to return to university for my B.S.N., and continued to support my decisions to pursue higher education at The Catholic University of America. His guidance as an editor facilitated my writing skills and he provided continuous computer assistance throughout the years. As a result of his steadfast support of my nursing education, I believe Michael is the primary reason I was able to obtain this terminal degree.

Dr. Han Kang

This research study would not have been possible without assistance from Dr. Han Kang, Director of the Environmental and Epidemiology Service and the War-Related Illness and Injury Study Center (WRIISC) at VA in Washington, DC. Dr. Kang gave me access to my study population through the national VA OEF and OIF veteran roster; provided assistance with the research postage costs; granted my flexible work schedule which allowed me to attend classes at CUA and to complete activities related to the dissertation study project.

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Throughout my 28 years of nursing, I have developed many professional collegial friendships. Dr. Clare Mahan stands out as the finest mentor I have had in my nursing career. Dr. Mahan was instrumental in helping me navigate the research process throughout the development and implementation of my protocol at the Department of Veterans Affairs. Her kindness and patience throughout the dissertation process was vital to my success as a Ph.D. candidate and as a first-time principal investigator.
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Sigma Theta Tau International, Kappa Chapter

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CHAPTER I

Introduction to the Problem

Military combat and amputation

As the Global War on Terrorism enters its sixth year with ongoing military operations in Iraqi and Afghanistan, the United States is witnessing a new generation of veterans with battle injuries. Soldiers returning from combat with battle injuries are vivid reminders of the human costs of war and the amputee veteran symbolizes the severely wounded warrior. Military tactics evolve with technology and with each conflict, while injuries resulting from combat have remained constant over time (Cohen, Griffith, Larkin, Villena, & Larkin, 2005). The signature insurgency tactic and the most effective weapon against U.S. deployed troops in Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF) is the planted roadside bomb also known as an improvised explosive device (IED). An estimated 65 percent of combat injuries result from IEDs followed by high-velocity weapons, rocket propelled grenades, small-arms fire, and suicide bombings (Bunker & Sullivan, 2005; Department of Veterans Affairs, 2002; Gondusky & Reiter, 2005).

Blast waves from IED explosions have an initial intense overpressurization followed by an underpressurization; these forceful changes in atmospheric pressure from the explosion lead to traumatic injuries and amputations (Scherer, 2007). Over the past 4
½ years in Iraq there have been an estimated 81,000 IEDs, and these IEDs account for nearly two-thirds of 3,100 combat deaths and approximately 21,200 wounded (Atkinson, 2007). As of May 2007, the reported number of OEF and OIF amputations (See Figure 1) has reached 654 (Armed Forces Health Surveillance Center, 2007). The U.S. military is increasingly the target of improved coordination of attacks; consequently, battle injuries resulting in amputations are expected to rise.

![Figure 1. OEF and OIF combat-related amputations by year (n = 654).](image-url)
Improved OEF and OIF mortality rates.

Improved lightweight protective helmets and torso-protecting body armor, such as vests lined with Kevlar (a composite that absorbs or deflects the blast) and ceramic plates, protect military personnel from most ballistic projectiles to the skull and torso, and has led to a noticeable increase in survival rates (DePalma, Burris, Champion, & Hodgson, 2005; Peake, 2005). In addition to Kevlar body armor, advances in the treatment of vascular injuries and theatre trauma care, expedited evacuation to military facilities, and advances in diagnostic support capabilities in combat support hospitals have led to a reduction in U.S. military mortality rates (Cohen et al., 2005; Department of Veterans Affairs, 2003; Peake, 2005; Starks, 2005). In OEF and OIF, 90 percent of U.S. combat-wounded soldiers have survived severe injuries; furthermore, if medical treatment commences on the field, fewer than 5 percent die of wounds (Friedman, 2005; Starks, 2005). As shown in Figure 2, there has been a dramatic reduction in the percent of U.S. war deaths caused by combat-related wounds.
Figure 2. Percent of deaths resulting from combat-related wounds (Starks, 2005).

Statement of the Problem

In OEF and OIF, the amputation rate from IED blast injuries is approximately 10 percent (Rush, 2007). While more soldiers are surviving IED blast injuries due to the increased use of improved torso-protecting body armor, the incidence of extremity trauma is as high as 50 to 70 percent (Rush, 2007). As a result of ongoing military operations in Iraq and Afghanistan, soldiers are at risk for serious injuries that may result in one or more amputations.
Combat-related amputations.

Combat-related amputations are severe injuries often accompanied by multi-system injuries that can result in a cycle of shock, hypothermia, and coagulation problems (Helling & McNabney, 2000). In combat, the soldier may acquire a partial or complete traumatic amputation. If there is a mangled extremity with severe vascular injury, a surgical amputation provides a means to sustain life and every effort is made to complete the amputation at the lowest level of viable soft tissue (Dougherty, 2001; Maricevic, 2004). In other words, the amputation surgical goal is to preserve life, and to maintain limb length including the knee or elbow, if possible. Combat amputations differ from traumatically-acquired amputations in a civilian setting due to the initial treatment in the field hospital, and the process of moving through several medical venues before arriving at a place where definitive care can begin (Dougherty, 2002; Flood & Saliman, 2002).

Combat-injured amputees are typically young and physically fit, and have an optimistic prognosis for a normal life expectancy and returning to preinjury levels of physical activity (Desmond & MacLachlan, 2004). While patients may recover physically from a traumatic amputation, full recovery includes a psychological shift in which the individual incorporates body changes, physical adjustments, and strategies to cope with the injury and psychosocial adjustment (Desmond & MacLachlan, 2004).
Mental health and OEF/OIF military service

It is expected that most soldiers returning from Iraq and Afghanistan will not suffer from chronic mental health problems; however, a substantial number of returning OEF and OIF military will exhibit clinically significant symptoms and disabilities (Friedman, 2005). Kang and Hyams (2005) note that up to 17 percent of personnel returning from combat in Iraq reported symptoms consistent with major depression, generalized anxiety, or PTSD. “The proportion of patients with possible PTSD did not vary substantially according to sex, race, or age, but there were significant differences according to characteristics of military service: the proportion of patients reported to have PTSD was 3.7 times as high among those who served in ground units of the Army or Marines as among members of the Navy or Air Force (11 percent vs. 3 percent), and rates were twice as high among members of the enlisted ranks as among officers (10 percent vs. 5 percent)” (Kang & Hyams, 2005, p. 1289). In general, the level of combat exposure predicts the risk of a mental disorder; current combat conditions in Afghanistan and Iraq expose US military to major combat operations and hazardous duty (Hoge et al., 2004).

Full recovery from a combat-related amputation is a lengthy and complex process; however, the prognosis for a physical recovery in the previously strong and healthy soldier is good. In addition to physical healing, psychological, and spiritual healing are equally important for a full recovery post combat-related amputation. In the
weeks, months, or years following the amputation, the veteran may experience posttraumatic growth (PTG) defined as the positive psychological change resulting from the struggle with the highly challenging life circumstance (Tedeschi & Calhoun, 2004).

To date, there are no known research reports of PTG among OEF and OIF amputee veterans. Social support, rumination, and the length of time following a combat-related amputation may play an important role in the process of PTG. To fill the gap in the knowledge of PTG in the aftermath of a combat-related amputation, this research study warranted investigation.

Statement of Purpose

The purpose of this research study was to explore the relationships among the length of time following a combat-related amputation, social support, rumination and posttraumatic growth among Operation Enduring Freedom and Operation Iraqi Freedom amputees.
Research study goal

A long-term goal of this study is to use knowledge derived from the data to develop and test nursing interventions that facilitate PTG after a combat amputation or other traumatic battle injury. This effort to promote physical, psychological and spiritual healing following an amputation mirrors Nursing’s holistic approach to the patient (Coward, 1996). Furthermore, according to Calhoun and Tedeschi (2006), “In the United States, scholars and clinicians tend to favor a utilitarian view, one that regards a decrease in distress and an increase in psychological well-being as the desirable outcome for persons who have faced highly stressful events” (p. 7). Interestingly, however, the process leading to PTG may not necessarily relieve distress initially; in fact, the cognitive processing that may lead to PTG could be a perceived as an increase psychological distress. “Distress is somewhat easier to tolerate if one recognizes a meaningful and valuable aspect to the experience; it is more difficult to live with trauma that has no redeeming value” (Tedeschi & Kilmer, 2005, p. 235).

Research Questions

1. What are the relationships among length of time following a combat-related amputation, social support, rumination, and posttraumatic growth among Operation Enduring Freedom and Operation Iraqi Freedom veterans?
a. What is the relationship between the length of time following a combat-related amputation and social support?

b. What is the relationship between the length of time following a combat-related amputation and rumination?

c. What is the relationship between social support and rumination?

This is the first known study of PTG among OEF and OIF amputees and there was no pilot data; thus, the lack of knowledge prohibited predicting a directional hypothesis a priori. The conservative two-tailed design allowed for the possibility of detecting statistical significance in either direction.

**Hypothesis**

$H_0$: There is no relationship among the predictor variables social support, rumination, or length of time following a combat-related amputation with posttraumatic growth among OEF and OIF amputees.

**Alternative hypotheses**

$H_1$: There is a relationship between the length of time following a combat-related amputation and social support.

$H_2$: There is a relationship between the length of time following a combat-related amputation and rumination.

$H_3$: There is a relationship between social support and rumination.
H₄: There is a relationship among the predictor variables length of time following a combat-related amputation, social support, rumination with posttraumatic growth among OEF and OIF amputees.

Definition of Terms

Operationalizing a study variable involves developing both conceptual and operational definitions (see Table 1), which reduces researcher bias; in correlational research concepts tend to be more abstract and broadly defined (Burns & Grove, 2005).
Table 1

*Definition of Terms*

<table>
<thead>
<tr>
<th>Definitions</th>
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<tr>
<td><strong>Theoretical</strong></td>
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<td>Amputation</td>
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<td>Social Support</td>
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<td>Rumination</td>
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<td>Posttraumatic Growth (PTG)</td>
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<td><strong>Operational</strong></td>
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<tr>
<td>Amputation</td>
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<td>Social Support</td>
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<td>Rumination</td>
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<tr>
<td>Posttraumatic Growth (PTG)</td>
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Theoretical Framework

The posttraumatic growth model (Tedeschi & Calhoun, 2004; 2006)

Tedeschi and Calhoun introduced the concept of *posttraumatic growth* and the research instrument by which to measure it in 1996. The Posttraumatic Growth Inventory (PTGI; Tedeschi & Calhoun, 1996) is an instrument used to measure the positive psychological change experienced as a result of the struggle with highly challenging life circumstances or crises. PTG is not simply a return to baseline, and differs from the concept of resilience (Tedeschi & Calhoun, 2004). Although the connection between PTG and resilience following a traumatic experience is not certain; however, the concept of PTG has *transformative* qualities (Tedeschi & Calhoun, 2004). Resilience relates to one’s ability to recover and return to baseline from an illness, depression or adversity and does not necessarily involve a transformation (Calhoun & Tedeschi, 2006). Furthermore, PTG does not occur as a direct result of the traumatic event; rather, PTG results from an individual’s struggle with the new reality following a traumatic event (Tedeschi & Calhoun, 2004). Following a traumatic event, important life goals are halted sometimes suddenly and unexpectedly. Consequently, one’s higher-order existential goals and beliefs (e.g., how the world functions and the meaning of life) that provide a general framework for life and a sense of stability may be shattered (Tedeschi, 1999). Tedeschi and Calhoun (2004) refer to the struggle after trauma as *grief work*; the process of grief...
work can lead to a greater sense of emotional stability even though one may be experiencing psychological distress simultaneously. "The term *posttraumatic growth* appears to capture the essentials of this phenomenon because it emphasizes that transformative positive changes (a) occur distinctively in the aftermath of trauma rather than during lower level stress, (b) appear to go beyond illusion, (c) are experienced as an outcome rather than a coping mechanism, and (d) require a shattering of basic assumptions about one's life that traumas provide but lower level stress does not" (Tedeschi & Kilmer, 2005, p. 233).

*Posttraumatic growth domains*

Five domains of posttraumatic growth are measured in the Posttraumatic Growth Inventory (PTGI; Tedeschi & Calhoun, 1996), and refer to different spheres of change within the individual. Table 2 outlines the five domains of PTG and the attributes associated with each domain (Tedeschi & Calhoun, 2004).
Table 2

The Five Domains and Corresponding Attributes of Posttraumatic Growth

<table>
<thead>
<tr>
<th>Domains of PTG</th>
<th>Attributes</th>
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<tbody>
<tr>
<td>Relating to Others</td>
<td>A change primarily in interpersonal behavior</td>
</tr>
<tr>
<td></td>
<td>Warmer, more intimate &amp; meaningful relationships</td>
</tr>
<tr>
<td>New Possibilities</td>
<td>A shift in goals or path in life</td>
</tr>
<tr>
<td>Personal Strength</td>
<td>The feeling of possessing personal strength</td>
</tr>
<tr>
<td></td>
<td>Vulnerable yet stronger</td>
</tr>
<tr>
<td>Spiritual Change</td>
<td>Engagement with existential issues e.g., the meaning &amp; purpose of life</td>
</tr>
<tr>
<td></td>
<td>Religious beliefs strengthened, or beliefs may be temporarily weakened</td>
</tr>
<tr>
<td>Appreciation of Life</td>
<td>A change in certain aspects of the belief system</td>
</tr>
<tr>
<td></td>
<td>A changed sense of priorities, and of what is important in life</td>
</tr>
</tbody>
</table>

PTG is multidimensional, and, according to Tedeschi & Calhoun (2004), persons may report growth experiences of one kind (e.g., a greater sense of personal strength), but not experience growth in another domain (e.g., spiritual or existential development). Tedeschi and Calhoun (2004) posit that different kinds of trauma and social support may initiate different facets of PTG, and the paths to PTG may differ. Different traumatic events and PTG triggers vary; one view is that the probability of experiencing PTG is higher in those who begin to experience it sooner after the traumatic event vs. those who
remain occupied in the search for meaning for many years following the traumatic experience (Tedeschi, 1999).

For over ten years, the PTG conceptual model has provided a theoretical basis from which investigators ground research studies (Cryder et al., 2006; Bellizzi & Blank, 2006; Konrad, 2006). Tedeschi (1999) notes, “Given the wide variety of events that have been reported to lead to posttraumatic growth, what all these events have in common is that they severely shake or destroy key elements of the individual’s important goals and world view, producing great emotional distress, rumination, and distress-reduction coping mechanisms” (p. 327).

**Rumination**

Rumination refers to several kinds of recurrent, event-related thinking from which one tries to make sense of the traumatic event, problem solve, reminisce, and anticipate (Calhoun et al., 2000). After a person experiences a major crisis, people tend to think about aspects surrounding the event in the hope of understanding, resolving, and making sense out of what happened (Martin & Tesser, 1996). Rumination is an attempt to make the crisis manageable and comprehensible, and to give it meaning (Tedeschi & Calhoun, 1995). In the model of PTG (Calhoun & Tedeschi, 2006), self-disclosure is closely related to rumination, and “depending on the reactions of the person receiving the
disclosures, can encourage or discourage it and, therefore, critically affect the likelihood of PTG outcomes" (p. 297).

Social support

Calhoun and Tedeschi (2006) describe an individual’s culture in the context of two broad categories: distal (broad geographic areas or the larger society) and proximal (small communities or networks with whom an individual interacts) (see Figure 3). An example of a cultural distal influence on an individual is the “American” narrative that includes “religious themes and perhaps themes of optimism and self-reliance” vs. less emphasis on religious ways of understanding the trauma experience in Europe (Calhoun & Tedeschi, 2006, p. 12). Calhoun and Tedeschi (2006) posit that proximate cultural influences may provide a more direct approach for evaluating how the process of PTG occurs. The quality and the responses of those to whom the individual shares self-disclosure are also important to the person’s “posttraumatic journey” (p. 12).

Persons who have immediate influence over the individual are primary reference groups and could include family, close friends, religious groups, health care providers, and others. An important element of the proximate social world are “the responses of important others to disclosures related to the trauma and in particular responses to intimations about growth or direct articulation of that experience” (Calhoun & Tedeschi,
Thus, emotional sustenance may be more useful in facilitating PTG rather than instrumental assistance that is also included in social support.
Figure 3. Posttraumatic growth model (Calhoun & Tedeschi, 2006).
Significance of the Problem

Amputations and warfare

One of the earliest documented major surgical procedures dating back to Hippocrates is the amputation (Hermes, 2002). Throughout the history of medicine, vascular surgery and nursing, professional knowledge has advanced by lessons learned from the care of wounded soldiers both on the battlefield and after the combat injury (Fox, et al., 2005). Based on research conducted after other military conflicts, in addition to sustaining a major physical injury, OEF and OIF veterans are at risk for postdeployment adjustment difficulties such as mental health problems including PTSD, major depression, substance abuse, impaired social functioning, and the ability to work (Hoge et al., 2004). Amputations, as a result of combat injuries, are on the increase in the U.S. military due to the ongoing deployment of troops in Afghanistan and Iraq, and the improved targeting and coordination of attacks (Bunker & Sullivan, 2005). As of May 2007, the reported number of amputations related to military service in OEF and OIF has reached 654, and this number will continue to rise with ongoing OEF and OIF military operations. In an effort to care for war-wounded, VA expects to spend more than $1.2 billion in FY08 on prosthetics and sensory aids (Department of Veterans Affairs, 2007).

The psychological aspects of amputation remain understudied despite the significance of the procedure and the potential impact on the patient’s future and life
adjustment (Fitzpatrick, 1999). To date, qualitative research reports reveal positive outcomes in persons after amputation; however, upon a comprehensive literature review, there are no research studies examining posttraumatic growth in the traumatic amputee or among Operation Enduring Freedom or Operation Iraqi Freedom amputees.

**Brief History of US Military Amputations**

*The American Civil War (1861-1865)*

Throughout history, the military has been instrumental in the development of amputation surgery, the design of artificial limbs known as prostheses, and the training and rehabilitation of the amputee (Eldar & Jelic, 2003; Hermes, 2002). During the American Civil War, 30 percent of gunshot and fragment wounds to the extremities resulted in amputation (Helling & McNabney, 2000). As a result of the large number of amputations during the Civil War, attention was given both to develop a large supply of prosthetics and the need to train people to design prosthetics for amputees. According to Kuz (2004), in 1866 one-fifth of Mississippi’s state revenue was devoted to artificial limbs. Out of necessity, the Civil War led to the development of trauma management, amputation techniques, the transportation of wounded soldiers, and the expanded role of nurses to care for American troops, which led to the development of nursing skills and education (Kuz, 2004).
World War I (1917-1918)

Over 4,000 amputations were performed on U.S. service members during World War I, and the transfemoral (above the knee) amputation was most common (Dougherty, 2002). Military surgeons learned in WWI that mortality rates were lower in below the knee amputees and that efforts to salvage the knee joint meant better energy expenditure and walking speed during the rehabilitation of the soldier (Hermes, 2002). Of the approximate 4000 amputations in WWI, 25.5 percent were due to the direct effects of trauma and 74.5 percent were due to infection (Dougherty, 2002). The military fostered the birth of physical rehabilitation as surgeons realized that surgery alone was insufficient; training was needed to assist the amputee to maximize physical functioning (Eldar & Jelic, 2003). Physical therapy and occupational therapy emerged after WWI and have continued to develop in part from the unintended consequences of war-related orthopedic casualties.

World War II (1941-1945)

During World War II (WWII), approximately 18,000 soldiers had major amputations, and the transtibial, or below-knee, amputation became the most common (Dougherty, 2002). Since WWII, the most common combat amputation has been the transtibial amputation (Department of Veterans Affairs, 2002). Amputee centers were opened by the Army in order to provide holistic care and rehabilitation by surgeons,
prosthetists, nurses and therapists. WWII gave rise to advances in medical research; as a result, the widespread use of antibiotics led to a decrease in mortality due to wound infection. In fact, according to Dougherty (2002), a dramatic reverse in the infection rate occurred during WWII when 75 percent of amputations resulted from trauma, and only 10 percent of amputations resulted from infection; vascular injuries resulted in the remaining 15 percent of amputations. A milestone in amputee rehabilitation, as a result of WWII, occurred when veteran lower-extremity amputees were able to walk on level ground without using ambulatory aids (Eldar & Jelic, 2003).
Korean War (1950-1953)

During the Korean War, surgeons developed techniques to repair damaged arteries and this surgical development dramatically improved the ability to salvage a wounded limb (Kuz, 2004). During the Korean War, 1500 Army personnel suffered amputations because of battle casualties, frostbite and other cold injuries (Dougherty, 2002). The transtibial amputee was the most common level of final amputation during the Korean and Vietnam wars.

Vietnam War (1964-1975)

The Vietnam War posed different life-threatening hazards and patterns of injury. Sixty-five percent of injuries were the result of tripping a landmine or booby trap, resulting in 6,000 battle-related amputations (Dougherty, 2002). Booby traps, also known as a “Bouncing Betty,” were particularly lethal; when triggered, they were designed to explode out of the ground exploding at waist height (Downs, 2002). According to Dougherty (2002), mortality rate was approximately 30 to 35 percent among amputee veterans on the battlefield. Vietnam amputees had the advantage of new prosthetic material and designs, and organized group athletic programs were instrumental in bringing a sense of accomplishment during and after rehabilitation (Hermes, 2002).
Gulf War I (August 2, 1990 – July 31, 1991)

Approximately 697,000 men and women served in Operations Desert Shield and Desert Storm. According to Department of Veterans Affairs (2002), “The extraordinarily low casualty rate among U.S. service members during the war was a clear military health triumph” (p. 1). Battle injuries, such as amputations, are not associated with Gulf War I; rather, syndromes such as fibromyalgia, chronic fatigue syndrome, irritable bowel syndrome, and PTSD are associated with this conflict.

Assumptions

1. “The loss of a limb phenomenologically parallels the death of a loved one” (Fitzpatrick, 1999, p. 102). The OEF and OIF amputee participating in this study considered the combat-related amputation a seismic traumatic event.

2. “Even when there has been excellent rehabilitative care, having had an amputation produces continued emotional tension” (Fitzpatrick, 1999, p. 103). The OEF and OIF amputee participating in the study experienced some degree of emotional tension or suffering related to the amputation. This emotional tension or suffering may have led to rumination or cognitive processing and the potential for PTG.

3. The study participant was able to answer the survey questions truthfully and without assistance or influence from their social support system.
4. The veteran's pre-deployment support systems and mental health were unknown and these factors may have influenced the PTG process following the combat-related amputation.

5. The veteran's beliefs about the Global War on Terrorism and Operation Enduring Freedom and Operation Iraqi Freedom may influence PTG; however, these beliefs were not measured nor accounted for in this research study.
Amputation, posttraumatic growth, social support, and rumination

As the U.S. War on Terrorism enters its sixth year, and the military remains the target of improved coordination of attacks in Iraq, one can expect an increasing incidence of combat-related amputations (Bunker & Sullivan, 2005; Gondusky & Reiter, 2005). The purpose of this research study was to explore the relationships among the length of time following a combat-related amputation, social support, rumination and posttraumatic growth among Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF) amputees.

Posttraumatic growth (PTG), both a process and an outcome, is a term used to describe a phenomenon persons experience after a struggle with a crisis whereby one develops beyond their previous level of adaptation, psychological functioning, or life awareness (Tedeschi, Park, & Calhoun, 1998). PTG is composed of five domains: personal strength (feeling vulnerable yet stronger); new possibilities (developing new interests or life goals); relating to others (a greater sense of closeness with others, or compassion for other persons who suffer); appreciation of life (a change in what is considered important or a change in one’s philosophy of life); and spiritual change (positive transformations in one’s religious, spiritual or existential life). The goal of this
research study was to provide further insight into the relationships among social support, rumination, the length of time following a combat-related injury resulting in one or more amputations, and posttraumatic growth. The following review of the literature will provide an overview of psychological recovery following an amputation, followed by a comprehensive and current review of the study variables posttraumatic growth, social support, and rumination.

Amputation

Approximately 1,285,000 (0.4% of the U.S. population) persons were living with an amputation in the United States during 1996 (Williams et al., 2004), and, in the civilian population, there are approximately 50,000 new amputations every year in the U.S. (Esquenazi, 2004). “Worldwide, a landmine casualty occurs every 20 minutes and, according to U.S. State Department estimates, there were 253 terrorist bombing incidents with thousands of casualties in 2001 alone” (Hayda, Harris, & Bass, 2004, p. 97). The epidemic of blast injuries, many of which result in amputation, from landmines and terrorist bomb attacks is a major global public health problem; however, it is beyond the scope of this review of the literature. The following literature review of amputation is a summary of current studies in which the focus is postamputation psychosocial adaptation, and, in particular, trauma-related amputation. No studies were found on posttraumatic
growth, measured by the posttraumatic growth inventory (PTGI; Tedeschi & Calhoun, 1996), in any amputee population.

In addition to adverse physical health outcomes, such as impaired mobility, chronic pain and skin breakdown, limb loss can be a psychologically stressful experience with rates of depression ranging from 21 to 35 percent (Williams et al., 2004). Chronic diseases, such as diabetes with complications and vascular disease account for 75 percent of all acquired amputations of the lower extremity (Fitzpatrick, 1999), and, in the civilian population, upper limb amputations comprise 25 percent of limb amputations, with trauma as the leading cause (Department of Veterans Affairs, 2002). Below the knee amputations, or transtibial amputations, are the most common type of amputation seen in war and peace, and combat amputations usually occur as the result of trauma in young, healthy individuals, and, differ from those seen in civilian life (Dougherty, 2001).

Amputation qualitative research studies

Gallagher and MacLachlan (2001) examined adjustment to both lower extremity amputation and to an artificial limb using a focus group (n = 14) methodology until saturation, and identified two themes: acceptance and support. While individuals who have experienced a lower extremity amputation must face the challenge of adjusting to the loss, the study revealed “The prevalent feeling expressed was that the effects of losing a limb were definitely worse on friends and relatives than on the person him-herself who
had had the limb amputated” (Gallagher & MacLachlan, 2001, p. 91). One response from a lower-limb amputee participant included, “You know you say to yourself, I did have this trauma in my life and I did deal with it. Maybe I am a bit of a better person for it” (Gallagher & MacLachlan, 2001, p. 92). Regarding time postamputation, “Participants at 5 years postamputation reported less support seeking, less use of practical coping methods, and less cognitive appraisal of the amputation” (Gallagher & MacLachlan, 2001, p. 92). A strength of this qualitative research study is the foundation on a holistic worldview in which there is no single reality; instead, reality is based on perceptions that are different for each person and change over time (Burns & Grove, 2005).

In a mixed method study of participants from an Amputee Golf Association, participants reported positive meaning following amputation, perceived control over the disability and being more optimistic also reported lower levels of depressive symptoms ($p < .05$) (Dunn, 1996). From this research study of amputees ($n = 138$) utilizing open-ended questions and self-report psychosocial instruments in both upper- and lower-extremity amputees from trauma and disease, Dunn (1996) identified positive meaning in participant’s responses, and the following five categories emerged: found side benefits (“I changed to a different occupation”); made social comparisons (“I have one leg. What about the person who has no legs”); imagined worse situations (“I survived. I have a second chance at life”); forgot negative aspects (“I found that I can still do about
everything I did before—only it takes longer to do it”); and *redefined event/reappraised life* (“All good has come out of it. I found God through it. It has given me purpose.”) (p. 291). This seminal research reported amputees with lower levels of depressive symptoms and higher levels of self-esteem, and, thus, supports the view of positive coping following an amputation.

In a qualitative study guided by three open-ended questions: “Describe the story of the injury”, “What has helpful in the recovery from the injury”, and “What was not helpful in recovery”, Ferguson, Richie and Gomez (2004) interviewed 37 amputees as a result of landmine explosions in Bosnia, El Salvador, Eritrea, Ethiopia, Jordan, and Mozambique. Ferguson and colleagues (2004) reported that amputees gave themselves encouragement when it was not available from the family, community, or hospital; and participants in this study “were motivated by the experience of other amputees” (p. 936). Results from this qualitative study support the notion that amputation recovery involves a relationship between physical and psychological health, social integration, and economic opportunity (Ferguson et al., 2004). “They accepted the limb loss, and expressed a desire to live and to make what happened to them into ‘something good’, to make meaning from an otherwise traumatic event” (Ferguson et al., 2004, p.936). This study reveals the global public health impact of landmines and the number of amputations that result from the 110 million landmines buried and stockpiled on every continent.
In a recent grounded theory, cross-sectional qualitative study, Oaksford, Cuddihy and Frude (2005) explored the coping mechanisms of participants having an amputation within the past 6 months ($n = 4$); 1 year postamputation ($n = 4$); and 5 years postamputation ($n = 3$). The primary etiology of amputation in this study was vascular. Oaksford et al. (2005) posit that amputees use five coping strategies to facilitate psychological adjustment: (a) mentally evading the experience, (b) seeking support from numerous sources, (c) the use of humor, (d) cognitive strategies that help them reframe or make sense of the experience, and (e) efforts to cope with practical difficulties. While the small sample in this study does not infer definitive patterns of coping over time following an amputation, the authors note that the study lends “support to the growing evidence that some people are psychologically strengthened and/or able to derive some benefit from a difficult life stressor because they have coped and survived” (Oaksford et al., 2005, p.273). This grounded theory study, has a theoretical basis of symbolic interactionism. “Symbolic interactionists suggest that individuals order their world by engaging in processes of negotiation and renegotiation; by making reflexive use of symbols, and by interpreting and eliciting meanings in situations, rather than simply by reacting” (Morse, 1992, p. 257). Through this grounded theory report, Oaksford and the research team allow the amputees’ narrative and their attempt to create meaning of the amputation to emerge. These qualitative studies are important to the body of amputation research and
positive psychology because they use a systematic, subjective approach to describe the life experience of amputation and the meaning that is associated with this experience.

**Amputation quantitative research studies**

Transtibial amputation is the most common amputation seen during war followed by the transfemoral amputation (Dougherty, 2003). Vietnam War transfemoral amputees (n = 46), an average of 28 years following the combat injury, were found to have lower health-related scores on the SF-36 Health Survey (p < .01) in all categories except mental health and vitality when compared to a study control group (Dougherty, 2003). In the general population of the United States, 56 percent of marriages remain intact at 15 years; of the 46 Vietnam amputees in this study, 43 were married, and 30 (69.8 %) remained married an average of 23.1 years (Dougherty, 2003). Furthermore, 41(89.1 %) of the Vietnam War amputees were employed an average of 20.1 years, and 40 (87 %) wore a prosthesis an average of 13.5 hours per day. These results imply that the amputee participants in this study were able to maintain a stable personal life and employment, and regularly utilized their prostheses.

In a review of the literature, Fitzpatrick (1999) discusses the psychologic assessment and psychosocial recovery of the patient with an amputation, with a goal of introducing the surgical clinician to the importance of psychosocial issues in patients undergoing an amputation. Fitzpatrick opined that traumatic amputation is likely to
increase the incidence of PTSD, and “Soldiers who have experienced a traumatic injury in battle that leads to amputation are a special group with a high incidence of the disorder [PTSD] that can be especially resistant to treatment” (p.105). Furthermore, “Rates of clinical depression in an outpatient setting were found in 23% to 35% of patients having undergone an amputation” (Fitzpatrick, 1999, p.103). The range of depression rates of 23 to 35 percent cited by (Fitzpatrick, 1999) are consistent with the amputee depression rates of 21 to 35 percent cited by (Williams et al., 2004). The Fitzpatrick report demonstrates the importance of assessing the amputee for depression and PTSD not only after the surgical event, but also along the continuum of rehabilitation care.

Length of time following an amputation

The literature supports related variables that could mediate the relationship between amputation and psychological adjustment (Horgan & MacLachlan, 2004; Rybarczyk, Nicholas, & Nyenhuis, 1997). Findings indicate that a greater amount of time following an amputation is associated with adaptation and in acceptance of changes in body image (Gallagher & MacLachlan, 2001); emotional adaptation to the amputation over time (Pezzin, Dillingham, & MacKenzie, 2000); the ability to sustain stable personal lives as demonstrated by the above average number of marriages that remained intact (Dougherty, 2003); and less support seeking and less cognitive appraisal at five years postamputation (Oaksford et al., 2005). According to Oaksford et al. (2005), “Coping
with a lower limb amputation is a process involving multiple demands, both physically (e.g., learning to walk and use a prosthesis) and psychologically (e.g., assimilating and accepting the amputation),” and “This process may be reflected in the coping strategies adopted, which fluctuate over time as the demands of adjustment change” (p. 267). Thus, there is support for the notion that the amount of time following an amputation is positively correlated with adjustment to the amputation.

On the other hand, Rybarczyk and colleagues (2004) support the notion that a longer amount of time following an amputation did not reduce adjustment problems. Furthermore, according to Rybarczyk et al. (2004), “the majority of research on adjusting to a range of losses has not supported the theory that adjustment proceeds in sequential stages or that experiencing any particular stage is necessary for an eventual healthy adjustment” (p. 245).

Posttraumatic growth

Posttraumatic growth (PTG) is a positive psychological change experienced because of a struggle with highly challenging life circumstances (Tedeschi & Calhoun, 2004). In a seminal report, Tedeschi and Calhoun introduced the term posttraumatic growth, and the Posttraumatic Growth Inventory (PTGI; Tedeschi & Calhoun, 1996), a 21-item scale designed to measure PTG. The PTGI (Tedeschi & Calhoun, 1996) responses range from 0 (not at all) to 5 (very great degree), with a total possible score of
105; higher PTGI scores indicate higher levels of PTG. A full description of the PTGI 
follows in Chapter III under instrumentation.

Tedeschi and Calhoun (2004) note, “Posttraumatic growth describes the 
experience of individuals whose development, at least in some areas, has surpassed what 
was present before the struggle with crises occurred” (p. 4). A severe trauma may result 
in more perceived benefits because the traumatic event challenges one’s beliefs and 
perceptions. “This may occur because traumatic events trigger rumination focused on 
searches for meaning, and ways to reconfigure goals, given that certain possibilities in 
life have become impossibilities” (Tedeschi & Calhoun, 1996, p. 464).

Tedeschi and Calhoun (2004) propose that traumatic events happen to 
individuals, groups, whole countries and societies. They cite the example of the Great 
Depression of the 1930s on society. Another example of traumatic events to the US are 
the actions of September 11, 2001 and the Global War on Terrorism that followed. 
According to Tedeschi and Calhoun (2004), “The social narrative can be changed by the 
struggle with events, just as it is in individuals, creating a discussion about who “we” are 
in the aftermath of the events, and what meaning the trauma has for the society” (p. 14). 
Moreover, when individual narratives are shared and incorporated into the larger social 
narrative in such a way that the traumatic events are recognized as turning points,
positive changes can arise. The authors also note the importance of leadership for these societal changes to occur.

In a qualitative research study, Arnold, Calhoun, Tedeschi, and Cann (2005) describe PTG among 21 licensed psychotherapists involved in trauma work. Examples of some thematic categories that emerged include: (a) impact of trauma work on self-perception, (b) clients' posttraumatic growth, (c) therapists' attention to self-care, and (d) trauma work and spirituality (Arnold et al., 2005). The authors note that therapists working with trauma survivors face special challenges and appear to grow and benefit as a result of their work.

**The introduction of a PTG model for children**

Cryder, Kilmer, Tedeschi, & Calhoun (2006) extend the posttraumatic growth model (Tedeschi & Calhoun, 2004; 2006) to children (see Figure 4). Cryder et al. (2006) note, “This first systematic study of PTG in children explores hypothesized linkages among PTG and social support, competency beliefs, and ruminative thinking” (p. 65).
Figure 4. Hypothesized model of posttraumatic growth in children (Cryder et al., 2006).
The PTGI-C (Cryder et al., 2006) is a four-point PTG scale with a total possible score of 84, and differs from the PTGI (Tedeschi and Calhoun, 1996) 5-point scale where 105 is the total possible score. Both the PTGI and the PTGI-C measure the five PTG domains. Cronbach’s alpha for the PTGI-C was .89 (Cryder et al., 2006).

In the study of children (n = 46) who experienced Hurricane Floyd and the flooding afterwards, the total mean PTGI-C score was 65.1 (SD = 11.9). Ruminative thinking correlated significantly with competency beliefs (r = .38, p < .01), and competency beliefs were significantly correlated with PTG-C (r = .547, p < .01); however, no significant correlations were found between ruminative thinking and PTG-C (Cryder et al., 2006). The Rumination Scale for Children was adapted from the adult Rumination Scale (Calhoun et al., 2000) and is a 5-item, 4-point scale with a Cronbach’s alpha of .75; the Rumination Scale for Children was designed to measure “recurrent event-related thought that help one understand, resolve, and make sense of trauma-related events” (Cryder et al., 2006, p. 67). This seminal study marks the advent of the PTGI-C that provides a measurement of PTG in children; the advent of the Rumination Scale for Children; and the introduction of the hypothesized model for posttraumatic growth in children. Cryder et al. (2006) examined the relationship between rumination and social support, and found no statistical correlation. Limitations of the study were the small sample size (n = 46), and the cross-sectional design that limit generalizability.
Many studies in the PTG literature are among cancer survivors. Table 3 represents a summary of current PTG studies, measured by the PTGI, in various cancer populations.

**Table 3**

*Current Posttraumatic Growth studies in Cancer Populations*

<table>
<thead>
<tr>
<th>Year</th>
<th>Authors</th>
<th>Location N</th>
<th>Population</th>
<th>Design</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>Weiss, T.</td>
<td>U.S. n = 41</td>
<td>Breast cancer &amp; spouses</td>
<td>Correlation Mailed survey Convenience sample At 35 months post treatment</td>
<td>PTGI women: 60.2 (SD = 18.8) PTGI husband: 46.0 (SD = 22.8)</td>
</tr>
<tr>
<td>2004</td>
<td>Ho, S.M.Y., Chan, C.L.W. &amp; Ho, R.T.H.</td>
<td>Hong Kong n = 188</td>
<td>Adult cancer survivors (mixed cancer)</td>
<td>Descriptive Chinese PTGI instrument developed 15-item vs. 21-item USA PTGI</td>
<td>Positive attitude most predictive of PTG in Chinese Linguistic questions</td>
</tr>
<tr>
<td>2004</td>
<td>Weiss, T.</td>
<td>U.S. n = 72</td>
<td>Early-stage breast cancer disease-free at the time of participation</td>
<td>Correlation Mailed survey</td>
<td>PTGI: 57.9 Social support &amp; PTG not significant</td>
</tr>
<tr>
<td>Year</td>
<td>Author(s)</td>
<td>Region</td>
<td>Type</td>
<td>Method</td>
<td>PTGI (42-54 yr.)</td>
</tr>
<tr>
<td>------</td>
<td>-----------</td>
<td>--------</td>
<td>------</td>
<td>--------</td>
<td>------------------</td>
</tr>
<tr>
<td>2004</td>
<td>Bellizzi, K.M.</td>
<td>U.S.</td>
<td>Mixed cancer</td>
<td>Mailed survey</td>
<td>(SD = 26.0)</td>
</tr>
<tr>
<td>2004</td>
<td>Manne, S., Ostroff, J., Winkel, G., Goldstein, L., Fox, K., &amp; Grana, G.</td>
<td>N.E. USA</td>
<td>Breast cancer patients and Partners</td>
<td>Longitudinal Survey</td>
<td>PTGI scores at time 1: 49.0</td>
</tr>
<tr>
<td>2005</td>
<td>Widows, M.R., Jacobsen, P.B., Booth-Jones, M. &amp; Fields, K.K.</td>
<td>Florida</td>
<td>Bone Marrow Transplant patients</td>
<td>Mailed survey</td>
<td>PTGI: 64.7</td>
</tr>
<tr>
<td>2005</td>
<td>Andrykowski, M. et. al</td>
<td>U.S.</td>
<td>Bone marrow transplant patients recruited from national BMT registry</td>
<td>Cross-sectional Telephone interview &amp; mailed survey</td>
<td>PTGI: 66.3</td>
</tr>
<tr>
<td>2006</td>
<td>Bellizzi, K.M., &amp; Blank, T.O.</td>
<td>U.S.</td>
<td>Breast cancer survivors</td>
<td>Cross-sectional Mailed survey</td>
<td>Intensity of diagnosis report &gt; levels of PTG(r=4.35 p&lt;0.01)</td>
</tr>
</tbody>
</table>
Posttraumatic growth quantitative studies

Sheikh (2004), a local researcher at The George Washington University, examined PTG in a population of patients from both the U.S. (\(n = 49\)) and the United Kingdom (\(n = 138\)) with a history of heart disease using a correlational design with a mailed self-report survey. Sheikh (2004) found that satisfaction with social support was not a significant predictor of PTG (\(\beta = .097, p = .30\)). Regarding the lack of significance between social support and PTG, Sheikh (2004) notes, “One interpretation is that the most important aspect of social support in relation to posttraumatic growth may actually be the opportunity for cognitive processing of the traumatic event, rather than companionship and the availability of help” (p. 271).

In a research study among former male political Palestinian prisoners from the Gaza Strip (\(n = 275\)), Salo, Qouta & Punamaki (2005) examined relationships among PTG, adult attaching and negative emotions. The posttraumatic growth inventory (PTGI; Tedeschi & Calhoun, 1996) was translated into Arabic, and independently “back translated” (translated from Arabic back into English for comparison) by a bilingual social worker before a pilot study was conducted among ten men with a history of political imprisonment.

Salo et al. (2005) did not support the author’s assumption that “… experiencing political trauma with ideological connotations would encourage positive transformation”
(p. 374) and that "...secure attachment played a protective role in enhancing posttraumatic growth" (p. 373). In other words, secure adult attachment was related to personal strength ($F = 25.2$, $p < .001$), affiliation to others ($F = 28.43$, $p < .001$), and spiritual change ($F = 4.34$, $p < .05$). A total PTGI score was not obtained in this study because only three of the five PTGI domain factors were used. Demographics such as age, marital status, and place of residence (refugee camp vs. town) were not associated with PTG (Salo, 2005). By contrast, a higher professional position with steady employment was associated with elevated levels of personal strength and positive affiliation to others, which are two factors of the posttraumatic growth inventory.

Grubaugh and Resick (2007) explored the interrelationship among PTG and PTSD among females receiving treatment for sexual assault ($n = 100$). While Grubaugh and Resick (2007) found "growth scores were comparable to those from other samples" (p.145) the authors scored the PTGI beginning with 1 rather than 0. Consequently, the range for the PTGI was 1 to 126 vs. 0 to 105 as noted on the PTGI (Tedeschi & Calhoun, 1996). Thus, the PTGI mean scores from this study should be used with caution when comparing them with other PTG studies. A finding from the study was that PTGI scores were not related to measures of depression and PTSD. The authors conclude that their findings lend support that PTG and distress may not be directly related to one another (Grubaugh & Resick, 2007).
PTG qualitative research

Konrad (2006) utilized a phenomenological design to investigate the maternal experiences \( n = 11 \) in the aftermath of a child’s unexpected development of a disability. Open-ended, participant-directed interviews were utilized to obtain detailed descriptions of the mother’s experiences after a child acquired a disability or illness. Examples of illnesses included encephalitis and stroke, motor vehicle accidents and falls, burns, and complications from cancer therapy. Konrad (2006) described the following themes that emerged from the data:

**Transformations in self: Found strength.**
“I guess for my children I had a reason to be strong.”
“I knew I had to be strong—it was a change from the day of the accident” (p. 104).

**Transformations in relationships: Compassion and membership.**
“You see a different side of life than you were ever exposed to.”
“And I mean, you know, my heart went out to that mother in a way that I don’t think it would’ve”[sic] (p. 105).

**Transformations in meaning making.**
“I’m happy he’s alive so I can do it.”
“Positive—I realize that I have more strength than I ever thought I had” (pp. 107).

**Transformations in faith and spirituality.**
“I guess that was my picture of—you’re turning over, just realizing you’re impotent in this situation. Um, the fate of this child is beyond my ability to help.”
“[My child] was lying in bed with a turban on his head...I don’t believe in God anymore. I was so mad...It’s so unfair...But God doesn’t have anything to do with it” (p. 108).

Konrad (2006) notes, “PTG does not diminish or contradict the burden and suffering experienced by caregivers, nor is it meant to silence the very real emotions
brought about by bearing witness to a child’s struggles and distress” (p. 109). Konrad (2006) describes how health professionals might promote PTG, “health professionals best serve individuals by focusing on how the struggle with loss, rather than the loss itself, can be a catalyst for change (p. 110).

Other international posttraumatic growth studies.

International studies in posttraumatic growth add richness to the PTG literature through studies with a variety of populations. A challenge can be the need to translate the PTGI (Tedeschi & Calhoun, 1996) into a foreign language. Cultural differences result in the factor differences and varying total mean PTGI scores in the PTGI (Powell et al., 2003; Ho et al., 2004). Table 2 is a sample of several current international PTG studies utilizing the English original version of the PTGI, and in Powell et al, (2003), a translated Arabic version of the PTGI.
Table 4

*International Posttraumatic Growth Research Studies*

<table>
<thead>
<tr>
<th>Year</th>
<th>Authors</th>
<th>Location</th>
<th>Population</th>
<th>Design</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>Peltzer, K.</td>
<td>South Africa</td>
<td>Victims of violent crime</td>
<td>Correlation Snowball sampling</td>
<td>Total PTG: 40.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$n = 128$</td>
<td></td>
<td></td>
<td>PTG significantly r/t major crimes experienced.</td>
</tr>
<tr>
<td>2003</td>
<td>Powell, S., Rosner, R., Butollo, Tedeschi, R., &amp; Calhoun, L.</td>
<td>Sarajevo</td>
<td>Former refugees outside of former Yugoslavia</td>
<td>Selected at random from Local Council list Interview/survey</td>
<td>Bosnian translation of PTGI: 44.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$n = 64$ (former refugee) $n = 72$ (displaced)</td>
<td>Displaced</td>
<td></td>
<td>Former refugee more PTG than displaced persons</td>
</tr>
<tr>
<td>2003</td>
<td>Cadell, S.</td>
<td>Canada</td>
<td>HIV/AIDS caregivers</td>
<td>Mailed survey</td>
<td>PTGI: 62.3 $(SD = 24.6)$</td>
</tr>
<tr>
<td>2003</td>
<td>Lev-Wiesel, R. &amp; Amir, M.</td>
<td>Israel</td>
<td>Holocaust child survivors</td>
<td>Survey in</td>
<td>PTGI: 43.2 $(SD = 17.3)$</td>
</tr>
<tr>
<td>2003</td>
<td>Wild, N. &amp; Paivio, S.</td>
<td>Canada</td>
<td>College students</td>
<td>Survey</td>
<td>PTGI: 57.4</td>
</tr>
<tr>
<td>2005</td>
<td>Lev-Wiesel, R. Amir, M., &amp; Besser, A.</td>
<td>Israel</td>
<td>Female survivors of sexual abuse</td>
<td>Survey</td>
<td>PTSD and PTG highly correlated $(r = .53, p &lt; .001)$</td>
</tr>
<tr>
<td>2007</td>
<td>Harms, L. &amp; Talbot, M.</td>
<td>Australia</td>
<td>Road trauma</td>
<td>Mailed survey</td>
<td>PTGI: 44.9 $(SD = 25.1)$</td>
</tr>
</tbody>
</table>
Finding benefit from military service.

For many soldiers, military service is a significant developmental experience that is perceived to have important effects on their postdeployment life (Schnurr, Rosenberg, & Friedman, 1993). Data from the National Vietnam Veterans Readjustment Study (NVVRS) enrolled 1,198 Vietnam combat veterans to examine the psychological benefits and liabilities of war time exposure. According to Fontana and Rosenheck (1998), psychological benefits in the form of self-improvement were positively associated with most types of traumatic exposure in the war zone; the one exception was participation in atrocities. Fontana & Rosenheck (1998) obtained responses to the questions: “What were some of the positive things you gained from your Vietnam experience?” and “What were some of the negative things?” When more than one theme emerged, the authors coded the response for each theme and found that 74 percent of the themes fell into the class of psychological benefits and liabilities; the leading psychological benefit of exposure to warfare was self-improvement, and the leading psychological liability was alienation from others.

In a study of women military nurses who served in Vietnam during the Vietnam War, Scannell-Desch (1996) described the lived experience of 24 military nurses using data analysis incorporated with qualitative methods of Colaizzi, Lincoln and Guba, and Van Manen. Findings from the Scannell-Desch (1996) study included strong personal
relationships that were developed during the service. A theme that developed from the
data included "growth as essence" where nurses described "personal and professional
growth as an essence of their experience" (p. 122). When asked for advice to the next
generation of military nurses, many nurses recommended keeping a journal of activities,
thoughts feelings.

Social support

“The general literature on the mechanism by which social support enhances
psychological well-being has tended to revolve around two theories: the *buffer effect*
model claims that social support mediates the relationship between stressful life events
and psychological distress, and the *direct effect* model states that social support has a
positive effect on psychological well-being regardless of the stress process” (Horgan &
MacLachlan, 2004, p. 844). In a recent metasynthesis of findings from qualitative
studies, Finfgeld-Connett (2005) clarified and expanded the concept of social support and
included the definition, “Social support is an advocative interpersonal process that is
centered on the reciprocal exchange of information and is context specific” (p. 5).

The two types of social support most reported in the literature are emotional and
instrumental. While instrumental social support includes providing tangible goods or
services, emotional support consists of comforting gestures intended to alleviate
uncertainty, anxiety, stress, hopelessness, and depression (Finfgeld-Connett, 2005).
Emotional support is broad and physical presence is not always required; alternative ways to offer support are available through the use of the e-mail messages, telephone calls, sending cards or flowers, knowing that others are offering prayer, or the reassurance that someone is available. Furthermore, Finfgeld-Connett (2005) describes attributes of social support that are context specific, which include the exchange of information such as facts or advice; advocacy or empowering recipients to act on their own behalf; and expressions of empathy, respect, or compassion.

Nurses often use the ecological map, also known as an ecomap, as a visual tool to depict the structure and strength of a patient’s family or social relationships because social support and social networks play a crucial role in the patient’s ability to survive a serious illness (Ray & Street, 2005). In supporting nurses’ use of ecomaps, Ray and Street (2005) note that lack of social support can prompt feelings of isolation, hopelessness, and fatalism; by contrast, positive social support is associated with coping. In order to find effective strategies to improve social support, the authors encourage nurses to focus on family and friendship networks, and to explore additional social networks for patients such as other health care professionals and community resources.
Amputation and social support

In a literature review of postamputation psychosocial adaptation for people with limb amputations, Desmond and MacLachlan (2004) suggest “Although interpretation of the role of social support is complicated by its construal as both a coping resource and a coping strategy, strong and positive social support is the only socio-environmental variable consistently associated with successful psychosocial adaptation to amputation” (p.84). In addition, from the literature review, the authors note there appears to be an inverse relationship between perceived social support and depressive symptoms. Thus, higher levels of perceived social support tend to be associated with higher subjective quality of life ratings and lower levels of symptoms of depression (Desmond & MacLachlan, 2004).

Social support and amputation quantitative research studies.

In a landmark longitudinal study of social support following amputation, perceived quality of social support is more important than quantity of network size and social integration (Williams et al., 2004). The study population consisted of 89 adult amputees, and the majority of amputees were admitted for amputation due to traumatic injury; secondary etiologies of amputation were due to diabetes and infection. Three goals of the study included: to describe social integration (SI), the extent to which an individual participates in a broad range of social relationships, in the two years following
an amputation; to explore the interrelationships between two types of social support: social integration, and perceived social support from three sources including family, friends, and significant other; and the third goal was to explore the impact of SI on five dependent measures of which depression, pain interference, satisfaction with life, mobility, and occupational functioning were included (Williams et al., 2004).

Significant findings include the following: (a) at two years postamputation, trauma-related amputees reported greater social integration (SI) than amputees due to non-traumatic causes ($t = 2.60, p < 0.01$); (b) at 1, 6, or 12 months postamputation, SI was not related to age or amputation level; (c) at one month postamputation, being married or living with a significant other was associated with greater perceived social support ($t = 4.06, p < 0.001$); (d) at 24 months postamputation, being married or living with a significant other was associated with greater social interaction ($t = 2.48, p < 0.05$); and (e) at one month postamputation, controlling for demographic (gender, age, partner status) and amputation-related factors (etiology or level), greater levels of perceived social support were associated with lower levels of pain interference ($p < 0.05$), greater levels of satisfaction with life ($p < 0.001$), and mobility ($p < 0.05$) (Williams et al., 2004). Thus, support exists for greater social integration in trauma-related amputees, regardless of their age or level of amputation who are married. Furthermore, pain appears to result in decreased levels of perceived social support, satisfaction with life, and mobility.
Williams and colleagues (2004) propose, “...perceived quality of relationships, rather than quantity of social network connections or interactions determines the degree to which a person with limb loss will benefit from their social support systems” and “...enhancing quality of support may be an important area for intervention after amputation” (p. 871). The authors note limitations of this study included a possible overestimation of social integration and perceived social support because unmarried participants were more likely to drop out of the study than married participants, and because of the correlational study design, one cannot conclude cause and effect. Moreover, social integration and perceived social support are two aspects of a complex social support construct, and the authors note a need for more research to understand the relationship between social support and amputation.

The Williams and colleagues (2004) report provides support for this study among OEF and OIF amputees with the aim to examine social support and amputation. The finding that trauma-related amputees had more social integration than vascular-related amputees (Williams et al, 2004) may add some credence to the possibility of PTG in the combat-related amputee.

In a large study funded by the Department of Veterans Affairs among 1,632 Vietnam theatre veterans (women = 26 %; men = 74 %), King, King, Fairbank, Keane & Adams (1998) documented the role of “posttrauma resilience-recovery factors”
(hardiness, structural social support, functional social support, and additional stressful life events) and war zone stressors to account for current posttraumatic stress disorder (PTSD) symptoms using a 9-factor model and structural equation modeling. Included in the posttrauma resilience-recovery factors was structural social support, operationalized in terms of the size and complexity of the veteran’s social network, and functional social support or the perceived emotional sustenance and instrumental assistance. The authors proposed that both structural social support and functional social support would directly relate to PTSD as a main effect; and found the model accounted for 73 percent of the variance in PTSD. Hardiness accounted for 17 percent, structural social support for 11 percent, functional social support for 40 percent, and additional stressful life events for 6 percent (King et al., 1998), which demonstrates there is substantial evidence that perceived social support has moderating effects on stress and the traumatic effects of combat. Furthermore, to reinforce the importance of social support, King and colleagues (1998) found “a substantial amount of the indirect effect of hardiness on PTSD (roughly 67% for the women and 80% for the men) was attributable to the linkage through functional social support (p. 429). A limitation of this study, noted by the authors, is related to the process of structural equation modeling (SEM) as a method of the 9-factor model in this study. The process of SEM, however, does not confirm the model; nevertheless, using the SEM statistical method, one can conclude that there is no
evidence to disprove the model. The authors urged that decisions regarding a model’s arrangement and acceptance be informed and guided by theory, as was the case in this Vietnam veteran study (King et al., 1998).

In another study funded by the Department of Veterans Affairs, lower extremity veteran amputees from both disease and trauma \((n = 92)\) completed the Prostheses Evaluation Questionnaire (PEQ), the SF-36 health status measure, and a series of open-ended questions (Legro et al., 1999). The number of years since the veteran’s amputation ranged from 1 to 53 years; 85 percent of the study population was male; and the mean age was 55 years. Four themes emerged from the open-ended questions. A theme of particular interest to this research study among OEF and OIF amputees was *Adaptation with Support from Others*. Several participants noted the importance of the relationship with their prosthetists, and the value of working together over the years to solve problems regarding the prosthesis. A sample of the participants’ responses included:

> I feel support groups are extremely important. Doctors and therapists are also important, but they cannot understand the frustrations an amputee goes through unless they are an amputee. Things just happen and you learn to live with them in the best possible way. A great deal of patience is required, and during the adjusting time encouragement is needed along with support from family members. It is a great shock when one really comes to cope with losing a limb (Legro et al., 1999, p. 160).
Social support and posttraumatic growth.

Although the literature supports the benefit of social support (Cadell et al., 2003; Desmond & MacLachlan, 2004; King et al., 1998; Rieck, 2005), Calhoun and Tedeschi (2006) caution that studies utilizing general measures of social support have not been consistent in demonstrating reliable relationships between scores on the Posttraumatic Growth Inventory (PTGI) and social support. Initially, Calhoun and Tedeschi (1998) posited that social support functioned to influenced PTG as a “source of comfort”, and as a source for viewing the negative experience in alternate ways, or “finding new schemas and coping behaviors” (p. 221). “Our current thinking about the relationship between growth to social factors is more specific, suggesting that certain types of responses, including supportive ones, to certain kinds of behaviors on the part of the person in crisis, will have a relationship with the degree of growth reported (Calhoun & Tedeschi, 2006, p. 14).

Weiss (2004) found social context was related to PTG (p < .05), in married breast cancer survivors (n = 68) and reported that “(a) contact with a person who suffered a similar trauma and perceived benefits from it (a unique predictor in the regression analysis), and (b) marital emotional support (a correlate in the bivariate analysis)” were related to posttraumatic growth (p.741). Weiss suggests that contact with a fellow breast cancer survivor, who reports finding benefit from the cancer and models new
perspectives on the traumatic event (breast cancer) may promote the vital cognitive processing that leads to PTG.

Cadell, Regehr, and Hemsworth (2003) examined factors contributing to posttraumatic growth and found in bereaved HIV/AIDS caregivers ($n = 174$) that social support had a significant, positive relationship with posttraumatic growth ($p < .05$). The social support variable was measured by the Social Support Questionnaire (O’Brien, Wortman, Kessler, & Joseph, 1993) and the Provision of Social Relations (Turner, Frankel, & Levin, 1983) scales. This study supports the notion that social support may be related to PTG in the aftermath of trauma. A limitation of the cross-sectional design of this study is that the data permit estimation of associations, but do not allow for the establishment of causal relationships. Furthermore, according to Cadell et al., a self-selection bias may be present; thus, the sample should not be considered representative of the population of bereaved HIV/AIDS caregivers.

Rieck (2005) found in a cross-sectional survey design research study with undergraduate students ($n = 218$) that social support was related to PTG ($r = .37, p < .01$). Rieck (2005) accounts for the relationship between social support and PTG as “talking through emotional issues with another person often empowers one to manage difficult situations and solve problems” (p. 95). Examples of traumatic events experienced by the university student participants included death of a significant other; experiencing sexual
assault; being in a motor vehicle accident; the suicide of family member or friend; a personal serious illness; and exposure to a natural disaster.

Qualitative research on social support and amputation.

In a qualitative nursing research study of 16 farmers with above-the-wrist amputations Reed (2004) studied how farmers with amputation function in their workplaces and found the “occupational recovery process included questioning, analyzing, and getting along” (p. 297). According to Reed, all participants blamed themselves for their injuries and cited carelessness as the predominant etiology of the injury. The participants relayed that the discovery of a fellow amputee farmer often resulted in a mentoring relationship, as a confidant, and an inspiration.

Rumination

The Rumination Inventory (Calhoun, Cann, Tedeschi, & McMillan, 2000)

The Rumination Inventory (Calhoun et al., 2000) measures posttraumatic cognitive processing using a set of items in both deliberate and intrusive thinking. Seven items focus on rumination soon after the event (“then”), and seven items focus on the degree of event-related rumination within the last 2 weeks (“now”) (Calhoun et al., 2000). Internal consistency for the “then” sub-scale has a Cronbach’s alpha = .81, and for the “now” sub-scale the Cronbach’s alpha = .88. Calhoun et al. (2000) reported that student participants \( n = 54 \) who reported more rumination soon after the event, reported
more PTG \( (r = .64, p < .001) \). The mean total PTGI score in the group of students was 76.5 \( (SD = 22.0) \). The authors encourage further study of the relationship between PTG and rumination.

*Adopted definition of rumination in the PTG model (Tedeschi & Calhoun, 2004)*

Martin and Tesser (1996) define rumination as “thoughts that are conscious, recurrent, instrumentally oriented, and not demanded by the immediate environment” (Martin & Tesser, 1996, p. 21). Moreover, people tend to persist in goal-directed action until they have either attained their goal or given up the desire for it; rumination is a form of looking (Martin & Tesser, 1996). An example of rumination is working through a problem and thinking about the problem until one finds resolution.

Martin and Tesser (1996) caution against distraction to reduce rumination because suppressing rumination may not bring the person any closer to attaining the goal of working through a crisis or traumatic event. Although Tedeschi and Calhoun (2004) encourage researchers to examine rumination and PTG, there is a paucity of research reports in the literature on the relationship between rumination and posttraumatic growth.

*Rumination and amputation*

“Rumination occurs when people perceive that their attainment of an important, higher-order goal has been threatened” (McIntosh, Harlow, Marin, 1995, p. 1233). Amputations, according to Dunn (1996), “initiate a search for meaning because they
represent irrevocable, physical losses that are imbued with social and psychological overtones... and can challenge people’s assumptions about an orderly, controllable world and their role in it” (p. 287). Furthermore, according to Dunn (1996), “… meaning appears to be related to psychological well-being following amputation” (p. 293).

Conclusion

A summary of the evidence from a range of current literature describes the major study variables utilized in this study: social support, rumination, and posttraumatic growth. In general, this review contributes to the emerging emphasis on wellness enhancement without discarding the complex and often distressing rehabilitation process following a combat-related amputation. “The term posttraumatic growth appears to capture the essentials of this phenomenon because it emphasizes that transformative changes (a) occur most distinctively in the aftermath of trauma rather than during lower level stress, (b) appear to go beyond illusion, (c) are experienced as an outcome rather than a coping mechanism, and (d) require a shattering of basic assumptions about one’s life that traumas provide but lower level stress does not” (Tedeschi & Kilmer, 2005, p. 233). Next, Chapter III Methodology provides a description of the study design, measurement and method of analysis for the relationships among the independent variables, and their individual and collective relationships with the dependent variable, PTG.
CHAPTER III
Methodology

Introduction

Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF) soldiers are at risk for serious injuries that may result in amputations, and while OEF and OIF death rates from wounds are down, U.S. military casualties continue to rise. Full recovery from a traumatic amputation is lengthy and complex; however, the prognosis for a physical recovery in the previously strong and healthy soldier is positive. Furthermore, research findings support the notion that physical, psychological, and psychosocial healing are equally important following a traumatic amputation (Ferguson et al., 2004; Gallagher & MacLachlan, 2001). In the weeks, months or years following a combat-related amputation, the veteran may experience posttraumatic growth (PTG) defined as the “positive psychological change experienced as a result of the struggle with highly challenging life circumstances” (Tedeschi & Calhoun, 2004, p.1). To date, there are no known studies that examine the construct of posttraumatic growth among OEF and OIF amputees. Therefore, to add to the nursing body of knowledge of rehabilitation following amputation, the need exists for a research study examining factors that may be associated with or promote PTG following a combat injury that results in amputation.
Statement of purpose

The purpose of this study was to explore posttraumatic growth among OEF and OIF amputees, and to describe the relationships between and among the length of time following a combat-related amputation, social support, rumination, and posttraumatic growth.

Research Questions

1. What are the relationships among length of time following a combat-related amputation, social support, rumination, and posttraumatic growth among Operation Enduring Freedom and Operation Iraqi Freedom veterans?
2. What is the relationship between the length of time following a combat-related amputation and social support?
3. What is the relationship between the length of time following a combat-related amputation and rumination?
4. What is the relationship between social support and rumination?

Hypotheses

Research hypotheses or alternative hypotheses

H₁: There is a relationship among social support, rumination, and the length of time following a combat-related amputation with posttraumatic growth among OEF and OIF amputees.
H2: There is a relationship between the length of time following a combat-related amputation and social support.

H3: There is a relationship between the length of time following a combat-related amputation and rumination.

H4: There is a relationship between social support and rumination.

Test of significance

According to Burns and Grove (2005), on a normal distribution curve, extremes of statistical values can occur at either end of the curve, and the tails of the curve contain the percent of statistical values that are statistically significant. This research study utilized a two-tailed test, in which the alternative hypothesis was nondirectional and allowed extreme scores to occur in either tail (see Figure 5). By contrast, if there had been strong empirical evidence from prior research studies about PTG among amputees suggesting the direction of the outcome, a directional research hypothesis would have been used in this study. Thus, a prediction for the direction of the alternative hypothesis in this study could not be reasonably established and a two-tailed test of significance was selected. This conservative approach allowed for the possibility of detecting statistical significance in either direction. The level of significance of all statistical tests was set at $\alpha = .05$. This led to the following decision rule: “Reject the null hypothesis if the
probability of obtaining a sample mean at or beyond a certain value is less than or equal to .05; otherwise, do not reject the null hypothesis” (Shavelson, 1996, p. 263).

Figure 5. The two-tailed test of significance with an alpha set at .05.

Human Subjects Protection

A human subject, defined in the Common Rule, is “a living individual about whom an investigator (whether professional or student) conducting research obtains (1) data through intervention or interaction with the individual, or (2) identifiable private information” (National Research Council, 2003, p. 17). The principle of justice provides the foundation for the obligation to show fairness with regard to the selection of research participants and in the distributions of the burdens and benefits of the research (National Research Council, 2003). This research study was designed to apply the principles of beneficence (assessment and appropriate balancing of risks and benefits) and justice (fair procedures for selection of research participants).
Informed voluntary consent is a main component of ethical research with human participants, and stems from the 1947 Nuremberg Code where the principle of voluntary consent to participate in research is affirmed (National Research Council, 2003). Informed consent is the act of “providing an individual with comprehensible information regarding known risks of harm, possible benefits, and other details of the proposed study prior to the point at which the person freely chooses to participate” (National Research Council, 2003, p. 24) and is grounded in the principle of respect for persons.

Human subject approval was obtained from The Catholic University Of America Committee for the Protection of Human Research Subjects and the Department of Veterans Affairs Washington, DC Institutional Review Board (IRB). Potential OEF/OIF participants were informed in writing that the signed consent form (See Appendix B) was a requirement for participation in research study; that they were free to withdraw from the study at any time without penalty; and that if participants withdrew from the study they would continue to receive all eligible medical care and benefits through the Department of Veterans Affairs.
Minimal risk research.

This study’s questionnaires queried research participants about a traumatic life experience, the combat-related amputation, and the resultant effects on themselves and their lives. Potential benefits of trauma-focused research studies include empowerment, learning or insight, altruism, kinship with others, feeling worthwhile by participating, and receiving favorable attention by the researcher (Newman & Kaloupek, 2004). On the other hand, though, “Available evidence demonstrates that negative emotions are experienced by at least some individuals during participation in trauma-related studies” (Newman & Kaloupek, 2004, p. 391). Moreover, a common concern of IRBs is the potential for emotional harm due to recall of traumatic events. Risk of inconvenience such as boredom or wasting a participant’s time is a potential risk of research participation; however, discomfort, which includes causing painful memories, evoking strong emotional distress, fostering self-destructive behavior, and worsening a participant’s condition, is the major concern for researchers of trauma-related studies (Newman & Kaloupek, 2004).

It is important to address the question of participant discomfort experienced as a result of this study, and if the discomfort arising from the questions about the combat-related amputation qualifies as minimal risk. "Minimal risk is defined as the probability that magnitude of harm or discomfort anticipated in the research are not greater in and of
themselves than those ordinarily encountered in daily life or during the performance of routine physical or psychological examinations or tests (National Commission for the Protection on Human Subjects of Behavioral Research, 1978)” (Newman & Kaloupek, 2004, p. 391). Newman & Kaloupek (2004) note, “there is no evidence that experience with trauma impairs the ability to make informed choice about participating in a study even if participation carries risk of emotional discomfort” and “the majority who experience strong emotional reactions do not regret or negatively appraise their research participation” (p.393).

Department of Veterans Affairs IRB stipulations

The Washington, DC VA Medical Center (VAMC) IRB stipulated that the investigator could contact potential OEF and OIF amputee participants only two times to request participation in the study. In addition, surveys must be returned to the investigator at the Washington, DC VAMC to ensure that no veteran personal identification left the medical center.

Research design

This research study was descriptive in nature and utilized a cross-sectional design. Burns & Grove (2005) and others describe the use of cross-sectional designs to examine groups of subjects in various stages of development simultaneously so that one can describe changes in the experience across stages. The hypothesis in a cross-sectional
design is that stages (e.g., time following an amputation) are part of a process (e.g., posttraumatic growth) that may progress over time. Support for analyzing participants at various points in the process is important because this provides further important information about the process of PTG, even though the same participants are not monitored through the entire process.

The data collection technique for this research study was a mailed self-report survey. Independent variables in this study were referred to as predictor variables; however, the variables were measured in order to describe an influence rather than predict the dependent variable, posttraumatic growth. In other words, the study design asserted correlation, not causation.

*Independent and dependent variables*

The variables of the research study are:

1. Posttraumatic growth (dependent or regressor variable);
2. Time following a combat-related amputation (independent or regressed variable);
3. Social support (independent or regressed variable); and
4. Rumination (independent or regressed variable).
Setting and Subjects

Efforts were made to identify the population of OEF and OIF combat-related amputees registered at the Department of Veterans Affairs. Potential participants were mailed the research survey packet to the veteran’s home. Thus, the research setting was the current mailing address on record at the Department of Veterans Affairs.

Inclusion Criteria

To participate in this study, the veteran:

1. Must have one or more amputations of the hand, any part of the arm, the foot, or any part of the leg.

2. Must have an amputation sustained while serving in Operation Enduring Freedom or Operation Iraqi Freedom.

3. Must be a minimum of six months postamputation.

4. Must be able to read and understand English.

5. Must be cognitively able to complete the survey packet without assistance from a caregiver.

6. Must have a current mailing address within the VA electronic record.

7. Must sign and return the study’s IRB- approved informed consent form.
Determining the sample size

Several factors combine to assist in planning the right sample size for a specific research study. Power of the test statistic is defined as the probability of rejecting the null hypothesis when the alternative hypothesis $H_1$ is true. Think of power as avoiding a type II error. According to Munro (2005), a level of .80 for power is generally viewed as adequate. “Effect size is the degree to which $H_0$ is false; that is, the magnitude of the effect of an independent variable on the dependent variable” (Munro, 2005, p. 100). The significance level is the probability of rejecting a true $H_0$ or making a type I error. This research study tested $H_0$ vs. $H_1$, with significance level set at $\alpha = 0.05$, and power of test for the alternative was set at .80. An nQuery Advisor, a software program for planning power (ROT3-1) was run for the purposes of this research study with $\alpha = 0.05$, power .80, 3 variables, and a squared multiple correlation, $R^2$, yielded $n = 115$ (Gatsonis & Sampson, 1989). "Cohen (1987) provides a formula for determining sample size…. He defines a small effect as an $R^2$ of 0.02, a moderate effect as an $R^2$ of 0.13, and a large effect as an $R^2$ of 0.30" (Munro, 2005, p. 261). As a result of the power planning, the projected number of required research subjects for this research study was 115.
Study Instruments

Demographic survey

The Demographic Survey (See Appendix A) consisted of 21 demographic questions and a 17-item questionnaire. The participants’ date of birth and date of injury were captured via the demographic survey, and the investigator using statistical software calculated the time postamputation. The 17-item Symptom and Activity Frequency Questionnaire utilized a 5-point Likert scale ranging from 1 (rarely or never) to 5 (daily). There was no total score for this questionnaire because the questions were designed to describe the population and to stand-alone. Sample items on the questionnaire include: Since my amputation, I attend a church, synagogue, or other religious meetings, and Since my amputation, I encourage or console another amputee.

Time following an amputation.

Time following a combat-related amputation was measured in months calculated by subtracting the month and year of the combat-amputation from the month and year of signed consent form in 2007. Thus, the time following the combat-amputation in 2007 was a ratio-level measurement and met the rules of the lower forms of measures that include mutually exclusive categories, exhaustive categories, rank ordering, equal spacing between intervals, a continuum of values, plus the presence of absolute zero points (Burns & Grove, 2005). Mathematical operations are limited in lower forms of
measurement, and more sophisticated analyses can be performed if the actual number of months following an amputation is obtained. Thus, the actual number of months following an amputation was calculated to facilitate a regression analysis.

Posttraumatic growth inventory (PTGI; Tedeschi & Calhoun, 1996)

The Posttraumatic Growth Inventory (PTGI; Tedeschi & Calhoun, 1996) (See Appendix A) is a 21-item, 6-point Likert scale ranging from 0 (I did not experience this change as a result of my crisis) to 5 (I experienced this change to a very great degree as a result of my crisis). Total possible scores range from 0 to 105, with higher scores reflecting greater posttraumatic growth. According to the instrument instructions, “my crisis” is replaced by the study population’s traumatic event, which in this research study was a combat related amputation. In this study, the Posttraumatic Growth Inventory was keyed to read “As a result of my amputation.” In development, the PTGI had a Cronbach’s alpha coefficient of .90, and test-retest reliability over two months was .71 (Tedeschi & Calhoun, 1996).

The PTGI has been used in research studies both domestically and internationally in populations such as breast cancer patients (Weiss, 2004); bone marrow transplant patients (Widows, 2005); children following a natural disaster (Cryder et al., 2006); in holocaust survivors (Lev-Wiesel, 2003); criminal victimization in South Africa (Peltzer, 2000); and Chinese cancer survivors in Hong Kong (Ho et al., 2004. The PTGI (Tedeschi
& Calhoun, 1996) includes and measures the following five factors or subscales and the results of the internal consistency Cronbach’s alpha coefficients during the instrument development were Relating to Others (.85), New Possibilities (.84), Personal Strength (.72), Appreciation of Life (.67), and Spiritual Change (.85). Permission to use the PTGI instrument was obtained from Dr. Calhoun and Dr. Tedeschi.

Social support

The Postdeployment Social Support Scale (See Appendix A) included in the Deployment Risk and Resilience Inventory (DDRI) (King, King, & Vogt, 2003) measured social support. The DDRI, developed by the Department of Defense and the Department of Veterans Affairs with a focus on contemporary military deployments, includes twelve surveys of experiences before, during, and after military deployment and may be administered individually or as a group (King et al., 2003). The Post-Deployment Social Support survey is a 15-item, Likert-scale ranging from 1 (strongly disagree) to 5 (strongly agree). The total score ranges from 15 to 75, with higher scores indicative of greater perceived social support upon return from the deployment. Permission to use the Post-Deployment Social Support was obtained from the authors.

According to King and colleagues (2003), emotional sustenance is the extent to which others provide the individual with understanding, companionship, a sense of belonging, and positive self-regard, while instrumental assistance is the extent to which
the individual receives tangible aid such as help to accomplish tasks and material assistance or resources. Sample items from the DDRI Post-Deployment Support Scale (King et al., 2003) include, *The reception I received when I returned from my deployment made me feel appreciated for my efforts; Among my friends or relatives, there is someone who makes me feel better when I am feeling down; and There are people to whom I can talk about my deployment experiences.*

In the development of the DDRI measures, King et al. (2003) note that careful attention was given to content validity and efforts included focus groups with members of the target population, consultation with content experts, and iterative procedures to insure relevance and appropriate wording and presentation of item content. The internal consistency of the DDRI Post-Deployment Support scale, measured by Cronbach’s coefficient alpha, was .87. Psychometric testing included testing among 357 Gulf War I veterans utilizing a mailed survey ($M = 56.7, SD = 10.5$). According to DeVellis (2003), an often-overlooked benefit of more reliable scales is that they increase statistical power because a reliable measure, like a larger sample, contributes to less Type II error.

*Rumination*

The Rumination Inventory (Calhoun, Tedeschi, Cann, & McMillan, 2000) (See Appendix A) is a 14-item, Likert scale ranging from 1 (*not at all*) to 4 (*often*) and is comprised of items that reflect several content areas that are believed to be common in
posttraumatic rumination. Total possible scores range from 14 to 56, with higher scores indicative of greater traumatic-event-related rumination. According to Calhoun et al. (2000), internal consistency for rumination soon after the traumatic event (then), as measured by Cronbach’s alpha, was .81; internal consistency for rumination within the past two weeks (now) was .88 (see Table 5). Internal consistency is concerned with the homogeneity of the items within the scale, and a scale is internally consistent to the extent that the items are highly intercorrelated; moreover, according to DeVellis (2003), a coefficient alpha between .80 and .90 is considered very good.

The authors selected items that reflected several content areas common in posttraumatic rumination that reflect both deliberate and intrusive thinking. "The items were focused on the degree to which the individual reported intrusive thoughts (Sanavio, 1988; Zilberg, Weiss, & Horowitz, 1982), deliberately thinking about the event to try to make sense out of it (Barrett & Scott, 1989), deliberately trying to make something good come out of the struggle with the event (Carver, Scheier, & Weintraub, 1989), deliberately trying to see benefits in the event (items suggested by Tennen & Affleck, 1998), and thinking, either deliberately or automatically, about the meaning or purpose of life (Yalom & Lieberman, 1991)" (Calhoun et al., 2000, p. 524).

The Rumination Inventory was developed to capture the extent of rumination soon after the traumatic event (then), and the degree of rumination within the last two
weeks (now). Two sample items contained in the Rumination Inventory are “Soon after the event, thoughts about the experience came into my mind and I could not get rid of them” and “Recently, I decided to think about the experience to try and make sense out of what happened.” According to Calhoun et al. (2000), “Although there is some apparent similarity in the semantics of the PTGI [Posttraumatic Growth Inventory] and rumination items, the rumination items, including those that focus on positive elements, are focused on cognitive processes, and the PTGI items are focused on outcomes” (p. 526).

Permission to use the Rumination Inventory was obtained from Dr. Tedeschi and Dr. Calhoun. A summary of the development psychometric properties for the research instruments utilized in this study are found in Table 5.
Table 5

*Summary of Development Psychometric Properties for Study Instruments*

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Author</th>
<th>No. Items</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Cronbach's Alpha</th>
<th>Sample Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTGI</td>
<td>Tedeschi &amp; Calhoun (1996)</td>
<td>21</td>
<td>Women: 75.18</td>
<td>(21.24)</td>
<td>.90</td>
<td>College Students (n = 604)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Men: 67.77</td>
<td>(22.07)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Postdeployment Social Support</td>
<td>King, King, &amp; Vogt (2003)</td>
<td>15</td>
<td>56.69</td>
<td>(10.52)</td>
<td>.87</td>
<td>Gulf War Veterans (n = 357)</td>
</tr>
<tr>
<td>Rumination Inventory</td>
<td>Calhoun, Tedeschi, Cann, &amp; McMillan (2000)</td>
<td>14</td>
<td>Soon after event: 20.7</td>
<td>(4.5)</td>
<td>.81</td>
<td>College Students (n = 54)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Then: 14.0</td>
<td>(5.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Within past 2 weeks (Now): 14.0</td>
<td>(5.6)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Study Population

Research participants were identified from a database of OEF and OIF veterans registered at Department of Veterans Affairs for health care. ICD-9 codes were used to identify amputees in the Department of Veterans Affairs data base. A goal of the research study was to identify the population of VA OEF and OIF amputee veterans, and attempt to survey all known VA OEF and OIF amputees.

VA Roster of OEF and OEF Amputees

In September 2003, The Department of Defense (DoD) Roster of Recent War Veterans was developed by the DoD Defense Manpower Data Center (DMDC). In September 2004, The DMDC revised procedures and created a mechanism to provide periodic updates of the roster and they now utilize direct reports from service branches of deployed OIF and OEF troops (Department of Veterans Affairs, 2006). The updated Roster of Recent War Veterans used for this study contains a list of veterans who left active duty and became eligible for VA health care from FY 2002 through May 31, 2006. The roster does not distinguish OIF from OEF veterans, nor does the roster contain the 2,515 veterans who died in-theater (Department of Veterans Affairs, 2006). As of August 2006, among all 588,923 separated OEF and OIF veterans, 31 percent or 184,524 have sought VA health care since FY2002. The primary use of the roster is to check the VA’s electronic inpatient and outpatient health records, in which the standard International
Classification of Diseases, 9th Revision (ICD-9) diagnostic codes are used to classify health problems and to determine which OEF and OIF veterans have accessed VA health care (Department of Veterans Affairs, 2006). The data available from the roster are mainly administrative information and are not based on a careful review of each patient record or a confirmation of each diagnosis.

In an attempt to identify the study population, a user agreement was signed between the investigator and Dr. Han Kang of the Veterans Health Administration (VHA) Environmental Epidemiology Service (EES) to obtain the names and contact information of OEF and OIF amputee veterans. A list of OEF and OIF veterans with amputation-related (ICD-9) codes was produced by Dr. Kang’s office and given to the investigator, who maintained the Department of Veterans Affairs security regulations to protect the veteran’s personal identification information. No personal identification left the VA Medical Center and the list was kept in a secured file in a locked office. Dr. Kang stipulated that each name on the amputee list have a chart review performed by the investigator. This was performed to ensure that the veteran had a correct amputation ICD-9 code and, thus, ensure that a research survey was not inappropriately sent to a non-amputee veteran.
Procedure

Mailed survey

1. Eligible OEF and OIF amputees were mailed a survey packet containing:
   a. Letter of introduction including a request to participate in the study and detailed principal investigator contact information.
   b. Two IRB-approved informed consent forms (ICF). One to return with the survey instrument and one marked "copy" for the veteran's records.
   c. Return-addressed, stamped envelope.
   d. Survey instrument containing study-specific non-identifying participant number and the following:
      i. Study-specific demographic questionnaire (Benetato, 2007).
      iii. DDRI Post-Deployment Support Survey (King et al., 2003).
      iv. Rumination Inventory (Calhoun et al., 2000).

2. Non-responders are sent a second research packet two weeks after the initial mailing.

3. Immediately upon receipt, survey packets were reviewed for:
   a. Signed informed consent form.
b. Response on mental health question 24-7 *Have feelings that life is not worth living*. If “once a week” or more was marked for Question 24-7, the veteran was contacted to offer assistance in obtaining a mental health consult at the veteran’s local VA Medical Center.

4. Once a determination of psychological harm was completed, the participant’s identifying information located on the Informed Consent Form was separated from the questionnaires to ensure confidentiality.

5. All research study data or information was secured in a locked cabinet at the Department of Veterans Affairs, and access was limited to the investigator and the investigator’s dissertation committee. The de-identified research data located on computer files was password-protected and they were not linked to any personal identifying information.

6. For missing items on the survey questionnaires, the investigator called the research participant and asked for responses to questions over the telephone.

7. There was no compensation to subjects for participating in this research study.

This chapter summarized the mailed survey methodology utilized in this research study. Surveys were mailed nationally to all known OEF and OIF amputee veterans registered at the Department of Veterans Affairs from March – July 2007.
CHAPTER IV

Results

Introduction

The purpose of this research study was to explore the relationships among the length of time following a combat-related amputation, postdeployment social support, rumination and posttraumatic growth among Operation Enduring Freedom and Operation Iraqi Freedom amputees. A descriptive, correlational design was used with a mailed survey methodology. Levels and relationships of PTG, social support, rumination and time since amputation among OEF and OIF veterans (n = 39) were examined.

Procedures

All procedures were implemented after protocol approval for use of human subjects from The Catholic University of America (CUA) Committee for the Protection of Human Research Subjects and Department of Veterans Affairs Washington, DC Institutional Review Board (IRB). Approval by the CUA Committee for the Protection of Human Research Subjects was granted on January 18, 2007, followed by VA IRB approval on February 16, 2007.

Combat amputees were identified from a DoD Roster of Recent War Veterans that was matched with VA inpatient and outpatient files that had been matched with International Classification of Diseases, 9th Revision (ICD-9) codes consistent with
amputation. The result was 415 OEF and OIF veterans with amputation-related ICD-9 codes. Chart reviews were performed to confirm reliability of ICD-9 coding for amputation status. Additionally, the chart review provided a means to obtain or confirm a current postal address. Electronic VA chart reviews were typically completed within 10 to 15 minutes; the total amount of time devoted to chart reviews for this study was approximately 90 hours.

Exclusion from study participation.

Common reasons for study exclusion (see Figure 6) included non-combat amputation status, finger or toe amputation, not an amputee (inaccurate or a broad use of ICD-9 coding), amputation occurred in the U.S. while on active duty, veteran presently lives outside of the U.S., or the inability to obtain a current mailing address.

From the chart reviews, the investigator found that at least six of the non-combat major amputations were a result motorcycle or car crashes within the U.S. after the veteran returned from active duty service in Iraq or Afghanistan. Two combat-related amputees had documentation of legal troubles and notations in the electronic medical record indicated the veterans were incarcerated. Potential participants deemed ineligible did not receive a study packet mailing.

Of the returned surveys, two completed surveys were excluded from this research study. One participant was not a combat amputee (amputation was a result of a motor
vehicle injury in U.S.), and the second excluded participant was a combat amputee but did not have a major amputation (toes were amputated).

*Figure 6*. Potential study participants identified after matching DoD Roster of Recent War Veterans with inpatient and outpatient VA files with amputation ICD-9 codes.
Mailed Survey Milestones

Research packets marked numbered 1001 to 1210 were mailed from the Washington, DC VA Medical Center from March to July, 2007 to eligible study participants.

December 2006: A User Agreement for Release of VA Data within VA was signed between Bonnie Benetato and Dr. Kang, Director of the War-Related Illness and Injury Study Center at VA. Amputation-related ICD-9 codes were identified in order to match these to VA outpatient files and Veteran Benefit files.

March 2007: Roster of OEF and OIF veterans given to investigator. Chart reviews begin. When a sufficient number of chart reviews were performed confirming amputee status and current address, batches of survey packets were mailed from VA.

April 2007: First and second batches of survey packets (No. 1001-1053 and No. 1054-1088) were mailed in April. Two weeks after mailing, non-responders were mailed a second survey packet.

May 2007: No. 1089-1124 and No. 1125-1161 mailed. Second mailing per study protocol.

June 2007: No. 1162-1182 mailed. Second mailing per study protocol.

August 2007: Continue SAS and SPSS data analysis.

Mailed survey procedure.

1. Eligible OEF and OIF amputees \((n = 210)\) were mailed a survey packet containing:
   
   a. Letter of introduction including a request to participate in the study and detailed principal investigator contact information.
   
   b. Two IRB-approved Informed Consent Forms (ICF) (See Appendix F). One to return with the survey instrument and one marked "copy" for the veteran's personal record.
   
   c. Return-addressed, stamped envelope.
   
   d. Research survey packet containing:
      
      i. Study-specific Demographic Questionnaire.
      
      
      iii. DDRI Post-Deployment Support Survey (King et al., 2003).
      
      iv. Rumination Inventory (Calhoun et al., 2000).
2. Potential respondents who did not return the questionnaires two weeks after they were mailed were sent a second research packet. Per VA IRB, the investigator could contact OEF and OIF amputees only two times with a request to participate in this research study.

3. Immediately upon receipt, survey packets were reviewed for:
   a. Signed consent form.
   b. Response on mental health question 24-7 *Have feelings that life is not worth living.* If “once a week” or more was marked for Question 24-7, the veteran was contacted and offered assistance in obtaining a mental health consult at the veteran’s local VA Medical Center *(n = 2)*.
   c. The remainder of the survey instrument was reviewed for missing items.
      i. Upon receipt of incomplete surveys *(n = 7)*, veterans were telephoned and, after the investigator identified herself, veterans were asked to complete questions by telephone. There were no refusals by veterans to complete missing items.
      ii. Subjects who returned surveys without a signed ICF *(n =1)* were contacted by mail with a request for the veteran to complete and return the ICF in order to participate in the study. Upon this request, there were no refusals to complete the ICF.
iii. ICF returned without the survey (n = 1) were contacted by mail with a request to complete the research survey. The survey was completed and sent to the investigator.

d. Surveys were separated from the ICF in which identifying information was contained. Paper surveys and consent forms were stored separately and kept in a locked filing cabinet located in a locked office at VA Medical Center (VAMC).

4. Survey data were entered on a password-protected Excel spreadsheet using research study code numbers. The Excel spreadsheet was saved in a password-protected file located on a secure VA network. No personal-identifying-veteran data were removed from VA

a. The data entered in the Excel spreadsheet were confirmed by a second reviewer and any data entry errors were corrected.

b. The Excel spreadsheet was uploaded within VA to a secure mainframe known as the VA Austin Automation Center. SAS version 13.1 (SAS Institute Inc., Cary, NC) was used to performed statistical analysis.
Central Limit Theorem

Characteristics of the sampling distribution of the mean.

If the underlying distribution of a variable X in a population, such as social support in OEF/OIF amputees, is normal, then it can be shown that the sample mean (e.g., the sample of n = 39 observations in this study) is itself normally distributed. If, however, the distribution of a variable in the OEF/OIF amputee population is not normal, it is still possible to make some statements about the distribution of the sample mean. These statements may be made because of the Central Limit Theorem, about which mathematicians interested in probability provide calculus proofs (Hoel, 1962). While a complete discussion of the Central Limit Theorem is beyond the scope of this chapter, it is important to consider, from a practical point of view, the theorem as it relates to this study. Many variables encountered in clinical practice and research, such as blood pressure or total cholesterol, are not normally distributed. According to the Central Limit Theorem, one can use normal curve methods to research study means, even when the population variable X has a distribution that differs from a normal distribution (Hoel, 1962; Rosner, 2006).

Consider, for example, if one repeated the process of obtaining a random sample of n = 39 observations from a population of OEF/OIF amputee veterans registered for health care at VA, obtained a mean PTG score from each of the samples, and then plotted
the distribution of sample PTG means. The distribution of the PTG sample means, according to the Central Limit Theorem, would be approximately normal. Thus, while the underlying distribution of variable X in the population (e.g., social support, rumination, or PTG among OEF/OIF amputees) may not be normal, it is still possible to determine the confidence interval based on the normal distribution approximation, and to determine the critical region of the area under the normal distribution in order to carry out an alpha-level test of a hypothesis.
Central Limit Theorem and sample size

According to Kendall & Stuart (1977), how large \( n \) must be for approximations to be satisfactory is not always easy to say, but "For some distributions, particularly that of the mean, quite a satisfactory approximation is given by low values of \( n \), say \( n \geq 30 \)" (p. 238). Furthermore, "For samples of 30 subjects or more, the sampling distribution of means will be approximately normal for a variety of differently shaped population distributions" (Shavelson, 1996, p. 238). If, however, the distribution of a variable \( X \) in the population is normal, the sampling distribution of means will also be normal, regardless of the sample size.

Consider again, for example, posttraumatic growth among all OEF and OIF amputee veterans where no available information about the shape of the distribution of variable \( X \) (i.e., PTG) in the population exists. The Central Limit Theorem asserts that as the sample size of observations increases, the shape of the distribution of means becomes increasingly like the normal distribution. Shavelson (1996) states, "For a size of 30, the normal distribution provides a reasonably good approximation of the sampling distribution of means"; thus, "\( N = 30 \) is used, as a rule, for inferring the shape of the sampling distribution" (p. 256). It follows that the Central Limit Theorem supports the assertion that the sample size of this research study, \( n = 39 \), is adequate to determine confidence limits based on the normal distribution approximation. In this study, there is a
95 percent probability that the confidence interval centered at the sample mean based on 
\( n = 39 \) derived from the formula \( \bar{x} \pm (1.96)SE \) contains the population mean. In 
other words, there is a 95 percent probability that the interval, defined by this study's 
PTG mean of 62.4 \( (SD = 23.9) \) is 62.4 ± 7.6, or the range from 55 to 70, contains the true 
population mean of PTG among OEF and OIF amputee veterans.

Descriptive Statistics

Participants were combat amputees from OEF (10%) and OIF (90%). The mean 
age of the study participant was 31.9 years \( (SD = 6.8, \text{ range } = 22 - 45 \text{ years}) \). Prior to 
deployment, over half of the amputees were Active Duty (59.0%), followed by National 
Guard (25.6%), and Reserves (15.4%). Most of the amputees in this sample reported a 
present status as retired or discharged (94.8%). One participant reported remaining in the 
National Guard, and another reported remaining in the Reserves; none remained on 
Active Duty in this sample. The majority of the amputees were Caucasian (see Figure 7), 
and men (92%) outnumbered female participants (8%). At the time of injury, most of the 
study participants were Army (82.1%) vs. Marines (17.9%); the study sample did not 
contain any Air Force, Navy or Coast Guard participants. This study sample was 
comprised of 84.6 percent Enlisted Service members and 15.4 percent Officers (See 
Figure 8).
Figure 7. Proportion of OEF and OIF amputees by race or ethnic group.
Figure 8. Branch of service and rank among amputee study participants ($n = 39$).
Amputation descriptive statistics

Thirty (76.9 %) of the study participants reported having a single amputation, followed by 8 (20.5%) reporting double amputations, and 1 (2.6%) reporting a triple amputation (See Figure 9).

Figure 9. Number of amputations per amputee participant \((n = 39)\).
Lower extremity amputations exceed upper extremity amputations in this sample, 40 vs. 9, respectively. Three participants (7.7%) experienced other amputations, such as fingers or toes on a different extremity, in addition to a major amputation. The majority of amputations in this study (see Figure 10) were left foot or leg (59.0%), followed by right foot or leg (43.6%), right hand or arm (20.5%), and left hand or arm (2.6%).

*Figure 10.* Site of major extremity amputations reported by OEF and OIF study participants. N ≠ 39 due to multiple amputations in nine participants.
Loss of eyesight and hearing.

Three (7.7%) of the 39 OEF and OIF study participants reported permanent loss of eyesight and 15 (38.5%) of the 39 amputees reported permanent hearing loss.

Amputation site infections.

Approximately seventy-five percent of OEF and OIF amputee participants reported a history of amputation site infections. Ten participants (26%) reported having no amputation site infections; almost half (49%) reported having 1 to 3 infections at the site; and 15 percent reported 4 to 6 infections (see Figure 11). No study participants reported having 7 to 9 infections, and 10 percent reported having more than 10 infections.
Figure 11. Number of self-reported infections at the amputation site among OEF and OIF amputees \((n = 39)\).

*Time post amputation.*

Length of time since the combat-related amputation was calculated by subtracting the self-reported date of injury leading to the amputation from the date on the signed informed consent form that was returned with the survey. The mean months postamputation was 37.5 months \((SD = 8.3, \text{ range } = 18-52 \text{ months})\). With an average time since amputation of just over 3 years, the majority had completed rehabilitation,
with only 3 (7.7%) participants in part-time rehabilitation. Rather, the majority of amputees were employed either full-time (51.3%) or part-time (7.7%). Over half of the study sample was married (56.4%); and the reminder was separated (2.6%), divorced (20.5%), single/never married (17.9%), or single/living with partner (2.6%).

*Education levels of study participants.*

Over three-fourths of the OEF/OIF amputees in this study were educated beyond a high school degree (see Figure 12). The majority (67.7%) of the participants reported having some college.

*Figure 12.* Education levels among sample participants ($n = 39$).
Questionnaire Descriptive Data

The demographic survey included 17 questions using a Likert-scale to assess the frequency of various activities during the past two months. The questionnaire provided further descriptive information about the study sample.

*Attend a church, synagogue, or other religious meeting.*

Most of the participants (71.8%) reported rarely or never attending a church or other religious meeting; 10.3 percent reported going to a religious meeting several times a month, and the remaining 17.9 percent reported attending a service one or more times a week.

*Play a team sport.*

While over half of the amputees (64.1%) reported rarely or never playing a team sport, 2 amputees (5.1%) played a team sport daily. Two amputees (5.1%) played a team sport two or more times a week; 2 amputees (5.1%) played once a week; and 20.5 percent played a team sport several times a month.

*Drive a car or ride a motorcycle.*

The vast majority of study amputees (84.6%) drives a car or rides a motorcycle daily. Four participants (10.3%) rarely or never drive or ride, and two participants (5.1%) drive a car or ride a motorcycle several times a month.
Have feelings that life is not worth living.

Over three fourths of the participants (84.6%) reported rarely or never having feelings that life is not worth living. Only two participants (5.1%) report such feelings once a week; these two participants were telephoned and offered assistance in obtaining a mental health referral or follow-up at their local VAMC. Four amputees (10.3%) reported having feelings that life is not worth living several times a month.

Stay home or indoors because of depression.

Over half of this study’s participants (61.5%) reported rarely or never staying home because of depression. The remainder of the sample, 8 amputees (20.5%) reported staying home because of depression several times a month; 4 (10.3%) once a week; 2 (5.1%) two or more times a week; and 1 (2.6%) stayed home daily because of depression. The one respondent that reported staying at home daily because of depression also reported have feelings that life is not worth living once a week, and reported rarely or never having pain. The second of two respondents that reported have feelings that life is not worth living once a week reported staying home or indoors because of depression several times a month, and having pain that requires me to take prescribed medications such as codeine or morphine once a week.
Drink 3 or more alcoholic beverages in a row.

Of the sample participants, 43.6 percent rarely or never consumed 3 or more alcoholic beverages in a row. As the frequency of alcoholic intake increased, the number of participants declined (see Figure 13). Eleven amputees (28.2%) consumed 3 or more alcoholic beverages in a row several times a month, 9 (23.0%) once a week, 1 (2.6%) two or more times a week, and 1 (2.6%) reported drinking 3 or more alcoholic beverages in a row on a daily basis.

Figure 13. Number of study participants who reported consuming 3 or more alcoholic beverages in a row in the past two months (n = 39).
Pain

Stay at home or indoors because of pain.

None of the amputees reported staying indoors on a daily basis because of pain. Five (12.8%) amputees stayed indoors once a week, 6 (15.4%) two stayed indoors two or more times a week because of pain; 11 (28.2%) several times a month, and 17 (43.6%) rarely or never stayed in-doors because of pain. The majority (71.8%) of this sample reported that they seldom or rarely stay at home or indoors due to pain.

Have pain that requires me to take an over-the-counter medication such as Tylenol or Advil.

Six study participants or 15.4 percent reported daily pain that required taking an over-the-counter medication. Fewer, 3 (7.7%) had such pain two or more time a week and 2 (5.1%) once a week. Eleven (28.2%) amputees in this study had pain that required an over-the-counter medication several times a month, and 17 (43.6%) had such pain rarely or never. The majority of this sample of amputees (71.8 %) reported pain that required an over-the-counter medication such as Tylenol or Advil several times a month or less.
Have pain that requires me to take prescribed medications such as codeine or morphine.

Twenty seven (69.2%) of the participants in this study rarely or never have pain that requires a prescription medication such as codeine or morphine. Six (15.4%) amputees in this study have pain that requires narcotic medication on a daily basis. The remainder of the sample, 3 (7.7%) had pain that required prescribed medications such as codeine or morphine several times a month, and 3 (7.7%) once a week. Three fourths of this sample requires prescription medication for pain several times a month or less.

Prosthetic Utilization and Satisfaction

Prosthetic utilization.

A majority of the participants (84.6%) uses a prosthetic device on a daily basis; 5.1 percent use a prosthetic device two or more times a week; 2.6 percent once a week; 2.6 percent several times a month; and 5.1 percent rarely or never use a prosthetic device (See Figure 14).
Use a prosthetic device

*Figure 14.* Prosthetic utilization among study amputees (*n* = 39).

*Prosthetic satisfaction.*

Satisfaction with the prosthetic device varied in this study (see Figure 15). Only 1 participant (2.6%) reported not applicable (N/A). Two participants (5.1%) were neither unsatisfied nor satisfied. Eight amputees (20.5%) were extremely unsatisfied with their prosthetic device and six amputees (15.4%) were somewhat unsatisfied with their
prosthetic device. Fourteen (35.9%) were somewhat satisfied and eight amputees (20.5%) were extremely satisfied with their prosthetic device.

Figure 15. Reported prosthetic satisfaction among study amputees (n = 39).
Results of Independent and Dependent Study Variables

Construct Validity

*Psychometric properties of the instruments used in the study.*

Cronbach’s alpha coefficient is a statistic used to support internal reliability and most nurse researchers use it to document how items comprising a research instrument are conceptually correlated. Psychometric testing on research instruments is not a one-time task that ends after the development of the scale; rather, it is necessary if differences exist between the population being sampled and the population sampled when the instrument was developed and tested. Alpha coefficients should be computed each time the research tool is administered in a research study, and the coefficient alpha is considered sample specific (DeVon et al., 2007). Reliability testing to obtain a Coefficient alpha was performed using SPSS for the study instruments utilized in this study.

*Internal consistency reliability*

Internal consistency for this study was calculated with Cronbach’s alpha coefficient. The Cronbach’s alpha for this study among OEF and OIF amputee veterans is located in Table 6 for comparison. The Cronbach’s alpha for the PTGI (Tedeschi & Calhoun, 1996) in this study among OEF and OIF amputees was .94. The Cronbach’s alpha for the Postdeployment Social Support (King, et al, 2003) survey had a Cronbach’s
alpha of .69 in this study’s OEF and OIF sample population. The Cronbach’s alpha for the Rumination Inventory (Calhoun et al., 2000) utilized in this study to measure rumination among this sample of OEF and OIF amputees was .84. See Appendix A for SPSS calculations of Cronbach’s alpha for the instruments used in this study.
Table 6

Comparison of Cronbach's Alpha for PTGI (Tedeschi & Calhoun, 1996) and the Five PTGI Domains

<table>
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<tr>
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<tbody>
<tr>
<td>Relating to Others</td>
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<td>Appreciation of Life</td>
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</tr>
<tr>
<td>Total PTGI</td>
<td>.90</td>
<td>.94</td>
<td>.93</td>
<td>.97</td>
</tr>
</tbody>
</table>

** Denotes PTGI instrument development
Posttraumatic Growth

*Operation Enduring Freedom and Operation Iraqi Freedom mean PTG scores*

Mean PTG scores for Operation Enduring Freedom (*M* = 66.6, *SD* = 24.0) and Operation Iraqi Freedom (*M* = 61.9, *SD* = 24.2) were analyzed (see Figure 16). A two-sample *t*-test was conducted to evaluate whether the mean PTG scores of OEF and OIF were significantly different. The two-sample *t*-test revealed no significant difference in mean PTG scores between OEF and OIF amputees, *t*(34) = -.36, *p* = .72. The result of the *t*-test was not significant indicating one would fail to reject the null hypothesis that there are no differences between the two groups of OEF and OIF amputees (See Figure 16). Thus, OEF and OIF participant data were pooled and analyzed together (See Figure 17). Mean PTG scores for male and female participants were almost identical. PTG male (*n* = 36) *M* = 62.4 (*SD* = 24.7); and female (*n* = 3) *M* = 62.0 (*SD* = 14.9).
Figure 16. Distributions of PTG scores among OIF and OEF amputee study participants.
Rumination

The Rumination Inventory (Calhoun et al., 2000) can be divided into two groups of rumination items (i.e., soon after the event and within the past 2 weeks). The rumination scores in this study ($n = 39$) for then or soon after the event, $M = 19.6$, $SD = 4.6$; and now or within the past two weeks, $M = 18.3$, $SD = 4.4$. The mean total Rumination Inventory score was 37.9 and standard deviation was 8.5 in this study (See Figure 18).
Figure 18. Histogram of rumination mean scores with a superimposed approximation of the normal curve.

Social Support

The independent variable, postdeployment social support, was measured by the Deployment Risk and Resilience Inventory (DDRI; King et al., 2003) Post-Deployment Support survey. The mean social support among OEF and OIF amputees in this study was 59.1 with a standard deviation of 6.9 (see Figure 19).
A summary of the means found in this study for predictor or independent variables (social support, rumination and time) and outcome or dependent variable (PTG) are outlined in Table 7. The relationships between and among the variables among OEF and OIF amputees were explored further using ANOVA and linear regression.
Comparisons between this sample and PTG reports in the literature provide a mechanism to evaluate PTG in samples from a variety of populations.

Table 7

Means and Standard Deviations for Dependent and Independent Variables (n = 39)

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>(SD)</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Posttraumatic Growth</td>
<td>62.4</td>
<td>(23.9)</td>
<td>0</td>
<td>105</td>
</tr>
<tr>
<td>Social Support</td>
<td>59.1</td>
<td>(6.9)</td>
<td>15</td>
<td>75</td>
</tr>
<tr>
<td>Rumination</td>
<td>37.9</td>
<td>(8.5)</td>
<td>14</td>
<td>56</td>
</tr>
<tr>
<td>Months post amputation</td>
<td>37.5</td>
<td>(8.3)</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Correlation Results

Correlation coefficients were computed among three self-report scales (PTG, social support and rumination), and time since the combat amputation. The results of correlation analysis presented in Table 8 summarize the correlation matrix and reveal that only one of the four correlations, rumination with PTG, was statistically significant. Postdeployment social support and length of time since a combat-related amputation were not significantly correlated with PTG in this sample of OEF and OIF amputees.
Rumination was the only predictor variable that was significantly correlated with PTG. The correlation between the PTGI and Rumination Inventory was significant $r(37) = .48, \ p < .01$. "Cohen (1987) defines a small effect as a correlation coefficient, $r$, equal to 0.10; a moderate effect as $r = 0.30$; and a large effect as $r = 0.50$" (Munro, 2005, p. 242).
Table 8

*Correlation Matrix of Study Variables*

<table>
<thead>
<tr>
<th></th>
<th>PTG</th>
<th>Social Support</th>
<th>Rumination</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTG Pearson Correlation</td>
<td>1.00</td>
<td>.121</td>
<td>.481*</td>
<td>.056</td>
</tr>
<tr>
<td>p-value</td>
<td>.</td>
<td>.463</td>
<td>.002</td>
<td>.736</td>
</tr>
<tr>
<td>Social Support</td>
<td>.121</td>
<td>1.00</td>
<td>.131</td>
<td>-.034</td>
</tr>
<tr>
<td>p-value</td>
<td>.463</td>
<td>.</td>
<td>.425</td>
<td>.836</td>
</tr>
<tr>
<td>Rumination</td>
<td>.481*</td>
<td>.131</td>
<td>1.00</td>
<td>.051</td>
</tr>
<tr>
<td>p-value</td>
<td>.002</td>
<td>.425</td>
<td>.</td>
<td>.759</td>
</tr>
<tr>
<td>Time</td>
<td>.056</td>
<td>-.034</td>
<td>.051</td>
<td>1.00</td>
</tr>
<tr>
<td>p-value</td>
<td>.736</td>
<td>.836</td>
<td>.759</td>
<td>.</td>
</tr>
</tbody>
</table>

* Correlation is significant at the 0.01 level (2-tailed).

The correlation coefficient summarizes the linear relationship between two variables with a single value and is usually cited in research reports describing a correlation. A scatterplot provides a rich explanation of the correlation data in the form of a pictorial description of the relationship. A scatter plot of the relationship between rumination and posttraumatic growth demonstrates a linear relationship (See Figure 20).
Figure 20. Scatter plot of rumination and PTG depicting the .48 correlation coefficient.

The correlations for this study may be summarized using the proposed model for PTG in this study. Figure 21 illustrates the model with correlations obtained from the correlation matrix between the study variables.
Figure 21. Model of the proposed relationships among time since amputation, social support, and rumination with posttraumatic growth. ** Correlation is significant at the 0.01 level (2-tailed).

Posttraumatic growth by service component

A comparison of PTG, social support, rumination and age in 2007 among Active Duty, National Guard and Reserve study participants (see Table 9) reveals that Active Duty study participants had the lowest PTGI, social support, time since amputation, and
mean age in 2007. The National Guard study participants had the highest PTG, rumination, and time since amputation mean scores; and Reserves had the highest social support and age mean scores.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Active Duty</th>
<th>National Guard</th>
<th>Reserve</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTG</td>
<td>54.8 (23.9)</td>
<td>74.5 (15.9)</td>
<td>71.2 (26.7)</td>
</tr>
<tr>
<td>Social Support</td>
<td>58.7 (7.9)</td>
<td>58.8 (6.3)</td>
<td>61.2 (2.1)</td>
</tr>
<tr>
<td>Rumination</td>
<td>36.7 (7.4)</td>
<td>43.1 (6.2)</td>
<td>33.3 (12.3)</td>
</tr>
<tr>
<td>Time since amputation</td>
<td>36.2 (8.5)</td>
<td>41.2 (8.4)</td>
<td>36.5 (6.2)</td>
</tr>
<tr>
<td>Age in 2007</td>
<td>31.4 (7.2)</td>
<td>32.4 (6.7)</td>
<td>33.2 (5.9)</td>
</tr>
</tbody>
</table>

A one-way ANOVA with three between-subjects factors (Active Duty, National Guard and Reserve) conducted revealed the relationship between PTG and military component prior to injury (see Figure 22). The one-way ANOVA, $F(2,36) = 3.18$, $p = .05$. The strength of the relationship as assessed by The $\eta^2$ (labeled Partial Eta Squared in
the output) of .15 indicates a medium relationship of PTG with the component of service prior to the injury, accounting for approximately 15 percent of the variance of the dependent variable, PTG (Green & Salkind, 2005). Follow-up tests were conducted to evaluate pair-wise differences among the means or contrasts. The test of homogeneity of variance was nonsignificant, $p = .42$. This tests the null hypothesis that the error variance of the dependent variable, PTG, is equal across groups. Due to the small sample size of the three groups, the result of the homogeneity test does not infer that there are no differences in the population variances. Therefore, the Dunnett’s C test, which is a multiple comparison procedure that does not require the population variances to be equal, was used (Green & Salkind, 2005). Results of the post hoc comparisons using the Dunnett’s C test revealed a statistically significant difference at the .05 level in the means between Active Duty and National Guard; however, no statistical difference was found between the means of Active Duty and Reserve, nor between the means of National Guard and Reserve.
Military component prior to deployment

Figure 22. Distributions of mean PTG scores for Active Duty, National Guard and Reserve.

Regression Analysis

Multiple regression analysis, a statistical method for studying the relationship between a dependent variable and two or more independent variables, was used in this study in an exploratory fashion to identify if the length of time following an amputation, rumination and social support were associated with PTG. In order to use multiple regression analysis to test hypotheses statistically, the following assumptions must be met.
Assumption one: Linearity

The relationship between an independent variable, $X$, and the dependent variable, $Y$, is linear when all other independent variables are held constant (Shavelson, 1996). Consider the scatter plots of the independent variables for this study in Figure 23 where the residual sum of squares reflects the scatter of points about the regression line. While all points do not fall on the regression line; ideally, they should be scattered closely around the line. The regression assumption of linearity was met for this study.

Figure 23. Scatter plots of variables to demonstrate linearity.
Assumption two: Independence

In this study, each of the \( n = 39 \) participants represents a unique OEF or OIF amputee. The assumption of independence assumes that measures, such as the PTGI, were obtained independently. “The [outcome Y] scores for any particular subject are independent of the scores of all other subjects” (Shavelson, 1996, p. 536). The assumption for independence was met in this study.

Assumption three: Normality

“In the population, the scores on the dependent variable are normally distributed for each of the possible combinations of the levels of the X variables” (Shavelson, 1996, p. 536). The assumption was met in this study (see Figure 22).

Assumption four: Homoscedasticity or equal variance of errors

The fourth assumption of homoscedasticity is concerned with the variance of the dependent variable. “For every value of X, the distribution of Y scores must have approximately equal variability. This is called the assumption of homoscedasticity” (Munro, 2005, p. 260). There is no apparent pattern to the scatterplot (see Figure 24) that would indicate that the assumption of homoscedasticity was violated in this study.
Scatterplot

Dependent Variable: PTG

Figure 24. Normality, Homoscedasticity, and Linearity. Scatterplot suggest that all three assumptions have been met: residuals are symmetric about 0.

Study Results by Null Hypothesis

*Research hypothesis I*

H0: There is no relationship between social support, rumination, and length of time following a combat-related amputation to posttraumatic growth among OEF and OIF amputees.
A multiple regression analysis using a *one set of predictors* method was conducted to evaluate how well the independent variables social support, rumination and length of time following the combat-related amputation predicted PTG. The linear combination of social support, rumination and time post amputation was significantly related to PTG, $F(3,35) = 3.59, p < .05$. Thus, the null hypothesis is rejected. $R^2 = .235$ indicating that approximately 24 percent of the variance of PTG in this sample of OEF/OIF amputees can be accounted for by the linear combination of social support, rumination, and time post amputation.

*Research hypothesis II*

H02: There is no relationship between the length of time following a combat-related amputation and social support among OEF and OIF amputees.

H02: $F(1,37) = .04, p = .836$. There is no evidence to reject the null hypothesis. No statistically significant influence of time following a combat-related amputation and social support was found in this sample.

*Research hypothesis III*

H03: There is no relationship between the length of time following a combat-related amputation and rumination among OEF and OIF amputees.
H0: $F (1, 37) = .096, p = .759$. There is no evidence to reject the null hypothesis. No statistically significant influence of time following a combat-related amputation and rumination was found in this sample.
Research hypothesis IV

H04: There is no relationship between social support and rumination among OEF and OIF amputees.

H04: $F(1,37) = .651, p = .425$. There is no evidence to reject the null hypothesis. No statistically significant influence between social support and rumination was found in this sample of OEF and OIF amputees.

Regression controlling for time, age and prosthetic satisfaction

A regression analysis conducted to assess how well social support and rumination predict PTG, controlling for time post amputation, age, and prosthetic satisfaction. The sets of predictors were ordered such that time, age and prosthetic satisfaction were entered first in the equation (Model 1); next, social support and rumination were added to these initial predictors (Model 2) to assess how well Model 2 predicted PTG over and above time, age and prosthetic satisfaction. In Model 1 (time, age, prosthetic satisfaction), $R^2 = .08, F(3,35) = .95, p = .43$. Model 2 (social support and rumination), $R^2 = .50, F(5,33) = 2.17, p = .08$. The $R^2$ change = .17, $F(2,33) = 3.77, p < .05$. Thus, social support and rumination accounted for a significant proportion of the PTG variance after controlling for the effects of time, age and prosthetic satisfaction.

Regression prediction equation
A prediction equation for variables social support, rumination, time following amputation, age, sex and prosthetic satisfaction was examined (see Table 10). The algebraic expression takes the following form:

\[ \hat{Y}_{PTG} = 29.87 + 0.09_{Social\ Support} + 1.13_{Rumination} + 0.18_{Time} - 0.34_{Age} - 3.50_{Prosthetic\ Satisfaction} - 3.69_{Sex} \]
Table 10

Results for Multiple Regression Prediction Equation $F(6,32) = 2.13, p=.08$

<table>
<thead>
<tr>
<th>Estimated Regression Coefficient</th>
<th>Standard Error</th>
<th>t</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>29.867</td>
<td>.64</td>
<td>.527</td>
</tr>
<tr>
<td>Social Support</td>
<td>.091</td>
<td>.16</td>
<td>.871</td>
</tr>
<tr>
<td>Rumination</td>
<td>1.132</td>
<td>2.44</td>
<td>.020</td>
</tr>
<tr>
<td>Time post amputation</td>
<td>.184</td>
<td>.41</td>
<td>.686</td>
</tr>
<tr>
<td>Age</td>
<td>-.340</td>
<td>-.60</td>
<td>.556</td>
</tr>
<tr>
<td>Pros. Sat.</td>
<td>-3.497</td>
<td>1.38</td>
<td>.177</td>
</tr>
<tr>
<td>Sex</td>
<td>-3.692</td>
<td>-.27</td>
<td>.787</td>
</tr>
</tbody>
</table>

Comparison of PTGI between two PTG studies

Cobb, Tedeschi, Calhoun, & Cann (2006) surveyed 60 women who met the criteria of intimate partner violence and found there was not a significant relationship between depressive symptoms and PTG. The domain of appreciation of life was related to severity of abuse; women who had left the abusive relationship had higher levels of PTG vs. those still in an abusive relationship. The PTGI and PTGI factors means found in Cobb et al. (2006) and this study are comparable (see Table 11).
### Table 11

*Comparison of Two Studies Examining PTG: Means and Standard Deviations for the Total PTGI Scale and PTGI Subscales*

<table>
<thead>
<tr>
<th>PTGI Factors</th>
<th>Possible range</th>
<th>Benetato (2007)</th>
<th>(SD)</th>
<th>Cobb et al. (2006)</th>
<th>n = 39</th>
<th>Intimate partner violence survivors</th>
<th>n = 60</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relating to others</td>
<td>0-35</td>
<td>18.6 (9.2)</td>
<td></td>
<td>21.7 (9.1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Possibilities</td>
<td>0-25</td>
<td>16.6 (6.3)</td>
<td></td>
<td>16.6 (6.8)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personal Strength</td>
<td>0-20</td>
<td>12.1 (5.7)</td>
<td></td>
<td>12.3 (5.6)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spiritual Change</td>
<td>0-10</td>
<td>4.4 (3.8)</td>
<td></td>
<td>6.4 (3.5)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Appreciation of Life</td>
<td>0-15</td>
<td>10.7 (4.1)</td>
<td></td>
<td>11.2 (3.9)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total PTGI Score</td>
<td>0-105</td>
<td>62.4 (23.9)</td>
<td></td>
<td>68.1 (24.95)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Summary

The purpose of this study was to examine the relationships of time following a combat-related amputation, rumination and social support with posttraumatic growth among VA’s newest group of combat veterans from Operation Enduring Freedom and Operation Iraqi Freedom. One way to improve health care to combat-injured veterans is to explore factors that may correlate to a positive outcome, such as posttraumatic growth. This descriptive correlational study provides an important first step in generating knowledge about the OEF and OIF amputee. This chapter presented the results from the analysis of data obtained from a nation-wide mailed survey among OEF and OIF amputees \((n = 39)\). Chapter 5 will provide a discussion of the data and will include study limitations and recommendations.
CHAPTER V
Discussion

Introduction

The goal of this research study was to explore the relationships among the length of time following a combat-related amputation, social support and rumination with PTG among OEF and OIF veterans. A long-term goal of this study is to use knowledge derived from the data to develop and test nursing interventions that facilitate PTG after a traumatic amputation or other severe battle injury. The findings of this study are important because OEF and OIF veterans are among VA’s top priorities, and this nursing study is at the forefront of research among these combat-injured veterans.

Response rate

Research participants were OEF and OIF amputees registered at Department of Veterans Affairs. After IRB approval from the Catholic University of America and the Washington, DC VA Medical Center, 210 potential research participants were identified for the study which utilized a mailed survey methodology. A strength of this study include its national scope as evidenced by the number of states from which veterans \( n = 39 \) returned a signed informed consent form and completed research survey. Of the 210 surveys that were mailed, five were returned undeliverable, and two surveys were returned but were rejected due to exclusion criteria.
The response rate was 19 percent during a collection period of four months from April – July, 2007. According to Galea and Tracy (2007), participation rates for epidemiologic studies have been declining over the past 30 years and even steeper declines have been seen in recent years in not only epidemiologic studies, but also in studies conducted by academic researchers, governmental agencies, and by for-profit companies. Furthermore, a review by Galea and Tracy (2007) revealed that many peer-reviewed studies published in ten “high-impact” journals failed to report information on study participation. Four reasons cited by the authors for the decline in participation in research studies included the proliferation of research studies in the past twenty years resulting in an increased number of requests to potential subjects to participate in research. A second factor, according to Galea and Tracy (2007), is a general decrease in volunteerism in the U.S. and in other western countries and this trend influences and has been found to have an impact on one’s willingness to participate in research studies. A third reason potential subjects might refuse to participate in a study is related to how important one sees the study in relationship to one’s life. Included in this need for “personal salience” is the fear of being “experimented on” and “disillusionment with science worldwide” (Galea & Tracy, 2007 p. 645). The fourth reason noted for a general decline in study participation rates is the increasingly invasive demand on subjects to participate in “survey assessment, biologic sampling, requests for long-term follow-up,
and “lengthy consent forms written at inappropriately high reading levels”.... and that in some cases, “a signature before the start of a survey reduced the response rate” (Galea & Tracy, 2007, p. 646).

In this study, the Washington, DC VA Medical Center IRB stipulated that the OEF/OIF amputee veteran could be contacted only twice related to the research study. Thus, the Dillman method, which incorporates four contacts by first class mail with an additional contact by telephone to increase the response rate for self-report survey data collection, could not be utilized in this study. Instead, a survey packet was mailed to 210 identified OEF/OIF amputees who met inclusion criteria. Potential participants who did not respond after two weeks were mailed a second full packet with a request to participate in the research study.

Some reasons for the 19 percent response rate in this study include veteran survey fatigue, as described above, as invitations to participate in research studies targeting this veteran cohort multiply. Another possible reason for this study’s response rate includes the severity of the injury and long recovery period; as a result, the veteran or family members might not wish to reveal sensitive or personal feelings at this time. One amputee participant contacted the PI about another VA-related issue and during the course of the conversation he was asked why amputees may not be responding to the survey. His response was, “The questions were pretty tough to answer, especially the
ones about the amputation.” He did not, however, feel the questions caused any psychological distress. Other reasons for this study’s response rate might include the veteran’s distrust of VA or the feeling that a student research project did not warrant the time.

**Marital status**

Over half of this study sample was married (56.4%), followed by divorced (20.5%), single/never married (17.9%), separated (2.6%), and single/living with partner (2.6%). This study provides baseline data for future comparison of marital status found in the OEF and OIF amputee. While the data in this study cannot be generalized to the population of OEF and OIF amputees, a comparison to Vietnam War amputees and a large group of returning OEF and OIF veterans provides insight to marital status in the injured and returning combat veteran. In a long-term follow-up of unilateral transfemoral amputees from the Vietnam War, 65.2 percent had been married an average of 23.1 years; 30.2 percent were or had been divorced, and 6.5 percent had never been married (Dougherty, 2003). In a descriptive analysis of the timing of mental health diagnoses among 103,788 OEF and OIF veterans who were new users of VA health care, marital status was reported as never married (47%); married (43%); divorce (10%); and separated or widowed (1%) (Seal, Bertenthal, Miner, Sen, & Marmar, 2007). Milliken, Auchterlonie, & Hoge (2007) found in a sample of 88,235 soldiers returning from Iraq,
the marriage rate was 58.2 percent. The authors did not report other marital status figures; however they did note a four-fold increase in concerns about interpersonal conflict between the two assessments six months apart. This finding “highlights the potential impact of this war on family relationships and mirrors findings from prior wars” (Milliken et al, 2007, p. 2146).

Length of Time Since the Amputation

Time was not significantly correlated with the dependent variable, PTG, nor did time significantly correlate with the independent variables of social support or rumination. The range of time post amputation found among respondents in this study was 18 to 52 months (1 year 6 months - 4 years 3 months). Rybarczyk, Nicholas, & Nyenhuis (1997) note that although coping with an amputation and the length of time since the amputation would seem to be important, this popular wisdom was not supported by their research. On the other hand, Horgan and MacLachlan (2004) in a literature review state, “When an effect of time since amputation has been found, the findings have indicated that increased time since amputation is associated with a more favourable outcome” (p. 841). There does not seem to be a consensus in the amputation literature of the benefit of time since amputation on psychological adjustment.

Sears, Stanton, and Danoff-Burg (2003) studied 101 early-stage breast cancer patients at 12 months and found a longer time interval from diagnosis predicted higher
levels of PTG. Furthermore, Manne et al. (2004) found that PTG significantly increased over a period of 18 months in breast cancer patients and their partners ($t = 1.93, p = .055$).

In a review of multiple studies examining the relationship between PTG and the amount of time elapsed since the onset of the stressor, Stanton, Bower and Low (2006) conclude “...the relationship between PTG and time since diagnosis may be stronger in the one to two years following diagnosis and treatment than after several years of survivorship” (p. 159). Research reports (Stanton et al., 2006; Calhoun & Tedeschi, 2006; Mann et al, 2004) support the notion that time is an important factor related to PTG, and that further longitudinal research is needed to clarify the influence of time since the injury or diagnosis on the course of PTG. With further investigation in the OEF and OIF amputee, it is possible that time might play a role as a predictor of PTG.

Social Support

In the present study, social support did not significantly correlate with PTG, nor did social support correlate with rumination. There are several possible reasons for this negative finding or lack of relationship between social support and PTG. One explanation stems from participation bias and self-selection found in this study. Secondly, due to the low power of this study, a type II error may be present and statistical significance may actually be present. Finally, there could be "truth in nature" leading to the conclusion that
social support and PTG are not related, despite conventional wisdom and the evidence found in the Posttraumatic Growth Model (Tedeschi & Calhoun, 2006).

Sheikh (2004) found satisfaction with sources of social support was not a significant linear predictor of PTG. Regarding the lack of significance between social support and PTG, Sheikh (2004) notes, “One interpretation is that the most important aspect of social support in relation to posttraumatic growth may actually be the opportunity for cognitive processing of the traumatic event, rather than companionship and the availability of help” (p. 271). This explanation is a possible explanation for the lack of correlation found in the present study, too.

Calhoun and Tedeschi (2006) note social support from the cultural domain of the PTG model with scores from general measures of social support utilized in research studies have not supported a correlation with PTG. Furthermore, proximate cultural influences may provide a more direct approach for evaluating how the process of PTG occurs. The quality and the responses of those to whom the individual shares self-disclosure are also important to the person’s “posttraumatic journey” (p. 12).

The Postdeployment Social Support scale (King et al., 2003), developed with Gulf War I veterans, is an instrument appropriate for use prior to and after contemporary military deployments. The Post-deployment Social Support scale (King et al., 2003) measures the degree to which family, friends, coworkers, employers, and community
provide emotional sustenance and instrumental assistance. However, social support, as measured by this instrument, may not capture the proximate cultural influences that lead to PTG. Calhoun and Tedeschi (2006) note, “Our current thinking about the relationship of growth to social factors is more specific, suggesting that certain types of responses, including supportive ones, to certain kinds of behaviors on the part of the person in crisis, will have a relationship with the degree of growth reported” (p. 14).

In this study, the correlation between social support and rumination was weak and not significant, $r (37) = .13, p = .43$. Questions from the Postdeployment Social Support (King et al., 2003) scale included statements such as *The American people made me feel at home when I returned*, or *My friends or relatives would lend me money if I needed it.* These statements might not capture the essence of social support that leads to rumination about the injury or amputation. It was encouraging to note that postdeployment social support perceived by the amputee respondents did not drop dramatically between those at either range of postamputation time because social support, regardless of its correlation to PTG or rumination, is important for the injured veteran. The medium to high levels of social support found in this study are important for long-term physical and psychological adjustment and are considered a positive finding, despite its lack of correlation with rumination and PTG. The veteran-focused Postdeployment Social Support (King et al.,
2003) scale used in this study provides a basis for comparisons of social support in future research studies among OEF and OIF veterans.

Rumination

The rumination scores in the present study for soon after the event (then), $M = 19.6$, $SD = 4.6$, and within the past two weeks (now), $M = 18.3$, $SD = 4.4$ are similar to those found in a report of 54 students who experienced multiple trauma and had rumination scores soon after the event (then), $M = 20.7$, $SD = 4.5$, and within the past two weeks (now), $M = 14.0$, $SD = 5.6$ (Calhoun et al., 2000). Rumination was found to be significantly correlated with PTG, $r (37) = .48$, $p < 0.01$; this study’s medium to large correlation coefficient is congruent with a previous report by Calhoun and colleagues (2000) that also found a correlation between rumination and PTG. Furthermore, in the present study, rumination was found to account for 23 percent of the variance in PTG through the linear model. This study supports the use of the Rumination Inventory (Calhoun, et al., 2000) in future studies examining PTG and rumination.

Calhoun and Tedeschi (2006) continue to reinforce the definition of rumination as …“to turn over in the mind, repeated thinking that is not necessarily intrusive and that includes reminiscing, problem solving, trying to make sense (Martin & Tesser, 1996) and perhaps searching for how the struggle has changed one in positive ways” (p. 9). This definition is valuable because it forms the basis of developing nursing interventions that
focus on fostering growth following trauma. The correlation between rumination and PTG in this study reinforces that nurses, by listening to our patient’s stories and helping them find meaning, can play a vital role in facilitating a holistic approach to healing for patients as they work through a traumatic event.

Posttraumatic Growth

Posttraumatic growth includes the possibilities for growth from the struggle after a traumatic event. PTG is measured by the Posttraumatic Growth Inventory (PTGI; Tedeschi and Calhoun, 1996) with a range of scores from 0 to 105, and includes five domains: personal strength, new possibilities, relating to others, appreciation of life, and spiritual change. The present study found PTG, $M = 62.4$, $SD = 23.9$ in the sample of ($n = 39$) OEF/OIF amputees. Calhoun and Tedeschi (2006) caution against taking a single score on a scale ... “Although such processes might be useful for the understanding of aggregate data, the use of a specific score does not seem a useful avenue to pursue when trying to understand the experience of individual persons” (p. 15). Calhoun and Tedeschi promote the use of quantitative studies because of their value in testing specific predictions and relationships. They encourage the use of cross-sectional methods for variables or relationships that have not been previously studied and longitudinal designs to identify and confirm antecedents and predictors of PTG. Calhoun and Tedeschi (2006) ... “see great potential for studies that utilize both qualitative and quantitative methods in
the same investigation” (p. 17). While the PTGI mean score of 62 in this study compared “favorably” with other research PTGI means (Grubagh & Resick, 2007; Morris et al., 2005; Sears et al., 2003; Tedeschi and Calhoun, 1996), this study would have been strengthened by the addition of a qualitative component.

For instance, in the PTGI (Tedeschi and Calhoun, 1996), question 10, *I know better that I can handle difficulties*; two respondents wrote in, “Already knew.” In question 4, *I have a greater feeling of self-reliance*, a participant wrote in, “Always have.” In question 20, *I learned a great deal about how wonderful people are*, an amputee wrote in “My wife.” These brief remarks were appreciated and the addition of a qualitative section would have expanded the understanding of PTG in the OEF/OIF amputee sample.

**PTG by service component**

According to Mangelsdorff (1999), the total force policy was implemented in 1973 from which the Active, National Guard, and Reserve forces were integrated into one force. “The Army Reserve is a federal force under direct Army control, whereas the National Guard reports to state governors for civil operations and to the Army for military operations...Soldiers may enter the reserves with no previous military service or after leaving active service” (Mangelsdorff, 1999, p. 715). The extent of prior military history and length of time in the Army Reserve, National Guard or Active Duty was not
assessed in this study. Furthermore, no assessment was made regarding unit cohesion or morale prior to deployment among Active Duty, Reserve, and National Guard.

In the sample of OEF/OIF amputees, a difference in mean PTG scores were noted among Active Duty, National Guard, and Army Reserve; however, only the difference between Active Duty and National Guard were statistically significant. The amount of time post amputation was greater among National Guard (n = 10), $M = 41.2$ months, $SD = 8.4$ vs. Active Duty (n = 23), $M = 36.2$ months, $SD = 8.5$. The National Guard group reported higher rumination, $M = 43.1$, $SD = 6.2$ compared to Active Duty, $M = 36.7$, $SD = 7.4$. Among the three groups, the Army Reserve reported the highest social support; however, I found the comparison of National Guard to Active Duty showed the social support scores to be essentially the same, 58.8 and 58.7, respectively.

What are some possible reasons for the higher PTG scores among the National Guard cohort in this sample? In the PTG conceptual model (Calhoun and Tedeschi, 2006), rumination is a precursor to PTG; thus, it follows that the higher report of rumination found among the National Guard would lead to the higher reported PTG scores in this study. Of interest, the time post amputation was higher in the National Guard group. While time post amputation was not correlated with PTG in this study, an increase in time from a diagnosis or injury upon PTG has been reported in the literature (Manne et al., 2004; Sears, Stanton, & Danoff-Burg, 2003). Social support mean scores
were essentially the same between Active Duty and National Guard, and, thus, social support is not considered a factor in the difference in PTG found between Active Duty and National Guard groups.

In general, National Guard members are posted in their community and train one weekend a month and two weeks a year. If seriously injured in combat, after treatment and rehabilitation, National Guard members would return to their community where their National Guard post, family, and employer are most likely located. This ability to return or be near one’s unit leads to what is known as unit cohesion. In this study, one National Guard respondent reported remaining in the National Guard after the amputation; whereas, none of the Active Duty reported remaining in the Army or Marines after the amputation. The base where one is stationed during Active Duty is not necessarily near one’s community; thus, when an injured Active Duty soldier completes treatment and rehabilitation and is discharged, the unit’s base may be in another state and there may not be the same level of support due to distance between the retired injured soldier and his or her unit. Upon returning to his or her community, National Guard personnel are more likely to have a familiar network of support. According to Mangelsdorff (1999), factors that reservists report for staying in the military are the military training lifestyle, friends, and colleagues. While social support was not significantly related to PTG in this study,
the type of social support found within one’s military unit is not captured in the social support inventory used in this study.

Another reason that PTG may be highest among this study’s National Guard respondents is related to employment after the battle-injury and amputation. An assumption is that Active Duty Soldiers would remain in the military until retirement or until some later date determined by the Soldier. For the Active Duty amputee, the injury and resulting amputation is a “career stopper” and one must contemplate a new career with physical limitations. Meanwhile, for the National Guard Soldier a civilian career, often with seniority, may still be a possibility.

Limitations

The findings of this study should be interpreted taking into account several limitations. The cross-sectional research design does not allow one to detect, temporal direction, or changes in PTG over time, and the design does not clarify the relationships between predictors and outcomes. Longitudinal research is needed to clarify causal roles independent variables may have on PTG. In a discussion of studies of the relationship between PTG and PTSD utilizing cross-sectional study designs, Stasko and Ickovics (2007) posit that study participants may create pretrauma self-images that are negatively weighted. When compared to the pretrauma self image, one can see improvement in their current life situation; thus, there is reinforcement that the traumatic event served a
purpose. The use of a secondary observer (i.e., family member or acquaintance) to validate the reliability of a respondent’s reported posttraumatic growth is one possibility of gaining insight into PTG since true pre-exposure assessments (e.g., mental health prior to the traumatic event) aren’t usually carried out before data collection.

This study included OEF and OIF veterans registered at VA and included in VA’s Roster of Recent War Veterans. The sampling frame, the list from which a sample is drawn (Dillman, 2007), for this study was based on a list generated by matching VA’s DoD Roster of Recent War Veterans with VA’s inpatient and outpatient files during March, 2007. Prior to matching the files, VA’s inpatient and outpatient files were accessed and matched with amputation-related ICD-9 codes. Every effort was made to obtain an accurate list of all known VA OEF and OIF veterans with a major amputation; however, the composition of the sampling frame ($n = 415$) was not entirely accurate due to ICD-9 code mis-classification and other reasons. After chart reviews, 210 OEF and OIF amputee veterans met inclusion criteria; each of the ($n = 210$) amputees had an equal chance of being in the study. As with all survey methodology, a limitation is that participant data are self-reported. Attempts to minimize self-report bias in this study included providing clear instructions in the survey letter and on the questionnaires, and assuring participant confidentiality.
Another limitation of the study was the low response rate. Among the respondents to the study questionnaire, the potential for selection bias exists. The 39 respondents self-selected to complete the mailed survey and participants who volunteered to complete the survey may have different characteristics when compared to those (n = 164) who did not respond. If there were no selection bias, the estimated mean PTG from the sample (n = 39) could be generalized to the known VA OEF and OIF amputee population during the time of this study. This is based on the Central Limit Theorem, and the point estimate and confidence interval, as presented earlier in Chapter IV, whereby there is a 95 percent probability that the true OEF and OIF amputee population mean of PTG falls within the range of 55 to 70.
Recommendations

Rumination

Calhoun and Tedeschi (2006) note four dimensions that might be considered in future studies of the relationships between rumination and PTG that include: “(a) intrusive versus deliberate cognitions, (b) the valence [characterize or categorize specific emotions] of the cognitions, (c) the content of the cognitions, (d) and the frequency and timing of cognitions” (p. 17). Findings from this study, through the Rumination Inventory (Calhoun, Cann, Tedeschi and McMillan, 2000), support both deliberate and intrusive ruminations are correlated with PTG. A small set of qualitative questions targeting rumination or cognitive processing about the combat-related amputation could assess dimensions of rumination described above.

In this survey study, there was no personal contact with the research participants; therefore, persuasively written material and strategies were critical. While the letter to potential participants enclosed with survey packet was carefully composed, review by an expert panel or group of OEF or OIF participants would have been beneficial. Due to the known problems of low response rates with survey methodology, a token of appreciation should have been given more consideration. Follow-up letters or cards have been shown to increase response rates; yet, the Washington, DC VA Medical Center IRB stipulated only two contacts with potential participants. In the future, the procedure section of the
proposal must include data, a rationale to support the Dillman (2007) tailored design method for increasing response in mailed survey methodology, and a more convincing argument for further contact with potential participants.

The addition of the following demographic questions could help clarify potential confounding variables related to PTG following a combat injury:

1. Length of time admitted to Walter Reed Army Medical Center or other military medical center for primary treatment of the injury.
2. Number of tours of OEF or OIF active duty tours prior to injury.
3. Length of present active duty and previous tours of active duty.
4. Length of time in the military prior to injury.
5. Assess loss of consciousness at the time of injury.
6. Number of skin breakdowns on the amputation stump or stumps.
7. Activity at the time of injury (i.e., traveling on foot, traveling in vehicle).

Summary

The sample mean of PTG among OEF and OIF amputees in this study was similar to PTG means in female survivors of intimate partner violence (Cobb et al, 2006); HIV/AIDS caregivers (Cadell, 2003); breast cancer patients (Sears, et al., 2003; Weiss, 2002; Weiss, 2004); and bone marrow transplant patients (Andrykowski et al., 2005; Widows, et al., 2005). It is possible that OEF and OIF amputees may continue, or begin,
to experience PTG with time. Thus, it is encouraging that levels of PTG, reported by participants in this study, did not decrease over time postamputation.

While the length of time postamputation and social support did not correlate with PTG in this study, the findings are still useful. OEF and OIF amputees reported levels of social support similar to Gulf War I veterans who were surveyed during the development of the DDRI Postdeployment Social Support scale.

Rumination, also known as cognitive processing, was moderately correlated with PTG in this study ($r = 48, p < .05$). This result supports the notion that rumination is a vital precursor of PTG as conceptualized in the PTG model (Calhoun & Tedeschi, 2006).

**Implications for nursing practice**

In the comprehensive model of PTG (Calhoun & Tedeschi, 2006), rumination is initially mostly automatic and intrusive; this initial cognitive processing is thought to reduce emotional distress and lead to the disengagement from prior life goals. In the next stage, rumination becomes more deliberate and a schema change and narrative development may foster the beginning of PTG. Rumination can take the form of writing, talking, journaling, or other forms of self-expression. Other clinical interventions might include encouraging patients to explore the meaning of the injury; for example, patients could consider writing or drawing about the traumatic event in a confidential journal.
During the acute phase of recovery and later in rehabilitation, nurses have the opportunity to assist patients, as Konrad (2006) suggests, by focusing on how the struggle with loss, rather than the loss itself, can be a catalyst for change. In an effort to normalize the traumatic experience, amputees could be encouraged to meet and talk with others who have had a similar experience. This contact with other amputees provides an opportunity to see how others find meaning in their amputation experience (Rybarczk et al., 1997). A practice recommendation for nurses working with combat-injured soldiers includes providing time for patients when they are ready to describe or recount their traumatic events and to assist them explore the change in their life goals.

Military nurses caring for wounded soldiers and nurses in the Department of Veterans Affairs who care for veterans returning from war know that the exposures of war include harsh living conditions, a persistently unsafe and often traumatic environment that may lead to posttraumatic stress disorder (PTSD). Nurses have the opportunity to be with the soldier during vulnerable times of acute illness and rehabilitation. During appropriate moments, nurses may consider helping the soldier or veteran consider changes that occurred in their life because of the war experience or battle injury. Furthermore, nurses may be able to assist the soldier explore meaning and to consider new life opportunities as a result of the injury.
Recommendations for future research

Recommendations for future studies include how to extend knowledge of the relationship between rumination and posttraumatic growth, and how to facilitate therapeutic rumination in the veteran following a traumatic event. This study provides directions for additional research and may provide pilot data for a future nursing study among OEF and OIF veterans with battle-injuries and posttraumatic growth.
Appendix A: Study Instrument
Veteran Amputation Health Study

The following questions are about you, your military service, and the injury that led to your amputation. Please mark the box with your response.

1. What is your branch of service?
   - Air Force
   - Army
   - Navy
   - Marine
   - Coast Guard

2. What was your military component prior to deployment?
   - Active Duty
   - National Guard
   - Reserve

3. What conflict were you serving in when you were injured?
   - Operation Iraqi Freedom (OIF)
   - Operation Enduring Freedom (OEF)

4. What is your gender?
   - Female
   - Male

5. What is your present education level?
   - Did not finish high school
   - High school/GED
   - Some college, no degree
   - Associate's degree
   - Bachelor's degree
   - Master's degree or higher

6. Date of birth:
   ______/______/______
   Month  Day  Year

7. Date of injury that resulted in your amputation:
   ______/______/______
   Month  Year

8. What is your rank?
   - Enlisted
   - Officer
   - Warrant Officer

9. What is your present military status?
   - Active Duty
   - National Guard
   - Reserve
   - Retired
   - Discharged

10. What is your race?
    - Black or African American
    - American Indian or Alaska Native
    - Asian
    - European American
    - Latino, Spanish, or Hispanic
    - White or Caucasian
    - Other race______________

11. What is your present marital status?
    - Married
    - Separated
    - Divorced
    - Widowed
    - Single, never married
    - Single, living with partner

12. What is your present employment status?
    (Check all that apply)
    - Full-time rehabilitation patient
    - Part-time rehabilitation patient
    - Full-time work
    - Part-time work
    - Unemployed, looking for work
    - Unemployed, not looking for work
    - Full-time Student
    - Part-time Student
13. Where is your amputation?  
(Check all that apply)  
☐ Left hand or arm  
☐ Left foot or leg  
☐ Right hand or arm  
☐ Right foot or leg  
☐ Other___________

14. To what extent would you agree or disagree with the following statement: “When I think about my amputation NOW, it is extremely traumatic for me.”  
☐ Strongly agree  
☐ Agree  
☐ Neither agree nor disagree  
☐ Somewhat disagree  
☐ Strongly disagree

15. Did you experience any permanent loss of hearing as a result of the injury that caused your amputation?  
☐ Yes  
☐ No

16. How many infections have you had at the amputation site(s)?  
☐ 0  
☐ 1-3  
☐ 4-6  
☐ 7-9  
☐ More than 10

17. To what extent do you agree or disagree with the following statement: “When I was FIRST injured, my amputation was extremely traumatic for me.”  
☐ Strongly agree  
☐ Agree  
☐ Neither agree nor disagree  
☐ Somewhat disagree  
☐ Strongly disagree

18. How satisfied are you with your prosthetic device(s)?  
☐ Extremely unsatisfied  
☐ Somewhat unsatisfied  
☐ Neither unsatisfied nor satisfied  
☐ Somewhat satisfied  
☐ Extremely satisfied  
☐ N/A

19. Did you experience any permanent loss of eyesight as a result of the injury that caused your amputation?  
☐ Yes  
☐ No

20. What hand did you write with pre-deployment?  
☐ Right  
☐ Left

21. I am able to read and understand this survey without assistance.  
☐ Yes  
☐ No
22. The next set of statements refers to your activity during the past two months. For each statement below, please indicate to the right the response that best fits the frequency of the activity. Circle Yes or No if you also did this before OEF or OIF, regardless of the frequency.

<table>
<thead>
<tr>
<th>During the past two months, I typically:</th>
<th>Daily</th>
<th>Two or more times a week</th>
<th>Once a week</th>
<th>Several times a month</th>
<th>Rarely or never</th>
<th>Before OEF/OIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Keep a journal or diary.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>2. Attend a church, synagogue, or other religious meetings.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>3. Spend time in private religious activities such as prayer, meditation, or Bible study.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>4. Correspond with friends or family via E-Mail.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>5. Correspond with friends or family via telephone or text message.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>6. Play a team sport.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>7. Have feelings that life is not worth living.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>8. Engage in a hobby or play board games (e.g., Monopoly) with others.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>9. Drink 3 or more alcoholic beverages in a row.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>10. Find enjoyment from time spent with a pet.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>11. Encourage or console another amputee.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>12. Drive a car or ride a motorcycle.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>13. Stay home or in-doors because of pain.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>14. Stay home or in-doors because of depression.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>15. Have pain that requires me to take an over-the-counter medication such as Tylenol or Advil.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>16. Use a prosthetic device.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>17. Have pain that requires me to take prescribed medications such as codeine or morphine.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
</tbody>
</table>
23. The following questions are about the changes that occurred in your life as a result of your combat-related amputation. Please circle the number to the right that best fits your opinion.

**As a result of my amputation,**

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

155
24. The next set of statements refers to social support after deployment. Please decide how much you agree or disagree with each statement and circle the number that best fits your choice.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly disagree</th>
<th>Somewhat disagree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The reception I received when I returned from my deployment made me feel appreciated for my efforts.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2. The American people made me feel at home when I returned.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3. When I returned, people made me feel proud to have served my country in the Armed Forces.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>4. I am carefully listened to and understood by family members or friends.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5. Among my friends or relatives, there is someone who makes me feel better when I am feeling down.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>6. I have problems that I can't discuss with family or friends.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>7. Among my friends or relatives, there is someone I go to when I need good advice.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>8. People at home just don't understand what I have been through while in the Armed Forces.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>9. There are people to whom I can talk about my deployment experiences.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>10. The people I work with respect the fact that I am a veteran.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>11. My supervisor understands when I need time off to take care of personal matters.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>12. My friends or relatives would lend me money if I needed it.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>13. My friends or relatives would help me move my belongings if I needed to.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>14. When I am unable to attend to daily chores, there is someone who will help me with these tasks.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>15. When I am ill, friends or family members will help out until I am well.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
25. The next set of statements compares the period of time soon after your injury and amputation to the last several weeks. Please consider each statement and circle the number that best fits your choice.

<table>
<thead>
<tr>
<th></th>
<th>Not at all</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Often</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Soon after my traumatic experience, I thought about the event when I didn't mean to.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Recently, I have thought about my traumatic experience when I didn't mean to.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Soon after the event, thoughts about the experience came into my mind and I could not get rid of them.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Recently, thoughts about the event came to my mind and I could not get rid of them.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>Soon after the event, I decided to think about the experience to try and make sense out of what happened.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>Recently, I decided to think about the experience to try and make sense out of what happened.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>Soon after the event, I tried to make something good come out of my struggle.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>8</td>
<td>Recently, I have tried to make something good come out of my struggle.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>9</td>
<td>Soon after the event, I reminded myself of some of the benefits that came from adjusting to the traumatic experience.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>10</td>
<td>Recently, I reminded myself of some of the benefits that came from adjusting to the traumatic experience.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>11</td>
<td>As a result of what happened, soon after the event I found myself automatically thinking about the purpose of my life.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>12</td>
<td>As a result of what happened, recently I find myself automatically thinking about the purpose of my life.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>13</td>
<td>As a result of what happened, soon after the event I deliberately would think about and ask questions about whether or not life has a meaning or purpose.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>14</td>
<td>As a result of what happened, recently I will deliberately think about and ask questions about whether or not life has a meaning or purpose.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>
Appendix B: VA Medical Center IRB Informed Consent Form

Subject Name: ___________________________ Date: __________
Title of Study: Veteran Amputation Health Study
Sponsor: None
Principal Investigator: Bonnie B. Benetato, RN, MSN VAMC: 688

PURPOSE

The purpose of this study is to explore aspects of recovery and healing following a combat-related amputation.

Military amputees are typically young, healthy and physically fit at the time of injury; thus, they have an optimistic prognosis that includes returning to physical activity and long-term survival. While soldiers may recover physically from a combat-related amputation, full recovery includes psychological healing. In order to better understand the various ways veterans recover after a combat-related amputation, this study will explore factors that may or may not influence psychological adaptation after an amputation. The results will ultimately be applied to the development of treatment strategies for veterans who have been injured in combat. The study population will include up to 450 Operation Iraqi Freedom (OIF) amputees and Operation Enduring Freedom (OEF) veterans. Veterans may be from any of the 50 states.

Bonnie Benetato, RN, the Principal Investigator for this study, is a nurse practitioner and is full-time staff at the War Related Illness and Injury Study Center (WRIISC) located in the Department of Veterans Affairs Medical Center (VAMC) in Washington, DC.

PROCEDURES

1. If you agree to take part in this research study, you will be asked to complete the enclosed questionnaire by mail. For those who complete the research questionnaire, the packet should be returned to the Department of Veterans Affairs in the postage-paid preaddressed envelope included with the questionnaire. You have the option to decline or refuse to answer any or all of the questions.
2. Other than completing the survey instrument, there will be no other direct involvement of veterans. The total time for completing the questionnaires is estimated to be 45 minutes.
3. Returned surveys will be briefly reviewed by Bonnie Benetato, RN for items regarding feelings, such as suicidal thoughts. If a safety risk is seen,
Bonnie Benetato, RN will contact you to offer assistance in obtaining a mental health consult at your local VA medical center.

4. After the safety risk assessment is completed, veteran’s identifying information will be removed from the survey packet to protect the privacy of responses to the questions. Each participant will be given a number that will identify his or her data file.

5. All information will be used for research purposes only, and all information will be kept private and confidential. The paper copies of the questionnaire will be stored without personal identifiers in a locked file cabinet located in a secured office space at the Washington, DC VAMC.

6. Following the completion of the study, paper copies of questionnaires will be shredded, and all electronic copies of the data with personal identifiers will be erased.

RISKS

This study involves only data collection through mail questionnaire with minimal risk to participants. However, participants will be answering questions about past and present experiences related to a combat-related amputation. This may bring up some sad memories or emotions. If this happens, and a participant would like to speak with Bonnie Benetato, RN, she will be available at [redacted] or [redacted] to speak with the participant. Additionally, Ms. Benetato, RN will be available to assist in obtaining a mental health clinic referral at the participant’s home VAMC, if needed.

BENEFITS

Taking part in this study may not personally help you at this time. However, an indirect benefit of participating in the study is helping to provide information needed to learn about the recovery following a combat amputation. Your participation may lead to knowledge that will help others.

OTHER TREATMENT AVAILABLE

This study does not involve a research treatment. The alternative is not to take part in the study.

PRIVACY & CONFIDENTIALITY

1. The Veterans Health Administration (VHA) of the Department of Veterans Affairs (VA) complies with the requirements of the Health Insurance Portability and Accountability Act of 1996 (HIPAA) and with its privacy regulations which, together with all other applicable laws, protects your privacy. The ways we do this are described in our “Notice of Privacy Practices.”
2. In order to do this research, Bonnie Benetato may need to read and use information about you that is kept in your medical record and other restricted files. When you sign this form, you will authorize the VHA to allow Bonnie Benetato to use the following information: Name, social security number, address, and telephone number.

3. If you do not sign this authorization, you cannot be part of the research study.

4. The authorization to use your information will last until the end of the research study.

5. You can revoke this authorization at any time. To do this, you can write to Bonnie Benetato, RN.

6. If you revoke the authorization, you cannot continue to be in the study. Bonnie Benetato, RN may use any information that has already been collected and combined with information from other participants. However, no new information will be collected.

7. If you revoke the authorization, you will continue to receive all of the medical care and benefits for which you are eligible.

8. Federal and local regulations may require review of your medical and research records by representatives of the Food and Drug Administration (FDA), the VA, and the Institutional Review Board (IRB) of this medical center.

9. The information disclosed does not include any identifiers or descriptive information.

10. There are no collaborating sites or coordinating research centers.

11. Your research data and records will not be available for your review until after the completion of the study.

12. Despite all of our efforts and all of these precautions, there is always a possibility that some of your information can be used or disclosed in a way that it will no longer be protected by the law. Please contact Bonnie Benetato, RN at [redacted] or [redacted] at the VA Medical Center at the Washington, DC VA Medical Center if you have any questions or concerns.

**RESEARCH RESULTS**

Bonnie Benetato, RN will maintain your privacy and the confidentiality of the research record and no information by which you can be identified will be
released unless required by law. Bonnie Benetato, RN will have possession of data including questionnaires. A member of Bonnie Benetato's dissertation committee and VA WRIISC staff member, Dr. Clare Mahan, will have access to them but they will be stored in a secure location for up to five years after completion of the study. At that time they will be destroyed. If the results of this study are reported in medical journals or at meetings, you will not be identified by any means without your specific consent.

SPECIAL INFORMATION

1. You are not required to take part in this study: your participation is entirely voluntary.

2. You can refuse to participate now or you can withdraw from the study at any time after giving your consent. This will not interfere with your regular medical treatment, if you are a patient.

3. There will be no costs to you for any of the testing done as part of this research study.

4. Eligibility for medical care is based upon the usual VA eligibility policy and is not guaranteed by participation in a research study.

5. The VAMC will provide necessary medical treatment if you are injured as a result of your participation in this study, unless you were injured because you did not follow the instructions that you were given.

6. Additional compensation may or may not be payable in the event of physical injury arising from this study under applicable federal law. Further information about compensation may be obtained from the medical administration service at this VA medical center.

7. If you have questions about your rights as a human research participant, you may contact the Director of Research, Dr. Marc Blackman, at [phone number] or the Chairman of the Human Studies Committee, Dr. James Finkelstein, at [phone number].

8. If you are a patient, a copy of this consent form will be placed in your medical record.
AFFIRMATION FROM SUBJECT

Bonnie Benetato, RN has explained the study to me and answered all of my questions. I have been told of risks or discomforts and possible benefits of the study.

I understand that I do not have to take part in this study, and my refusal to participate will involve no penalty or loss of rights to which I am entitled. I may withdraw from this study at any time without penalty or loss of VA or other benefits to which I am entitled.

The results of this study may be published, but my identity will not be revealed unless required by law.

In case there are medical problems or questions, I have been told I can call Bonnie Benetato, RN at [Contact Information] during the day; at other times I can call the hospital operator at [Contact Information] and ask for Bonnie Benetato, RN to be paged. If any medical problems occur in connection with this study, the VA will provide emergency care.

I understand the explanation of my rights as a research participant, and I voluntarily consent to participate in this study. I understand the explanation of what the study is about and how and why it is being done. I will keep a duplicate signed copy of this mailed consent form.

________________________________________
Veteran's Printed Name

________________________________________
Veteran's Address

________________________________________  ___________  ___________
Veteran's Signature               Date               Time
### Reliability Analysis for PTGI

**RELIABILITY ANALYSIS - SCALE (ALPHA)**

<table>
<thead>
<tr>
<th></th>
<th>PTGI</th>
<th>Q01</th>
<th>Mean</th>
<th>Std Dev</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PTGI</td>
<td>Q01</td>
<td>3.9231</td>
<td>1.3256</td>
<td>39.0</td>
</tr>
<tr>
<td>2</td>
<td>PTGI</td>
<td>Q02</td>
<td>3.5897</td>
<td>1.8023</td>
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<tr>
<td>3</td>
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</tr>
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</tr>
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<tr>
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</tr>
<tr>
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</tbody>
</table>

Statistics for Mean Variance Std Dev Variables
Scale 62.3590 571.8677 23.9138 21
Reliability Coefficients 21 items
Alpha = .9381 Standardized item alpha = .9378

163
### Reliability Analysis for DDRI Social Support Scale

Method 2 (covariance matrix) will be used for this analysis.

#### RELIABILITY ANALYSIS - SCALE (ALPHA)

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Std Dev</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>SS Q01</td>
<td>.3846</td>
<td>.9898</td>
</tr>
<tr>
<td>2.</td>
<td>SS Q02</td>
<td>4.5128</td>
<td>.9140</td>
</tr>
<tr>
<td>3.</td>
<td>SS Q03</td>
<td>4.4359</td>
<td>.9118</td>
</tr>
<tr>
<td>4.</td>
<td>SS Q04</td>
<td>3.9231</td>
<td>.8393</td>
</tr>
<tr>
<td>5.</td>
<td>SS Q05</td>
<td>4.3590</td>
<td>.9028</td>
</tr>
<tr>
<td>6.</td>
<td>SS Q06</td>
<td>2.6667</td>
<td>1.4018</td>
</tr>
<tr>
<td>7.</td>
<td>SS Q07</td>
<td>3.9744</td>
<td>1.1118</td>
</tr>
<tr>
<td>8.</td>
<td>SS Q08</td>
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<td>1.3138</td>
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<tr>
<td>9.</td>
<td>SS Q09</td>
<td>4.2051</td>
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<tr>
<td>10.</td>
<td>SS Q10</td>
<td>4.2308</td>
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<tr>
<td>11.</td>
<td>SS Q11</td>
<td>3.9744</td>
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<tr>
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<td>SS Q12</td>
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<tr>
<td>13.</td>
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<td>.5980</td>
</tr>
<tr>
<td>14.</td>
<td>SS Q14</td>
<td>3.5897</td>
<td>1.3902</td>
</tr>
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<td>15.</td>
<td>SS Q15</td>
<td>4.2564</td>
<td>.8801</td>
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</table>

**RELIABILITY ANALYSIS - SCALE (ALPHA)**

Statistics for Mean Variance Std Dev Variables
Scale 59.0769 47.0202 6.8571 15

Reliability Coefficients 15 items

Alpha = .6949 Standardized item alpha = .7262
Reliability for Rumination Inventory

Method 2 (covariance matrix) will be used for this analysis

<table>
<thead>
<tr>
<th>Statistics for Mean Variance Std Dev Variables Scale</th>
<th>Mean</th>
<th>Variance</th>
<th>Std Dev</th>
<th>Variables</th>
</tr>
</thead>
<tbody>
<tr>
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<td>2.7033</td>
<td>1.8205</td>
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<td>Item Variances</td>
<td>1.1526</td>
<td>.7018</td>
<td>1.5722</td>
<td>.8704</td>
</tr>
</tbody>
</table>

Reliability Coefficients 14 items

Alpha = .8351 Standardized item alpha = .8397

Appendix B: Map of Afghanistan

165
## Appendix D: SPSS Printout for Regression Equation

### Regression

#### Descriptive Statistics

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>N</th>
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<tbody>
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<td>39</td>
</tr>
<tr>
<td>Soc Sup</td>
<td>59.08</td>
<td>6.857</td>
<td>39</td>
</tr>
<tr>
<td>Rum</td>
<td>37.85</td>
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#### Correlations

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166
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Variables Entered/Removed

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a All requested variables entered.
b Dependent Variable: VAR00019

Model Summary

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a Predictors: (Constant), Pros Sat, Age, Time, Soc Sup, Rum

ANOVA

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a Predictors: (Constant), Pros Sat, Age, Time, Rum, Soc Sup  
b Dependent Variable: PTG

Coefficients

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a Dependent Variable: PTG
Bibliography

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