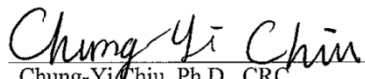
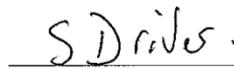
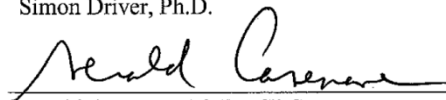


RESILIENCE PROFILE AMONG PEOPLE WITH SPINAL CORD INJURY: A CLUSTER
ANALYSIS

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DEDICATION

I would like to thank my wife, Kelly White, without which none of this would have been possible. Also, I would like to thank Dr. Chiu for her support and encouragement, Dr. Driver for continuing our research relationship and motivating me to be a good researcher and Dr. Casenave for his insight and wisdom in the fields of Psychology and Rehabilitation Counseling.

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by

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THESIS

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Abstract

BACKGROUND: Resilience is considered as an important coping attribute for people adjusting from trauma and loss such as spinal cord injury. Resilience has been found that it has moderate to high correlations with multiple psychosocial characters such as coping strategies, spiritual belief, and life satisfaction as well as mental health. However it is unclear if resilience could have developmental phases when people have adjusted to their trauma and distress over time, or if there are different types of resilience based on a person's psychosocial characters. Therefore the present study aimed to explore if there are some phases of resilience among people with spinal cord injury (SCI).

SUBJECTS: The 93 inpatients with SCI who were undergoing rehabilitation at Baylor Institute of Rehabilitation, Dallas, TX, 58 males (62.4%) and 35 females (37.6%), 77 Caucasians (82.8%) and other races (17.2%; i.e., African American, Hispanic), with mean age of the sample was 44.2 years ($SD = 16.2$), and the mean months since onset was 16.14 months ($SD = 62.12$).

METHODS: Patients completed the Connor-Davidson Resilience Scale, Personal Health Questionnaire-9, Satisfaction with Life Scale, Intrinsic Spirituality Scale at any time point since being hospitalized to discharge. Using SPSS 19.0, a hierarchical cluster analysis was performed to preliminarily explore optimal patterns of resilience based on the psychosocial evaluations. Further a two-step cluster was used as a post hoc test of cluster quality and predictor importance. ANOVA and chi-squared test were used to identify any differences of the above psychosocial components of resilience and related demographic characters between the identified patterns of resilience.

METHOD: Patients completed the Connor-Davidson Resilience Scale, Personal Health Questionnaire-9, Satisfaction with Life Scale, Intrinsic Spirituality Scale at any time point since being hospitalized to discharge. Using SPSS 19.0, a hierarchical cluster analysis was performed to preliminarily explore optimal patterns of resilience based on the psychosocial evaluations. Further a two-step cluster was used as a post hoc test of cluster quality and predictor importance. ANOVA and chi-squared test were used to identify any differences of the above psychosocial components of resilience and related demographic characters between the identified patterns of resilience.

RESULTS: A hierarchical cluster analysis found three clusters with appropriate differentiable dendrogram distance labeled Spontaneous Resilience (SR; $n=28$, 35.9%), Evolving Resilience (ER; $n=28$, 35.9%) and Rebounding Resilience (RR; $n=22$, 28.2%). Further using a two-step cluster analysis as a post hoc testing, the silhouette measure of cohesion and separation indicated that the cluster quality was fair (0.40). The predictor importance for the cluster formation showed spirituality had an importance of 1.00, the most important predictor, with depression and SWL each showing a predictor importance score of 0.46. The ANOVA found significant differences between groups on resilience, $F_{(2,75)} = 7.98, p < .001$; depression, $F_{(2, 75)} = 23.86, p < .000$; SWL, $F_{(2,75)} = 23.66, p < .000$; and spirituality, $F_{(2, 75)} = 71.62, p < .000$. Chi square test found no significant associations between the two resilience patterns of gender ($X^2_{(2, N=78)} = 1.997, p = 0.368$), and marital status ($X^2_{(8, N=78)} = 8.287, p = 0.406$). Race results were significant ($X^2_{(4, N=78)} = 9.559, p = 0.049$), but race was unable to be used due to the majority of participants being Caucasians.

DISCUSSION: The current study suggested that there are three resilience patterns recognized in this sample of people with SCI. The hierarchical cluster analysis clustered participants into three clusters: Spontaneous Resilience (SR), Evolving Resilience (ER) and Rebounding Resilience (RR), three of which reflect the levels of resilience change over time and differences in depression, SWL and spirituality. Rehabilitation professionals could apply the present findings on understanding the status of patients' resilience and design according adjustment psycho-educational therapy for growing patients' optimal resilience.

Keywords: resilience, coping, spinal cord injury, cluster analysis

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LIST OF ABBREVIATIONS

ADLs – Activities of Daily Living

AMA – American Medical Association

ASIA – American Spinal Injury Association

CDC – Center for Disease Control

ER – Evolving Resilience

FI – Functional Independence

FIM – Functional Independence Measure

ISS – Intrinsic Spirituality Scale

MVC – Motor Vehicle Collisions

NSCIA – National Spinal Cord Injury Association

NSCISC – National Spinal Cord Injury Statistics Center

PHQ-9 – Patient Health Questionnaire

RR – Rebounding Resilience

SCI – Spinal Cord Injury

SR – Spontaneous Resilience

SWL – Satisfaction with Life

SWLS – Satisfaction with Life Scale

CHAPTER ONE

Introduction

Some individuals seem to “bounce back” quicker and adapt when difficult events occur in their lives. Yet others seem to never quite make it back after the event occurs (Tugade & Fredrickson, 2004). Being able to adapt to these negative stressors does not indicate luck but is a demonstration of resilience. Resilience refers to an individual’s ability to deal with and overcome adversity or a traumatic event (White, Driver, & Warren, 2010), for example, a person living well with his spinal cord injury. According to White et al., it is considered a multidimensional variable with distinct psychological and dispositional attributes (e.g., such as competence, social support, spirituality, engagement of medical, insurance and law professionals). Such resilience would affect a person’s functional performance in his community, life satisfaction, and physical and mental health.

A spinal cord injury (SCI) is a disruption of the spinal cord that results in loss of sensation and mobility (American Medical Association, 2009). The two common types of SCI are traumatic (e.g., automobile accidents, gunshots, falls) and non-traumatic (e.g., polio, spina bifida, Friedreich's ataxia). A SCI can, and often does, change functional independence (FI) of an individual’s life for as long as they live (Martz, 2005).

Functional independence (FI) examines a person’s independence over a variety of abilities to perform activities of daily living (e.g., self care, sphincter control, mobility, locomotion) while undergoing rehabilitation (Kennedy, Lude, Elfstrom, & Smithson, 2011). Physical abilities may be lost depending on the characteristics of the SCI, inhibiting FI. The

most common measurement of FI for individuals with SCI has been the *Functional Independence Measure* (FIM) in both clinical and rehabilitation settings.

Also, psychosocial functioning may also influence or be influenced by FI. Examining the extreme impact of SCI on an individual, Bracken and Shepard (1980) indicated SCI as “one of the most extreme psychological insult of all forms of trauma” (p. 74).

In an analysis of multiple studies, depression might be one of the most studied psychological variables among persons with SCI (Elliott & Kennedy, 2004). Among the general population, major depression is a common and treatable mental disorder and yet, is considered to be one of the most costly and debilitating of mental health conditions across all populations in the United States (Catalano, Chan, Wilson, Chiu, & Muller, 2011; CDC, 2011). Among individuals with SCI, depression has been shown to be pervasive and have a negative correlation to satisfaction with life (SWL) and resilience (Catalano et al.; White et al., 2010).

A component of subjective well being is SWL (Diener, 1984). SWL is a common construct included in research among individuals with SCI (Chlan, Zebracki & Vogel, 2011; Ruff, Adamson, Ruff & Wang, 2007; Vogel, Klaas, Lubicky & Anderson, 1998, White et al., 2010). In the literature the construct of SWL has been measured using the *Satisfaction with Life Scale* (SWLS; Diener, Emmonds, Larsen, & Griffin, 1985). It has been one of the most widely used SWL measures in the study of individuals with SCI, largely because of its brevity (i.e., five items), psychometrics, and its inclusion as a standard measure in the National SCI Database. In summary, it is important to be able to positively adapt to, or bounce back from stress and negative events in our lives. Given the high number of SCI in the United States and the relationship of resilience, FI, depression and SWL, the current study examined the psychological

resilience of individuals with SCI, focusing on its subjective, emotional, psychological and physiological qualities. The primary purpose of the current study was to determine if different profiles of resilience among individuals with SCI undergoing rehabilitation could be identified. It was expected that individuals with SCI could be categorized by the similarity between their levels of both psychosocial and physical functioning and that clusters would differ in levels of resilience for these outcomes. It was hypothesized that a significant number of individuals with SCI would be categorized into at least two profiles, high and low. The second objective was to assess the strength of variables that characterized the individual's functioning in predicting the clusters or profiles. It was posited that profiles would differ significantly by the amount of FI, depression, and SWL.

CHAPTER TWO

Review of the Literature

Resilience

Resilience is a multidimensional dynamic system of cognitions, behaviors and biological factors operationalized as an outcome pattern of positive adaptation in the presence of a significant disruption event (e.g., tragedy, trauma, adversity, significant life stressors; Bonanno, Westphal, & Mancini, 2011; Cicchetti & Blender, 2006; Masten, 2007; Rutter, 2006, White et al., 2010). Resilience refers to the ability to bounce back from adversity, something everyone faces in their lives (Dyer & McGuinness, 1996). Findings from previous literature identified resilience as something that occurs within everyone to varying degrees and that operates from a system of basic human adaptation (Masten, 2001; Newman, 2005). According to Rutter (2006) the identification of resilience begins with the awareness that individual's responses varies in vast ways to the same disruptive events (e.g., reinventing one's self, getting back to normal, substance abuse, emotional pathology). Recognition of these variations may aid researchers in the discovery of resilience mechanisms (e.g., social support, satisfaction with life) and associate responses to the levels of resilience. This may perhaps have implications on preventative and recovery types of resilience interventions in the presence of traumatic injuries. As an example, Bonanno (2004) reported that positive emotion and laughter helped reduce stress and increase social support following a traumatic event. The implication was if the positive emotion and laughter reflected pre-morbid functioning, then resilience may have a positive impact on the individual's recovery.

Richardson (2002) presents a metatheory of resilience that synthesizes previous literature, presents a conceptual model, and provides practical applications for enhancing resilience. He describes his metatheory as a collection of theoretical ideas from physics (i.e., Einstein, Heisenberg, and Hawking), psychology (i.e., Bandura, Jung, Maslow, Moore, and Pert), and medicine (i.e., Ader, Felton, Cohen, and Gerber). Richardson's metatheory presents a historical discussion of resilience research outlining three distinct waves of study including (a) identification of resilient qualities (e.g., social support, perceived competence), (b) understanding the resiliency process (e.g., disruption and reintegrative behaviors), and (c) development of innate resilience (e.g., ability to modify resilience through training and experience). Each of these waves has built the body of knowledge about resilience and has helped define the direction for future research.

Richardson's model of resilience outlines a process that begins with a traumatic event which, serves as a primer for an individual to demonstrate resilience, and ends with one of four outcomes. The post traumatic event's outcomes include (a) resilient reintegration (e.g., accept limitations after a traumatic injury, but develop new interests and activities), (b) reintegration back to homeostasis (e.g., life activities return to previous state after a traumatic injury), (c) reintegration with loss (e.g., a marathon racer who can no longer walk due to a SCI redefines his marathon performance in a wheelchair), and (d) dysfunctional reintegration (e.g., depression, isolation, substance abuse post injury). The traumatic event marks the beginning of an imbalance to the individual's 'biopsychospiritual homeostasis'. Biopsychospiritual homeostasis occurred when a person was in balance physically, mentally, and spiritually (Richardson, 2002). Ideally individuals would pursue resilient reintegration or reintegration back to

biopsychospiritual homeostasis, but this is not always possible after some traumatic events (e.g., death of a loved one, traumatic injury). If an individual dysfunctionally reintegrates (e.g., does not set goals, does not have or use support systems) there is an increased likelihood that they will continue in a state of disruption as they have failed to demonstrate resilient qualities.

Consequently, it is critical to develop skills associated with resilience to help individuals successfully reintegrate after a traumatic event.

The development of resilience and its protective factors can help individuals avoid some (e.g., stress-related disorders), but not all trauma (e.g., death of loved one) caused by a traumatic event. Richardson (2002) postulates that one way to develop resilience is through resilience-based therapy (e.g., therapy to enhance social skills, family support, spirituality). Through the development of resilience individuals may then experience resilient reintegration or reintegration back to biopsychospiritual homeostasis. Another means of enhancing resilience is through educating individuals, such as children in schools, adults in continuing education, or people in a rehabilitation program (Richardson, 2002). The goal of these education programs would be to develop key resilience skills for individuals based on their specific context (e.g., bereavement, rehabilitation). By developing critical skills associated with resilience, individuals are more likely to deal with the traumatic event positively. Individuals will also have the tools required to protect themselves against future disruptions (Richardson, 2002). By developing resilience skills (e.g., social skills, self competence) through therapy or education, an individual's rehabilitation from a traumatic event may be enhanced as they will have a greater repertoire of resilience skills at their disposal to help them adapt (Richardson, 2002).

The systematic empirical study of resilience has been conducted over the past three decades (Cicchetti & Blender, 2006; Masten, 2007). Research of the resilience construct can be viewed in four historical waves (a) descriptive, (b) process of identifying correlates of resilience (e.g., depression, satisfaction with life, spirituality, social support), (c) direct testing of resilience (e.g., Connor-Davidson Resilience Scale), and (d) a multilevel-multidisciplinary approach (Masten, 2007). The latest direction for research included biological, psychosocial and environmental-contextual measurements which were considered critical to the advancement of resilience research (Cicchetti & Blender, 2006; Masten, 2007; Rutter, 2006). According to Cicchetti and Blender, this does not imply a reductionist view of resilience to simple biological processes. According to these researchers, the inclusion of biological and genetic components allowed the research to become an all-encompassing systems approach to understanding resilience. However, after three decades of studies on resilience, there is still a need for additional research on the topic to assist the rehabilitation community's understanding of why some people demonstrate higher levels of resilience than others and reintegrate more successfully after exposure to a traumatic event. Researchers working in the framework of *positive psychology* may suggest that resilience is largely responsible (Kortte, Gilbert, Gorman, & Wegener, 2010; Lohne, 2008; White, Driver, & Warren, 2008). Individuals with greater resilience could be expected to overcome a traumatic event (e.g., SCI) more successfully than individuals with low resilience (White et al., 2008). However, after a traumatic event, reconstructing a life with positive adaptation and social reintegration can be and frequently is a challenging process that is not always successful (Lustig, 2005). The goal of healthcare providers (e.g., doctors, counselors, therapists) during rehabilitation is to help individuals recover

to the highest level of independence and learn to cope with and adjust to their new lives (White et al.). According to White and colleagues, the study of resilience can benefit the field of rehabilitation and help in achieving these goals.

The psychosocial adaptation among people who have sustained traumatic and severe physical injuries, in particular SCI, has attracted growing attention. Most common among research today are efforts to examine psychological reactions in the aftermath of a traumatic injury (Livneh & Martz, 2005). According to Livneh and Martz, frequent research has been conducted among individuals with SCI on the constructs of hope, depression, subjective well-being, and the acceptance or internalization of the situation. Also, some kind of reorganization or adaptation occurs after SCI. These constructs have been shown to be related to resilience (Lohne, 2008; Lustig, 2005; White et al., 2010). According to White et al., when working with individuals with SCI, a significant modest correlation between resilience and depression ($r = -.35, p < .05$) satisfaction with life ($r = .54, p < .05$), and spirituality ($r = .35, p < .05$) existed. Also, with interventions (e.g., counseling, psychotropic medication, increased social support) these correlations became stronger during rehabilitation, that is, depression ($r = -.48, p < .05$), satisfaction with life ($r = .69, p < .05$), spirituality ($r = .56, p < .05$), which could contribute to the individual's positive adaptation (e.g., return to work, social reintegration, fewer reported physical and mental health problems after discharge; Kortte, et al., 2010; Luther & Cicchetti, 2000). In the American Psychology Association's "The Road to Resilience" program, Newman (2005) reported that there may be mental health benefits with increased resilience in individuals in a clinical rehabilitation setting due to a potential reduction of stress and anxiety. This could be especially true for individuals with SCI or other traumatic injuries.

Spinal Cord Injury

According to the NSCISC (2011), the annual incidence of SCI in the United States is approximately 12,000 new cases each year with an estimated 231,000 to 311,000 people living with SCI. Since 2005, the mean age has increased to 40.2 years old with over 80% of those injured each year being male. The breakdown of cause in order of frequency was (1) motor vehicle collision (MVC) (41%), (2) falls (27%), (3) violence (15%), (4) unknown/other (9%), and (5) sport and exercise (8%). The leading cause of SCI appears to vary by age. For those under age 65, MVC are the leading cause and for individuals age 65 and older, falls appear to be the leading cause.

Spinal cord injury is defined as a disruption of the spinal cord that results in loss of sensation and/or mobility (AMA, 2009). According to the CDC (2011), often SCI involves both skeletal and neurologic damage to some portion of the spine that requires extensive acute care, as well as comprehensive rehabilitation. These injuries were reported as devastating to individuals and families because it involves life-threatening complications and loss of FI (Nayduch, 2010).

According to AMA (2009) and CDC (2011), these injuries are categorized into two ways: traumatic (e.g., motor vehicle collision, gunshots, sports, falls) and non-traumatic (e.g., spinal tumor, infarct of the spinal cord, stenosis, transverse myelitis). They further define traumatic SCI into two diagnoses: tetraplegia and paraplegia. Tetraplegia was defined by a cervical injury resulting in paralysis of four limbs. This was more commonly known in the United States as quadriplegia. The second diagnosis was paraplegia which was defined as an injury to the thoracic, lumbar or sacral areas of the spine resulting in paralysis in two limbs. Either of these types of injuries was further defined by the level of which vertebrae(s) were involved and

severity (i.e., complete, incomplete, normal). The severity was usually defined by the ASIA Impairment Scale which identified the remaining sensory and motor functions ranging (i.e., A, B, C, D, E) from A (complete injury – low functioning) through E (normal) indicating the completeness of the SCI (NSCIA, 2010).

It was reported that during the last 50 years, a 2000% increase in life expectancy has taken place after SCI had occurred (NSCISC, 2011). This was due in no small part to the improvements in medical care and rehabilitation practices (Kemp & Krause, 1999). However, according to Kemp and Krause, life expectancy for individuals with SCI was still shorter than that of the general population's, and secondary conditions described as age-related (e.g., depression, joint trouble, other disease) were becoming more prevalent for individuals with SCI as they live longer lives. Despite these conditions, many individuals with SCI were living decades after their injury with relatively positive outcomes (Whiteneck et al., 1992).

Due to the high incidence of SCI in the United States and that more individuals are living longer with SCI and experiencing more secondary conditions, a continued focus on research on psychosocial and physical rehabilitation following SCI was necessary to have a positive influence on the rehabilitation process, improve adaptation, SWL, and FI of people with SCI. Several key factors are associated with healthy adaptation after SCI such as resilience, the amount of FI, presence or absence of depression, and SWL (Bombardier, Richards, Krause, Tulskey, & Tate, 2004; Dixon & Caradoc-Davies, 2005; Kenney & Rogers, 2000; White et al., 2010).

Functional Independence

Rehabilitation after SCI should be focused on regaining the highest level of an

individual's FI (Haisma et al., 2008). The FI of an individual undergoing rehabilitation was an important outcome of the rehabilitation process (Dixon & Caradoc-Davies, 2005), and referred to the both physical (e.g., toileting, bathing) and cognitive (e.g., verbal and analytical) abilities in individuals (Hamilton, Granger, Sherwin, Zielezny, & Tashman, 1987). Comprehensive rehabilitation (e.g., physical therapy, occupational therapy, psychotherapy) was required for individuals with SCI as soon as possible after their injury (Labruiere, Agarwala, & Curt, 2010). It was critical to expediently identify what skills an individual possessed (e.g., hand movement, arm movement) to make an attempt to enhance physical functioning of an individual with SCI (Lustig, 2005). One of the primary measures of FI in a rehabilitation setting was the FIM which consisted of two subscales including (1) motor functioning (e.g., bathing, grooming, toileting, etc), and (2) cognitive functioning (Burnett, Kolakowsky-Hayner, White, & Cifu, 2002; Dixon & Caradoc-Davies, 2005; Hall et al., 1999; Hamilton, Granger, Sherwin, Zielezny, & Tashman, 1987). FIM scores have shown to accurately measure clinical changes in motor and cognitive functioning during rehabilitation (Dixon & Caradoc-Davies, 2005). Burnett et al. (2002) collected FIM score data three times during inpatient rehabilitation including (1) admission to acute medical care, (2) admission to inpatient rehabilitation, and (3) discharge. This study showed an improvement in FIM scores at all measurement times for the SCI participants. Results were attributed to physical and occupational therapy, and according to the authors may be related to levels of the participants' resilience. Fann et al. (2005) also investigated the relationship between depression and FIM scores by examining longitudinal data during and after rehabilitation. Results showed a significant negative correlation between FIM scores and depression at each time period, indicating that individuals with greater functioning had lower

levels of depression and vice versa. Therefore, with FIM scores being the standard outcome measurement of FI during rehabilitation, it was important to include the motor subscale as a dependent variable.

Depression

A key variable related to the rehabilitation of individuals after a SCI was depression, which has consistently been associated with an array of psychosocial and medical complications (Bombardier, Richards, Krause, & Tulskey, 2004; Dreer, Elliott, Shewchuck, Berry, & Rivera, 2007; Elliott & Kennedy, 2004). One measure of depression was the Patient Health Questionnaire-9 (PHQ-9; Kroenke, Spitzer, & Williams, 2001) which had been used to examine depression at different stages post-injury including (a) inpatient rehabilitation, (b) 1-6 months after rehabilitation discharge, and (c) 6, 8, 10, and 12 months following injury (Fann et al., 2005). Results indicated that individuals experienced depressive symptoms or depression at each stage post injury, and a significant negative correlation was found between depression level and the FI of an individual, which is the ability of an individual to complete activities of daily living without assistance, indicating that higher FI scores were related to lower levels of depression. Thus, individuals who had a more severe injury experienced greater levels of depression as they struggled to terms with their new abilities. In contrast, Bombardier et al. (2004) found that depression did not differ based on severity of injury and functional status, but that increased depression was associated with negative mental and physical health behaviors (e.g., isolation, substance abuse). Bombardier et al. further suggested that diagnosis and treatment of depression during rehabilitation was important to the recovery process, and understanding changes to depression and its relationships to other variables, such as resilience during rehabilitation, could

help to reduce negative mental and physical health behaviors and improve rehabilitation outcomes. Collectively, research considered it pertinent to examine depression and its relationship to other variables during rehabilitation. As a result, depression was considered a critical variable in this study.

There were many measures of depressive symptoms (e.g., Hamilton Rating Scale for Depression, Becks Depression Inventory, Zung Self-Rating Depression Scale). However, the Patient Health Questionnaire-9 (PHQ-9; Spitzer, Williams, & Droenke, 1999) was a widely used and well validated measure of depressive symptoms and severity within clinical rehabilitation centers and among individuals with SCI due in part to its brevity (i.e., nine items), and its identifying the criteria of major depressive disorder (Fann et al., 2005). Fann et al. found the PHQ-9 provided good sensitivity (0.85) and specificity (0.94). The area under the PHQ-9 sum score ROC curve was 0.97, suggesting a test that discriminates well between persons with and without major depression. The PHQ-9 served as both a depression severity measure as well as a diagnostic instrument for major depressive disorder as defined by the Diagnostic and Statistical Manual of Mental Disorders, 4th ed. (Kroenke, Spitzer & Williams, 2001). Fann et al. showed criterion, construct and discriminant validity among 478 individuals in a hospital setting who suffered from a traumatic brain injury. The test-retest reliability was also found to be significant. The selection of the PHQ-9 as a measure for the current study was made on the basis of its validity and the rehabilitation center in which the research was conducted already used the measure prior to the study.

Satisfaction with Life

The construct of satisfaction with life (SWL) was considered a component of positive

psychology and a global assessment of a person's life (Diener, 1984). Existing literature indicated SWL was an important variable to examine in individuals with a SCI (Kennedy & Rogers, 2000; Matheis, Tulskey, & Matheis, 2006; Sherman, DeVinney, & Sperling, 2004). Research indicated that SWL was (a) considered a key variable associated with resilience, (b) considered an important outcome measure of rehabilitation, and (c) has been a widely studied construct among individuals with SCI (Charlifue, Lammertse, & Adkins, 2004; Chen et al., 2008; Krause & Reed, 2009; Putzke, Richards, Hicken, & DeVivo, 2002; White et al., 2010). Several studies indicated that individuals with SCI reported SWL improved as time since injury increased (Charlifue & Gerhart, 2004; Chen et al., 2008; Whiteneck et al., 1992). Labryere, et al. (2010) suggested the importance of an individual with SCI participating in shaping the outcome of their future in order to develop a greater sense of satisfaction. Research has shown positive correlations of social support to SWL among individuals with SCI (van Leeuwen et al., 2010; Whalley Hammel, 1994). Even more research confirmed that individuals with SCI who indicated higher levels of social support, locus of control and time since injury reported higher levels of SWL (Kortte et al., 2010; Lohne, 2008; Lustig, 2005). For example, individuals with a SCI who reported receiving greater social support indicated that they (a) identified themselves as being better adjusted to their injury and experienced less emotional anguish, which is a characteristic of resilience, (b) reported higher overall SWL, and (c) had significantly smaller number of health problems, less hospitalization time, and decreased mortality (Matheis et al., 2006). Results also showed that SWL changed based on a number of factors including level of injury, functional status, and social support. Conversely, research indicated that higher levels of depression and low levels of social support and community participation were negatively

correlated with SWL (Kortte et al., 2010; van Leeuwen et al., 2010; Whalley Hammel, 1994).

In addition, research has shown that physical ability and factors of resilience, such as family and social support, were important determinates of SWL following a SCI (Kennedy & Rogers, 2000). Results from a sample of 24 individuals with SCI indicated that family support, social support, as well as physical and material wellbeing each enhanced SWL. Consequently, the current study examined the relationship between SWL and resilience due to the commonalities on factors that may impact each variable.

Spirituality

One key factor associated with resilience is spirituality, which has been shown to help some individuals deal with adversity (Connor & Davidson, 2003; Connor, Davidson, & Lee, 2003; Hodge, 2003; Richardson, 2002). Spirituality refers to an individual's belief in a universal power, believed transcendence, or omnipotent intervention in one's life (Connor & Davidson, 2003), and "spiritual well-being" is recognized as an intrinsic value structure that shapes the foundation of an individual's behaviors (Hodges, 2002). Spirituality has been shown to change after a significant event in an individual's life (Hodge, 2003). According to Hodges (2002), when individuals exhibited spirituality (e.g., prayer, meditation, faith) they also demonstrated "emotional well-being" (e.g., social support, family support), which could be interpreted as resilience. Consequently, examining the relationship between spirituality and resilience is critical because increased spirituality may result in enhanced resilience and SWL.

Purposes

The primary purpose of the current study was to determine different types of profiles of resilience among individuals with SCI undergoing rehabilitation. Given the review of literature,

it was expected that individuals with SCI could be categorized by the similarity between their levels of both psychosocial and physical functioning and that clusters would differ in levels of resilience for these outcomes. It was hypothesized that a significant number of individuals with SCI would be categorized into profiles of high resilience or low resilience. The second objective was to assess the strength of variables that characterized the individual's functioning in predicting the clusters or profiles. It was posited that profiles would differ significantly by the amount of FI, depression, SWL, and spirituality.

CHAPTER THREE

Method

Participants

Participants were sampled from inpatient rehabilitation at Baylor Institute for Rehabilitation (BIR) and typically the spinal cord injuries were traumatic or acquired, complete or incomplete, or multi-trauma injuries, and experienced a variety of physical and/or secondary health impairments. Participants were 93 adult inpatients at BIR undergoing an individualized rehabilitation program based on the type and severity of their medical condition and remaining abilities. The mean age of the sample was 44.2 years ($SD = 16.2$), 58 males (62.4%) and 35 females (37.6%). In regards to race/ethnicity, 82.8% ($n = 77$) were Caucasian, 13.98% ($n = 13$) African American, and 3.2% ($n = 3$) Hispanic. In terms of marital status, 35.1% ($n = 33$) were single, 2.1% ($n = 2$) separated, 14.9% ($n = 14$) divorced, 1.1% ($n = 1$) widowed, and 45.7% ($n = 43$) married.

Measures

The *Connor-Davidson Resilience Scale* (CD-RISC) short form was used to measure the overall resilience of each participant (Campbell-Sills & Stein, 2007). The short form of the CD-RISC assesses one latent factor of resilience that “reflects the ability to tolerate experiences such as change, personal problems, illness, pressure, failure, and painful feelings” (Campbell-Sills & Stein, 2007). The measure consists of 10 items using a 5-point Likert scale ranging from 0 (not true at all) to 4 (true nearly all of the time). In previous research the CD-RISC short forms had demonstrated good reliability (.85) and construct validity by moderating the relationship between

childhood maltreatment and current psychiatric symptoms. The correlation between the 10-item short form and the original 25-item CD-RISC was high ($r = .92$).

The *Functional Independence Measure* (FIM) was the most widely accepted functional assessment measure in inpatient rehabilitation centers (Hamilton, et al., 1987). Several studies have used the FIM in studying rehabilitation populations (Burnett et al., 2002; Dixon & Caradoc-Davies, 2005). The FIM is an 18-item, seven level ordinal scale used to assess functional ability in individuals with a variety of acquired disabilities (e.g., traumatic brain injury, SCI, stroke). It is the result of efforts to develop standardized measurement and data on disability and rehabilitation outcomes (Wright, 2000). According to Wright, FIM was designed to assess areas of dysfunction in activities which commonly occur in individuals with any progressive, reversible or fixed neurologic, musculoskeletal and other disorders. FIM scores range from 1 to 7 with a score of 7 classified as *complete independence* while a score of 1 is *total assist*; performs less than 25% of task. The FIM has both motor and cognitive subscales. This study only utilized the motor component of the FIM which assesses four areas of function including self-care, bladder and sphincter control, mobility, and locomotion. By summing the points for each item in the motor component section, the possible total score ranges from 13 (lowest) to 91 (highest) level of independence. During inpatient rehabilitation, FIM scores are recorded daily by clinicians observing patient function.

The *Personal Health Questionnaire – 9 Depression Scale* (PHQ-9) was a brief 9-item self-report measure of Major Depressive Disorder (Kroenke, Spitzer, & Williams, 2001). In a study of 6000 patients from two separate medical settings (primary care clinics, ob-gyn clinics), the PHQ-9 was found to have excellent internal reliability, with a Cronbach's α of .89 in the

primary care population and an α of .86 in the ob-gyn clinic population (Kroenke, et al.). Test-retest reliability had a correlation of .84 in the sample. The authors established criterion validity with 589 patients who had an interview by a mental health professional and found strong construct and external validity.

The *Satisfaction with Life Scale* (SWLS; Diener, Emmons, Larsen, & Griffin, 1985) has been one of the most widely used SWL measures in studies of individuals with SCI, largely because of its brevity (i.e., five items) and its inclusion in the National SCI Database, which reflects the contributions of a nationwide network of model systems of care. The SWLS is a 5-item measure of the cognitive, judgmental component of subjective well-being that evaluates satisfaction with life overall (Sherman, DeVinney, & Sperling, 2004). It was selected because of its frequent use with participants with traumatic injuries (Matheis, Tulskey, & Matheis, 2006; Scherer & Cushman, 2001; Sherman, et al., 2004). Chen et al., (2008) used the SWLS measure in a longitudinal study of 278 individuals with SCI that showed a significant trend in the increase of SWL. Chen et al., estimated an increase of 0.14 a year in SWLS score during the timeframe of the study which was significant. Putzke et al., (2002) used SWLS data from the NSCISC database to examine with a longitudinal design, 940 individuals with SCI to identify predictors of SWL change from year 1 follow-up to year 2 follow-up. A univariate analyses between the potential year 1 predictor variables and the SWLS at year 2 showed all potential predictors variables were related to year 2.

Participants indicate their degree of agreement with each item (e.g., “I am satisfied with my life.”) using a 7-point Likert scale, with scores ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Scores range from 5-35, with a score of 5 representing dissatisfied, and 35

points representing completely satisfied. A total score of 20 reflects the neutral point on the scale.

The *Intrinsic Spirituality Scale* (ISS) was used to measure intrinsic spirituality (Hodge, 2003). Evidence of the validity and reliability of this measure indicate its appropriateness as a measure of intrinsic spirituality. The ISS is a six-item measure that uses a sentence completion format. An incomplete sentence fragment was provided, followed by two phrases anchoring each end of the scale (e.g., “My spiritual beliefs affect: 10 - *absolutely every aspect of my life*, 0 - *no aspect of my life*”). An individual’s level of intrinsic spirituality is scored by summing the six subscales and dividing by six. Scores range from 0-10, with higher scores denoting a person who possesses greater spiritual motivation, and a score of 0 representing an individual for whom spirituality is not a part of their life. The alpha coefficient (.87) and intraclass correlation ($r = .62$) were both acceptable providing evidence of the internal consistency and stability of the ISS for individuals with a SCI.

A *demographic form* was created for this study to obtain certain demographics (e.g., age, gender, ethnicity, relationship status, etc.) and injury-related information (e.g., location and severity of injury, rehabilitation progress, etc.). The data was obtained through medical chart reviews by the resident intern listed on the Institutional Review Board (IRB), as well as the research assistant.

Procedures

This study was part of a larger, ongoing data collection that has obtained IRB approval from Baylor Institute for Rehabilitation (BIR). Additional IRB approval was obtained from the University of Texas Southwestern Medical Center. Appropriate participants were identified by

the clinical psychologist on staff. Eligible patients were those who had experienced a traumatic or non-traumatic SCI resulting in a need for inpatient rehabilitation. Commonly, these patients have experienced complete or incomplete SCI, non-traumatic or traumatic, or multi-trauma injuries, and various debilitating illnesses (e.g., ALS, Guillian Barre Syndrome, etc.).

Only investigators listed on the IRB approval requested consents from participants. If an investigator in the study was involved in a patient's care (e.g., the clinical psychologist working with a patient) they were not utilized with that participant in order to avoid a dual relationship that might impact the study or the patient's treatment. Potential participants were approached and provided information regarding the nature of the study, including a brief explanation of the purpose, time involved, risks and benefits, and confidentiality. Consent was not immediately required, but rather potential participants were given the opportunity to take additional time to decide if they wished to participate.

All measures were administered by the principal investigator, additional research assistants, or the clinical psychologist on staff. Measures were completed at the same time in the participant's hospital room or occasionally in the clinical psychologist's office and no follow-up measures were provided. The level of independent completion of the instruments depended on the patient's functioning and degree of aid needed. Total time of completion was typically less than 30 minutes in duration. If the investigator read the instruments to the participant, standard directions for each measure were provided, and the participant was also able to view each item as it was read.

Data Analysis

All statistical analysis used the IBM SPSS 19 statistic software package. Descriptive

analysis (e.g., frequency, mean, SD) was used for demographic variables and measured scores.

A hierarchical grouping-subjects cluster analysis was performed to identify profiles of resilience patterns based on the psychosocial assortment of depression, SWL and spirituality, which are pivotal components of resilience. Further a two-step clusters was used as a post hoc test of cluster quality and predictor importance. ANOVA and chi-squared test were used to identify any differences of the above psychosocial components of resilience and related demographic characters between the numbers of clusters of resilience patterns. An alpha level of .05 was used.

We hypothesize that individual adjustment experience and rehabilitation effects would lead to different patterns of resilience. Further we hypothesized that people with different patterns of resilience would have significant differences in resiliency coping attributes, such as depression, SWL and spirituality.

CHAPTER FOUR

Results

There were 93 participants (58 males [62.4%] and 35 females [37.6%]; 77 Caucasian [82.8%], 13 African American [14%], 3 Hispanic [3.2%]) with a mean age of 44.17 years ($SD = 16.19$). A summary of the samples demographic and frequency information was included (see Table 1). The categories of SCI were divided into traumatic 64 (68.8%) and non-traumatic 21 (22.6%). A previous psychiatric history was reported by 42 participants (i.e., depression 18 [19.4%], anxiety 7 [7.5%], more than one diagnosis 17 [18.4%]). The described marital statuses of the participants were Single 33 (35.5%), Separated 2 (2.2%), Divorced 14 (15.1%), Widowed 1 (1.1), and Married 43 (46.2%). The descriptive statistics for each measure of the dependent variables were CD-RISC, $M = 32.18$ ($SD = 5.39$), PHQ-9, $M = 6.81$ ($SD = 5.24$), SWLS, $M = 23.03$ ($SD = 7.01$), and ISS, $M = 47.26$ ($SD = 12.53$) (see Table 2 and Table 3).

A hierarchical cluster analysis was performed first in order to group the individuals with SCI into relatively homogenous within groups but heterogeneous between groups based on measures of psychosocial functioning (i.e., PHQ-9, SWLS, ISS). The cluster procedure was run using Ward's method of linkage, which is designed to optimize the minimum variance within clusters (Ward, 1963). Ward's method is a hierarchical procedure, whereby each individual case is initially considered to be a separate cluster. Two similar cases are then joined at each step until one large cluster is achieved. This process generates an agglomeration schedule, which contains coefficients that represent the distance between cluster centroids. Large drops in the distance coefficients signify possible cluster solutions. Solutions in the range expected based on theory must then be examined to see if they produce reasonably sized clusters. This method

identifies clusters that are maximally homogeneous within clusters and maximally heterogeneous across clusters. The hierarchical cluster analysis suggested three clusters.

Further, using a two-step cluster analysis, the silhouette measure of cohesion and separation indicated that the cluster quality was fair (0.40). The predictor importance for the cluster formation showed spirituality had an importance of 1.00, the most important predictor, with depression and SWL each showing a predictor importance score of 0.46. This analysis re-specified three quality cluster labels: Spontaneous Resilience (SR; $n = 28$, 35.9%), Evolving Resilience (ER; $n = 28$, 35.9%), and Rebounding Resilience (RR; $n = 22$, 28.2%).

A one-way ANOVA was used to determine overall significant differences between groups with respect to all variables.

The demographic (see Table 5) and dependent variable data for the SR cluster were 28 participants (18 males [38.30% within gender] and 10 females [32.30% within gender]; 19 Caucasian [29.20% within race], 6 African American [60% within race], 3 Hispanic [100% within race]) with a mean age of 44.43 years ($SD = 15.00$). The months since injury for this cluster were $M = 4.71$ months ($SD = 14.37$) with a range between 0.13-72 months. The raw score and z-scores for the each measure are in Table 5.

The demographic (see Table 6) and dependent variable data for the ER cluster were 28 participants (14 males [29.80% within gender] and 14 females [45.2% within gender]; 25 Caucasian [38.50% within race], 3 African American [30% within race] with a mean age of 46.43 years ($SD = 18.1$). The months since injury for this cluster were $M = 16.99$ months ($SD = 65.24$) with a range between 0.10-342.70 months. The raw scores and z-scores for the each measure are in Table 6.

The demographic (see Table 7) and dependent variable data for the RR cluster were 22 participants (15 males [31.9% within gender] and 7 females [22.6% within gender]; 21 Caucasian [32.3% within race], 1 African American [10% within race] with a mean age of 38.50 years ($SD = 14.97$). The months since injury for this cluster were $M = 44.49$ months ($SD = 101.90$) with a range between 0.10-343.97 months. The raw scores and z-scores for the each measure are in Table 7.

ANOVA results showed resilience, $F_{(2,75)} = 7.979, p = .001$; depression, $F_{(2,75)} = 23.86, p = .000$; SWL, $F_{(2,75)} = 23.656, p = .000$; and spirituality, $F_{(2,75)} = 71.624, p = .000$, were included (see Table 3). Post hoc testing results showed significant differences between group means using Tukey HSD when the test of homogeneity was not violated and Games-Howell when the test of homogeneity was violated (see Table 4). The significant differences in Resilience were between SR-ER (mean difference = .93, $F_{(2,75)} = 7.979, p = .001$), ER-RR (mean difference = .70, $F_{(2,75)} = 7.979, p = .022$), SR-RR (mean difference = .23, $F_{(2,75)} = 7.979, p = .635$). The significant differences in Depression were between SR-ER (mean difference = 1.45, $F_{(2,75)} = 23.86, p = .000$), ER-RR (mean difference = .59, $F_{(2,75)} = 23.86, p = .028$), SR-RR (mean difference = .86, $F_{(2,75)} = 23.86, p = .001$). The significant differences in SWL were between SR-ER (mean difference = 1.46, $F_{(2,75)} = 23.656, p = .000$), ER-RR (mean difference = .78, $F_{(2,75)} = 23.656, p = .000$), SR-RR (mean difference = .69, $F_{(2,75)} = 23.656, p = .020$). The significant differences in Spirituality were between SR-ER (mean difference = .22, $F_{(2,75)} = 71.624, p = .346$), ER-RR (mean difference = 1.89, $F_{(2,75)} = 71.624, p = .000$), SR-RR (mean difference = 1.67, $F_{(2,75)} = 71.624, p = .000$) (see Table 4). Results of three Chi square test found no significant associations between the two resilience patterns with gender ($X^2_{(2, N=78)} = 1.997, p = 0.368$), marital status

($X^2_{(8, N=78)} = 8.287, p = 0.406$). The race results were significant ($X^2_{(4, N=78)} = 9.559, p = 0.049$), and literature would argue that race or ethnicity could relate with resilience however, race was unable to be used due to the majority of participants being Caucasians.

In addition, according to literature suggesting possible association between demographic factors and resilience, we examined collected demographic information it showed interesting differences among the demographic data as well as the way in which they responded to the measures (see Figure 1). For example, the mean months since injury increased between the SR-ER clusters and again between ER-RR clusters, with the highest mean for months since injury in the RR cluster and the lowest mean in the SR cluster. The mean age between the SR-ER groups increased however, it decreased in the RR cluster. The highest mean age was found in the ER cluster while the lowest average age was in the RR cluster.

CHAPTER FIVE

Discussion

The primary purpose of the current study was to determine if different profiles of resilience among individuals with SCI undergoing rehabilitation existed. The results indicated that individuals undergoing rehabilitation from a SCI could be clustered into three distinguishable patterns of resilience that were labeled *spontaneous resilience*, *evolving resilience* and *rebounding resilience*, and developed along with the time since onset. The three clusters had both within group similarity, and the between group differences. The group comparison analysis showed significant differences between groups on all three pivotal resilient components (i.e., depression, SWL and spirituality). However, results found no significant associations between the three resilience patterns and gender, marital status and traumatic/non-traumatic injury. Race was unable to be associated with the patterns of resilience due to the majority of participants being Caucasians skewing the results.

The selection of the term *spontaneous resilience* was related to the time since injury being earlier than the other clusters, what their resilience looked like as compared with other groups, and what their depression, SWL, and spirituality was at the time of study. The present study found that as time since injury increased there were fluctuations in resilience patterns. All between group differences in resilience clustered groups were significant, except the between group differences for resilience in the SR and RR clusters and spirituality in the SR and ER clusters. In the current study, results indicated the SR group was dealing with a more recent injury and was still learning adjustment to both the physical and mental elements of their injuries. This early coping could be described as demonstrating their pre-morbid or a preliminary

resilience response. Individuals in this group had the highest level of reported depression and the lowest level spiritual belief possibly due to coping with the loss of function, thinking ‘why me’, experiencing sadness, shock, denial or anger, or still believing that walking out of the hospital could be possible. As time since injury passed, there appeared to be an inverse relationship as spirituality increased and depression decreased. The mean SWL in this group was relatively high which may have been due to having high expectations for their rehabilitation outcomes, strong family and social support, or not fully understanding the long-term outcome of their injuries. These reasons may explain why they still maintained a relatively high level of SWL that possibly represented their pre-morbid functioning. Many clinicians and therapists use the term spontaneous recovery when describing the early rehabilitation of an individual during rehabilitation process. The term spontaneous recovery refers to the early and naturally occurring recovery that takes place after an injury. Consequently, the SR cluster reported a natural resilience response after the SCI occurred. During this time their pre-morbid resilience functioning may have played a role in helping them cope with their adjustment. At this stage, supporting the individual with a SCI through the use of therapeutic and educational strategies and social support may be beneficial.

As time since injury passed, the individuals reported *evolving resilience*. As they had continuous multidisciplinary rehabilitation, they improved some functioning, learned some adjustment skills and new strategies, which they may have begun to practice represented by improved coping with both physical and emotional challenges. The individuals in the ER cluster reported the highest level resilience of the three clusters. To further detail this finding, a rise in resilience reached a peak when the average time since injury was approximately 16 months.

With this ER, a decrease in depression and an increased spiritual belief was reported. It is likely because of continuous improvement, coping experience, and more understanding their disability. The mean SWL remained at similar levels to the SR group, but was highest level among three resilience clusters. This may be in part due to ongoing adjustment to their mobility, still developing strategies of coping, and continued family and social support. These reasons may explain why they increased SWL to the highest level. This evolution led us to describe this cluster as ER. This cluster had an increase in time since injury over the SR group, and more time to adjust to their injuries and recoveries. More exposure to the continued encouragement of therapists, family, and peers may have contributed to the increase in resilience.

Finally, for individuals who had lived with their SCI for a substantial duration, the authors used the term *rebounding resilience*. Overall, the RR cluster saw a different pattern of responding with relatively lower resilience and SWL scores. During this stage, the highest mean time since injury was reported indicating that amongst all the participants in the current study, this cluster had been living with their injury the longest. This meant that having lived with their SCI for a longer period of time they may have had adjustments in their hopes and expectations, while facing more life issues such as financial support, functional restoration, and life role changes. Based on Richardson's (2002) meta-theory of resilience and resiliency, the acceptance of a new biopsychosocial homeostasis occurs and a rebound of resilience pattern closer to baseline can happen. According to his theory, as time continues it is possible that without an intervention for resilience, a natural fluctuation occurs in resilience and coping contributing to the adjustment process back to homeostasis after a traumatic event. The data in the current study indicated this pattern of resilience. However, the current study found a rebound in reported

resilience that dropped below the initial level of the SR cluster. It appeared that with the acceptance of a different life after the adjustment to SCI was completed, a lower level of resilience existed. This supported the use of a resilience intervention that Richardson mentioned. It appeared that when individuals used their own natural resources after having had a SCI they may need help to be more resilient long-term. During this stage, individuals reported depression decreased to relatively low levels, while spiritually increased to levels relatively high over the ER cluster further indicating an inverse relationship between these two components of the study. Also, a decrease in SWL was reported to relatively low levels for this cluster. This may be explained by the realization of decreased job opportunities which has been shown to be correlated to SWL (Burns, Hill, Boyd, & Hough, 2010). According to Putze et al. (2002), as time since injury increased a potential existed for decreased social support decreasing SWL. Individuals in the current study may have reported decreased SWL with the potential decreased job opportunities and lower social support explained by Burns et al. and Putze et al.

Bonanno (2004) mentioned the importance of developing resilience skills (e.g., social skills, self competence, spirituality) through therapy or education to enhance an individual's rehabilitation from a traumatic event and helping them adapt. According to Bonanno, sustaining resilience across time can improve rehabilitation outcomes. He reported that the expression of positive emotion and laughter was a mechanism that helped reduce stress, increased social support, and thereby sustaining resilience following a traumatic event. Also, in a review of resilience, White et al. (2008) added that it was important for clinicians and researchers to increase resilience early and throughout rehabilitation programming to have a positive an impact on rehabilitation outcomes.

The current study identified clusters of resilience by examining depression, SWL, spirituality, and time since injury. This information may help guide researchers in the development of resilience interventions to increase spirituality, social support, satisfaction with life, and decreased depression, thereby addressing the fluctuation in biopsychosocial functioning and increasing resilience. By developing interventions that address these areas, researchers and clinicians could have a positive impact on rehabilitation outcomes after a SCI.

Based on the present findings, spirituality was a critical component to study in the development of resilience profiles across time. When companioned with depression and SWL interventions, resilience development, or the validation a resilience intervention could be enhanced. These results were similar to previous research, finding spirituality was a key to being resilient (Connor & Davidson, 2003; Connor, Davidson, & Lee, 2003; Richardson, 2002). Also, similar to our findings, spirituality has been shown to fluctuate in individuals. According to Hodge (2003), this fluctuation can occur for any number of reasons, (e.g., spiritual practices, social support, importance of spirituality, time of life). For example, a pattern of an increased spirituality followed by a decrease is perhaps supported by the supposition that after a substantial disruption in someone's life, spirituality tends to increase, but often returns to previous levels after a period of time (Hodge). Likewise the changes that occurred during the rehabilitation process (e.g., adjustment to loss of function, or improvement in function across time) may have contributed to this fluctuation. However, the fluctuation or changes that occur may or may not be permanent signs of spiritual growth (Hodge). The current study found that spirituality was significantly different between the RR cluster and the SR and ER clusters. However, no significant differences between the SR and ER clusters were found however, there was an

increase in spirituality between these two groups (see Figure 2 and Figure 3). The ISS measured spirituality as defined by one's relationship to God, or whatever you perceive to be Ultimate Transcendence. This may have impacted the reported spirituality, as individuals that were earlier in rehabilitation may not have thought they had this kind of relationship. Therefore, as time since injury increased, individuals appeared to better align with the definition of spirituality used for this measure.

According to the chi square testing, there were no significant difference between the three resilience patterns regarding gender, marital status, and traumatic/non-traumatic injury. These results were similar to previous resilience research. According to White et al. (2010), some differences in gender were found but they only trended toward significance as it related to resilience. Similar to findings of the current study, Matheis et al. (2006) reported that marital status was shown to not predict SWL which, as previous identified, was positively correlated with resilience (White et. al.). Lastly, the lack of significant difference found between the resilience patterns and traumatic/non-traumatic injury, might have indicated that differences do not exist in resilience patterns whether the injury was traumatic or non-traumatic in nature. In addition, these results may have been influenced by the diversity, location, and size of the sample.

Limitation

A limitation of the study was the snapshot nature of the sample. As one of the primary findings was that resilience fluctuated as time since injury increased, a more longitudinal sample may demonstrate a different result in profiles of resilience.

Another limitation was related to the convenience sampling, and the limited sampling size and location of the sample (i.e., 93 participants, one location). Having more individuals, perhaps from multiple facilities around the country, may present a more generalizable result for resilience profiles in individuals with SCI and to the rehabilitation and research communities. Individuals from the current study were not a good representation of the diversity in the general population. This could have been due to this facility requiring the majority of individuals receiving services to be covered by traditional healthcare insurance. This can result in demographic and socioeconomic homogeneity in the facility's population that does not represent the broader societal population. For example, even though the region has a large Hispanic and African American population, these groups only represented a small portion of the sample from this facility.

Future Research

There are many opportunities for future research on resilience for populations with SCI undergoing rehabilitation. Based on the findings of this study, profiles of resilience may be used to help develop a resilience evaluation or intervention by targeting specific attributes like spirituality, depression, SWL, thus improving resilience and coping. Also, future research should focus on maintaining the improvement of resilience as time passes since rehabilitation effects may stop at some point, and degeneration may occur as aging continues. The current study identified spirituality as a critical variable in identifying profiles of resilience. Focusing future resilience research on developing spirituality could lead to improving resilience during rehabilitation thus possibly improving long-term outcomes. Meanwhile, identifying what spirituality means to the individual using a variety of spiritual measures and sub-domains could

be important because spirituality can be an individual experience (Hodges, 2002). Thus, how someone defines spirituality could impact how it determines resilience. An example is developing a mindfulness intervention, considering it is a religiously neutral practice yet, beneficial to emotional management that may improve spirituality and hence resilience during rehabilitation. This may be a simple yet effective means of developing spirituality in this population. Additionally, future research could focus on developing resilience or spirituality interventions that could be implemented as early as possible after a traumatic event has occurred (Amatea, Smith-Adcock, & Villares 2006; LaFromboise, Hoyt, Oliver, & Whitbeck 2006; Luthar & McMahon, 1996; Vera & Shin, 2006; Weed, Keogh, & Bordowski, 2006). This could lead to an optimum rehabilitation outcome as defined by the highest level of independence an individual can achieve. Early intervention may increase the likelihood of an individual with a SCI successfully reintegrating posttraumatic event. This may generalize to a broader rehabilitation population as well, but further research is needed with different populations to determine efficacy.

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Table 1

Demographic information of participant (n=93)

Variable	Range	M (SD)	
Age	17-78	44.10 (16.20)	
Age at Injury	6-77	41.60 (17.06)	
Months since Injury	0.10-344	16.14 (62.12)	
Variable	N	Variable	N
Gender		Injury Category	
Male	58 (62.4%)	Traumatic	64 (68.8%)
Female	35 (37.6%)	Non-traumatic	21 (22.6%)
Race		Psychiatric History	42 (45.7%)
Caucasian	77 (82.8%)	Depression	18 (19.4%)
African American	13 (14%)	Anxiety	7 (7.5%)
Hispanic	3 (3.2%)	More than one diagnosis	17 (18.4%)
Marital Status			
Single	33 (35.5%)		
Separated	2 (2.2%)		
Divorce	14 (15.1%)		
Widowed	1 (1.1%)		
Married	43 (46.2%)		

Table 2

Descriptive Analysis of Measures

	Range	<i>M</i>	<i>SD</i>
CD-RISC	14-40	32.18	5.39
PHQ-9	0-24	6.81	5.24
SWLS	7-35	23.03	7.01
ISS	0-60	47.26	12.53

Note. CD-RISC = Connor-Davidson Resilience Scale; PHQ-9 = Patient Health Questionnaire- 9;

SWLS=Satisfaction With Life Scale; ISS = Intrinsic Spirituality Scale

Table 3

Means, standard deviations, F and p for clustering variables by cluster (n=78)

	Spontaneous		Evolving		Rebounding			
	Resilience		Resilience		Resilience			
	<i>(n=28)</i>		<i>(n=28)</i>		<i>(n=22)</i>			
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>F</i>	<i>p</i>
Age	44.43	15.00	46.43	18.51	38.5	14.97	1.52	.22
Age at Injury	44.31	14.49	43.15	19.22	31.95	15.82	3.76	.03
Months since Injury	4.71	14.37	16.88	65.24	40.49	101.90	1.71	.19
Resilience ^a	30.14	6.05	35.18	3.83	31.41	4.36	7.98	.001
Resilience ^b	.38	1.12	.55	.71	.14	.81	7.98	.001
Depression ^a	9.57	4.49	2.86	2.07	5.59	4.03	23.86	.000
Depression ^b	.77	.97	.67	.45	.08	.87	23.86	.000
SWL ^a	17.93	7.39	28.18	3.95	22.73	4.72	23.66	.000
SWL ^b	.73	1.04	.74	.11	.04	.67	23.66	.000
Spirituality ^a	52.14	6.82	54.93	5.185	31.27	10.171	71.62	.000
Spirituality ^b	.38	.54	.61	.41	1.28	.81	71.62	.000

^a*raw scores*, ^b*z-scores*

Table 4

Post hoc differences between group means

		Mean Diff	<i>p</i>
Resilience ^a	SR - ER	.93 [*]	.001
	SR- RR	.23	.64
	ER- RR	.70 [*]	.02
Depression ^a	SR - ER	1.45 [*]	.0001
	SR- RR	.86 [*]	.001
	ER- RR	.59 [*]	.03
SWL ^b	SR - ER	1.46 [*]	.0001
	SR- RR	.68 [*]	.02
	ER- RR	.77 [*]	.0001
Spirituality ^a	SR - ER	.22	.346
	SR- RR	1.67 [*]	.0001
	ER- RR	1.89 [*]	.0001

^ATUKEY HSD; ^BGAMES-HOWELL; ^{*}*p* < .05

Table 5

Demographic information of SR Cluster (n=28)

Variable	Range	M (SD)	
Age	17-73	44.43 (15.00)	
Age at Injury	19-72	44.31 (14.49)	
Months since Injury	0.13-72	4.71 (14.37)	
Variable	N	Variable	N
Gender		Injury Category^a	
Male	18 (64.3%)	Traumatic	20 (76.9%)
Female	10 (35.7%)	Non-traumatic	6 (23.1%)
Race		Psychiatric History	
Caucasian	19 (67.9%)	Depression	6 (21.4%)
African American	6 (21.4%)	Anxiety	1 (3.6%)
Hispanic	3 (10.7%)	More than one diagnosis	8 (28.6%)
Marital Status			
Single	11 (39.3%)		
Separated	2 (7.1%)		
Divorce	4 (14.3%)		
Widowed	1 (3.6%)		
Married	10 (35.7%)		

^aMissing two records for this category

Table 6

Demographic information of ER Cluster (n=28)

Variable	Range	M (SD)	
Age	17-78	46.42 (18.51)	
Age at Injury	17-77	43.15 (19.22)	
Months since Injury	0.10-342.70	16.99 (65.24)	
Variable	N	Variable	N
Gender		Injury Category^a	
Male	14 (50%)	Traumatic	19 (68.8%)
Female	14 (50%)	Non-traumatic	7 (22.6%)
Race		Psychiatric History	
Caucasian	25 (89.3%)	Depression	5 (17.9%)
African American	3 (10.7%)	Anxiety	3 (10.7%)
Hispanic	0 (0%)	More than one diagnosis	3 (10.7%)
Marital Status			
Single	8 (28.6%)		
Separated	0 (0%)		
Divorce	6 (21.4%)		
Widowed	0 (0%)		
Married	14 (50%)		

^aMissing two records for this category

Table 7

Demographic information of RR (n=22)

Variable	Range	M (SD)	
Age	18-68	38.50 (14.97)	
Age at Injury	6-68	31.95 (15.82)	
Months since Injury	0.10-343.97	44.49 (101.90)	
Variable	N	Variable	N
Gender		Injury Category	
Male	15 (68.2%)	Traumatic	14 (63.6%)
Female	7 (31.8%)	Non-traumatic	8 (36.4%)
Race		Psychiatric History	
Caucasian	21 (95.5%)	Depression	4 (18.2%)
African American	1 (4.5%)	Anxiety	2 (9.1%)
Hispanic	0 (0%)	More than one diagnosis	5 (22.7%)
Marital Status			
Single	10 (45.5%)		
Separated	0 (0%)		
Divorce	2 (9.1%)		
Widowed	0 (0%)		
Married	10 (45.5%)		

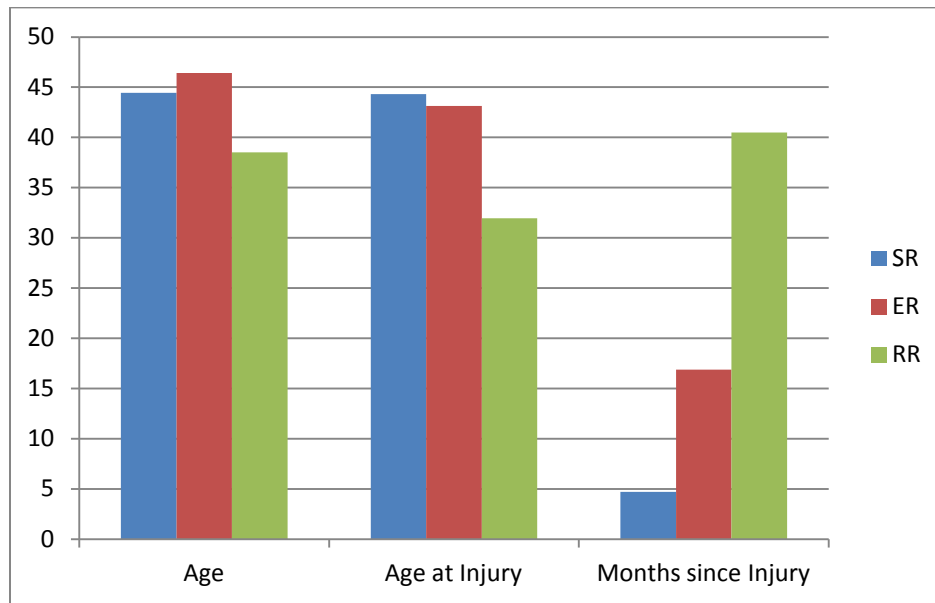


Figure 1. Demographic differences by three resilience clusters.

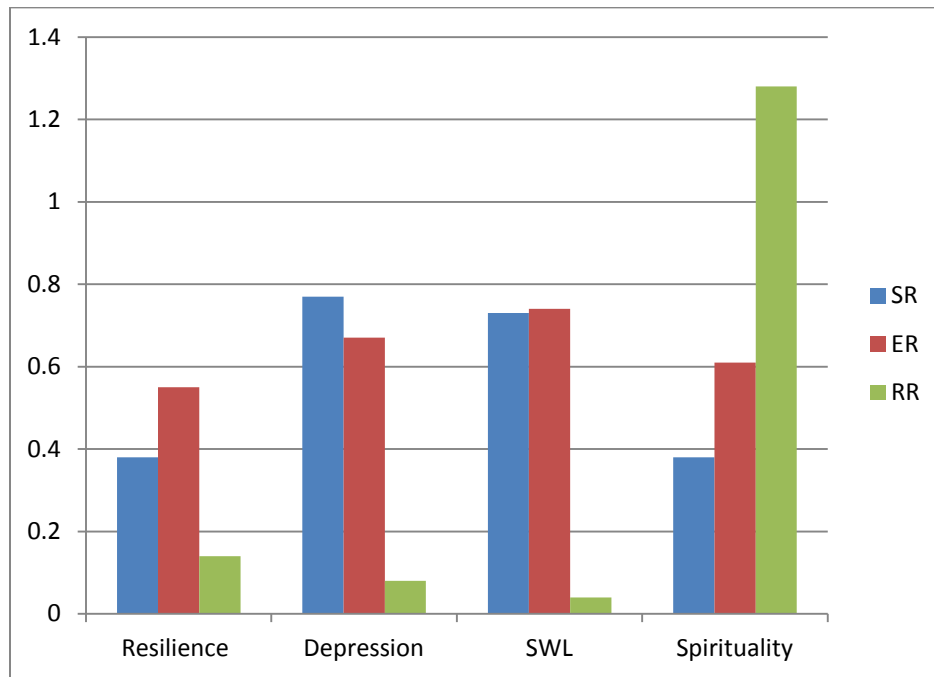


Figure 2. Patterns of Z-Scores of measures by three resilience clusters.

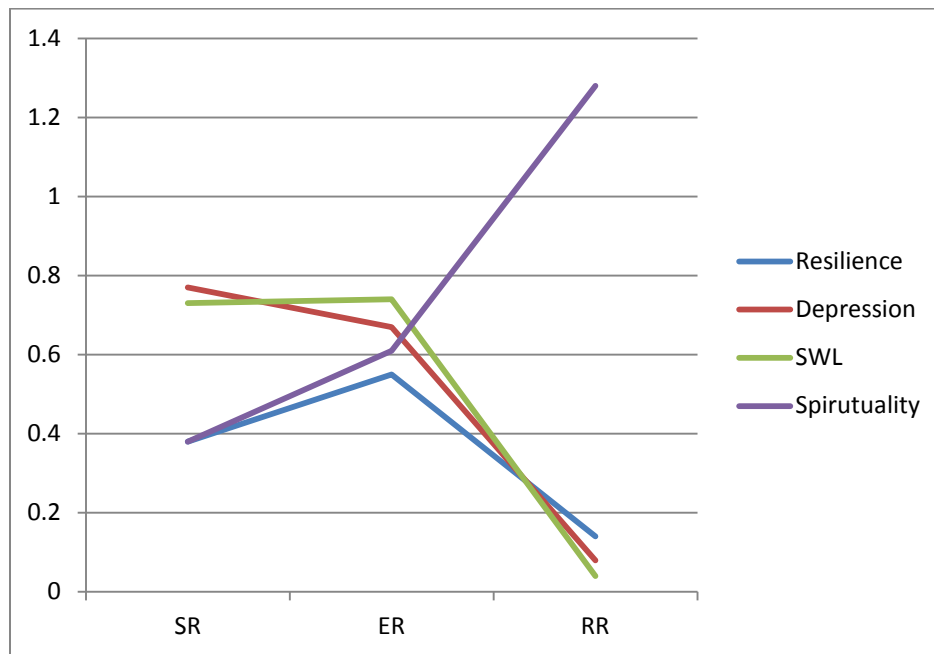


Figure 3. Resilience trends of psychosocial characters.

BIOGRAPHICAL SKETCH

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EDUCATION/TRAINING

INSTITUTION AND LOCATION	DEGREE	YEAR(s)	FIELD OF STUDY
The University of North Texas School of Arts and Sciences, Denton, TX	B. A.	2003-2005	Psychology
The University of North Texas Toulouse School of Graduate Studies, Denton, TX	M. S.	2005-2008	Kinesiology
The University of Texas Southwestern Medical Center School of Health Professionals, Dallas, TX	MRC	2010-2013	Rehabilitation Counseling

Positions and Employment

2012-Current	Counselor	<i>Centre for Neuro Skills- Irving, TX</i>
2008-2010	Realtor	<i>Coldwell Banker Residential - Dallas, TX</i>
1998-2002	IT Manager	<i>Capital One - Richmond, VA, Plano TX</i>
1997-1998	IT Manager	<i>Federal Reserve Bank - Richmond, VA</i>
1993-1997	Account Manager	<i>Federal Reserve, FRAS - Richmond, VA</i>
1988-1993	System Engineer	<i>Electronic Data Systems (EDS) - Plano, TX</i>
1986-1987	Managing Partner	<i>DomesticAide - Dallas, TX</i>
1980-1986	Programmer	<i>Pegler-Sysco Corporation - Lincoln, NE</i>

Presentations and Publications

White, B., Driver, S., & Warren, A. (2010). Resilience and Indicators of Adjustment during Rehabilitation from a Spinal Cord Injury. *Rehabilitation Psychology, 55*, 23-32.

White, B., Driver, S., & Warren, A. (2008). A consideration of resilience in rehabilitation of people with traumatic disabilities. *Rehabilitation Psychology, 53*, 9-17.

White, B., Driver, S., & Warren, A. (2007). Identifying Changes in Resilience during The Rehabilitation from a Spinal Cord Injury. International Symposium of Adapted Physical Activity, Rio Clara, Brazil.