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Relationship between Adverse Childhood Experiences and Illness Perceptions among Individuals with Fibromyalgia

Susan D. Fay
Walden University

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Walden University

College of Social and Behavioral Sciences

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Susan Fay

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Walden University
2015

Abstract

Relationship between Adverse Childhood Experiences and Illness Perceptions among
Individuals with Fibromyalgia

by

Susan D. Fay

MS, Drexel University, 1994

BS, Metropolitan State University of Denver, 1983

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Psychology

Walden University

February 2015

Abstract

Adverse childhood experiences (ACEs), including abuse and neglect, are a significant social health problem. Exposure to ACEs can place a child at a high risk for developing different diseases or illnesses in adulthood, including fibromyalgia. The purpose of this study was to determine if exposure to ACEs, moderated by perceived social support and/or social undermining, would result in more negative illness perceptions of personal control and/or treatment control. A survey research design was used in this quantitative study. Purposive convenience sampling methods were used to solicit 231 participants to complete an online survey. Moderated multiple regression analysis was used to assess the moderating roles of perceived social support and social undermining on the relationship between ACEs with personal control and treatment control facets of illness perceptions among individuals with fibromyalgia. Developmental traumatology, allostatic load, social support, social undermining, and illness perceptions served as the theoretical and empirical foundation for this study. Social undermining was found to be a significant moderator of the relationship between sexual abuse, perceived social support, and personal control perceptions, $F(7, 174) = 1.28, p < .001$, but only when levels of social undermining were moderate to high. The relationship was not significant for treatment control perceptions as the criterion variable, or for physical or emotional abuse as predictor variables. Positive social change implications include an expanded knowledge of important social and psychological factors that influence the health of fibromyalgia patients, especially those exposed to sexual abuse. Such information can assist health care providers develop more effective therapies, treatments, and screening protocols.

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Dedication

This study is dedicated to all those who suffer with the debilitating symptoms of fibromyalgia. It is my sincere hope that one day there will be a cure.

Acknowledgments

I would like to thank the individuals who were instrumental in my journey and were generous enough to share with me their valuable time and knowledge. Your contributions will never be forgotten. Dr. Rasmussen, your unwavering support and encouragement helped me through the rough patches and paved the way for my success. Dr. Mary O'Brien, thank you for stepping in as my methods expert. You helped me become a better researcher. Dr. John Schmidt, my URR reviewer, your professionalism, expertise, and attention to detail were invaluable. Your review and comments elevated my dissertation to another level. Pat Corwin, your editing abilities were amazing. D.J., you were the source of my inspiration. You came into my life at the perfect moment and I will always cherish our unique friendship. You helped me heal the past and recognize my future.

Mom and Dad, I will never be able to repay you for the opportunities you have given me. You were there when I needed you the most. Nancy, I consider you not only my sister, but my friend, mentor, and role model. My best friends, Susan Girtten, Rebecca Hubbard, Shirley Rodgers, Debbie Tenney, and Julie Brinkley, you were supportive and helped me stay positive during this journey. My horses, dogs, and cats, you always knew what to do to help me feel better.

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Chapter 1: Introduction to the Study

Adverse childhood experiences (ACEs), including abuse and neglect, are a significant social health problem. Researchers have shown that exposure to ACEs may place an individual at a high risk for developing different diseases or illnesses in adulthood, including fibromyalgia syndrome (Felitti et al., 1998; Imbierowicz & Egle, 2003). Fibromyalgia is considered a chronic condition with often debilitating and life-changing pain and fatigue (Bellato et al., 2012; Teitelbaum, 2007). Individuals with this syndrome can also experience a host of other physical, cognitive, and psychological symptoms (Teitelbaum, 2007). The pain and fatigue associated with fibromyalgia, when compounded by the addition of other symptoms, makes coping with this syndrome a daily challenge for millions of people in the United States (Arnold, 2006; Bellato et al., 2012; National Fibromyalgia Association, 2009; van Wilgen, van Ittersum, Kaptein, & van Wijhe, 2008). With no cure on the horizon, and few options for effective control of their symptoms, many fibromyalgia patients form negative perceptions about their illness (Stuifbergen, Phillips, Voelmeck, & Browder, 2006; van Wilgen et al., 2008). These negative illness perceptions can further exacerbate the number and severity of their symptoms (Hassett, Cone, Patella, & Sigal, 2000; Stuifbergen et al., 2006; van Wilgen et al., 2008).

The purpose of this study was to examine whether exposure to a greater number of ACEs increases the likelihood that individuals with fibromyalgia would develop negative illness perceptions. Specifically, I focused on illness perceptions associated with how much personal control individuals with fibromyalgia believe they have over the

course of their illness and whether they would benefit from available treatment options. Additionally, I examined whether social interactions (i.e., perceived social support and social undermining) influenced the relationship between ACEs and illness perceptions. A common theme that has emerged from stories told by individuals with fibromyalgia is that there is a lack of understanding and support from health care providers and members of their social network (Arnold et al., 2008; Åsbring & Närvänen, 2003; Mengshoel & Heggen, 2004). Mengshoel and Heggen (2004) stated that such factors influence perceptions about fibromyalgia and make coping with its symptoms more difficult.

Background

Researchers have compiled a body of evidence on the importance of perceptual/cognitive factors in health outcomes. Researchers have found that patients' beliefs about their illness or disease can influence such factors as coping ability, recovery time, and pain or symptom severity (Masi, White, & Pilcher, 2002; Newsom, Mahan, Rook, & Kraus, 2008; Petrie, Jago, & Devcich, 2007). Petrie et al. (2007) noted that patients living with a chronic illness or disease experience a reduction in their quality of life, and coping with the consequences of such changes is dependent on the perceptions they have about their illness. These perceptions include such things as what they believe about the cause, consequences, and functional limitations of their illness or disease (Masi et al., 2002; Petrie et al., 2007). Researchers found that pessimistic beliefs about symptoms and consequences of a disease or illness were predictive of health-related behaviors, severity of symptoms, and efficacy of treatments (Cohen, 2004; Gatchel, Peng,

Peters, Fuchs, & Turk, 2007; Montoya, Larbig, Braun, Preissl, & Birbaumer, 2004; Newsom et al., 2008; Petrie et al., 2007; Petrie & Weinman, 2006; Uchino, 2013).

The importance of illness perceptions among individuals with fibromyalgia was illustrated in a qualitative study conducted by Mengshoel and Heggen (2003). These researchers interviewed five females who had recovered from fibromyalgia. Mengshoel and Heggen discovered that these five females shared similar beliefs about fibromyalgia. They all had positive perceptions regarding their ability to control the progression and outcome of their syndrome, believed that fibromyalgia was a temporary condition, and believed that they would recover. Further, Mengshoel and Heggen noted that the subjects also took control of their treatment, seeking out many different options to control their pain and other symptoms.

In another study involving individuals with fibromyalgia, researchers examined how negative illness perceptions impacted pain perceptions. In this quantitative study of 91 females with fibromyalgia, Stuifbergen et al. (2006) found that participants who had negative perceptions regarding the consequences and controllability of their fibromyalgia scored high on the Fibromyalgia Impact Questionnaire (FIQ). The FIQ evaluates an individual's perceived severity of pain and symptoms, physical functioning, and quality of life (Burckhardt, Clark, & Bennett, 1991). In this same study, Stuifbergen et al. pointed out that the females with positive perceptions about their level of personal control over fibromyalgia reported lower levels of pain and rated their overall health as better than those with more negative perceptions. Compared to patients with other chronic conditions such as rheumatoid arthritis and chronic fatigue syndrome, fibromyalgia

patients reported less personal control and more negative beliefs concerning the effectiveness of various treatment options currently available (van Wilgen et al., 2008). It is for these reasons that I chose to study illness perceptions among individuals with this syndrome.

In addition to the influence of cognitive factors on health outcomes, an individual's social interactions can have an influence on health. Evidence of the influence of social interactions on health and health-related behavior is supported by more than 30 years of research (Cohen, 2004; Fiore, Becker, & Coppel, 1983; Uchino, 2013). Researchers have found that perceived social support helps recipients maintain or improve health-related behaviors (e.g., diet, exercise, and adherence to treatment protocols), in addition to reducing the negative physiological effects of stress on the body (Cohen, 2004; Masi et al., 2002). Perceived social support has also been found to reduce perceptions of pain (Montoya et al., 2004). In contrast, negative social interactions (i.e., social undermining) have been found to reduce the ability to cope with a disease or illness by diminishing feelings of well-being, increasing perceptions of pain, increasing anxiety, and increasing recovery times (Croezen et al., 2012; Newsom, et al., 2008; Uchino, 2013).

Investigators have found that many individuals with cognitive and social interaction problems experienced negative events during childhood (Felitti et al., 1998; National Scientific Council on the Developing Child; 2007; Middlebrooks & Audage, 2008). Researchers have compiled evidence that children who experience abuse and/or neglect often suffer developmental delays (Grassi-Oliveria, Ashy, & Stein, 2008; Lupien,

McEwen, Gunnar, & Heim, 2009; National Scientific Council on the Developing Child, 2007) and are at a high risk of developing mental health problems in adulthood, including depression and anxiety (Felitti et al., 1998; Middlebrooks & Audage, 2008). Further, there is evidence that exposure to childhood abuse or neglect increases the risk of behavioral problems, interpersonal violence, risky sexual behaviors, suicide, smoking, and substance abuse problems (Felitti et al., 1998; Middlebrooks & Audage, 2008).

The negative impacts of child abuse and neglect exact a price, both on the victim who experiences maltreatment and on society as a whole (Fang, Brown, Florence, & Mercy, 2012; Middlebrooks & Audage, 2008). The Centers for Disease Control and Prevention (CDC; 2014) reported that state and local agencies receive more than 3 million reports of child maltreatment (i.e., physical abuse, sexual abuse, psychological abuse, physical neglect, or emotional neglect) each year. This high number of reports led the CDC to proclaim child maltreatment a significant and serious threat to public health (CDC, 2012).

The health care costs associated with child abuse and neglect extend beyond treatment of physical injuries and mental health issues. When Felitti et al. (1998) published the results of their ACE study, the potential long-term effects of child abuse and neglect on victims' physical health were revealed. From health data gathered on more than 9,000 males and females, Felitti et al. concluded that exposure to abuse and neglect during childhood is a significant risk to physical health in adulthood. Felitti et al. found that individuals with a reported history of abuse or neglect as children were less healthy

and experienced higher rates of disease than their counterparts who reported no abuse or neglect.

During the 15 years following publication of the ACE study, investigators have found evidence to back up the findings and conclusions reached by the 1998 Felitti et al. study (Afifi, Mota, MacMillan, & Sareen, 2013; Binder et al., 2008; Carpenter et al., 2009; Danese & McEwen, 2012; Giedd & Rapoport, 2010; Kendall-Tackett, 2009; Middlebrooks & Audage, 2008). Researchers have reported a high incidence of ACEs in individuals with adult onset of a wide range of illnesses, diseases, and disorders, including cancer, heart disease, lung disease, liver disease (Felitti et al., 1998; Giedd & Rapoport, 2010; Kendall-Tackett, 2009; Middlebrooks & Audage, 2008), post traumatic stress disorder (Binder et al., 2008; Dansie et al., 2012), Type 2 diabetes (Carpenter et al., 2009), chronic pain (Gatchel, et al. 2007), chronic fatigue syndrome (Brooks, Cronholm, & Strawn, 2012; Maloney et al., 2012), chronic inflammation (Danese & McEwen, 2012), immune system dysfunctions (Danese & McEwen, 2012; Kendall-Tackett, 2009), depression (Middlebrooks & Audage, 2008), and fibromyalgia (Brooks et al., 2012; Imbierowicz & Egle, 2003). These findings led many researchers to conclude that ACEs are a significant risk factor for poor health and disease in adulthood.

There is a physiological explanation for the negative health implications of chronic stress, specifically stress experienced by children exposed to ACEs (Danese & McEwen, 2012; DeBellis, 2001; Katz, Sprang, & Cooke, 2012; Lupien et al., 2009). Danese and McEwen (2012) developed the allostatic overload model as a way to explain how chronic and/or repeated activation of the stress response system can cause wear and

tear on the brain, organs, and physiological systems in the body. The effects of stress on the body are cumulative, eventually reducing the body's ability to regulate stress. The dysregulation of the physiological stress response system and the damage to the brain and organs leave the body more susceptible to disease (Danese & McEwen, 2012; Katz, Sprang, & Cooke, 2011). Danese and McEwen (2012) argued that the allostatic load model provides an explanation for why illness or disease often appears decades after the initial exposure to abuse or neglect, and long after the abuse or neglect has ended.

Fibromyalgia is a health condition in which ACEs are theorized to be a risk factor (Imbierowicz & Egle, 2003). In the United States, it is estimated that 10 million individuals have a clinical diagnosis of fibromyalgia, and females are 9 times more likely than males to develop this syndrome (Berger, Dukes, Martin, Edelsberg, & Oster, 2007; National Fibromyalgia Association, 2009; Teitelbaum, 2007). It is rarely diagnosed in individuals under the age of 20 or over the age of 55 (Berger et al., 2007). Although fibromyalgia is not life threatening (White, Parr-Lemkau, & Clasen, 2001), there is currently no known cure for this syndrome, and medications prescribed by physicians typically offer patients only temporary relief from their pain and symptoms (Arnold, 2006; Arnold et al., 2007; Bellato et al., 2012).

Pain and chronic fatigue are the primary symptoms associated with fibromyalgia; however, patients often complain that they experience many additional symptoms (Teitelbaum, 2007). The most common symptoms or complaints include widespread pain, irritable bowel syndrome, digestive problems, muscle fatigue, body stiffness, exercise intolerance, cognitive or memory problems, tingling sensations, numbness in

limbs, headaches, frequent infections, inflammation, insomnia, hormonal imbalances, weight gain, food sensitivities/allergies, chemical or medication sensitivities, depression, and anxiety (Abeles, Pillinger, Solitar, & Abeles, 2007; Arnold et al., 2008; Barker, 2002; Bellato et al., 2012; Teitelbaum, 2007). The number and severity of these symptoms can vary widely between individuals; some individuals experience many different symptoms while others may have only a few symptoms. According to Teitelbaum (2007), the severity of these symptoms can also vary on a daily basis, and some symptoms may worsen over time.

Fibromyalgia is often difficult for physicians to diagnose because many of its symptoms are also commonly associated with other diseases or syndromes, especially chronic fatigue syndrome (Bellato et al., 2012; Dansie et al., 2012; van Houdenhove & Egle, 2004). In addition, there is no biomarker for fibromyalgia; therefore, there are no definitive blood or lab tests available to confirm a diagnosis (Bellato et al., 2012). The ambiguous nature of fibromyalgia, the number of symptoms it shares with other diseases or syndromes, and the lack of a definitive biomarker for diagnosis has led to its designation as a syndrome rather than a disease (Barker 2002; White et al., 2001).

To make a diagnosis of fibromyalgia, physicians must follow diagnostic criteria established by the American College of Rheumatology (Wolfe et al., 1990). Based on these criteria, a diagnosis of fibromyalgia can be made if a patient has a history of widespread musculoskeletal pain (i.e., above and below the waist and in all four limbs), and pain or tenderness in at least 11 of 18 designated sites in the body (Abeles et al., 2007; Wolfe et al., 1990). In many cases, physicians make a final diagnosis of

fibromyalgia when a patient's condition meets these criteria, and all other possible causes for his or her symptoms are ruled out (Berger et al., 2007).

Researchers are still unsure of what causes fibromyalgia, but genetic factors, ACEs, physical trauma, exposure to hazardous chemicals, hormonal imbalances, and prolonged sleep deprivation have all been implicated as possible causes or triggers (Ablin, Neumann, & Buskila, 2008; Arnold, Clauw, & McCarberg, 2011; Bellato et al., 2012; Brooks et al., 2012; Imbierowicz & Egle, 2003). Many individuals with fibromyalgia note that they experienced a severe physical or emotional trauma, a highly stressful event, exposure to a toxic substance, pregnancy or childbirth, sleep disturbances, and/or severe fatigue just prior to the onset of their pain or symptoms (Bellato et al., 2012; Hartman, Müller, & Fischer, 2000; Teitelbaum, 2007). Therefore, the consensus among many researchers is that fibromyalgia develops due to an interaction between biological, perceptual/cognitive, social, personality, behavioral, and psychological factors (Abeles et al., 2007; Masi et al., 2002; van Houdenhove & Luyten, 2008).

Although other diseases may trace their etiology to ACEs, I selected fibromyalgia for this study because it is a syndrome that has psychological and social underpinnings. Further, little is known about how these factors affect illness perceptions in this population. Sim and Madden (2008) conducted a meta-analysis of qualitative studies on fibromyalgia and revealed that few researchers have explored perceived social support and social undermining among individuals with fibromyalgia. Based on the findings relevant to the impact of ACEs on the body's physiological stress response systems, and the volume of research on the impact of social interactions (i.e., perceived social support

and social undermining) on health (Cohen, 2004; Croezen et al., 2012; Newsom et al., 2008; Uchino, 2013), this is an area of study that deserves additional inquiry among individuals with fibromyalgia.

In alignment with the conclusions reached by Sim and Madden in their 2008 meta-analysis, some investigators have pointed out that future research efforts on fibromyalgia should include attention to interactions between multiple psychological and social risk factors. According to Bellato et al. (2012), this is because the influence of social and psychological factors on the etiology and progression of fibromyalgia is still poorly understood. Based on Bellato et al.'s suggestion, a gap in the literature I identified in Chapter 2, and empirical evidence of the importance of psychological and social factors in other diseases and illnesses, I consequently selected ACEs, perceived social support, social undermining, and illness perceptions as the variables for this study.

In Chapter 1, I include the study problem statement, nature of the study, research questions and hypotheses, and the study purpose. I include the theoretical and empirical framework that forms the basis of this inquiry. Within this chapter, I also provide operational definitions of study variables and key terms and discuss assumptions, limitations, scope, and significance of the study.

Problem Statement

Exposure to ACEs has been shown to increase the risk of poor mental and physical health in adulthood (Felitti et al., 1998; Middlebrooks & Audage, 2008). Fang et al. (2012) estimated that the average lifetime costs for an individual exposed to childhood maltreatment is \$210,012. This figure includes costs associated with health care, special

education, child welfare visits, loss of productivity, and legal costs. In 2008, the overall economic burden to the U.S. economy due to direct and indirect costs of child abuse and neglect was \$124 billion (Fang et al., 2012). The high personal and societal costs associated with ACEs underscores the need for additional resources and research dedicated to prevention of childhood abuse.

In addition to identifying ways to reduce the incidence of ACEs, there is a need to gain a better understanding of the impact of ACEs on health. Imbierowicz and Egle (2003) discovered that many patients with fibromyalgia were exposed to ACEs, leading these researchers to conclude that it may be a significant risk factor for development of this syndrome. Robinson et al. (2003) stated that the number of medical, pharmaceutical, and disability claims submitted by patients with fibromyalgia is disproportionately higher than those for typical insurance beneficiaries. In a study of 33,176 patients with fibromyalgia and a comparison group of 33,176 patients with other conditions and diseases, Berger et al. (2007) reported that patients with fibromyalgia incurred an average of \$9,500 in total health care costs each year. This figure was almost 3 times higher than the costs incurred by patients in the control group. Robinson et al. found that disability claims were twice as high for patients with fibromyalgia than for patients with other diseases. The National Fibromyalgia Association (2009) indicated that the costs associated with health care and decreased work productivity for patients with fibromyalgia is \$12 to \$14 billion annually in the United States alone. The high health care costs incurred by individuals with fibromyalgia provide further support for the need to gain additional information on the cause, progression, and treatment of fibromyalgia.

During my initial review of the literature, I found only a limited number of studies where researchers examined the prevalence of ACEs among individuals with fibromyalgia (Brooks et al., 2012; Imbierowicz & Egle, 2003). I identified only three research studies on illness perceptions among patients with fibromyalgia (Stuifbergen et al., 2006; van Ittersum, Wilgren, Hilberdink, Groothoff, & van der Schans, 2009; van Wilgren et al., 2008). To date, no scholars have examined relationships between ACEs, perceived social support, social undermining, and illness perceptions among individuals with fibromyalgia.

Nature of the Study

The objective of this quantitative study was to examine the relationship between ACEs (i.e., physical punishment, emotional abuse, and sexual events) and personal control and treatment control facets of illness perceptions. I hypothesized that perceived social support would act as a primary moderator in this relationship, and social undermining would act as a secondary moderator. Through the synthesis of studies presented in Chapter 2, I intended to provide justification for the hypothesized relationships between these variables.

Investigators have studied perceived social support and determined that it can act as a dependent, independent, or moderating variable in relationships between stress and health outcomes (House, Landis, & Umberson, 1988). In Figure 1 and Figure 2, I provide conceptual models for the hypothesized relationships for the dependent variables of personal control and treatment control. It should be noted that I hypothesized that social

undermining would moderate the overall relationship between ACEs, perceived social support, and personal control and treatment control facets of illness perceptions.

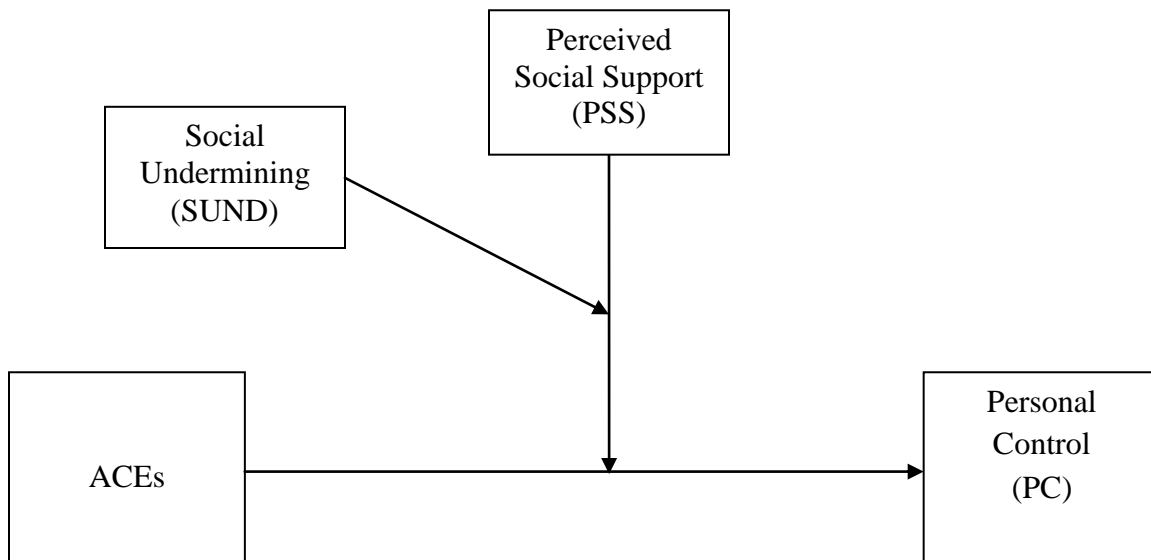


Figure 1. Conceptual model for personal control

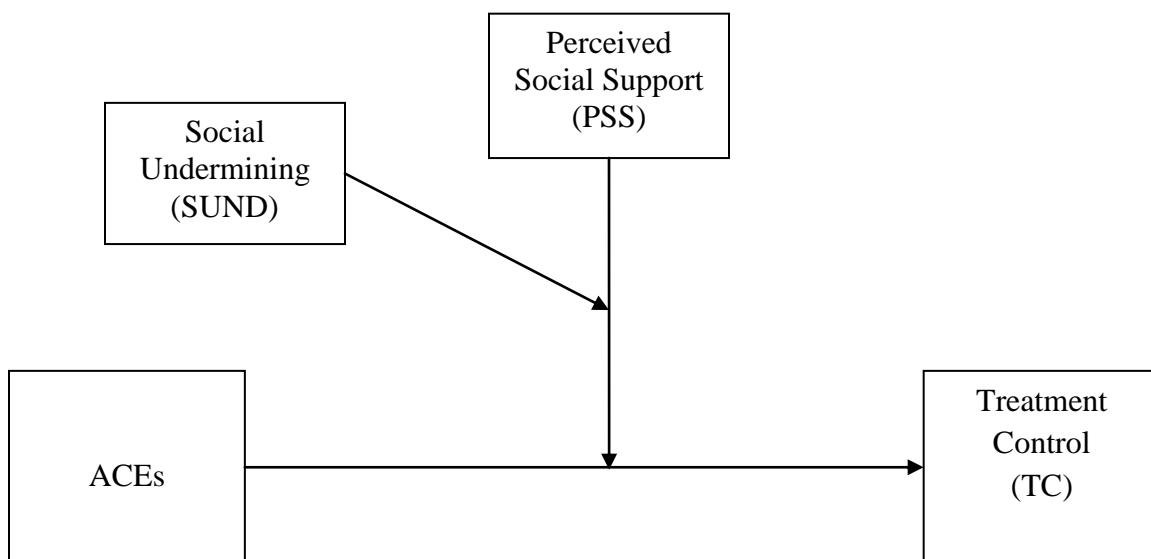


Figure 2. Conceptual model for treatment control

For this study, I used a survey research design. I examined the hypothesized relationships between variables using a moderated multiple regression analysis. I selected participants for this study using purposive convenience sampling methods, and I obtained data on the variables of interest through an online survey. I designed the online using items from existing research instruments, including the Early Trauma Inventory Self Report-Short Form (ETISR-SF; Bremner, Bolus, & Mayer, 2007), the Multidimensional Scale of Perceived Social Support (MSPSS; Zimet, Dahlem, Zimet, & Farley, 1988), the Social Undermining Scale (SUND; Vinokur, Price, & Caplan, 1996), and the Revised Illness Perceptions Questionnaire (IPQ-R; Moss-Morris et al., 2002). In Chapter 3, I provide information on the psychometric properties of these instruments and detailed descriptions of the study design and statistical analyses.

Research Questions and Hypotheses

I formulated the following research questions and associated hypotheses to address the gaps identified in the literature:

Research Question 1:

Is exposure to ACEs (i.e., physical punishment, emotional abuse, and sexual events) a predictor of illness perceptions of personal control and treatment control among individuals with fibromyalgia?

Null and Alternative Hypotheses:

H_0 1: Exposure to ACEs, as measured by the ETISR-SF, is not a predictor of illness perceptions of personal control and treatment control, as measured by the IPQ-R, among individuals with fibromyalgia.

H_{A1} : Exposure to ACEs, as measured by the ETISR-SF, is a predictor of illness perceptions of personal control and treatment control, as measured by the IPQ-R, among individuals with fibromyalgia.

Research Question 2:

Does perceived social support act as a primary moderator in the relationship between ACEs and illness perceptions of personal control and treatment control among individuals with fibromyalgia?

Null and Alternative Hypotheses:

H_02 : Perceived social support, as measured by the MSPSS, does not have a primary moderating effect on the relationship between ACEs and illness perceptions of personal control and treatment control among individuals with fibromyalgia.

H_{A2} : Perceived social support, as measured by the MSPSS, has a primary moderating effect on the relationship between ACEs and illness perceptions of personal control and treatment control among individuals with fibromyalgia.

Research Question 3:

Does social undermining act as a secondary moderator in the relationship between ACEs and illness perceptions of personal control and treatment control among individuals with fibromyalgia?

Null and Alternative Hypotheses:

H_03 : Social undermining, as measured by the SUND, does not have a secondary moderating effect on the relationship between ACEs and illness perceptions of personal control and treatment control that is moderated by perceived social support.

H_{A3}: Social undermining, as measured by the SUND, has a secondary moderating effect such that it moderates the relationship between ACEs and illness perceptions of personal control and treatment control that is moderated by perceived social support.

Purpose of the Study

Research on the link between exposure to ACEs and the development of many diseases in adulthood is extant (Danese & McEwen, 2012; Danese, Pariante, Caspi, Taylor, & Poulton, 2007; Felitti et al., 1998; Imbierowicz & Egle, 2003; Middlebrooks & Audage, 2008). Additionally, scholars have provided evidence of a relationship between social support and an individual's ability to cope with his or her disease in a positive way (Holt-Lunstad, Smith, & Layton, 2010; Newsom, Rook, Nishishiba, Sorkin, & Mahan, 2005; Uchino, Holt-Lunstad, Smith, & Bloor, 2004). Positive or negative perceptions about an illness or disease have been found to influence the severity of symptoms and the course of a disease (Petrie et al., 2007; Petrie & Weinman, 2006; Stafford, Berk, & Jackson, 2009). Therefore, the purpose of this quantitative study was to examine the moderating roles of perceived social support and social undermining on the relationship between ACEs (predictor variable) and illness perceptions of personal control and treatment control (criterion variables) among individuals with fibromyalgia.

Theoretical and Empirical Framework

I developed the research questions and hypotheses for this study based on peer-reviewed empirical research on the impact of ACEs, perceived social support, social undermining, and illness perceptions on adult health. I selected the biopsychosocial model of disease proposed by Engel (1977) to serve as an overarching guide in this study.

I selected Engel's model because of the holistic focus and the emphasis on inclusion and integration of biological, social, and psychological factors in the study of illness and disease. Researchers and health care providers still do not understand why the type of symptoms and their severity can vary widely between individuals with fibromyalgia (Teitelbaum, 2007), but most agree that this variation in symptoms is due to an interaction between biological, social, and psychological factors (Abeles et al., 2007; Masi et al., 2002; van Houdenhove & Luyten, 2008).

In the literature review presented in Chapter 2, I provide the reader with an understanding of how chronic exposure to stress affects the body's physiological systems and predisposes an individual to disease or illness. The theory of developmental traumatology (De Bellis, 2001) is used to explain the negative impacts of stress on the developing brain. De Bellis (2001) posited that when children experience chronic stress, trauma, or neglect during critical periods of brain development, their physiological stress response system becomes damaged. I included an overview of the allostatic load model (McEwen, 2007) and its relationship to disease in the literature review. In this model, McEwen (2007) provides an explanation for the damaging effects on the body that result from exposure to chronic stress.

I chose the variables of perceived social support and social undermining for this study because of the influence of these factors on health. There is emerging evidence that negative social interactions (i.e., social undermining) have a significant influence on health behaviors and beliefs (Brooks & Dunkel-Schetter, 2011; Croezen et al., 2012; Petrie & Weinman, 2006). Several researchers have reported that individuals with high

levels of social undermining from friends, family, and significant others in their social network experienced longer recovery times from illness and were more likely to have mental health problems than individuals who reported high levels of positive social interactions (Croezen, 2012; Newsom et al., 2005; Umberson, Williams, Powers, Liu, & Needham, 2006). In contrast to the limited number of studies on the effects of social undermining, there is a large body of evidence on the health benefits of social support (Holt-Lunstad et al., 2010). Felitti et al. (1998) found that morbidity and mortality rates among individuals with good social support networks were significantly lower than the mortality and morbidity rates for individuals who reported high levels of negative social interactions. These findings led me to conclude that it was important to include the constructs of perceived social support and social undermining in this study.

In addition to social network interactions, illness perceptions have been found to influence health outcomes. In their self-regulatory model of illness perception, Leventhal, Leventhal, and Contrada (1998) posited that when faced with a health threat, individuals develop cognitive and emotional representations of their illness, injury, or disease. These representations include beliefs about the cause, consequences, duration, and likelihood of recovery. I selected two facets of illness perceptions (i.e., treatment control and personal control) as the dependent variables in this study because these perceptions can influence beliefs about recovery and the efficacy of various treatments (Gatchel et al., 2007).

In Chapter 2, I included a synthesis of studies and theories to support the hypothesized relationships between the variables in this study. From a review of the literature, there is evidence for a relationship between ACEs and fibromyalgia. There is

also extant literature to support the inclusion of social and psychological/cognitive factors (i.e., perceived social support, social undermining, and illness perceptions) as relevant issues in any examination of fibromyalgia.

Operational Definitions of Research Variables

Adverse childhood experiences (ACEs): Emotional or physical abuse, neglect, and/or violence that is observed or experienced during childhood (Felitti et al., 1998). Physical abuse is harm caused by constraint, contact, or confinement; emotional abuse is verbal humiliation or degradation; sexual abuse is any type of unwanted sexual contact, especially contact intended to dominate or degrade another individual (Bremner et al., 2007). ACEs (i.e., physical punishment, sexual events, and emotional abuse) were assessed using the Early Trauma Inventory Self Report-Short Form (ETISR-SF; Bremner et al., 2007).

Illness perceptions: Following the diagnosis of an injury, illness, or disease, individuals construct an illness identity. This includes cognitive representations and emotional beliefs about the cause, consequences, symptoms, duration, and possibility of a cure (Leventhal et al., 1998; Petrie et al., 2007). For the purposes of this study, IPQ-R (Moss-Morris et al., 2002) was used to assess two facets of this construct: personal control and treatment control. Personal control is an assessment of how much the individual believes he or she can control the outcome; treatment control is an assessment of beliefs concerning the effectiveness of treatment (Moss-Morris et al., 2002).

Perceived social support: Individuals' subjective assessment of availability and dependability of physical and psychological support, comfort, and/or physical assistance

from members of his or her social network (Abbey, Abramis, & Caplan, 1985; Cohen, 2004). For purposes of this study, the operational definition of perceived social support is the adequacy of social support from friends, family, and significant other. This construct was assessed using the MSPSS (Zimet et al., 1988).

Perceived personal control: See illness perceptions.

Perceived treatment control: See illness perceptions.

Social undermining: Disempowerment or reduction of status in a relationship due to (a) withdrawal of physical or emotional support; (b) criticism, conflict, or disapproval; (c) unpleasant or negative social exchanges; and/or (d) a direct physical or emotional threat (Vinokur & Vinokur-Kaplan, 1990). Researchers have hypothesized that social undermining creates power differentials in a relationship, resulting in increased stress, decreased self-worth, and reduced relationship satisfaction for the recipient (Vinokur et al., 1996). In this study, the SUND (Vinokur et al., 1996) was used to assess the construct of social undermining.

Definition of Terms

Allostasis: The ability of physiological systems to return the body to normal functioning after it has responded to a change in its internal or external environment (Katz et al., 2012). See also homeostasis.

Allostatic load: The theory that chronic exposure to stress exerts a negative effect on the body's physiological stress response systems, eventually leading to dysfunction of these systems. An allostatic load score is determined through measurements of nervous, immune, and endocrine system functions (Danese & McEwen, 2012; Katz et al., 2012).

Alternative medicine: Treatments or therapies for disease and illness that are used instead of those advocated by evidence-based or conventional Western medical practitioners. Alternative medical therapies include such things as acupuncture, meditation, massage therapy, biofeedback, chiropractic, and homeopathy (National Center for Complementary and Alternative Medicine, 2008; Oguamanam, 2006).

Amygdala: A structure located in the anterior temporal lobe of the brain that is responsible for fear conditioning and regulation of emotions (Pinel, 2009).

Biomedical model of disease: The study of disease and the practice of medicine, based on a reductionist viewpoint that the cause of disease can be traced to a specific structural, physiological, or biological abnormality or dysfunction. This model is also dualistic (i.e., mind and body do not influence each other), so it does not take into account potential social or psychological influences on disease and illness (Gatchel, 2004; Oguamanam, 2006; Quintner, Cohen, Buchanan, Katz, & Williamson, 2008).

Biopsychosocial model of disease: An approach to the study of disease and the practice of medicine. A model of disease based on the theory that there is an interaction between psychological, social, and biological factors in the development and progression of disease or illness (Engle, 1977).

Catecholamines: Neurotransmitters (e.g., dopamine, norepinephrine, and epinephrine) that are secreted by the brain in response to stress. They help the body react to stress by increasing heart rate, blood pressure, respiration, and blood glucose levels (MedLinePlus, 2010b).

Comorbidity: One or more distinct diseases or symptoms that exist in addition to the primary diagnosed disease (MedicineNet.com, n.d.).

Complementary medicine: The use of both alternative treatments or therapies and evidence-based conventional medical treatments and therapies for alleviation of symptoms related to an illness or disease symptoms (National Center for Alternative and Complementary Medicine, 2008; Oguamanam, 2006).

Cortisol: A hormone produced by the hypothalamic-pituitary-adrenal axis. Cortisol is damaging to systems and structures in the body and brain if levels remain high through frequent or chronic activation of the body's stress response system (Gatchel, 2004; Middlebrooks & Audage, 2008).

Critical periods of brain development: The theory that there are critical periods during childhood when certain environmental and social experiences must take place to ensure that normal structural and functional brain development occurs (Knudsen, 2004; Pinel, 2009).

Developmental traumatology: The theory that exposure to ACEs, especially during critical periods of brain development, can negatively impact structural and functional development of the brain. According to this theory, the interactions between social, psychological, biological, and genetic factors influence brain development (De Bellis, 2001; Grassi-Oliveria et al., 2008).

Disease: A physiological, anatomical, or pathological dysfunction in the body due to infectious agents, environmental stress, genetic abnormalities, or other unknown causes (Gatchel, 2004).

Epigenetic programming: The alteration of gene expression due to environmental influences (Szyf, McGowan, & Meaney, 2007).

Etiology: The study of the origin and cause of disease (MedLinePlus, 2010a).

Fibromyalgia: A syndrome characterized by widespread chronic pain and fatigue but often associated with other symptoms, such as joint stiffness, headaches, depression, anxiety, sleep problems, cognitive problems, and digestive disorders (Bellato et al., 2012).

Hippocampus: A structure located in the medial temporal lobe of the brain that is responsible for memory and theorized to be sensitive to the effects of stress (Danese & McEwen, 2012; Pinel, 2009).

Homeostasis: The physiological adjustments that an organism or cell undergoes to establish and maintain internal equilibrium after exposure to internal or external changes in its environment (Pinel, 2009).

Hypothalamus-pituitary-adrenal axis (HPA-axis): The primary physiological stress response system in the body (Kendall-Tackett, 2009).

Illness: A subjective feeling that there is disease present in the body. Illness encompasses the lived experience of sickness, disability, or disease symptoms for both the individual and members of his or her social network (Gatchel, 2004; Mengshoel & Heggen, 2004). Illness is the result of interactions between biological, social, and psychological factors (Gatchel, 2004).

Integrative medicine: A branch or specialty of Western medicine that makes use of both alternative and conventional evidence-based treatments and therapies, with a

focus on exploring all aspects of a patient's life that contribute to mental and physical health (National Center for Complementary and Alternative Medicine, 2008; Oguamanam, 2006).

Mind-body connection: A view that thoughts and emotions affect the body. Specifically, thoughts and emotions can influence physical and mental health (Ray, 2004).

Negative social interactions: Verbal criticism, disagreement, or conflict; physical or emotional rejection; and/or or lack of reciprocity in a relationship (Krause, 2005; Vinokur et al., 1996).

Prefrontal cortex: A structure located in the anterior frontal lobes of the brain responsible for fear conditioning and regulation of emotions (Danese & McEwen, 2012; Pinel, 2009).

Proinflammatory cytokines: Molecules secreted by white blood cells in response to a foreign substance or tissue injury. Proinflammatory cytokines promote wound healing and help the body fight infection by inducing inflammation (Kendall-Tackett, 2009).

Sensitive periods of brain development: The theory that there are sensitive periods during childhood when brain development is vulnerable to environmental and social experiences. These experiences can alter neural connectivity patterns and/or the development of certain areas of the brain (Knudson, 2004; Pinel, 2009).

Social network interactions: Positive and negative exchanges that occur between and individual and other members of his or her social network (Fiore et al., 1983). For the

purpose of this study, social network interactions include perceived social support and social undermining from family, friends, and/or significant other.

Stress: A physiological response to a real or perceived threat. This threat can be physical, biological, or emotional (Pinel, 2009; van Houdenhove & Egle, 2004).

Assumptions

Due to use of an Internet survey, I had to assume that the individual filling out the survey met all of the inclusion criteria specified for participation in this study. An important assumption made in this study was that participants could accurately recall incidents of childhood emotional, physical, and sexual abuse, and that they would report any such incidents. I also assumed that participants would answer questions about perceived social support, social undermining, and illness perceptions honestly.

Limitations

A methodological limitation to this study was my reliance on convenience sampling to obtain participants. This nonprobability sampling method prevents generalizing the results to other populations of patients with fibromyalgia, something that would be possible if random sampling methods were employed (Creswell, 2009). The correlational nature of this study design also prevented me from attributing causality to any of the relationships between predictor and moderating variables (i.e., ACEs, perceived social support, and social undermining) and the criterion variable of illness perceptions (Tabachnick & Fidell, 2007). There was also the potential that other variables not included in this study could have an influence on the relationship between the predictor, moderator, and criterion variables.

The design of this study presented another limitation. Longitudinal data are more reliable indicators of relationships between variables (Tabachnick & Fidell, 2007), especially when assessing childhood experiences of abuse or neglect (Hardt & Rutter, 2004). However, due to time and budget constraints, this type of design was not considered a practical option for this study. Although the results of this study are not generalizable to the entire population of patients with fibromyalgia, the findings may prove significant enough to provide a foundation for longitudinal studies or studies in which researchers employ random selection methods.

Use of surveys presented another set of potential limitations. I used self-report instruments in this study, and they are subject to inaccuracies or biases. There is no way to verify if respondents answered questions honestly; therefore, respondents may have under-reported or over-reported their levels of social support, social undermining, illness perceptions, or ACEs. I chose an online survey environment for this study due to time and cost considerations. A limitation to using an online survey was that I had to assume that the individual filling out the survey met the inclusion requirements for this study, as specified in Chapter 3. Self-selection bias is another limitation associated with the use of an online survey. In any Internet setting, some individuals are more likely to visit a particular website or respond to an invitation to participate in a survey than others (Eysenbach, 2004; Wright, 2005). These survey limitations and the use of convenience sampling methods prohibits the generalization of research findings to other populations of individuals with fibromyalgia (Creswell, 2009; Eysenbach, 2004; Wright, 2005).

An additional limitation to this study involves controversy over the legitimacy and accuracy of retrospective reports of ACEs. Hardt and Rutter (2004), in their review of studies involving assessment of childhood memories of adversity, concluded that retrospective reports of ACEs introduce bias into a study; however, the impact of recall bias is generally not significant enough to invalidate the results. Hardt and Rutter found that this was especially true in studies where the questions concerning ACEs were easy for participants to understand rather than questions that required a subjective judgment or interpretation. To reduce bias, I used a valid and reliable instrument for assessing ACEs and administered the survey in an online environment. The anonymity of the online environment increased the likelihood of participants' answering questions about ACEs (Alessi & Martin, 2010; Gosling, Vazire, Srivastava, & John, 2004; Hardt & Rutter, 2004).

Several additional factors could have influenced the statistical analyses and findings in this study. The length of the survey, nature of the questions, selection of moderating and predictor variables, and non normal distributions for some of the variables could have influenced the results. I discuss each of these factors in detail in Chapter 5.

Scope and Delimitations

The scope of this study included an investigation of ACEs, perceived social support, social undermining, and perceptions of illness (i.e., personal control and treatment control) in an online sample of individuals with fibromyalgia. The study was delimited to individuals 18 years of age and older who had received a clinical diagnosis

of fibromyalgia. It was necessary for participants to be computer literate. The survey was only available in English.

Significance of the Study

Patients with fibromyalgia may incur costs that are not easy to quantify, such as loss of personal productivity, decreased quality of life, memory and sleep disturbances, disruptions in social relationships, and development of psychological problems such as anxiety and depression (Arnold et al., 2008). For many individuals with fibromyalgia, their symptoms become progressively worse, often debilitating, over time, and symptoms are not alleviated by any available treatment options (Arnold, 2006; Arnold et al., 2007; Bellato et al., 2012). To add to the problem, there is currently no cure on the horizon for fibromyalgia (Bellato et al., 2012; Berger et al., 2007).

The results of this study will increase the body of knowledge concerning the relationships between ACEs, perceived social support, social undermining, and illness perceptions. This knowledge could have positive social change implications. For individuals who suffer from fibromyalgia, the results of this study may bring awareness of the importance of creating or maintaining positive interpersonal relationships. The information and findings of this study could motivate them to seek a health care practitioner who could develop an individualized and multimodality treatment plan. The study could also alert health care practitioners of the importance of social network interactions and illness beliefs on patients' ability to cope with fibromyalgia. At a societal level, the synthesis of studies I present in Chapter 2 could increase awareness of the scope of physical and mental health problems associated with ACEs, thus underscoring

the need for more attention and funding for prevention measures. I discuss these and additional positive social change implications in greater detail in Chapter 5.

There is little agreement among health economists on whether it is more cost effective to spend money on prevention versus treatment for many diseases (Cohen, Neumann, & Weinstein, 2008). However, the high prevalence of child abuse and neglect, coupled with the disproportionately high drain on medical resources incurred by individuals with fibromyalgia, might suggest that the allocation of dollars toward education, awareness, and prevention is cost effective. For this reason, there may be a greater emphasis placed on preventative practices and programs, including identification, assessment, and mitigation of significant risk factors for disease.

Summary and Transition

For the millions of individuals who suffer from fibromyalgia, there are few effective therapies or treatments that help alleviate pain or prevent the myriad of other physical or psychological symptoms associated with this syndrome. Fibromyalgia presents differently in each individual, adding to the challenge of finding treatment protocols that are effective for a majority of individuals with this syndrome. Examining fibromyalgia from an interdisciplinary perspective is important, because researchers have indicated that its etiology may be traced to a complex interaction between physiological, social, and psychological factors. Identification of potential risk factors as well as factors that may help ease pain and symptoms may lead to effective therapies for the millions of individuals who suffer from fibromyalgia.

In the literature review, I provide an overview of the theories and empirical research that served as the foundation for this study, including research findings that support the theorized relationships between the variables in this study. I begin the literature review with an overview of the biomedical and biopsychosocial models of disease and their influence on disease research. In the following sections of Chapter 2 are descriptions of the theories of allostatic load and developmental traumatology, along with a synthesis of studies on the effects of ACEs, social support, social undermining, and illness perceptions on illness and disease processes. In Chapter 3, I provide an overview of the methodology used to answer the research questions, including my rationale for selecting a quantitative survey research design. I also include discussions about recruitment, sampling, power analysis, and target population characteristics. A description of the survey instruments, ethical issues related to this study, and the sampling and data analysis methods form the basis for the remainder of this chapter.

In Chapter 4, I cover data collection, screening, and results of correlation and multiple regression analyses. I include a description of the sample characteristics and discussions of all findings associated with each research question and hypothesis. I conclude Chapter 4 with an overview of additional findings that may influence future studies. In Chapter 5, I summarize the entire study, and include in this summary detailed descriptions of study limitations, interpretations of findings, recommendations for future research, and potential positive social change implications.

Chapter 2: Literature Review

Introduction

In 1990, the American College of Rheumatology designated fibromyalgia a legitimate medical disorder with diagnosable clinical symptoms (Wolfe et al., 1990). No longer considered merely a psychosomatic musculoskeletal illness, this designation led to a more concerted effort on the part of researchers to explore biological and psychosocial factors that might contribute to the development of fibromyalgia (Masi et al., 2002; Quintner et al., 2008; Wolfe et al., 1990). Due to the limited number of empirical studies on the influence of ACEs, social network interactions, and perceptions of illness among individuals with fibromyalgia, I include in this review overviews and references to studies on the relationship of these factors to other chronic diseases and to disease processes in general. Throughout this chapter are references to how illness and disease are studied using a biomedical versus biopsychosocial (BPS) model of disease. The purpose of this comparison is to provide a compelling argument for the need to explore fibromyalgia, a complex and poorly understood syndrome, in a holistic and integrative fashion.

I begin this literature review with a comparison of the BPS model of disease with the biomedical model, the latter of which has been the accepted model in medical practice and disease research from the mid-20th century to the present (Engle, 1977; Fava & Sonino, 2008; Quintner et al., 2008). In an attempt to provide the reader with a better understanding of the mechanisms whereby stress can lead to physiological changes in the body, I include in this chapter a brief description of the allostatic load model and the

theory of developmental traumatology. I conclude the literature review with an overview of studies highlighting the role of social network interactions and illness perceptions in disease and illness, including how illness perceptions influence symptom severity, disease progression, efficacy of treatments, and health outcomes.

Literature Review Search Strategy

Although I focused on experiential and psychological factors (i.e., ACEs, perceived social support, social undermining, and illness perceptions) among individuals with fibromyalgia, in the literature review, I also provide references to biological- and physiological-based studies that support the interaction between psychological, social, and biological factors in the etiology and progression of disease. Articles and information relevant to the topic under investigation were identified through various sources, including PsycINFO, Medline, and EBSCO databases, PubMed/MEDLINE, Google Scholar, Internet websites, and scholarly books. Articles included in this literature review were obtained from peer-reviewed journals and scholarly books, and an effort was made to include sources published within the last 10 years. Articles and seminal research studies conducted prior to 2003 were also included if they provided historical context or if they described important contributions to knowledge about fibromyalgia or other chronic pain disorders. Keywords used to locate articles included *biomedical model of disease, biopsychosocial model of disease, complementary and alternative medicine, adverse childhood experiences, brain development, developmental traumatology, stress, allostatic load, fibromyalgia, social support, negative social interactions, illness perceptions, and chronic pain/illness.*

Models of Disease

Researchers, in their attempt to understand disease, have developed models that represent disease processes (Engle, 1977; 2006; Horrobin, 2003). Due to safety issues and ethical problems inherent when using human subjects, researchers often obtain information on diseases from *in vitro* studies (i.e., studies done in test tubes) or studies conducted on animals (Horrobin, 2003; Joffe & Miller, 2008). Although this is a convenient and cost effective method of obtaining information about some diseases, the results obtained from these studies are not always generalizable to human populations (Horrobin, 2003; van der Worp et al., 2010). Van der Worp et al. (2010) stated that this is especially true in cases of neurological-based diseases, diseases that have social and/or psychological risk factors, and diseases that have a delayed onset or slow progression. In their meta-analysis of animal studies, Van der Worp et al. noted that only 10% of the interventions from animal studies were effective in human clinical trials. Such findings underscore the need to study the subjective experiences of individuals with fibromyalgia because psychological and social factors may exert an influence on the etiology and progression of this syndrome.

Animal models and *in vitro* studies are not the only methods researchers use to obtain information on human diseases (Horrobin, 2003). Recent advances in medical testing and imaging technologies have made it possible for researchers to obtain information on genetics, brain functioning, and other physiological processes associated with some diseases without risk to human subjects (Horrobin, 2003). Although technological advances have led to a better understanding of many diseases, adherence to

a biomedical model of disease has not provided a complete picture of the cause of fibromyalgia and other chronic pain disorders (Arnold et al., 2011; Masi et al., 2002; Quintner et al., 2008). Horrobin (2003) argued that the root of the problem with animal and in vitro studies is that there is no congruence between the information obtained from these studies and the “real world of medical illness” (p. 152). Horrobin’s conclusion provided me with an addition reason to study fibromyalgia from a BPS perspective.

Biomedical Model of Disease

The biomedical model of disease arose during the mid-20th century as scientific knowledge of pathogens, physiological processes, and biochemistry expanded, and effective methods for describing, diagnosing, and treating physical conditions and diseases were developed (Oguamanam, 2006; Sargent, 2005). The biomedical model of disease is both dualistic (i.e., the mind and body are independent and do not influence each other) and reductionist (i.e., diseases can be reduced to a single elemental cause). The underlying assumption of the biomedical model is that there is a predictable relationship between structural or physiological changes in the body and the site of symptoms or pain (Engle, 1977; Quintner et al., 2008). Therefore, if a physician could identify and treat the specific anatomical, pathological, and/or biological system responsible for disease, the individual’s health would be restored (Gatchel et al., 2007). The biomedical model has become the clinical diagnostic paradigm of Western conventional medicine (Galland, 2006). The reductionist and dualistic nature of the biomedical model leaves little or no room for consideration of psychological factors in the diagnosis and treatment of illness and disease. As a result, physicians who adhere to a

biomedical model often ignore psychological and social factors in their patients' lives or consider these factors irrelevant (Galland, 2006; Gatchel et al., 2007).

Western conventional medicine has embraced the biomedical model, considering it the gold standard for scientific inquiry (Oguamanam, 2006). As a result, the biomedical model has dominated medical research endeavors and medical school curriculum since its inception (Carr, Emory, Errichetti, Bennett-Johnson, & Reyes, 2007). Although the biomedical model is an efficient and effective tool in research and clinical settings, it has received criticism for its inability to address complex disease processes, especially those with concurrent medical and psychiatric components, those that involve multiple systems, and many chronic pain disorders (Engle, 1977; Fava & Sonino, 2008; Masi et al., 2002). Engle (1977, 1997) argued that researchers have historically studied and classified diseases according to measureable dysfunctions in biological systems, structural abnormalities, or observable symptoms without regard to any behavioral, psychological, or social factors that might also be relevant.

Engle (1977) proposed that a complete understanding of disease, illness, and health required attention to biological, social, and psychological factors. Following Engle's recommendations, I designed this study with an emphasis on psychological and social factors that may influence individuals' perceptions of their fibromyalgia experience. In alignment with the BPS model, I include in the literature review an overview of studies and theories on the biological processes that researchers believe contribute to the onset of fibromyalgia symptoms.

Biopsychosocial Model of Disease

Aristotle and Plato first proposed the concept that the mind could have an influence on the body (i.e., mind-body connection); however, Cartesian mind-body dualism replaced this concept in the 17th century when Descartes proposed that the mind and body were independent and could not influence each other (Alonso, 2004). The mind-body connection and its relationship to health outcomes resurfaced in the scientific literature during the 1940s and 1950s when Halliday and Grinker proposed the need for a more inclusive and humanistic exploration of disease processes (Fava, Ruini, Tomba, & Wise, 2012). Grinker was the first researcher to use the term BPS to refer to the concept of studying disease in this manner (Ghaemi, 2009). The BPS model began to gain support within the medical and research communities when Engle issued a challenge to Western medical institutions to re-evaluate the usefulness of the biomedical model (Gatchel et al., 2007; Lindau, Laumann, Levinson, & Waite, 2003).

The BPS model was Engle's answer to the limitations he felt were inherent in the biomedical model (Engle, 1977, 1997). Engle (1997) believed that the BPS model represented a more humanistic, holistic, and scientific approach to the study of health, disease, and illness because it contained "observation (outer viewing), introspection (inner viewing), and dialogue (interviewing)" (p. 523). Engle envisioned that the BPS model would expand the scope of study and practice in the areas of health and disease to include social, psychological (e.g., behaviors, emotions, and beliefs), and cultural factors, in addition to the biological factors already considered in the biomedical model (Engle, 1977, 1997; Quintner et al., 2008).

Engle (1977) argued that a new medical model of disease was necessary because the biomedical model was not equipped to recognize the importance of subjective aspects of illness and disease, nor could it address complex disease processes. Engle viewed disease and illness as a multifactoral process, one in which many systems were connected and interrelated (Borrell-Carrió, Suchman, & Epstein, 2004; Lindau et al., 2003). Engle believed that the human body was a hierarchical system of increasing size and complexity; and thus, in accord with general systems theory (GST), a change in one system would create a change in all other systems in the hierarchy (von Bertalanffy, 1972; Quintner et al., 2008; Smith, Fortin, Dwamena, & Frankel, 2013).

Applying GST to the human body, Engle (1977, 1997) proposed that to understand and treat the biological manifestations of disease, it was also necessary to take into consideration an individual's psychological, social, and cultural environments. Engle (1977) pointed out that the BPS model provided health care practitioners with a way to explore cases where biochemical abnormalities existed in the absence of symptoms of illness, or illnesses persisted in the absence of a biochemical abnormality. Engle also believed that the BPS model was useful in cases where the physical symptoms of disease preceded or accompanied changes in psychological functioning, including changes in behavior, beliefs, and perceptions about illness and disease. Engle contended that it was important to understand how psychological, social, and cultural factors interacted with biological systems to affect the etiology and progression of different diseases, as well as the way each individual perceived and experienced his or her illness.

Engle (1977) was uncertain about the impact of his BPS model on the medical and research communities but proposed that it would serve as a “blueprint for research, a framework for teaching, and a design for action in the real world of health care” (p. 135). Gatchel et al. (2007) contended that the BPS model has recently gained momentum because of its heuristic nature and its interdisciplinary approach, adding that these factors make it especially applicable to the understanding of chronic pain disorders and pain management. However, as Borrell-Carrió et al. (2004) pointed out, the biopsychosocial model is primarily a way of approaching the study of disease and a general guide to care and treatment, rather than a specific model of disease.

Future of the BPS model. In their 2001 report, researchers at the Institute of Medicine (IOM) stressed the need for a more integrated and patient-centered approach to health care. This was in response to increased reports of patient dissatisfaction with quality of care. In this report, the IOM researchers even called on the Association of American Medical Colleges to include more behavioral and social science training in their curriculum; however, major changes have not yet taken place (Carr et al., 2007, Smith et al., 2013). Although the BPS model is the model of choice in many social science research and academic contexts, public health and preventative medicine settings, and with health care recipients, widespread adoption of the BSP has met with resistance from the mainstream medical community (Alonso, 2004; Carr et al., 2007; Smith et al., 2013). Alonso (2004) contended this is due, in part, to the perception that the biomedical model has proven its value as an efficient and effective scientific model for studying, diagnosing, and treating illness and disease.

Several other factors may be responsible for the hesitancy of the Western medical establishment to adopt the BPS model in research, education, and healthcare settings (Alonso, 2004; Smith et al., 2013). Physicians, institutional health care providers, and health care insurers find it difficult to justify the additional time, training, resources, and expense needed to diagnose and treat patients using a BPS model (Alonso, 2004; Levinson & Pizzo, 2011). Smith et al. (2013) theorized that the medical community has not fully embraced a BPS model because of the perception by some that the model is unscientific and too general. This perception may be traced back to McLaren (1998) who criticized Engle's model, contending that it was difficult to determine if the BPS model was even a model because it contained no specific steps or concepts that were testable. McLaren argued that the BPS model did not contain a cohesive overarching theory that can serve to tie all the data from different fields together.

Another major factor preventing widespread adoption of the BPS model is Western medicine's dogmatic focus on disease rather than health (Lindau et al., 2003). Lindau and colleagues (2003) argued that this is because disease is easier to recognize and measure than the more subjective and ambiguous concepts of well-being, resiliency, and quality of life. Evaluating the complex interaction between physical, psychological, environmental, social, and cultural factors in patients' lives is both difficult and time consuming, whereas diagnosis and treatment of presenting symptoms is an efficient and effective use of time and money. In addition, as Alonso (2004) pointed out, the biomedical model has established a reputation as an effective scientific model for studying, diagnosing, and treating illness and disease.

Aside from these issues, critics of the BPS model claim that it is difficult to implement in a medical setting due to time and budget constraints. Smith et al. (2013) stated that what physicians need is a consistent and quick method to identify relevant biological, psychological, and social information prior to a physical examination. Armed with this information, physicians could establish a course of treatment based on the specific needs of each individual patient. Although such an evidence-based interviewing method for physicians has not yet been developed (Smith, Dwamena, Grover, Coffey, & Frankel, 2011), there has been a move toward teaching and implementing a more patient-centered interviewing technique. Using this patient-centered technique, physicians ask open-ended and nondirective questions aimed at uncovering psychological and social components of the disease or illness. Masi et al. (2002) stated that this approach works well for patients with chronic diseases and illnesses such as fibromyalgia because the symptoms are often subjective, with patients providing emotional, psychosocial, and behavioral responses.

To address the limitations of both the biomedical and BPS models, Schmitt diel et al. (2007) and Wagner et al. (2005) endorsed a patient-centered approach to the diagnosis and treatment of illness and disease. As they envisioned it, such an approach would consist of a coordinated multidisciplinary team of physicians and nonphysicians that could help patients understand their disease and treatment options, direct them to resources, and provide self-management education and support. In addition, this team could help patients develop goals and strategies for coping with their illness, as well as identify psychological, behavioral, and social risk factors. Due to the comorbidity of

physical and psychological symptoms in patients with fibromyalgia and other pain disorders, many health care practitioners and researchers advocate this type of patient-centered approach to treatment of symptoms associated with these syndromes and disorders (Schmittiel et al., 2007; Wagner et al., 2005).

The BPS model and fibromyalgia. According to Quintner et al. (2008), in the case of fibromyalgia and other chronic pain disorders, strict adherence to a biomedical model has proven to be problematic because there is often no clear relationship between the site of pain stimulus (nociception) and an associated area of tissue or nerve damage. Without a way to discern the site of nociception in these patients, physicians have two options: dismiss the patient's perception of pain or diagnose it as a psychosomatic illness (Quintner et al., 2008). Quintner et al. argued it is for these reasons that pain management practitioners and researchers have gravitated toward the BPS model; it provides them with a framework for exploring the complex interactions that may be taking place between biological, social, behavioral, and psychological factors in the experience of pain. It also allows them to consider patients' beliefs, emotions, and memories in their perception of pain and illness. It is these more subjective factors that provide a partial explanation for the variability and unpredictability of fibromyalgia patients' symptoms and responses to treatment. Masi et al. (2002) stated that fibromyalgia is a syndrome that lends itself to investigation using a BPS model due to its (a) unknown etiology, (b) comorbidity of physical and psychological symptoms with other chronic diseases, (c) variation in symptom severity between individuals, and (d) inconsistency and/or

ineffectiveness of existing medical and pharmacological interventions to relieve patients' symptoms.

Arriving at a diagnosis of fibromyalgia is often a complicated and frustrating ordeal for both patients and health care practitioners due to the complex, subjective, and variable nature of symptoms associated with this syndrome (Arnold et al., 2011; Bellato et al., 2012; Bennett, Jones, Turk, Russell, & Matallana, 2007). In an Internet survey of 2,596 individuals diagnosed with fibromyalgia, approximately 46% reported that they had to consult with between three and six health care practitioners before they were able to receive a diagnosis for their symptoms. According to Bennett et al. (2007), 26% of the study participants indicated that they consulted more than six practitioners before they received a diagnosis.

Individual variations in response to treatment represent yet another hurdle for patients with fibromyalgia (Arnold, 2006; Nöller & Sprott, 2003; Piro-Boisset, Esdaile, & Fitzcharles, 1996; Wahner-Roedler et al., 2005). Individuals suffering from chronic pain disorders are often dissatisfied with how their physician managed their condition, leading them to seek an integrative medicine (IM) practitioner or a complementary/alternative medicine (CAM) treatment (Haugli, Strand, & Finset, 2004; Piro-Boisset et al., 1996). For example, in a Mayo Clinic study of 289 patients with fibromyalgia, Wahner-Roedler et al. (2005) found that 87% of these patients had used one or more CAM treatments. These results are similar to those reported by Piro-Boisset et al. (1996), who found that 91% of the 80 patients with fibromyalgia participating in

their study had sought CAM treatments for relief of pain and other symptoms associated with their condition.

Researchers have found that many fibromyalgia patients feel that biomedicine does not offer effective and safe treatments for their pain (Arnold, 2006; Nöller & Sprott, 2003). In a 2-year prospective study of 48 patients with fibromyalgia, 68.8% of those treated with medication for pain reported no improvement in their symptoms (Nöller & Sprott, 2003). These findings conflict with the results of two clinical placebo-controlled studies where researchers examined the efficacy of the drug duloxetine in patients with fibromyalgia. Arnold et al. (2007) reported that patients who received this drug reported a significant decrease in pain. However, of the 354 patients in the study, 214 patients reported at least one adverse side effect (e.g., nausea, dry mouth, constipation, diarrhea, sweating, nervousness, flu-like symptoms, and decreased appetite) as compared to 109 of the patients who received a placebo.

In a review of pharmacological and nonpharmacological treatments, Arnold (2006) concluded that both treatment options showed mixed results, but more adverse side effects and issues with drug tolerability were reported with patients taking medications versus those who were exposed to nonpharmacological treatments (e.g., exercise, cognitive-behavioral therapy, meditation/stress reduction techniques, biofeedback, hypnosis, education, diet/nutrition, and acupuncture). In addition, Arnold pointed out methodological problems in clinical drug trials conducted prior to 2006. These problems included (a) inconsistencies in measurement of pain and other symptoms associated with fibromyalgia, (b) limited data on long-term effects of medications, (c)

limited number of male subjects in most studies, (d) exclusion of patients with other comorbid disorders or diseases, and (e) singular focus on pain reduction to the exclusion of other symptoms. Although Arnold concluded that there were also methodological issues inherent in most of the nonpharmacological intervention studies, these types of therapies and interventions appeared to help relieve a wider variety of symptoms with fewer reported adverse side effects.

Adverse Childhood Experiences

For several decades, researchers studying the physiological implications of stress on the body have compiled a growing body of evidence that the effects of exposure to chronic stress (i.e., physical and psychological abuse and/or neglect) are additive (Danese & McEwen, 2012; Katz et al., 2012; Kendall-Tackett, 2009). If stress is severe and persistent, the cumulative effects can be devastating to the brain, immune, and neuroendocrine systems (Danese & McEwen, 2012). Due to the numerous studies on the effects of ACEs, especially in the absence of supportive caregivers, researchers and mental health professionals now know that these experiences can have psychological health implications (Felitti et al., 1998; Middlebrooks & Audage, 2008). However, researchers have just begun to gain a better understanding of the biological/physiological implications of childhood abuse and neglect. Advances in neuroimaging technology and the development of more sophisticated medical testing techniques have made it possible for researchers to study the effects of ACEs on the brain and the body's physiological systems. Researchers point toward a dismal outcome: ACEs may not only be psychologically devastating, they may also predispose an individual to a wide-range of

physical health problems in adulthood (Danese & McEwen, 2012; Katz et al., 2011, 2012; Middlebrooks & Audage, 2008).

Stress Response System

According to Kendall-Tackett (2009) and Danese and McEwen (2012), the body's stress response system provides insight into how ACEs exert such negative impacts on psychological and physical health. When faced with changing external conditions, the brain sends signals to the nervous, endocrine, and immune systems (Kendall-Tackett, 2009). These integrated systems then activate in a way that allows the organism to respond appropriately to the perceived change or threat; after the environmental stimuli has subsided, these systems work together to bring the body back to a normal state (Katz et al., 2011, 2012). Although this integrated system works well in cases where the stressor is short lived, it becomes maladaptive when the stressor is severe, frequent, and/or chronic (Danese & McEwen, 2012; Katz et al., 2012).

The stress response system evolved in order to allow an organism to channel the biological resources and energy needed to respond to a life-threatening event. This has been called the flight-or-fight response (Kendall-Tackett, 2009). In humans, there are few situations when it is necessary to take such an extreme action, but the stress response system still activates any time there is a perceived physical or psychosocial threat (Danese & McEwen, 2012; Katz et al., 2012). Detection of a threat causes the sympathetic nervous system to respond by releasing norepinephrine, epinephrine, and dopamine, thus increasing heart rate, respiration, and blood pressure. With the release of these catecholamines, activation of the hypothalamus-pituitary-adrenal (HPA) axis

occurs. The first to respond is the hypothalamus, and it releases the corticotrophin-releasing hormone (CRH) and vasopressin (also known as AVP). When the pituitary gland detects CRH and AVP, it is stimulated to release the adrenocorticotrophin hormone (ACTH). ACTH then causes the adrenal glands to release cortisol. Cortisol levels remain elevated until the stressor is no longer present. It is through this process that an animal has the energy and resources needed to respond adaptively to the threat. Once the threat is gone, this system returns the body back to a state of homeostasis (Kendall-Tackett, 2009; McEwen, 2007; Neigh, Gillespie, & Nemeroff, 2009; Tarullo & Gunnar, 2006).

Although the stress response system is adaptive in cases of short-term stressors, it becomes maladaptive if the perceived stress does not dissipate (Danese & McEwen, 2012). If the HPA axis is frequently activated or activated for long periods, the stress hormones can become toxic to the body, creating pathological changes in other systems (Danese & McEwen, 2012; Neigh, Gillespie, & Nemeroff, 2009). Over time, the continual wear and tear on the stress response system due to frequent or chronic activation makes it less effective and efficient (Danese & McEwen, 2012; Grassi-Oliveria et al., 2008). Across numerous studies, researchers found that adults exposed to ACEs showed chronic activation of the HPA axis. When exposed to a stressor, these individuals had heightened cortisol responses as compared to individuals who had no exposure to ACEs (Carpenter et al., 2009; Danese & McEwen, 2012; Tanriverdi, Karaca, Unluhizarci, & Kelestimur, 2007; Weissbecker, Floyd, Dedert, Salmon, & Sephton, 2006).

Carpenter et al. (2009) found that measurements of hormone levels associated with the HPA axis are biomarkers for vulnerability to stress-related diseases and neuropsychiatric disorders. Carpenter et al. noted that the existence of a heightened cortisol response (hyperresponsivity) is associated with depression and Type 2 diabetes; a cortisol hyporesponsivity (i.e., reduced cortisol response) is associated with chronic fatigue syndrome, fibromyalgia, and multiple sclerosis. From 2002 to 2008, Carpenter and colleagues obtained cortisol data from 230 males and females, aged 18 to 61. Out of this sample, 41 participants reported a history of emotional abuse, 13 reported sexual abuse, 27 reported emotional neglect, and 18 reported physical neglect. Carpenter and colleagues stated that the type of abuse often dictated whether an individual showed cortisol hyperresponsivity or hyporesponsivity. Those exposed to sexual abuse had cortisol hyperresponsivity; those who experienced emotional neglect or physical abuse had dampened cortisol responses. Carpenter et al. concluded that the variation in response to stress is dependent on the nature of the threat, the emotional response, the ability to control the stress, and the individual's perception of the situation.

Stress Response and the Immune System

Another major component of the stress response system is the immune response (Kendall-Tackett, 2009; Robles, Glaser, & Kiecolt-Glaser, 2005). According to Kendall-Tackett (2009), a perceived threat or stressor cause the immune system to release proinflammatory cytokines that protect the body against a possible injury. The proinflammatory cytokines aid in the healing of wounds and they help the body fight infection (Kendall-Tackett, 2009). There is evidence that both psychological and physical

stress can cause an inflammatory response (Robles et al., 2005). As with the HPA axis, the immune system can also become dysregulated. For example, cortisol is usually an anti-inflammatory, helping the body maintain optimum levels of proinflammatory cytokines. However, if stress is chronic or extremely high, cortisol no longer inhibits proinflammatory production. Higher levels of cytokines can make individuals more prone to disease and less able to fight off infections (Kendall-Tackett, 2009).

Stress, Allostasis, and Allostatic Overload

Allostasis is a term used to describe how the body reacts to stress and attempts to maintain homeostasis or stability when faced with a change in the internal or external environment (Danese & McEwen, 2012; McEwen, 2007). Allostatic load is the term used to describe the wear and tear on the body from one of four conditions: (a) repeated activation due to multiple stressors, (b) prolonged response and no shut off after the stressor has been removed, (c) dampened response to a stressor, or (d) a lack of proper adaptation to stressors (McEwen, 2007). Once the body has reached allostatic overload, the cumulative effects of stress begin to show up as abnormalities in the functioning of the nervous, endocrine, and immune systems.

There are 10 physiological parameters researchers use to obtain a measurement of an individual's allostatic load risk (Katz et al., 2011). Katz et al. (2011) stated that these primary mediators reflect changes in the nervous, endocrine, and immune systems, and include measurements of urinary cortisol, dehydroepiandrosterone sulphate (DHEA-S), epinephrine, norepinephrine, blood pressure, waist to hip ratio, body mass index, high density lipoprotein (HDL) and total HDL cholesterol ratio, and glycosylated hemoglobin.

These measurements reflect HPA function, sympathetic nervous system activation, cardiovascular activity, metabolic function, atherosclerotic risk, and glucose metabolism (Katz et al., 2011). The resulting allostatic load score, which ranges from 0 to 10, indicates the degree of wear and tear that has occurred across multiple systems.

According to Katz et al. (2012), the allostatic load score helps clinicians assess an individual's stress burden and thus his or her susceptibility to stress-related mental and physical problems.

High allostatic load scores are associated with diseases, such as Type 2 diabetes, cardiovascular disease, and neurodegenerative diseases (Giedd & Rapoport, 2010), as well as chronic fatigue syndrome (Maloney et al., 2006). High allostatic load scores are also predictive of mortality and morbidity as evidenced by the results of several large-scale prospective studies (Seeman, McEwen, Rowe, & Singer, 2001; Seeman, Singer, Rowe, Horowitz, & McEwen, 1997). Danese & McEwen (2012) contended the effects of allostatic overload are cumulative and lead to a slow onset of disease, often decades after initial exposure to a stressor.

Developmental Traumatology

Researchers attempting to discover whether exposure to chronic stress is more damaging if it occurs during childhood have found that there are sensitive and critical periods during brain development when the effects of chronic stress or maltreatment (i.e., mental or physical abuse/neglect) can be more harmful and enduring (De Bellis, 2001; Knudsen, 2004). De Bellis et al. (1999a) coined the term developmental traumatology to refer to the psychological, biological, and physiological effects of chronic interpersonal

violence on childhood development. Following a BPS model, developmental traumatology investigators study and synthesizes research findings from a wide range of disciplines, including psychiatry, stress and trauma research, social and relationship science, genetics, and neuroscience.

De Bellis (2001) stated that researchers involved in the study of developmental traumatology explore how a child's genes, psychosocial environment, and biology affect biological stress systems and brain development (De Bellis, 2001). Developmental traumatologists also take into account that there are critical or sensitive periods of brain development when negative life experiences exert their greatest effect. According to De Bellis, in the study of developmental traumatology, researchers also consider protective factors such as social support that can often ameliorate the effects of negative experiences that occur during critical or sensitive periods of brain development.

Sensitive and critical periods of brain development. A baby is born with an overabundance of neurons, approximately 50% of which are lost by adulthood (Grassi-Oliveria et al., 2008). The degree of neuronal loss is dependent on both environment and experiences (Grassi-Oliveria et al., 2008; Knudson, 2004). During childhood, the brain eliminates neurons that serve no purpose, and it strengthens and retains those neurons and neural connections needed for survival (Grassi-Oliveria et al., 2008). This process of synaptic pruning and myelination, respectively, occurs at an accelerated rate prior to age 4 but continues through age 30. From age 5 to age 18, myelination determines brain size (Giedd & Rapoport, 2010).

Sensitive periods are marked by times when the brain is especially vulnerable to the effects of the environmental and social experiences (Knudson, 2004). Critical periods are times when certain environmental or social experiences, or the lack thereof, can forever change the course of brain development, resulting in permanent functional and/or structural changes (Knudsen, 2004; National Scientific Council on the Developing Child, 2007). If an adverse experience persists throughout a critical period, the associated patterns of neuronal connectivity that develop may become stable and persist into adulthood. Such connectivity patterns can manifest as particular behaviors, emotional/stress responses, and psychopathology. Structural changes that occur in the brain and stress response system can leave individuals more vulnerable to health problems in adulthood (Knudsen, 2004; Middlebrooks & Audage, 2008). According to researchers at the National Scientific Council on the Developing Child (2007), “The exceptionally strong influence of early experience on brain architecture makes the early years of life a period of both great opportunity and great vulnerability for brain development” (p.1). For this reason, an environment that does not supply adequate emotional support, one in which caregivers are neglectful, or one in which the child is subjected to interpersonal violence or abuse can have a profound effect on his or her developing brain circuitry (National Scientific Council on the Developing Child, 2007).

Activation of the stress response system occurs when an individual is exposed to a real or a perceived threat (Juster, McEwen, & Lupien, 2010). The hippocampus, amygdala, and prefrontal cortex regions of the brain work as a network to conduct this threat evaluation and signal the stress response system to activate, if necessary (Danese &

McEwen, 2012; Juster et al., 2010). According to Danese and McEwen (2012), the areas of the brain found to be most susceptible to the effects of allostatic load are the prefrontal cortex, amygdala, and hippocampus. The prefrontal cortex is responsible for emotional regulation, attention, and fear-conditioned responses; the amygdala is responsible for fear conditioning, and the hippocampus regulates memory.

Literature on the negative effects of childhood stress and trauma on brain development is extant (Middlebrooks & Audage, 2008; National Scientific Council on the Developing Child, 2007; Danese & McEwen, 2012). Brain imaging studies conducted on individuals exposed to severe trauma and/or abuse during childhood have shown that these individuals have smaller intracranial and cerebral volumes than individuals who were not abused (De Bellis et al., 1999b). Lupien and colleagues (2009) found that different areas of the brain have critical periods of development, and if chronic stress occurs during a critical time, it can slow the development of that brain region. In their study, Lupien et al. found that females exposed to sexual abuse before age 12 had smaller hippocampal volume, whereas those exposed to sexual abuse between ages 12 and 18 had reduced prefrontal cortex volume.

In another study, Maercker, Michael, Fehm, Becker, and Margraf (2004) found that females who were exposed to chronic stress or trauma before age 13 were more likely to develop depression; after age 13, they were more likely to develop PTSD. Across several studies, adults with a history of ACEs have smaller prefrontal cortex and hippocampus volumes as compared to healthy controls. The amygdala volumes of those exposed to ACEs were comparable to those of the control group, but individuals with a

history of ACEs showed abnormal activation of the amygdala when faced with fearful stimuli (Grassi-Oliveria et al., 2008; McEwen, 2007).

The developmental traumatology model: ACEs and gene expression. As mentioned above, developmental traumatology includes the study of how childhood experiences affect genetic expression (De Bellis, 2001). Researchers have identified specific genes or gene abnormalities in some individuals with post-traumatic stress disorder (Binder et al., 2008; Broekman, Olf, & Boer, 2007), Parkinson's disease (Lesage & Brice, 2009), fibromyalgia (Bellato et al., 2012; Buskila & Sarzi-Puttini, 2006; Dadabhoy, Crofford, Spaeth, Russell, & Clauw, 2008), and chronic fatigue syndrome (Goertzel et al., 2006). There are also numerous empirical studies where researchers reported that behavior and environment (e.g., social experiences) can alter gene expression (Bakermans-Kranenburg, & van Ijzendoorn, 2011; Szyf et al., 2007).

Epigenetic programming is the ability of an organism's environment to alter gene expression. Szyf et al. (2007) stated that epigenetic programming is a dynamic process that continues throughout an individual's lifetime. Szyf and colleagues added that early social and behavioral experiences influence epigenetic programming by altering behaviors and stress responses, thus predisposing an individual to disease. In a review of empirical studies on the effects of maternal care and early life adversities on the epigenome, Champagne and Curley (2009) concluded that maternal care affects gene expression, especially genes involved in regulating stress responses. In a study of 1,148 individuals aged 30 to 34, investigators Das, Cherbuin, Tan, Anstey, and Eastaer (2011)

found that genetic factors also moderate the effects of negative early life experiences, making individuals more resistant to the effects of stress on behavior and health.

Although an exhaustive review of studies on the effects of early life adversities and social experiences on epigenetic programming is beyond the scope of this study, this area of inquiry lends additional support for the need to take an expanded viewpoint of disease etiology, progression, and health outcomes. Such a viewpoint is relevant in chronic pain disorders such as fibromyalgia where ACEs may be a significant risk factor for developing the syndrome.

ACEs, mental health, and physical disease. In the ACE Study, a joint research effort undertaken by the CDC and the Kaiser Permanente Health Appraisal Clinic, investigators provided compelling evidence of the negative effects of ACEs on health (CDC, 2006; Felitti et al., 1998). In this retrospective study of over 17,000 adults, researchers evaluated the effects of ACEs on adult behaviors and health outcomes. These researchers found that there was a significant relationship between the reported number of ACEs and the number of health problems and negative health behaviors (e.g., smoking, drug/alcohol abuse, obesity, and sexually transmitted diseases) experienced in adulthood (Felitti et al., 1998).

A more thorough discussion of the health consequences of childhood maltreatment is contained in a review and meta-analysis conducted by Norman et al. (2012). These researchers concluded that children exposed to abuse or neglect experience alterations in neurobiological development, predisposing them to physical, psychological, cognitive, emotional, and social challenges. In addition, negative childhood experiences

were a contributing factor in the development of adult mental and physical health problems, either through the cumulative effect of stress on biological systems or through exposure to adverse experiences during critical brain development periods. The results of these studies should serve as further support for the importance of considering ACEs as a potential risk factor for the development of fibromyalgia in adulthood.

ACEs and Fibromyalgia

Researchers across numerous studies have found that individuals with fibromyalgia who reported being exposed to ACEs have high allostatic load scores (Imbierowicz & Egle, 2003), HPA axis dysfunction (Gökce et al., 2004), immune/inflammatory problems (Danese et al., 2007), and disruptions in normal daily cortisol patterns (Weissbecker et al., 2006). Across several studies, the reported incidence of ACEs in fibromyalgia patients ranged from 32% to 64% (Goldberg, 1999; Imbierowicz & Egle, 2003; van Houdenhove et al., 2001; Walker et al., 1997). Van Houdenhove et al. (2001) noted in their study that chronic fatigue and fibromyalgia patients ($n = 91$) had significantly higher rates of childhood and adulthood emotional neglect, emotional abuse, and physical abuse than a group of healthy controls ($n = 95$), and a group of patients with rheumatoid arthritis or multiple sclerosis ($n = 52$). The rates of sexual abuse/harassment in the chronic fatigue and fibromyalgia groups were also higher than the other two groups but not statistically significant.

In a study of 323 patients ($n = 38$ with fibromyalgia and $n = 71$ with somatoform pain disorder), Imbierowicz and Egle (2003) found that those with fibromyalgia reported significantly higher levels of childhood physical and/or sexual abuse than the control

group. In addition, the levels of physical and/or sexual abuse and physical violence between parents were 7 times higher than that reported by the control group. These researchers also noted that individuals with fibromyalgia reported significantly poorer emotional relationships with parents and significantly higher separation from parents before age 15 than the other two groups. Overall, the fibromyalgia patients had higher cumulative ACE scores (cumulative risk factors), indicating that they experienced more chronic or severe childhood adversities than the control group.

HPA Axis Dysfunction and Fibromyalgia

In a review of studies on HPA axis function in patients with fibromyalgia, Tanriverdi et al. (2007) found that most researchers reported that there were significant alterations in the function of the HPA axis; however, it was not possible to conclude whether these changes were a contributing factor or the result of the syndrome. These investigators pointed to several research studies indicating that peak cortisol levels among individuals with fibromyalgia were significantly lower than levels found in healthy individuals. Such results would suggest that the stress response system in individuals with fibromyalgia is under-activated. Gökce et al. (2004) found that more than 95% of the fibromyalgia patients in their study had HPA axis dysfunction, leading them to conclude that dysregulation of the central stress axis leads to the onset of symptoms associated with fibromyalgia. These researchers also noted that such alterations predispose individuals to developing stress-related disorders in adulthood.

Although Tanriverdi and colleagues (2007) found studies contradicting the above findings, they attributed many of the inconsistencies to testing, interpretation, and

methodological issues. Throughout the studies they reviewed, it was evident that HPA dysfunction and hypocortisolemia (i.e., depressed cortisol production) were common in individuals with fibromyalgia. These conclusions were echoed by Gupta and Silman (2004), who added that symptoms experienced by individuals with fibromyalgia (e.g., fatigue, muscle/joint pain, and sleep disturbances) are also associated with low cortisol levels, providing further evidence to support a theory of HPA axis dysfunction and hypocortisolemia in these individuals. Collectively, the studies on HPA axis function in individuals with fibromyalgia suggest that ACEs and chronic activation of the body's stress response system may play a role in the etiology and progression of this syndrome.

Immune System Impairment, ACEs, and Fibromyalgia

Researchers have found that children exposed to psychosocial stress have impaired immune responses when tested as adults (Danese et al., 2007). In a longitudinal study of 1,037 children, these researchers found elevated levels of C-reactive protein (i.e., an inflammatory marker) in those who had been exposed to childhood maltreatment; the greater the maltreatment, the higher the level of C-reactive protein. Danese and colleagues (2007) stated that C-reactive protein increases the risk of acquiring serious health conditions, including Alzheimer's disease, heart disease, and chronic pain disorders. High levels of inflammation due to chronic activation of the sympathetic nervous system also lead to reduce immune response to infections (Danese & McEwen, 2012).

New immune-histochemical staining techniques have provided evidence of inflammation in the fascia (i.e., connective muscle tissue) in individuals with

fibromyalgia (Liptan, 2010). Liptan (2010) speculated that this inflammation could be the cause of widespread pain reported by individuals with this syndrome. Liptan stated that the root of the inflammation seen in the fascia of these individuals could be the result of impaired growth hormone release due to an HPA axis dysfunction.

Social Support and Health

The role of social relationships in psychological well-being and health outcomes has been the subject of intense study for more than 30 years (Holt-Lunstad et al., 2010). After the results of five large-scale prospective studies were reported, House et al. (1988) went so far as to proclaim “social relationships, or the relative lack thereof, constitute a major risk factor for health, rivaling the effect of well-established health risk factors such as cigarette smoking, blood pressure, blood lipids, obesity, and physical activity” (p. 541).

Social relationships affect health and physiology through both behavioral and psychological means (Brooks & Dunkel-Schetter, 2011; Croezen et al., 2012; Petrie & Weinman, 2006). For example, social relationships may determine what individuals eat and whether they exercise, smoke, or drink (Croezen et al., 2012). In addition, these relationships can influence how often they seek medical help and advice and if they adhere to a prescribed medical protocol (Petrie & Weinman, 2006). The quality of social relationships can also determine such things as life satisfaction, perceptions of stress, and depressive symptoms (Brooks & Dunkel-Schetter, 2011).

A comprehensive review of reports from studies conducted over the past three decades provides indisputable evidence that there is a predictable relationship between

structural and functional aspects of an individual's social network and health outcomes (Campo, Uchino, Vaughn, Reblin, & Smith, 2009; Cohen, 2004; Holt-Lunstad et al., 2010; House et al., 1988; Uchino et al., 2004). For example, in a 6-month study of 75 married couples, DeLongis, Folkman, and Lazarus (1988) found that when individuals perceived that social support was available, they were better able to cope with negative experiences and had fewer minor health problems (e.g., headaches, backaches, and cold/flu symptoms). The results of two large-scale prospective studies conducted in the United States and Sweden provided especially strong support for the link between social relationships and health. Berkman and Syme (1979) studied 4,775 healthy adults in Alameda County, California over a period of 9 years and found that the types of social relationships an individual had were reliable predictors of mortality. In a 5-year study of 17,433 men and women aged 29 to 74, Swedish researchers Ortho-Gomér and Johnson (1987) concluded that the greater the frequency of social interactions with others, the lower the risk of mortality.

In a more recent meta-analysis of 148 prospective studies, many spanning more than 20 years, Holt-Lunstad et al. (2010) concluded that even when controlling for age, sex, and initial health status, those individuals with greater levels of social support had a 50% decreased risk of mortality. These results reflect data compiled from 308,849 participants living in North America, Europe, Asia, and Australia. Holt-Lunstad et al. argued that the consistency of the results of these studies across age, race, sex, and initial health status suggest that it is possible to predict health outcomes based on individuals' social relationships.

Social Network Interactions and Health

Although researchers who conducted empirical studies have established the existence of a causal link between social support and mortality/morbidity, some researchers have pointed out that it is also important to take into consideration subjective qualities of social relationships and their influence on health (Brooks & Dunkel-Schetter, 2011; Campo et al., 2009; Uchino, 2013). For example, an individual's social network may be comprised of some relationships that are primarily positive in nature and some relationships in which a large number of negative interactions occur. Holt-Lunstad, Uchino, Smith, and Hicks (2007) argued that social support and negative social interactions (i.e., social undermining) can lead to different outcomes; therefore, they are "separable dimensions" (p. 278).

As previously pointed out, researchers who conducted large-scale studies have documented the role of positive social support and better mental and physical health outcomes (Berkman & Syme, 1988; Holt-Lunstad et al., 2010; House et al., 1988; Newsom et al., 2008; Ortho-Gomér & Johnson, 1987). There are fewer studies where researchers have examined the effects of negative social interactions on physical health outcomes; however, the results they reported indicate that negative social interactions may be a better predictor of mental health outcomes than social support (Newsom et al., 2005). Researchers have also established a relationship between higher levels of negative social interactions and lower levels of self-rated physical health (Croezen et al. 2012; Newsom et al., 2008; Umberson et al., 2006). For example, in a study of 41 females with rheumatoid arthritis, Zautra et al. (1997) found that negative social interactions were

predictive of increased elevations in biological indicators of rheumatoid arthritis, as well as the perceived severity of pain. Stephens, Druley, and Zautra (2002) found that patients had a harder time recovering from knee surgery when they had a high number of negative social interactions.

Further support for the effect of negative social interactions on health comes from a 2-year, 5-wave longitudinal study of 916 adults, age 65 to 90. In this study, Newsom et al. (2008) assessed participants' self-reported level of health and their perceived level of negative social interactions (i.e., unwanted advice/intrusion, failure to provide help, unsympathetic or insensitive behavior, and neglect). Newsom and colleagues found that those individuals who reported negative social interactions that persisted over the 2-year period had significantly more health conditions, lower levels of self-rated health, and more difficulties performing daily activities. These results were consistent even when controlling for health conditions present at the onset of the study and demographic factors (i.e., income, sex, age, education level, and race). Study researchers concluded that negative social interactions diminished feelings of well-being and increased psychological distress, whereas positive social exchanges only increased feelings of well-being.

Croezen et al. (2012) stated that in numerous cross-sectional studies, researchers have established a relationship between social support and health but pointed out that longitudinal support for this relationship was not as conclusive. Therefore, Croezen and colleagues undertook a 10-year study of 4,724 Dutch males and females to assess the effects of social support and negative social interactions on self-perceived physical

health, psychological health, lifestyle factors, and biological risk factors. Researchers found that negative social interactions had a greater influence on smoking habits, diet, exercise, and self-rated health than did social support. Such findings confirmed Newsom et al.'s (2008) findings and Uchino, Smith, and Hick's (2007) assertion that positive and negative social interactions represent separate constructs.

Social Network Interactions and Allostatic Load

As discussed earlier, activation of the body's stress response system can occur due to negative social interactions, and the cumulative effect of chronic stress is allostatic overload. Two large-scale studies of older adults established such a link between quality of social relationships and allostatic load. Seeman, Singer, Ryff, Love, and Levy-Storms (2002), in their community-based cohort study of 871 males and females aged 58 to 79, found that higher levels of criticism and demands from a spouse correlated significantly with higher allostatic load scores. Gustafsson, Janlert, Theorell, Westerlund, and Hammarström (2012) reported similar results in a prospective cohort study conducted in Sweden. Analysis of the allostatic load score and the level of social and material adversities for the 822 participants in the study provided additional support for the theory that there is a cumulative risk associated with chronic exposure to stress, as well as sensitive periods. Gustafsson and colleagues concluded that social stressors experienced in early life have negative physiological consequences that can carry over into adulthood.

Social Network Interactions and Fibromyalgia

Several themes have emerged from qualitative studies where researchers explored the impact of fibromyalgia on an individual's social network interactions (Arnold et al.,

2008; Åsbring & Närvänen, 2003; Mengshoel & Heggen, 2004; Sim & Madden, 2008). Most individuals with fibromyalgia reported that relationships with members of their social network changed significantly after the onset of their symptoms (Arnold et al., 2008; Åsbring & Närvänen, 2003; Mengshoel & Heggen, 2004). Individuals with fibromyalgia cited unpredictability of symptoms, pain, fatigue, depression, changes in physical abilities, changes in previous social roles, inability to participate in social activities, and skepticism about their condition as the main causes for changes in their social relationships (Arnold et al., 2008; Sim & Madden, 2008). Negative changes in relationships with friends, family, and co-workers were common complaints, but many individuals with fibromyalgia also reported that the relationship with their physician and/or health care providers also suffered (Arnold et al., 2008; Mengshoel & Heggen, 2004).

Individuals with fibromyalgia often feel stigmatized by those in their social network even though the disorder has received clinical validity (Arnold et al., 2008; Bennett et al., 2007; Mengshoel & Heggen, 2004). Bennett et al. (2007) found that 28% of patients with fibromyalgia felt that even their health care provider did not consider their condition a legitimate medical disorder. Barker (2002) stated that some physicians and health care providers still consider fibromyalgia a psychosomatic illness or the somatic representation of a mental illness. Barker speculated that this viewpoint persists due to fibromyalgia's initial designation as a clinical presentation of hypochondria or hysteria due to its high prevalence in females. Across several studies, individuals with fibromyalgia voiced concerns that (a) their pain and symptoms were not understood or

managed effectively by their physician (Alamo, Moral, & de Torres, 2002; Haugli et al., 2004), (b) their complaints were not taken seriously by their physician (Arnold et al., 2008; Åsbring & Närvänen, 2003; Kool, van Middendorp, Boeije & Geenen, 2009), and/or (c) their physician did not listen or appear to have empathy (Alamo et al., 2002; Haugli et al., 2004; Lind, Lafferty, Tyree, Diehr, & Grembowski, 2007; Sim & Madden, 2008).

For individuals who suffer from fibromyalgia, the stigmatization by health care professionals, family, friends, and co-workers has wide-reaching implications (Barker, 2002; Gatchel et al., 2007). The social implications of fibromyalgia can be as devastating as its physical symptoms, with many individuals reporting that their social relationships suffered or ceased to exist after their diagnosis (Barker, 2002; Schoofs, Bambini, Ronning, Bielak, & Woehl, 2004). Barker (2002) stated that many individuals with fibromyalgia appear healthy to an outside observer. This healthy appearance often leads to feelings of frustration or anger, because they must try to convince others, including physicians, of the realness of their pain and symptoms. Gatchel et al. (2007) stated that when chronic pain patients perceive that others do not understand their symptoms and pain, they often develop psychological and emotional problems, including depression and anxiety. The resulting psychological and emotional distress can exacerbate their symptoms, as well as causing sleep disturbances, functional limitations, loss of work, and financial difficulties.

Mengshoel and Heggen (2004) stated that when individuals become ill, they take on a different social role and identity due to their changing expectations and the changing

expectations of others. Often the role placed on them by others is not reflective of the role they want to assume. Although some individuals with fibromyalgia resist taking on a sick role, for others a sick role provides relief from work and social obligations (Mengshoel & Heggen, 2004).

Illness Perceptions

When given a diagnosis of disease or a label of illness by their physician, individuals create an illness perception (Leventhal et al., 1998). The illness perception is a cognitive representation of how they expect that disease or illness to affect their life (Leventhal et al., 1998; Petrie et al., 2007; Petrie & Weinman, 2006). Leventhal et al. (1998), in their perceptual-cognitive model of self-regulation provide an explanation of the mechanisms whereby illness perceptions affect health and recovery from an illness or disease. Individuals use five main and interrelated components to construct an illness perception. These include (a) an illness identity or label; (b) beliefs about the cause of the disease or illness; (c) beliefs about how the disease or illness will progress or persist; (d) beliefs about how much control they have over their symptoms and whether a cure is possible; and (e) the overall physical, emotional, and social consequences of the disease or illness (Leventhal et al., 1998; Petrie & Weinman, 2006).

Individuals generate beliefs and perceptions about an illness or disease based on previous experiences and personal knowledge about medical concepts and diseases (Petrie et al., 2007; Petrie & Weinman, 2006). Petrie and Weinman (2006) stated that illness beliefs and perceptions are used by individuals to help them make sense of their illness or disease, as a means of understanding and processing health information, and as

a way to evaluate possible treatments and health outcomes. Petrie et al. (2007) and Petrie and Weinman (2006) stated that illness perceptions determine coping mechanisms, adherence to treatment protocols, perceptions of pain, emotional responses, functional ability, and recovery.

Petrie and Weinman (2006) stated that the illness identity or label individuals assign to their disease determines what they believe the symptoms should be and how they should act, even if this does not coincide with current medical knowledge or the treating physician's opinion. The cause they attribute to their illness then determines what types of treatment they might seek and what steps they would take to deal with their illness. Petrie and Weinman added that individuals will also develop beliefs about whether their illness is temporary or chronic, and this belief can influence adherence to a treatment protocol. These last two beliefs about the cause and progression of their disease will then determine the perception of how much control there is over the illness and whether a cure is possible. Beliefs about the consequences of the illness determine how they perceive it will affect their life, including social relationships, work, lifestyle, and finances.

Illness Perceptions and Health Outcomes

There is growing body of empirical evidence to support a relationship between illness perceptions and health outcomes (Galland, 2006; Petrie & Weinman, 2006; Stafford et al., 2009; Turner et al., 2000). In studies of patients with a variety of different diseases, researchers have shown that negative illness perceptions result in longer recovery times, more severe symptoms, increased number of symptoms, and greater

functional disability (Petrie & Weinman, 2006; Stafford et al., 2009). Petrie and colleagues (2007) noted that even in individuals with the same condition, illness perceptions vary widely and can influence health-related behaviors.

The role of illness perceptions on health outcomes has been extensively studied in relation to many different diseases, including coronary artery disease (French, Cooper, & Weinman, 2006; Stafford et al., 2009), cancer (Thuné-Boyle, Myers, & Newman, 2006), diabetes (McSharry, Moss-Morris, & Kendrick, 2011), asthma (Horne & Weinman, 2002), and chronic fatigue syndrome (Edwards, Suresh, Lynch, Clarkson, & Stanley, 2001). The conclusions investigators reached in these studies led them to suggest that negative perceptions about illness (e.g., chances for recovery, disease severity, symptoms, and disease progression) are predictive of adherence to a treatment protocol, coping ability, severity of symptoms, disease progression, depressive symptoms, wound healing, functional disability, return to work, and recovery rates. Stafford et al. (2009) commented that such results point toward the need for health care providers to evaluate patients' illness perceptions and identify any negative perceptions that could affect health outcomes or adherence to treatment protocols. Stafford and colleagues added that this information could be beneficial in formulating an effective clinical intervention targeting erroneous or unproductive beliefs that might prevent patients from understanding and coping with their illness or disease.

Michie, Miles, and Weinman (2003) stressed that in situations where individuals receive a diagnosis of a chronic condition, determining their illness perceptions can aid a health care provider in tailoring successful management strategies. This is because living

and coping with a chronic condition often requires a high degree of self-management skills and health-related behavioral changes. These changes can be easier when patients have good communication with their treating physician or health care provider and when perceptions of illness align with reality. Petrie and Weinman (2006) developed the Illness Perception Questionnaire as a way for health care providers to assess a patient's beliefs about his or her illness and thus gain a better understanding of what areas of the patient's care require the most attention.

Illness Perceptions and Pain

Pain appraisals and pain beliefs are important because they determine how an individual affectively and behaviorally responds to pain (Gatchel et al., 2007). Beliefs about pain develop over a lifetime and influence how that individual will respond to the pain experience, including the cause of pain, its progression, and treatment options (Leventhal et al., 1998). Beliefs are assumptions that individuals use to determine their reality and through which they interpret and understand events (Lazarus & Folkman, 1984). Turner et al. (2000) found that beliefs that pain is a permanent condition and that it is uncontrollable are especially damaging to pain appraisals and adjustment.

Gatchel et al. (2007) pointed out that results from numerous cross-sectional studies have shown that when individuals catastrophize their pain (i.e., they have an exaggerated and negative response to actual or anticipated pain, and/or they expect negative outcomes), they actually experienced higher levels of pain, exhibited more illness-related behaviors, and had more physical and psychological problems. Two studies on catastrophizing and health outcomes in patients with fibromyalgia produced

similar results. Burckhardt, Clark, O'Reilly, and Bennett (1997) noted that fibromyalgia patients who catastrophized experienced increased pain and depression, and reduced quality of life; Martin et al. (1996) found that they experienced higher levels of functional disability.

In a study of 169 patients with chronic pain, Turner et al. (2000) found that participants' beliefs about their condition and their coping skills were statistically significant predictors of functional disability. In addition, negative beliefs, combined with catastrophizing about their condition, were significant predictors of depression. In this study, beliefs encompassed the following factors: (a) pain could be controlled; (b) it is possible to function with pain; (c) pain is the result of damage, thus any activity that might cause damage should be avoided; (d) one has control over pain; (e) emotions influence pain; (f) medication alleviates pain; (g) others should respond to pain; and (h) there is a cure for pain.

Galland (2006) argued that it is essential for a health care provider to understand patients' illness beliefs and perceptions of self-efficacy in order to tailor effective therapeutic interventions. Galland stated that individuals are more likely to change their health behaviors when they receive adequate information and when they have help settings goals and measuring their progress. In addition, Galland believed that it is important to help patients identify triggers that exacerbate their symptoms.

Illness Perceptions, Social Network Interactions, and Fibromyalgia

There is growing body of empirical evidence supporting the theory that illness perceptions influence pain and recovery from disease or injury (Burkhart et al., 1997;

Gatchel et al., 2007; Martin et al., 1996; Stuifbergen et al., 2006; Turner et al., 2000.

Stuifbergen et al. (2006) stated that fibromyalgia is a syndrome in which much of care is the responsibility of the individual; therefore, individuals' perceptions about their illness can have a large influence on how they cope with their disease. In their quantitative study, Stuifbergen and colleagues surveyed 91 females diagnosed with fibromyalgia and noted that most had a negative perception of their illness. A majority of the females believed that their illness symptoms were the result of stress, that their condition was chronic, and that the consequences of the syndrome were serious. The study participants who perceived fibromyalgia in this way scored high on the Fibromyalgia Impact Questionnaire (FIQ), a quantitative measure of the impact of fibromyalgia on factors, such as physical functioning, pain, sleep, depression, anxiety, and other quality-of-life dimensions (Burckhardt et al, 1991).

Mengshoel and Heggen (2004) were interested in discovering some of the characteristics of individuals who have recovered from fibromyalgia. In their qualitative study, these researchers interviewed five females who had successfully recovered from fibromyalgia even though they followed different treatment regimes. All five females stated that they sought alternative therapies to deal with their symptoms and that they remained hopeful for a cure. This led them to form a belief that fibromyalgia was not a chronic condition. Two out of the five participants believed that they improved because of lifestyle changes, whereas the others believed their recovery was due to a biological change.

Mengshoel and Heggen (2004) noted that all of the participants in their study reported that when they received a diagnosis of fibromyalgia, it changed their relationships with others in their social network, and they struggled to maintain their previous social roles. The participants indicated that most of their friends, family members, co-workers, and healthcare providers viewed their diagnosis with skepticism. All five participants stated that the lack of social support diminished their ability to cope with their symptoms. All five participants also indicated that they did not adopt a sick role, nor did they attend fibromyalgia support groups. They all expressed an opinion that support groups reinforce and perpetuate a sick role. Mengshoel and Heggen attributed the recovery of these five participants to their resistance to assuming a sick role, hypothesizing that they recovered by reducing the mismatch between their abilities and their social obligations. In other words, they all redefined their social obligations, life goals, and meaning of pain. Based on the results of this small-scale study, the inclusion of illness perceptions and the role of social support deserve further inquiry.

Summary and Conclusions

From my review of the literature, it is apparent that there are still many unanswered questions concerning the etiology and progression of fibromyalgia. What is also apparent is that fibromyalgia is a complex syndrome with many potential contributing factors. Research suggests that there is a complicated interplay between biological, psychological, and social factors in the etiology of this syndrome; therefore, studying fibromyalgia in an integrated fashion by adhering to a BPS model of disease seems appropriate. The reported inconsistency of pharmacological and biomedical

interventions in relieving the myriad of symptoms associated with fibromyalgia serves to strengthen this contention as well as point to the need for further research into a multifactorial cause for fibromyalgia. This perspective also applies to the treatment and progression of this syndrome, because social network interactions and illness perceptions may play a role in the persistence and perceived severity of symptoms.

To date, there have been a limited number of empirical studies examining the role of ACEs as a potential contributing factor in the etiology of fibromyalgia. However, several researchers have found that a high percentage of individuals with fibromyalgia reported exposure to severe abuse or neglect during childhood. There is also a high prevalence of ACEs in patients with other diseases and syndromes, some of which share many symptoms in common with fibromyalgia, such as rheumatoid arthritis and chronic fatigue syndrome. Adding these findings to the emerging evidence on the role of stress on the developing brain, there appears to be sufficient justification for further inquiry into the role of ACEs as a potential risk factor for developing fibromyalgia.

An underlying factor in ACEs is chronic activation of the body's stress response system. In this literature review, I presented a large body of evidence on the negative biological impacts of chronic stress on neuroendocrine and immune system functions. Allostatic load, a measure of the cumulative effects of stress on these systems, provides physicians and researchers with a means of examining the role that stress plays in the onset of disease. Researchers have found high allostatic load scores in adults who were victims of childhood abuse or neglect. They have also found high allostatic load scores in individuals with a wide range of diseases, including coronary artery disease, chronic pain

disorders, post-traumatic stress disorder, and fibromyalgia. Such findings are compelling and provide additional support for the theory that there is a relationship between ACEs and many adult onset diseases.

In keeping with the biopsychosocial model, this study took into account the role of social and psychological factors in the study of fibromyalgia. There have been numerous studies on the role that social support plays in health outcomes. In this literature review, I revealed that evidence for the relationship between these variables is strong, spanning over 30 years. The accumulation of such a large body of evidence has led researchers to conclude that social relationships are a reliable predictor of physical and mental health.

There is also recent evidence of a relationship between social support and allostatic load, the latter of which is also a predictor of health outcomes. As mentioned earlier, several studies have found that individuals with fibromyalgia have high allostatic load scores. In addition, themes emerging from qualitative studies and results of quantitative studies have indicated that individuals with fibromyalgia experience negative changes in their social relationships after onset of their symptoms or their diagnosis . Therefore, studying the quality of social relationships in patients with fibromyalgia may provide additional insight into how social network interactions (i.e., social support and social undermining) influence the course and outcome of their illness.

Illness perceptions are another factor that may influence the course and outcome of illness in individuals with fibromyalgia. The relevance of illness perceptions and health outcomes in individuals with fibromyalgia is unknown, but illness perceptions are

known to influence health behaviors, coping strategies, symptom severity, and disease progression in patients with chronic fatigue syndrome, a syndrome commonly associated with fibromyalgia. It is also unknown if there is a relationship between social network interactions and illness perceptions among individuals with fibromyalgia.

The findings summarized in this literature review led me to develop the research questions and hypotheses investigated in this study. In Chapter 3, I provide a detailed explanation of the methodology I followed to examine the relationship between ACEs and illness perceptions of personal control and treatment control among individuals with fibromyalgia. Due to the empirical evidence on the influence of social network interactions on illness perceptions, I felt that it was important to include perceived social support and social undermining as potential moderating variables in this study. I examined the theorized relationships between variables using moderated multiple regression analyses. I present a statistical model for this analysis, along with an explanation of the power analysis and data analysis procedures in Chapter 3.

In Chapter 3, I present an overview of the research design for this study, including sampling methods, recruitment strategies, and measurement instruments. In Chapter 4, I provide a description of the results of this study, including a restatement of the research questions, an explanation of the data collection process, descriptive statistics for the study sample, data analyses performed, and statistical results as they pertain to each research question. In Chapter 5, I summarize the overall study and provide an interpretation of results, study limitations, recommendations for future research, and a discussion of social change implications.

Chapter 3: Research Methodology

Introduction

The purpose of this quantitative study was to determine if ACEs (i.e., physical punishment, emotional abuse, and sexual events) are predictive of two facets of illness perceptions, personal control and treatment control, among individuals with fibromyalgia. My additional goal in this study was to examine the potential moderating effects of perceived social support and social undermining on the relationship between ACEs and illness perceptions. In this chapter, I begin with a restatement of the research questions and hypotheses, followed by an overview of the study and justification for selecting a survey research design and moderated multiple regression analysis. Following this section, I provide descriptions of the study population and selection criteria, sampling and recruitment strategies, study setting, and power analysis calculation. In the next section, are discussions of the study variables and instruments used to assess these variables. I intended the data analysis section that follows to provide readers with a systematic description of how I analyzed the data. I conclude Chapter 3 with a discussion of ethical issues relevant to this study, including Walden University Institutional Review Board (IRB) requirements.

Research Questions and Hypotheses

I designed the methodology described in this chapter to answer the following research questions and associated hypotheses:

Research Question 1:

Is exposure to ACEs (i.e., physical punishment, emotional abuse, and sexual events) a predictor of illness perceptions of personal control and treatment control among individuals with fibromyalgia?

Null and Alternative Hypotheses:

H_01 : Exposure to ACEs, as measured by the ETISR-SF, is not a predictor of illness perceptions of personal control and treatment control, as measured by the IPQ-R among individuals with fibromyalgia.

H_A1 : Exposure to ACEs, as measured by the ETISR-SF, is a predictor of illness perceptions of personal control and treatment control, as measured by the IPQ-R among individuals with fibromyalgia, among individuals with fibromyalgia, such that exposure to a greater number of ACEs is associated with a higher level of negative perceptions concerning personal control and treatment control.

Research Question 2:

Does perceived social support act as a primary moderator in the relationship between ACEs and illness perceptions of personal control and treatment control among individuals with fibromyalgia?

Null and Alternative Hypotheses:

H_02 : Perceived social support, as measured by the MSPSS, does not have a primary moderating effect on the relationship between ACEs and illness perceptions of personal control and treatment control among individuals with fibromyalgia.

H_{A2} : Perceived social support, as measured by the MSPSS, has a primary moderating effect on the relationship between ACEs and illness perceptions of personal control and treatment control among individuals with fibromyalgia, such that higher levels of perceived social support are associated with higher levels of positive perceptions concerning personal control and treatment control.

Research Question 3:

Does social undermining act as a secondary moderator in the relationship between ACEs and illness perceptions of personal control and treatment control among individuals with fibromyalgia?

Null and Alternative Hypotheses:

H_03 : Social undermining, as measured by the SUND, does not have a secondary moderating effect on the relationship between ACEs and illness perceptions of personal control and treatment control that is moderated by perceived social support.

H_{A3} : Social undermining, as measured by the SUND, has a secondary moderating effect such that it moderates the relationship between ACEs and illness perceptions of personal control and treatment control that is moderated by perceived social support.

Measurement of Variables

ACEs: I assessed ACEs using 11 yes/no questions from the ETISR-SF (Bremner et al., 2007) comprising the subscales of physical punishment, emotional abuse, and sexual events. Answers were coded 1 = *yes* and 0 = *no*. I calculated the total ETISR-SF score by summing the total number of events for all three subscales. Total scores were

also calculated for each of the individual subscales in the same manner. Scores for all subscales of the ETISR-SF ranged from 0 to 16. Scores for the physical punishment and emotional abuse subscales ranged from 0 to 5, and the score for sexual events could range from 0 to 6. Higher scores indicated exposure to a greater number of ACEs prior to age 18.

MSPSS: I assessed perceived social support using all 12 items of the MSPSS (Zimet et al., 1988). Answers for each item were coded as follows: 1 = *very strongly disagree*, 2 = *strongly disagree*, 3 = *mildly disagree*, 4 = *you are neutral*, 5 = *mildly agree*, 6 = *strongly agree*, and 7 = *very strongly agree*. I calculated the score for the MSPSS by summing all 12 items. The total scores for the MSPSS could range from 12 to 84. Higher scores indicated higher levels of perceived social support.

SUND: I assessed social undermining using all seven items of the SUND (Vinokur et al., 1996). Answers for each item were coded as follows: 1 = *never*, 2 = *once in a while*, 3 = *fairly often*, 4 = *very often*. I calculated the score for the SUND by summing all seven items. The total score for the SUND could range from 7 to 28. Higher scores indicated higher levels of social undermining.

IPQ-R: I assessed illness perceptions of personal control and treatment control using two subscales of the IPQ-R (Moss-Morris et al., 2002). Answers for each item were coded as follows: 1 = *strongly disagree*, 2 = *disagree*, 3 = *neither agree nor disagree*, 4 = *agree*, and 5 = *strongly agree*. Items 1 and 5 of the treatment control variable, and Items 4 and 6 of the personal control variables were reversed coded, as specified by the

developers. The total score for treatment control could range from 5 to 25; the total score for personal control could range from 6 to 30.

Research Design and Rationale

I used a survey research design for this study. Survey research is appropriate in correlational, experimental, or nonexperimental studies when the researcher is interested in collecting quantitative information on attitudes, beliefs, or behaviors (Trochim, 2000). In survey research, researchers use interviews or questionnaires to obtain quantitative information from a sample of the population, and this sample can be obtained through random or nonrandom sampling techniques (Creswell, 2009; Trochim, 2000). When researchers use nonrandom sampling techniques in a multiple regression analysis, the independent variables are referred to as predictor variables, and the dependent variable is referred to as the criterion variable (Green & Salkind, 2008). When a researcher does not use random sampling techniques, the study is considered quasi-experimental (Creswell, 2009; Trochim & Donnelly, 2008).

Sampling Design

I obtained a sample of the population for this study through purposive convenience sampling techniques. Convenience sampling is a type of nonprobability sampling in which the researcher selects study participants because they are easy to identify and access (Stapleton, 2010). Convenience sampling is often chosen when researchers study rare, socially isolated, or hidden populations. In these cases, it is often challenging or cost prohibitive to obtain a representative sample of the population (Watters & Biernacki, 1989). Convenience sampling is frequently the method of choice

when time, access, and cost considerations make random sampling difficult and members of the population of interest are accessible in a clinical, institutional, or online setting (Stapleton, 2010; Watters & Biernacki, 1989).

Purposive sampling is a type of nonprobability sampling that allows a researcher to select participants based on a predetermined set of criteria or particular population characteristics (Creswell, 2009; Trochim & Donnelly, 2008). In this study, purposive sampling was appropriate because it was necessary to obtain a sample of individuals who had received a diagnosis of fibromyalgia. I chose purposive convenience sampling methods for this study because individuals with fibromyalgia are not easy to identify in a population. In many cases, individuals with fibromyalgia appear healthy and choose not to reveal their condition to everyone in their social or professional network. However, they may be members of a support group or may seek medical information about their condition from online sources (Barker, 2002; Fox, 2011; Sim & Madden, 2008).

The drawback to using nonrandom sampling designs such as purposive convenience sampling is that it reduces the external validity of the results (Trochim & Donnelly, 2008) and introduces bias into the study (Eysenbach, 2004; Kraut et al., 2004). Therefore, these sampling methods can result in misrepresentation of the population. For example, Watters and Biernacki (1989) pointed out that surveys often result in underrepresentation of hidden populations.

Due to the use of nonprobability sampling methods, it is not possible for me to draw conclusions about causation between study variables. Further, the results are not generalizable beyond the sample of individuals with fibromyalgia taking part in this study

(Creswell, 2009; Kraut, 2009; Trochim & Donnelly, 2008). However, because of the difficulty in identifying a representative sample of individuals with fibromyalgia and the limited information on the relationships between the variables being examined, the results of this study may be important enough to stimulate further discussion and research. In a later section of this chapter, I provide a detailed discussion of the sampling and recruitment strategies for this study. I discuss limitations in the chosen sampling strategy in greater detail in Chapter 5.

Survey Design

I collected data using an online survey. The survey I developed for this study consisted of items from existing instruments with good psychometric properties. With the survey questions, I assessed ACEs (i.e., physical punishment, sexual events, and emotional abuse), perceived social support, social undermining, and personal control and treatment control facets of illness perceptions. As recommended by Eysenbach (2004) and Kraut et al. (2004), I selected several individuals to pre-test the functionality and user friendliness of the survey prior to making it available to participants. I did not include the survey results from this test group in the data analyses. Refer to Appendix A for a list of the survey questions.

I used SurveyMonkey® to develop my online survey. SurveyMonkey® offers survey design and administration services, in addition to data collection, integration, storage, and analysis services (SurveyMonkey®, 2014). SurveyMonkey® allowed me to embed a link to the survey on the study website and share the survey link on Facebook. It also allowed me to download survey responses directly into IBM® SPSS® Statistics,

version 21 (IBM SPSS Software, n.d.) data analysis software, saving data entry time and preventing data entry errors. SurveyMonkey® ensures confidentiality of data through an SSL encryption package (SurveyMonkey®, 2014). This package provided study participants with a secure survey link for data transmission, protecting the confidentiality of all data and the anonymity of their survey responses. I was the registered user of the SurveyMonkey® account; therefore I was the only individual with access to the data.

Advantages of online surveys. Collection of data using survey instruments is considered an acceptable method of obtaining data on psychological and social factors (Creswell, 2009), and online surveys are becoming popular in psychological and health-related studies (Gosling et al., 2004; Kraut et al., 2004; Wright, 2005). Studies conducted over the past 10 years provide support for using online surveys and attest to the growing popularity and acceptance of this form of data collection for research purposes (Gosling et al., 2004; Granello & Wheaton, 2004; Wright, 2005). Gosling and colleagues (2004) determined that the quality of data obtained from online surveys was comparable to that obtained from pencil-and-paper surveys, in-person interviews, and phone surveys. Researchers have found that participants are more likely to answer questions of a sensitive nature when the survey is self-administered (Gosling et al., 2004; Tourangeau & Yan, 2007; Wright, 2005) and with the added anonymity provided by an online survey environment (Alessi & Martin, 2010; Gosling et al., 2004).

Online surveys are an easy, fast, and cost-effective method of collecting data (Kraut et al., 2004; Wright, 2005). Researchers have found that the costs of administering online surveys are significantly less than those for pencil-and-paper surveys or mail

surveys, with savings realized in the areas of recruitment, administration, mailing, transportation, paper, and data entry (Alessi & Martin, 2010; Evans & Mathur, 2005; Wright, 2005). In addition, online surveys are often more convenient for researchers and participants; the researcher does not have to administer the test, and the participants can take the survey at a convenient time and place (Evans & Mathur, 2005; Wright, 2005). An added advantage of an online survey is the ability to reach a broad, diverse, or specialized audience through such avenues as listserv, email, websites, virtual communities, and social media sites, thus increasing the potential participant pool (Kraut et al., 2004; Wright, 2005). Therefore, collecting data through an online survey allowed for inclusion of fibromyalgia patients from the United States and possibly other countries.

Disadvantages of online surveys. Surveys are not without their disadvantages. When using an in-person or online survey, there is an assumption that participants are answering questions honestly (Wright, 2005). With online or mail-in surveys, the researcher cannot always verify the identity of the individual completing the survey (Granello & Wheaton, 2004; Kraut et al., 2004). Researchers using online surveys must also be aware that participants could enter the survey multiple times. Therefore, the researcher should check to see that the software or survey company has the ability to track cookies or identify and collect Internet protocol addresses (IP addresses). This allows identification of multiple responses from the same source (Eysenbach, 2004; Granello & Wheaton, 2004). SurveyMonkey® can be set up to notify the researcher of multiple responses from the same IP address, or the survey can be designed to prevent more than one response from any IP address (Alessi & Martin, 2010).

Internet-Based Recruitment

I used Internet-based recruiting to obtain a sample of individuals with fibromyalgia for this study. Social media, websites, and other online avenues are gaining popularity as a method of recruiting individuals for participation in psychological and health-related studies (Fenner et al., 2012; Gosling et al., 2004; Morgan, Jorm, & Mackinnon, 2013; Ritter, Lorig, & Matthews, 2004). Morgan et al. (2013) reported that recruitment from high profile and trustworthy Internet sites yielded more volunteers than did recruitment from email lists, specific health-related forums, or community noticeboards. One of the reasons for the success of online recruiting methods is that more individuals are searching the Internet for health-related information. Data compiled from a survey of over 3,000 adults revealed that 74% of Americans have access to the Internet, and 80% of these individuals have searched online for information about a specific disease (Fox, 2011). Alessi and Martin (2010) noted that Internet-based recruiting is a cost-effective way to recruit individuals from a broad geographic area and stressed that Internet recruiting is especially useful in cases where researchers wish to ask participants questions of a sensitive nature. The following section contains a discussion of online recruitment strategies relevant to this study.

Population, Recruitment, Power Analysis, and Setting

Population

The sample obtained in this study consisted of males and females, 18 years of age and older, who had received a clinical diagnosis of fibromyalgia. In addition to the information on ACEs, perceived social support, social undermining, and perceptions of

illness, the survey asked participants to provide basic demographic information. This information included age, gender, marital status, education level, and year of fibromyalgia diagnosis. To participate in this study, individuals were required to meet the following inclusion criteria: (a) aged 18 or older, (b) a clinical diagnosis of fibromyalgia, (c) access to the Internet to fill out the survey, and (d) sufficient computer knowledge to fill out the survey.

Setting

I developed a website that served as the setting for this study. On the study website, I provided my name and contact information (i.e., phone number and email address), a description of my affiliation with Walden University, and the IRB approval number assigned to this study. I also provided (a) a description of the study, (b) requirements for participation, (c) the approximate time it would take to complete the survey, (d) a downloadable/printable informed consent agreement, (e) a link to the survey, (f) the closing date for the survey, (g) a number for psychological/counseling assistance, and (h) a statement that a report outlining the findings would be posted at the conclusion of the study. Refer to Appendix C for a copy of the consent agreement and Appendix D for the study website design.

Power Analysis

To determine the necessary sample size for this study, I conducted an a priori analysis using G*Power 3.1 statistical software (Faul, Erdfelder, Buchner, & Lang, 2009). Using the statistical test for a linear multiple regression fixed model, fixed model, R^2 , deviation from zero, I calculated that this study would require a minimum sample size

of 119 to detect a significant model, $F(3, 115) = 2.68$, and achieve a power of 0.95. This sample size calculation was based on a two-tailed test with a medium effect size of $f^2 = .15$ and an error probability of $\alpha = .05$. During a 60-day recruitment period, $N = 289$ individuals completed the study survey. Due to incomplete responses, I deleted 58 cases from the final analysis. I discuss the deletion criteria in Chapter 4.

Participant Recruitment

I recruited participants for this study through an announcement placed on the National Fibromyalgia Association (NFA) Facebook page and on the HealingWell.com website. In this announcement (Appendix B), I provided information about the study and a link to the study website/survey. The NFA Facebook page has over 100,000 followers. HealingWell.com is a health and wellness website that also has online support communities for individuals who suffer from fibromyalgia and a wide range of other diseases. Members have access to forums, blogs, videos, newsletters, articles, and resources relevant to their disease. HealingWell.com has been in existence since 1996 and currently has over 140,000 members. Major national and international news publications have written feature articles on this site, and it has established a reputation as an excellent source for health-related information and support (HealingWell.com, 2014).

I also placed the name of my study and a link to the webpage and survey on the Social Psychology Network (<http://www.socialpsychology.org/expts.htm>) and American Psychological Society (<http://psych.hanover.edu/research/exponnet.html>) website pages. To qualify for posting a study link on these websites, my study had to meet the following requirements: (a) IRB approval, (b) minimal risk to participants, (c) no deception of

participants, and (d) inclusion of an informed consent agreement with researcher contact information.

Refer to Appendix C for a copy of the informed consent agreement used in this study. The informed consent agreement appeared on the study website and on the page preceding the survey. The website design ensured that access to the study survey could only occur if individuals clicked an icon that indicated that they had read the informed consent form, agreed to the terms of the study, and attested that they meet the inclusion criteria. Clicking on a “Done” button at the end of the survey served as permission to use their survey responses for this study. The online survey provided participants with an indication of their progress after they completed each page, a service available through SurveyMonkey® (www.surveymonkey.com). Couper, Traugott, and Lamias (2001) found that online surveys with progress indicators increased respondent motivation and yielded a higher number of completed surveys.

The link to the study survey was available online for 2 months. Singh, Taneja, and Mangalaraj (2009) found that short deadlines for participation in online surveys resulted in higher response rates. Using the proposed sampling methods and recruitment strategies, I anticipated that I would be able to recruit in excess of 119 volunteers for this study. I recruited a total of 289 volunteers. Ritter et al. (2004) employed a similar online recruitment strategy and were able to recruit 397 volunteers to take part in their online survey. These researchers were able to obtain this number of volunteers during a 2-month recruitment window.

Study Variables

The predictor variable for this study was ACEs (i.e., physical punishment, emotional abuse, and sexual events). The primary moderating variable was perceived social support and the secondary moderating variable was social undermining. Two facets of illness perceptions, personal control and treatment control, were the criterion variables. Personal control is an individual's perception of how effectively he or she can control the symptoms and course of the illness; treatment control is an individual's perception of the effectiveness of various treatments and the ability of health care professionals to provide assistance in controlling the illness (Dempster & McCorry, 2012). Negative beliefs regarding the level of personal control and treatment control can make coping with the symptoms of the syndrome more difficult, increase perceptions of pain, decrease functional ability, hinder recovery, exacerbate emotional or psychological problems, and/or determine adherence to treatment protocols (Hassett et al., 2000; Petrie et al., 2007; Petrie & Weinman, 2006).

Survey Instruments

I used the following instruments to acquire data on the variables of interest in this study: the ETISR-SF (Bremner et al., 2007), the MSPSS (Zimet et al., 1988), the SUND (Vinokur et al., 1996), and the IPQ-R (Moss-Morris et al., 2002). In addition to data relevant to the research variables, the survey I developed for this study asked participants to supply demographic information (i.e., age, gender, education level, and marital status, and years of schooling). With 51 items, the survey took approximately 15 minutes to complete. Refer to Table 1 for a synopsis of the survey instruments used in this study.

Refer to Appendix A for a list of the instrument items included in the study survey. Refer to Appendix E for e-mail correspondence from developers of the ETISR-SF, MSPSS, SUND, and IPQ-R granting me permission to use these instruments and/or subscales of these instruments.

Table 1

Synopsis of Survey Instruments

Instrument	Scale Type/ Number of Items	Construct Measured	Scoring/Score Range	Cronbach's Alpha Reliability/ Test-Retest Reliability
ETISR-SF	Dichotomous 16 items 0 = no 1 = yes	ACEs: physical punishment emotional abuse sexual events	Subscale: sum of scores in each subscale/0 – 5; 0-6 Global: sum of all subscale scores/0 - 16 (for subscales used in this study)	Total scale: .70 - .87 Subscales: .86 - .87 Test-Retest (Subscales): .78 - .90
MSPSS	7-point Likert 12 items 1 = very strongly disagree 7 = very strongly agree	Perceived social support: friends family significant other	Subscale: sum of all items in subscale/ 1 - 7 Global: sum of all subscale scores/ 12-84	Total scale: .88 Subscales: .87 - .91 Test-Retest (Subscales): .72 - .95
SUND	5-point Likert 7 items 0 = never 4 = very often	Social undermining: significant individual in social network	Global: sum of all 7 items/7-28	Total scale: .91 Test-Retest: .76
IPQ-R	5-point Likert 11 items 1 = strongly disagree 5 = strongly agree	Illness perceptions: personal control treatment control	Subscale: sum of all items in subscale/Treatment control = 5 -25; personal control = 6-30	Total scale: .79 - .88 Subscales: .80 - .81 Test-Retest: .46 - .88

Note. ETISR-SF = Early Trauma Inventory Self Report-Short Form adapted from J. D. Bremner et al., 2007). MSPSS = Multidimensional Scale of Perceived Social Support adapted from G. D. Zimet et al., 1988. SUND = Social Undermining Scale adapted from A. D. Vinokur et al., 1996. IPQ-R = Revised Illness Perceptions Questionnaire adapted from R. Moss-Morris et al., 2002. ACEs include the domains of physical punishment, emotional abuse, and sexual events.

Early Trauma Inventory Self Report-Short Form

Overview and scoring. According to its developers, the 27-item ETISR-SF (Bremner et al., 2007) has several advantages over other instruments used to measure childhood trauma, including (a) it is self-administered; (b) it does not require a trained scorer; (c) items are easy to understand; (d) it is quick to administer; and (e) it has good psychometric properties. The ETISR-SF is based on a dichotomous scale, with “yes” answers receiving a score of 1, and “no” answers receiving a score of 0. Scores represent the number of events that occurred in each of four domains (i.e., general trauma, physical punishment, emotional abuse, and sexual events). When using the ETISR-SF, researchers can obtain a global score, or scores for each domain by summing all the “yes” answers. Scores for the entire ETISR-SF range from 0 to 27, with higher scores indicating exposure to a greater number of traumatic experiences and/or abuse. For the purposes of this study, I included in the survey only the 16 items that assessed the domains of physical punishment, emotional abuse, and sexual events. The general trauma items were not relevant to the research questions. The scores for these items used ranged from 0 to 16. Use of the ETISR-SF for this study was appropriate because it is a self-report instrument that can assess physical punishment, emotional abuse, and sexual events that occur prior to age 18. The ETISR-SF is publically available on the Emory University website (<http://userwww.service.emory.edu/~jdbremn/instruments/ETISR-SF.pdf>). Refer to Appendix E for correspondence from the developer granting me permission to use subscales of this instrument. Use of these subscales does not impact scoring, reliability or

validity of the ETISR-SF because subscales are individually validated (J. D. Bremner, personal communication, March 26, 2014).

Psychometric properties. Bremner and colleagues (2007) derived the 27-item ETISR-SF from the 62-item Early Trauma Inventory Self Report (ETISR; Bremner, Vermetten, & Mazure, 2000), a valid and reliable measure of early trauma. Across the individual domains of general trauma, physical abuse, emotional abuse, and sexual abuse, the ETISR demonstrated a high internal consistency, with Cronbach's alpha values ranging from .78 to .90. In the assessment of the psychometric properties of the ETISR, Bremner et al. (2007) compared it to the Clinician Administered PTSD Scale (CAPS; Blake et al., 1995), a valid and reliable measure of PTSD severity. There were statistically significant correlations between the items in the ETISR and similar items in the CAPS ($r = .39$ to $.47$).

Bremner et al. (2007) developed the ETISR-SF through factor analysis, deleting items from the ETISR that were redundant or items that did not discriminate between similar events. This resulted in a shorter version, with 11 items that measure general trauma, five items that measure physical punishment, five items that measure emotional abuse, and six items that measure sexual events. Bremner and colleagues reported that the domains of physical punishment, emotional abuse, and sexual events all correlated highly between the ETISR and the ETISR-SF ($r = .94$, $.97$, and $.97$, respectively). Correlations between the ETISR-SF and the CAPS were also high ($r = 0.32$ to $.44$), supporting the convergent validity of this instrument. For the scale as a whole, Cronbach's alpha values ranged from $.70$ to $.87$, providing evidence of good internal reliability. For the domains of

physical punishment, emotional abuse, and sexual events, the Cronbach's alpha values were .86, .87, and .87, respectively. In this initial comparison study, Bremner et al. found that the ETISR-SF had good discriminate validity. It was able to identify individuals exposed to trauma or abuse from those who had not experienced these types of events. The ETISR-SF also demonstrated good construct validity, because all domains produced factor loadings greater than .50.

Studies supporting psychometric properties of the ETISR-SF. Several recent studies provided further support for the psychometric properties of the ETISR-SF. Hyman, Garcia, Kemp, Mazure, and Sinha (2005) tested the validity and reliability of this instrument in 92 male and female cocaine addicts. These researchers reported a high internal consistency, with Cronbach's alpha values ranging from .70 to .80. In this study, the ETISR-SF also demonstrated good convergence. When compared to the Childhood Trauma Questionnaire-Short Form (CTQ-SF; Bernstein et al., 2003), correlations between items related to physical, sexual, and emotional abuse ranged from $r = .56$ to .82. Using the ETISR-SF, investigators were able to predict the co-occurrence of psychiatric disorders commonly associated with trauma, providing evidence of the predictive validity of this instrument.

In a study involving 342 Chinese heroin users, Wang et al. (2010) reported that the ETISR-SF showed good reliability, with Cronbach's alpha values ranging from .66 to .82. Osório et al. (2013) administered the ETISR-SF to 253 Brazilian males and females. In this study, these researchers reported an overall Cronbach's alpha value of .83, and the Cronbach's alpha values for the individual domains of physical punishment, emotional

abuse, and sexual events were .69, .83, and .73, respectively. Test-retest reliability of the subscales ranged from .78 to .90. The ETISR-SF correlated moderately ($r = .23$ to $.47$) with other scales that measure similar constructs, indicating adequate concurrent and divergent validity. In another study of 304 Korean individuals ($n = 207$ patients with a clinical diagnosis of depression; $n = 97$ controls), Jeon et al. (2012) reported a Cronbach's alpha value of .87 for the entire scale. Cronbach's alpha values for the subscales ranged from .68 to .83; test-retest reliability for the entire scale was .84. The ETISR-SF showed high correlations (physical punishment, $r = .55$; emotional abuse, $r = .65$; and sexual events, $r = .74$), with similar domains in the CTQ-SF, indicating good divergent and convergent validity. The validation of the ETISR-SF in different languages (e.g., Portuguese, Spanish, Chinese, Korean, and Dutch), populations (e.g., drug abusers, college students, and hospital patients), and age groups provide evidence of its usefulness as a tool in acquiring information on childhood trauma and abuse (Hyman et al., 2005; Jeon et al., 2012; Osório et al., 2013; Wang et al., 2010).

Multidimensional Scale of Perceived Social Support

Overview and scoring. The MSPSS (Zimet et al., 1988) is a 12-item self-report measure designed to assess an individual's subjective evaluation of his or her social support network. The purpose of the MSPSS is to evaluate the perceived adequacy of social support received from family, friends, and a significant other. Zimet et al. (1988) advocated the use of the MSPSS in psychological and social research settings because it is easy to understand, easy to administer and score, and is ideal for use in studies where

other types of data are also being obtained through use of psychological measurement instruments.

The MSPSS contains 12 items rated on a 7-point Likert scale. The scale ranges from 1 (*very strongly disagree*), to 7 (*very strongly agree*). Items 3, 4, 8, and 11 measure perceived support from family; perceived support from friends is derived from Items 6, 7, 9, and 12; and perceived support from significant other is derived from Items 1, 2, 5, and 10. A high score for each of the subscales indicates a greater level of perceived support from individuals in that domain. The total score on the MSPSS can range from 12 to 84, with higher scores indicating higher levels of perceived social support. Researchers using the MSPSS can determine the level of perceived social support from three sources, in addition to obtaining a global score that represents satisfaction across all three domains (Clara, Cox, Enns, Murray, & Torgrudc, 2003; Wilcox, 2010b). The MSPSS was ideal for use in this study because of its brevity, ability to capture participants' perceptions of positive social support, its popularity in health-related studies, and its good psychometric properties. See Appendix E for correspondence from the developer granting permission to use the MSPSS in this study.

Psychometric properties. The MSPSS has good internal and test-retest reliability, along with good factorial and construct validity. In the original study designed to evaluate the psychometric properties of the MSPSS, Zimet et al. (1988) administered the test to 275 Duke University students. In this study, factor analysis supported the division of perceived social support into the following three subscales: (a) family, (b) friends, and (c) significant other. Zimet et al. reported a Cronbach's alpha value of .88 for

the total scale, with subscale values of .87 for family, .85 for friends, and .91 for significant other.

Zimet and colleagues (1988) assessed the test-retest reliability of the MSPSS using 69 of the original participants. At a 2-month and 3-month retest, the Cronbach's alpha values were high for significant other (.72), family (.95), and friends (.75). These values indicated that the MSPSS has good internal and test-retest reliability. Zimet and colleagues also assessed the construct validity of the MSPSS by comparing it to the Depression and Anxiety subscales of the Hopkins Symptom Checklist (HSCL; Derogatis, Lipman, Rickels, Uhlenhuth, & Covi, 1974). Aligning with the theory that social support is inversely related to depression and anxiety, Zimet et al. found that support from family, friends, and significant other were all negatively related to depression ($r = -.24$, $r = -.24$, $r = -.13$, respectively). For the scale as a whole, depression was negatively related to social support ($r = -.25$). The results for anxiety were not as strong, although significantly related to the family subscale ($r = -.18$), but not in the significant other or friend subscales.

Studies supporting psychometric properties of the MSPSS. Following this initial study, Zimet, Powell, Farley, Werkman, and Berkoff (1990) evaluated the reliability and validity of the MSPSS in a sample of 265 pregnant females, 74 high school students in Madrid and Paris, and 55 pediatric residents in the United States. The internal reliability of the MSPSS in all three groups was similar to the results obtained in the first study, with high Cronbach's alpha values in the family (.81 to .90), friends (.90 to .94), and significant other (.83 to .98) subscales. The Cronbach's alpha values for the entire

scale ranged from .84 to .92. These studies provided confirmation of the factor structure of the MSPSS, with items loading strongly on the appropriate subscale (.72 to .89).

Researchers have provided further evidence of the high psychometric properties of the MSPSS. For example, in a study of 154 college students from a variety of ethnic and socioeconomic backgrounds, Dahlem, Zimet, and Walker (1991) reported that the internal reliability of the MSPSS was .91. Cronbach's alpha values for the subscales ranged from .90 to .95. In a confirmatory factor analysis (CFA) of the MSPSS, Clara and colleagues (2003) reported high Cronbach's alpha values for the three subscales (.92 to .94) and all items loaded on a single factor in all CFA models. In a more recent study of 83 male combat veterans, Wilcox (2010b) reported high factor loadings for the family (.47 to .93), friends (.81 to .93), and significant other (.51 to .94) subscales, as well as an additional subscale of support from military peers (.33 to .92).

Social Undermining Scale

Overview and scoring. In this study, it was also important to identify the influence of negative social interactions. This necessitated the inclusion of several questions pertaining to negative aspects of social relationships, a construct known as social undermining. To assess the construct of social undermining, Vinokur et al. (1996) developed the SUND, adding two questions to the original scale developed by Abbey et al. (1985). The SUND consists of seven items that require participants to rate the perceived level of social undermining from a significant individual in their social network. Respondents are instructed to think of a significant friend, spouse, family member, or partner prior to answering the following questions:

1. How often does this significant person in your life act in an unpleasant or angry manner toward you?
2. How often does this significant person in your life act in ways that show he/she dislikes you?
3. How often does this significant person in your life make your life difficult?
4. How often does this significant person in your life make you feel unwanted?
5. How often does this significant person in your life gets on your nerves?
6. How often does this significant person in your life criticize you?
7. How often does this significant person in your life insult you even if he/she did not mean to?

The SUND uses a 4-point Likert scale, with responses ranging from 1 (*never*), to 4 (*very often*) for each item. A total score for the scale is the sum of all seven items, and the scores can range from 7 to 28. See Appendix D for correspondence from the developer granting permission to use the SUND in this study.

Psychometric properties. Cranford (2004) used the SUND in a 2-wave study of 181 married individuals. This researcher was interested in examining the moderating role of perceived social support and social undermining on depressive symptoms and perceived stress. Cranford reported that the SUND had good internal reliability (Cronbach's alpha value of .91 at Time 1) and good test-retest reliability (.76). In an earlier study, Vinokur and Vinokur-Kaplan (1990) assessed the perceived level of social undermining in 431 older married couples using the original five item version of this

instrument. These researchers reported that the instrument had good reliability, producing Cronbach's alpha values of .85 to .90.

Studies supporting the psychometric properties of the SUND. Vinokur and van Ryn (1993), in a study of social support and social undermining on the mental health of 1,087 recently unemployed persons, used confirmatory factor analysis to determine if social support and social undermining were separate constructs. All models were statistically significant (factor loadings $> .58$), providing support for this theory. These results provided additional support for the construct validity of this scale. Vinokur and van Ryn also reported that the correlations between social support and undermining ranged from $r = -.63$ to $-.76$. The Cronbach's alpha values for the instrument ranged from .84 to .92 during three waves of data collection.

Vinokur et al. (1996) obtained similar results in a study of marital relationships in 815 recently unemployed individuals. Factor models supported the constructs of social support and social undermining. The reported correlation between social support and undermining was $r = -.78$ in a pretest and $r = -.79$ in a follow-up test. In this study, the Cronbach's alpha values for the 5-item instrument ranged from .67 to .71. These researchers found a statistically significant negative correlation between social support and social undermining, indicating that they represent two different constructs (Abbey et al., 1985; Vinokur et al., 1996). These findings underscore the importance of considering positive and negative aspects of social networks, supporting the Abbey et al. (1985) statement, "Researchers interested in the effects of social support should consider examining the effects of social conflict" (p.124).

Revised Illness Perception Questionnaire

Overview and scoring. The IPQ-R (Moss-Morris et al., 2002) contains 73 items intended to provide researchers with a quantitative measure of the five components of illness representation proposed in the perceptual-cognitive model of self-regulation (Leventhal et al., 1998). As I described in Chapter 2, these representations include the construction of an illness identity, attributions about the cause, the physical and emotional consequences associated with the disease/illness, how long it will last (timeline), and whether recovery is possible. For the purposes of this study, it was important to determine perceptions concerning the potential for recovery and the effectiveness of treatments in individuals with fibromyalgia. Therefore, the survey I developed for this study included only the 11 items contained in the personal control and treatment control subscales of the IPQ-R. These two subscales of the IPQ-R are scored using a 5-point Likert scale, with responses ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The final score for each subscale represents the mean of all items in that subscale, and scores can range from 1 to 5. High scores on the personal control and treatment control subscales indicate that the individual believes he or she has control over the condition and that treatments would be effective. Moss-Morris et al. (2002) stated that it is acceptable to tailor the questions in the IPQ-R to a particular disease or illness. Therefore, in the survey developed for this study, any time the word *illness* appeared in an item, it was replaced by the word *fibromyalgia*. Refer to Appendix E for correspondence from the developer granting me permission to use subscales of this

instrument. Use of these subscales does not impact scoring, reliability, or validity of the IPQ-R (R. Moss-Morris, personal correspondence, March 19, 2014).

Psychometric properties. According to Moss-Morris et al. (2002), the IPQ-R has good internal and test-retest reliability and sound discriminant, group, and predictive validity. Moss-Morris and colleagues initially evaluated the psychometric properties of the IPQ-R in a study of 711 patients with a variety of medical conditions, including rheumatoid arthritis, Type 2 diabetes, chronic pain, asthma, multiple sclerosis, heart disease, human immunodeficiency virus (HIV), chronic pain, and acute pain. In this initial study, all the subscales showed good internal reliability, with high Cronbach's alpha values ranging from .79 to .88. For the subscales relevant to this study, the Cronbach's alpha values were .81 for the personal control and .80 for the treatment control.

The test-retest reliability of the IPQ-R was determined by administering the questionnaire to two patient groups at intervals of 3 weeks and 6 months. Moss-Morris et al. (2002) reported that the test-retest reliability was acceptable for all the subscales of the IPQ-R, with correlations ranging from $r = .46$ to $.88$. The three subscales intended for use in this study all had statistically significant correlations ranging from $r = .46$ to $.76$.

The multiple sclerosis patients in this study ($n = 170$) were used to determine the predictive validity of the IPQ-R. The subscales of identity, control, consequences, and timeline (cyclical) were significant predictors of adjustment to illness. The IPQ-R also demonstrated good group validity. Independent sample t -test scores were all statistically significant ($t = 3.20$ to 10.68 , $p < .01$) in a comparison group comprised of chronic pain

and acute pain patients. In an effort to assess discriminant validity, Moss-Morris et al. (2002) compared the IPQ-R to the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988). The PANAS has good psychometric properties and is a valid and reliable measure of positive and negative emotions. Correlations between the dimensions of the PANAS and the IPQ-R subscales were small to moderate, with correlations for the subscales of personal control and treatment control ranging from $r = 0.07$ to $.35$ for negative affect and $r = .13$ to $.19$ for positive affect. Personal control and treatment control were unrelated to negative affect. These results indicate that the IPQ-R has sound discriminant validity and is not merely a measure of affect.

Studies supporting the psychometric properties of the IPQ-R. Wittkowski, Richards, Williams, and Main (2008) examined the psychometric properties of the IPQ-R using a sample of 284 individuals with atopic dermatitis. These researchers reported internal reliability of the IPQ-R subscales was good, with Cronbach's alpha values ranging from $.67$ to $.93$. The Cronbach's alpha values for the personal control and treatment control subscales were $.86$, and $.77$, respectively. Inter-correlations were calculated, revealing that the personal control and treatment control subscales were negatively correlated ($r = -.15, p < .05$ and $r = -.45, p < .01$) with timeline (acute/chronic), suggesting that those with strong beliefs about the chronic nature of their condition were less convinced they could manage their illness.

Dempster and McCorry (2012) evaluated the validity of the factor structure of the IPQ-R using a sample of 2,185 oesophageal cancer survivors. Confirmatory factor analysis revealed that the seven-factor structure of the IPQ-R was adequate, with all

factor loadings greater than .40. Factor loadings for the treatment control subscale ranged from .58 to .74, and factor loadings for the personal control subscale ranged from .44 to .75. However, Dempster and McCorry found that the personal control and treatment control factors were moderately correlated ($r = .57, p < .001$). Similarly, Hagger and Orbell (2005) found positive and statistically significant correlations between several of the subscale items. Although there were significant correlations, both sets of researchers concluded that the subscales measure different and distinct constructs (Dempster & McCorry, 2012; Hagger & Orbell, 2005).

Data Analysis

Overview

In this study, I analyzed the relationships between the study variables of ACEs (i.e., physical punishment, emotional abuse, and sexual events), perceived social support, social undermining, treatment control, and personal control using bivariate correlation and multiple regression analysis methods. Bivariate correlation analysis is a method of determining if a linear relationship exists between two variables (Cohen, Cohen, West, & Aiken, 2003; Tabachnick & Fidell, 2007). Regression analysis takes bivariate correlation analysis further by allowing a researcher to obtain an equation that can be used to predict the value of a dependent (criterion) variable based on the combination of multiple independent (predictor) variables (Green & Salkind, 2008; Mertler & Vannatta, 2010; Tabachnick & Fidell, 2007). In addition, multiple regression analysis allows a researcher to analyze the interaction effects of moderating or mediating variables (Hayes, 2013; Jaccard & Turrissi, 2003; Tabachnick & Fidell, 2007). A moderating variable is theorized

to alter the strength, magnitude, or direction of a relationship between one or more predictor variable(s) and a criterion variable (Cohen et al., 2003; Hayes, 2013; Jaccard & Turrisi, 2003). In this study, I theorized that perceived social support moderates the relationship between ACEs and illness perceptions of personal control and treatment control, and social undermining further moderates this relationship. According to Hayes (2013), this type of relationship can be analyzed using a moderated multiple regression analysis. Refer back to Figures 1 and 2 for conceptual diagrams of the moderated model for this study.

Data Analysis Procedures

I analyzed the raw data using the latest IBM[®] SPSS[®] version 21 statistical software (IBM SPSS Software, n.d.), available through Walden University. I calculated the demographic data for the study participants and present the results in a table in Chapter 4. I used bivariate correlation analysis to examine the relationships between the five variables in this study. PROCESS (Hayes, 2013), add-on software for IBM[®] SPSS[®] was then used to examine the moderated effect of perceived social support and social undermining on the relationship between ACEs and personal control and treatment control facets of illness perceptions. Prior to statistical testing of the study hypotheses, I conducted tests to ensure that the variables met the assumptions for multiple regression analysis, including normality, linearity, and homoscedasticity. Violations of these assumptions can weaken the results of a multiple regression (Tabachnick & Fidell, 2007); therefore, it was important to identify any violations of these assumptions and address them prior to performing the multiple regression analyses.

I imported data into IBM[®] SPSS[®] statistical software for analysis. The data analysis for this study was performed in the following order:

1. Coding of variables
2. Preliminary screening of data for missing values
3. Identification of outliers
4. Tests for normality, linearity, and homoscedasticity
5. Calculation of descriptive statistics
6. Bivariate correlation analyses
7. Moderated multiple regression analyses

In the sections that follow, I provide a complete description of the steps involved in the data analysis phase of this study.

Data entry, coding, and screening. After importing the data into the IBM[®] SPSS[®] software, I constructed a data file. Variables were given a name, and all categorical and nominal data were coded. All questions associated with each of the four instruments were combined into a single variable. Two questions each for the variables of personal control and treatment control were reverse coded, as specified by the instrument developer (Moss-Morris et al., 2002). Prior to conducting any data analyses, I examined data for missing values. I deleted cases with a high number of missing values from the data set, as discussed in Chapter 4.

Identification of outliers. In a regression analysis, outliers can significantly influence the results of a correlation (Cohen et al., 2003; Mertler & Vannatta, 2010; Tabachnick & Fidell, 2007). Outliers can occur due to data entry errors, measurement or

procedural errors, participant answer errors, or inclusion of one or more atypical individuals in the sample (Cohen et al., 2003). To test for univariate outliers, I examined stem-and-leaf plots and Box plots for indications of outliers. If outliers were suspected, I standardized the raw scores and re-examined the charts. As recommended by Mertler and Vannatta (2010), any z -score values exceeding ± 3 were considered outliers and deleted. Multivariate outliers were evaluated through calculation of a Mohalanobis distance value. I provide a detailed description of the results of these tests in Chapter 4.

Basic assumptions for multivariate analysis. Normality, linearity, and homoscedasticity are basic assumptions that must be met prior to conducting a multiple regression analysis (Cohen et al., 2003; Mertler & Vannatta, 2010; Tabachnick & Fidell, 2007). The results of a multiple regression analysis can be compromised when these assumptions are not met, and violations should be addressed in the preliminary analysis stage (Mertler & Vannatta, 2010). IBM[®] SPSS[®] Statistics software provides statistical and graphical methods of checking variables for multivariate normality, linearity, and homoscedasticity (Mertler & Vannatta, 2010).

I assessed univariate normality through visual examination of histograms and normal Q-Q plots, Box plots, in addition to statistical examination of skewness and kurtosis values and the Kolmogorov-Smirnov statistic. I used appropriate statistical transformation methods for any variables that deviated significantly from normal. According to Mertler and Vannatta (2010) and Tabachnick and Fidell (2007), bivariate normality is dependent on univariate normality.

Linearity is a measure of the relationship between variables (Tabachnick & Fidell, 2007). For multiple regression analyses, this relationship can be either positive or negative, but it should approximate a straight line (Mertler & Vannatta, 2010). I assessed linearity through examination of bivariate scatter plots and residuals plots. In addition, I examined tolerance and VIF values for evidence of multicollinearity. Multicollinearity occurs when the independent variables included in the regression equation are highly correlated with one another (Cohen et al., 2003). In multiple regression analysis, multicollinearity can become problematic, affecting the results of the regression (Cohen et al., 2003; Tabachnick & Fidell, 2007).

Tolerance is a measure of the percentage of variance in a predictor variable that is not explained by the other predictors; VIF is a measure of the amount of inflation in the standard error due to collinearity (Cohen et al., 2003; Hayes, 2013). As recommended by Cohen et al. (2003) and Mertler and Vannatta (2010), if tolerance or VIF values provide evidence of multicollinearity (i.e., VIF values of 10 or greater or tolerance values less than .01), predictor variables should be centered prior to conducting a regression analysis. Centering is accomplished by subtracting the mean of the predictor variable and then multiplying the residuals together to create a centered product term (Hayes, 2013). No evidence of multicollinearity was found; therefore, it was not necessary to mean center any of the variables.

Homoscedasticity is observed when the variability of scores (i.e., the variance of errors) remains constant across all levels of another variable (Tabachnick & Fidell, 2007). As recommended by Mertler and Vannatta (2010), I conducted appropriate tests to assess

homoscedasticity and visually inspected the bivariate scatterplots. I found no evidence of homoscedasticity.

Descriptive statistics. Demographic data collected on the participants in this study was analyzed in IBM[®] SPSS[®] version 21 statistical software and presented in a table. I present this table in Chapter 4 and it includes the number, frequency, and percentages for gender and marital status. Means, standard deviations, and ranges for the continuous demographic variables of age, years since fibromyalgia diagnosis, and number of years of schooling are also presented in this table. I used this demographic data to describe the characteristics of the study sample, but no demographic data were used as covariates in the regression models. I did not use demographic variables in the study models because researchers Stuifbergen et al. (2006) found that there were no significant relationships between these demographic variables and illness perceptions in their study of $n = 91$ individuals with fibromyalgia.

Bivariate correlation analysis. In the next step of data analyses, I performed a bivariate correlation analysis in IBM[®] SPSS[®] version 21 statistical software. A review of the output indicated the presence of several significant correlations between variables. In addition, the output indicated whether the correlation is positive or negative. I discuss the results of this preliminary correlation analysis in Chapter 4.

Multiple regression analysis. I hypothesized that perceived social support and social undermining would act as moderating variables in relationship between ACEs and personal control and treatment control facets of illness perceptions. Therefore, I had an interaction model (Hayes, 2013; Jaccard & Turrisi, 2003). According to Hayes (2013),

this type of analysis, with two moderating variables can be performed using his PROCESS software. PROCESS is available free from <http://www.afhayes.com/introduction-to-mediation-moderation-and-conditional-process-analysis.html>.

Hayes (2013) provided the following regression equation for a moderated multiple regression analysis:

$$Y = i_1 + b_1X + b_2M + b_3W + b_4XM + b_5XW + b_6XW + b_6MW + b_7XMW + e_Y$$

For the variables of interest in this study, Y was the value of the criterion variable of personal control/treatment control, X was the value of the predictor variable of ACES, M was the primary moderating variable of perceived social support, and W was the secondary moderating variable of social undermining. For this equation, i_1 was the constant for the equation (Y -intercept), b was the slope of the regression line, and e was the error of prediction (Mertler & Vannatta, 2010). Refer to Figure 3 for the statistical representation of the moderated multiple regression model for this study. Note that Figure 3 only depicts the regression analysis for the predictor variable of personal control to prevent redundancy.

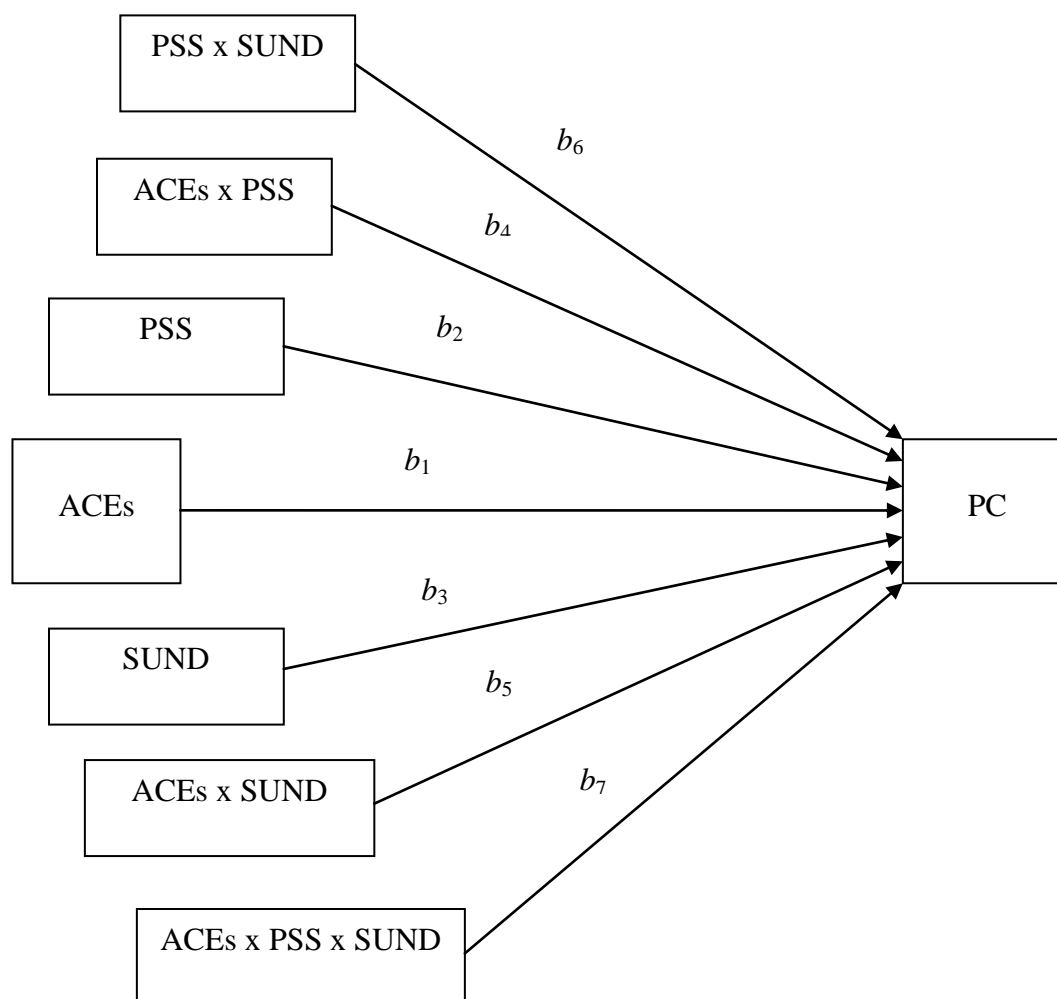


Figure 3. Moderated multiple regression model tested in this study. Model depicts the theorized relationships between ACEs (physical punishment, emotional abuse, and sexual events), perceived social support (PSS), social undermining (SUND), and the personal control facet of illness perceptions.

Threats to Validity

In this study, potential threats to internal validity included measurement errors, non normal distributions of some variables, and potential contributions of variables not included in the study. Threats to external validity included use of survey design and nonrandom sampling methods (i.e., purposive and convenience sampling). I could not be certain that the sample obtained in this study was representative of the population of individuals with fibromyalgia. Construct validity was increased through selection of instruments with high reliability and validity. Threats to internal and external validity identified above prevented me from attributing causation to any observed correlations between variables. It also reduced the generalizability of any results or conclusions to other populations of individuals with fibromyalgia.

Ethical Considerations

In any research study involving human subjects, it is important to receive IRB approval to ensure that the study adheres to strict ethical guidelines. For this study, I obtained Walden University IRB approval prior to recruitment of participants and development of the study website and survey. I did not make any changes to the proposed recruitment; therefore, no changes or amendments to the IRB approval were required.

On the study website, I provided my contact information (i.e., phone number and email address) for questions or additional information about the study. I posted on the website the Walden University IRB approval number for this study. To ensure that each individual made an informed and voluntary decision prior to agreeing to participate in this study, I included on the study website information regarding the purpose of the study,

an assurance of anonymity, and a statement of the potential risks or benefits of participation. On the study website,, I also provided an informed consent agreement. Participant acknowledgement of the terms of the consent form was required prior to accessing the survey. Refer to Appendix B for a copy of the study announcement and Appendix C for a copy of the informed consent agreement.

On the home page of the study website, I informed participants of the purpose of the study and the sensitive nature of the some of the survey questions. Some individuals may have experienced anxiety or distress when recalling events or experiences in their childhood. Therefore, on the study website, I provided the phone number for the Substance Abuse and Mental Health Services Administration (SAMSHA) helpline (1-800-662-HELP [4357] along with their website address. This free service is available 24 hours a day, 7 days a week. Individuals calling this number can receive information and referral to health care professionals, support groups, and community organizations in their area.

Support for using this approach came from the ACEs study conducted by Felitti et al. (1998). In the two waves of this study, more than 30,000 individuals answered sensitive and detailed questions concerning their history of childhood abuse and neglect. Edwards et al. (2001) reported that only 7% of the participants in this study failed to answer questions concerning childhood sexual abuse, and almost all respondents answered questions regarding other forms of abuse and neglect. Edwards et al. added that none of the participants placed calls to the help line number provided despite the sensitive nature of the questions.

In compliance with the requirements of the Walden University IRB approval, data compiled during this study were copied to a flash drive. I will keep this flash drive in a locked storage compartment in my office for a period of 5 years post study. After 5 years, I will erase the data from the storage device or destroy the storage device.

Summary

In this chapter, I outlined the methodology that I used to examine the relationships between ACEs, perceived social support, social undermining, and two facets of illness perceptions, personal control and treatment control. These variables, and the hypothesized relations between them, were chosen based on the gap in knowledge I identified in the literature review. The theorized relationships between the variables, and the research questions posed in this chapter led to the selection a moderated multiple regression analysis for this study. All instruments/and or instrument items I selected for inclusion in the study survey had been used extensively in other empirical research and exhibited good psychometric properties.

As I pointed out in this chapter, time and cost constraints led to my decision to use purposive convenience sampling methods to select study participants. Recruitment, sampling, and data collection occurred in an online environment. This method of accessing participants and acquiring data is becoming more popular and acceptable among psychological researchers. As stated in this chapter, I developed a study website where I could post information regarding this study, including a report of the study findings. It is my hope that the information acquired through this research effort, and the report that I post on the website after completion of this study, provides participants with

a way of seeing the important contribution they made to furthering scientific knowledge about fibromyalgia.

In Chapter 4, I provide a more detailed discussion of the study methodology, data screening/preparation, and data analyses used in this study. Descriptive statistics for all demographic and study variables are presented and discussed. For each research question in this study, I provide the results of the statistical analysis used to test its associated hypothesis. The final section in Chapter 4 I devote to presentation of additional findings that were revealed during the preliminary data analyses stage of this study. In Chapter 5 is a summary of the study, including key findings, interpretations of results, study limitations, recommendations for future research, and social change implications.

Chapter 4: Results

Introduction

The purpose of this quantitative study was to determine if ACEs are predictive of illness perceptions of personal control and treatment control among individuals with fibromyalgia. Perceived social support and social undermining were evaluated as potential moderators in this relationship. I developed the following three research questions for this study:

Research Question 1: Is exposure to ACEs (i.e., physical punishment, emotional abuse, and sexual events) a predictor of illness perceptions of personal control and treatment control among individuals with fibromyalgia?

Research Question 2: Does perceived social support act as a primary moderator in the relationship between ACEs and illness perceptions of personal control and treatment control among individuals with fibromyalgia?

Research Question 3: Does social undermining act as a secondary moderator in the relationship between ACEs and illness perceptions of personal control and treatment control among individuals with fibromyalgia?

I collected data using an online survey comprised of questions from the following four instruments: ETISR-SF, MSPSS, SUND, and two subscales of the IPQ-R. With these instruments, I assessed ACEs (i.e., physical punishment, emotional abuse, and sexual events), perceived social support, social undermining, and illness perceptions of personal control and treatment control, respectively. Using IBM®SPSS® version 21 and PROCESS software (Hayes, 2013), I conducted bivariate correlation, multiple regression,

and moderated multiple regression analyses to answer the three research questions and their associated hypotheses.

In this chapter, I provide a detailed description of the statistical analyses I performed to examine the study research questions and hypotheses. I begin this chapter with an overview of the data collection process and a description of the study sample. In the next section, I include discussions of data screening and preparation, including tests for reliability, normality, linearity, and homoscedasticity (i.e., assumptions for multiple regression analysis). I organized the results section that follows by research question, and I conclude Chapter 4 with a summary and discussion of additional preliminary findings relevant to the variables in this study.

Data Collection

I developed a secure online survey using SurveyMonkey® (SurveyMonkey®, 2014) and embedded a link to this survey on the study website. Following IRB approval on July 1, 2014, I placed announcements and links to the study website on the National Fibromyalgia Association Facebook page, and the HealingWell.com, Social Psychology Network, and American Psychological Society websites. Participants accessed the online survey through the study website. Prior to making the study public, I had six individuals test the functionality and user friendliness of the website and survey. To my knowledge, participants did not experience any technical issues with the study website or online survey format.

Based on a power analysis, I needed to recruit at least 119 participants. During the 60-day recruitment period specified in my Walden University IRB approval, 289

individuals completed the online survey for this study. Following an initial screening of the data, I deleted 58 cases (8.0%) from the analysis. I provide justification for deletion of these cases in the data screening section of this chapter. After deleting incomplete surveys, $N = 231$ cases remained for analysis.

Sample Characteristics and Descriptive Statistics

In the sample obtained for this study, $n = 225$ (97%) of the respondents were female and $n = 6$ (2%) were male. The age of participants ranged from 18 to 74 ($M = 44.28$, $SD = 11.91$) and 40% of the participants were between the ages of 43 and 54. Fifty-five percent of the participants were married ($n = 128$), and 70% ($n = 162$) indicated they had 12 years or more of schooling. When asked the year of their diagnosis, 14% ($n = 32$) reported receiving a diagnosis between the years of 1990 and 1999. In contrast, 53% ($n = 123$) of the participants reported receiving a diagnosis between 2010 and 2014. The average age of participants at the time of their diagnosis was 37 ($SD = 11.9$).

The high female to male ratio and the descriptive statistics for this sample are similar to those reported in other studies of individuals with fibromyalgia (Berger et al., 2007; Bennett et al., 2007; Imbierowicz & Egle, 2003; Stufbergen et al., 2006). According to Berger et al. (2007), most individuals who develop fibromyalgia begin to experience symptoms and/or receive a diagnosis of fibromyalgia in middle age; therefore, the statistics in this study are in alignment with previous studies. The American College of Rheumatology did not establish diagnostic criteria for fibromyalgia until 1990 (Wolfe et al., 1990), a factor that may provide a partial explanation for the low number of reported diagnoses between 1990 and 1999.

Refer to Table 2 for a summary of the descriptive statistics and characteristics of the study sample. I provide frequency, range, mean, and standard deviations for the variables of age and years of schooling. Frequency and percent are provided for the variables of gender, marital status, education/years of schooling, and year of diagnosis. To simplify interpretation, I broke down years of schooling and year of diagnosis into seven categories.

Table 2

Participant Characteristics (N=231)

Variable	<i>n</i>	Percent	Range	<i>M</i>	<i>SD</i>
Age	230		18-74	44.28	11.91
unstated	1				
Gender					
Female	225	97			
Male	6	3			
Marital Status					
Married	128	55			
Separated	12	5			
Divorced	38	17			
Same sex partner	8	4			
Single (never married)	39	17			
Widowed	6	2			
Education/Years of Schooling			2-22	12.70	2.86
11 or fewer	65	28			
High school diploma	72	31			
Some college	47	20			
Bachelors degree or equivalent	22	10			
Masters degree or equivalent	19	8			
Doctoral degree	2	1			
Unstated	4	2			
Year of Diagnosis					
Prior to 1990	8	3			
1990-1994	13	6			
1995-1999	11	5			
2000-2004	32	14			
2005-2009	44	19			
2010-2014	123	53			

Data Screening

Preliminary Data Screening and Analyses

I imported data directly from SurveyMonkey® into IBM®SPSS®. Prior to any statistical tests or analyses, 8% of the cases were deleted from analysis. I deleted cases if participants did not provide a date of fibromyalgia diagnosis, a requirement for participation in this study. As recommended by George and Mallery (2011), I also deleted a case if the participant omitted more than 15% of the questions associated with a variable. I created a variable for ACEs, social support, social undermining, personal control, and treatment control by combining all questions associated with each of the four instruments/subscales. I recalculated the variables for personal control and treatment control to represent the reverse coding requirement for two questions in each of these domains of the IPQ-R. Following this initial screening and data preparation, I completed preliminary univariate and multivariate analyses to check for internal reliability, missing data, outliers, linearity, and homoscedasticity. Refer to Appendix F for histograms and plots associated with these univariate and multivariate analyses.

Assessment of Reliability

I selected the four instruments used in this study based on their high reliability and validity. The Cronbach's alpha reliabilities for items on each of the scales of the ETISR, MSPSS, SUND, and the personal control and treatment control subscales of the IPQ-R were assessed for this study. As shown in Table 3, Cronbach's alpha values for the measurement instruments ranged from .74 to .93. These internal reliability values were

similar to those reported by the instrument developers (Bremner et al., 2007; Moss-Morris et al., 2002; Vinokur & Van Ryn, 1993; Zimet et al., 1990).

Table 3

Cronbach's Alpha Reliabilities for Instrument Scales and Subscales

Scale/Subscale	Items	Study (α)	Developer Reported (α)
ETISR	16	.89	.83
physical	5	.81	.86
emotional	5	.84	.87
sexual	6	.85	.87
MSPSS	12	.92	.84 - .92
SUND	7	.93	.84 - .92
Personal Control (IPQ-R)	6	.74	.81
Treatment Control (IPQ-R)	5	.75	.80

Missing Data

A large number of missing values (i.e., more than 5%) or outliers can impact the validity of correlation and regression analyses (Mertler & Vannatta, 2010; Tabachnick & Fidell, 2007). Descriptive statistics revealed that 3% of cases were missing values for treatment control and MSPSS; 2% of cases were missing values for SUND; and 5% of cases were missing values for personal control. There were no missing values for the ETISR-SF. I did not replace missing values because of the large sample size and the small percentage of missing values (i.e., 5% or less).

Univariate Outliers

According to Mertler and Vannatta (2010), univariate and multivariate outliers can have a considerable influence on the results of a statistical analysis. Visual examination of the histograms, stem-and-leaf plots, and Box-plots for each of the study variables revealed the presence of outliers for personal control and MSPSS. I converted the scores for these two variables into z -scores and examined the graphs and plots. I deleted one value on each of these variables that exceeded ± 3 standard deviations from the mean.

Tests for Univariate Linearity and Normality

Visual examination of the normal and normal detrended Q-Q plots showed that all variables were linear, with deviations due to outliers noted above. Examination of histograms indicated deviations from normality for the ETISR and SUND. The skewness and kurtosis values were significant for the ETISR, SUND, and personal control variables. The Kolmogorov-Smirnov (K-S) and Shapiro-Wilk (S-W) tests of normality were also significant for these variables, $p > .001$. A significant p -value for the K-S and S-W tests indicates deviation from normality (Tabachnick & Fidell, 2007). Refer to Table 4 for skewness and kurtosis values obtained for each variable. According to Tabachnick and Fidell (2007), transformation of variables should be conducted if the ratio of skewness and kurtosis to their standard error (se) exceeds the critical chi-square value of 3.29. The SUND was the only variable that met these criteria.

I conducted log₁₀, square root, and inverse transformations for the SUND. As indicated in Table 4, the skewness and kurtosis values for the SUND improved with a

log10 transformation; therefore, I used the SUND log 10 variable in all further statistical analyses. I also performed log10, square root, and inverse transformations for the ETISR, MSPSS, and the personal control variables. I did this because the histogram for the ETISR indicated a flat distribution (i.e., platykurtosis) and the histograms for personal control and MSPSS indicated a negative skew in the distribution. The transformations did not result in a significant improvement in the skewness and kurtosis values or the respective normality plots for these variables; therefore, I did not use any transformations for these three variables in the statistical analyses. According to Mertler and Vannatta (2010), minor deviations from linearity and normality can weaken the results of an analysis, but there is no standard to determine what amount of deviation will affect or invalidate the results. Refer to Chapter 5 for a further discussion of implications on statistical results due to inclusion of variables that exhibit deviations from normality.

Table 4

Skewness, Kurtosis, K-S, and S-W Values for Study Variables

Variable	Skewness/ se	Ratio	Kurtosis/ se	Ratio	K-S (<i>p</i>)	S-W (<i>p</i>)
ETISR	.42/.16	2.62	-.72/.32	-2.25	>.001	>.001
SUND	1.04/.16	6.50*	.83/.32	2.59	>.001	>.001
SUND_log10	.26/.16	1.63	-.54/.32	-1.69	.005	>.001
SUND_inv	.40/.16	2.50	-.67/.32	2.09	>.001	>.001
SUND_sqrt	.64/.16	4.00*	-.03/.32	-.10	>.001	>.001
MSPSS	-.37/.16	-2.31	-.33/.32	-1.03	.056	.009
Personal Control	-.47/.16	-2.94	-.03/.33	-.09	>.001	>.001
Treatment Control	-.04/.16	-.25	-.23/.32	-.72	.003	.146

Note. * Exceeds critical chi-square value of 3.29.

Multivariate Analyses

To detect the presence of multivariate outliers, I conducted a linear regression with all predictor variables entered into the model. I conducted two separate analyses, one with personal control as the dependent variable and one with treatment control as the dependent variable. The Mahalanobis' distance for personal control (11.25) and treatment control (11.26) did not exceed the critical chi-square value of 16.266, $p < .001$ for 3 degrees of freedom, indicating no multivariate outliers. Analysis of the scatter plot matrix, residual plots, normal probability plots, and histograms indicated multivariate normality, linearity, and homoscedasticity requirements were met. See Appendix F for

graphics associated with multivariate tests. I present the Mahalanobis' distance, VIF, and tolerance for each variable in Table 5. According to Mertler and Vannatta (2010) VIF values greater than 10, or tolerance values less than .1 indicate high intercorrelations between variables (i.e., multicollinearity). No values were within these ranges; therefore I did not mean center any variables.

Table 5

Mahalanobis' Distance, VIF, and Tolerance for Study Variables

Variable	Mahalanobis Distance	VIF	Tolerance
Personal Control	11.25		
ETISR		1.18	.85
SUND		1.29	.78
MSPSS		1.32	.76
Treatment Control	11.26		
ETISR		1.33	.85
SUND		1.32	.76
MSPSS		1.33	.75

Results

Overview

I used IBM®SPSS® Statistics version 21 to conduct the preliminary data screening, bivariate correlation, and multiple regression analyses. I used PROCESS, an add-on software for IBM®SPSS® (Hayes, 2013), to perform the moderated (three-way interaction) multiple regression analysis. I conducted two separate analyses in PROCESS, one using personal control as the criterion variable and one using treatment control as the criterion variable. The findings for the correlation, multiple regression, and moderated

multiple regression analyses are discussed below in association with each research question.

Refer to Table 6 for descriptive statistics and correlation coefficients for the predictor variable of ACEs, the two moderating variables of perceived social support and social undermining, and the criterion variables of personal control, and treatment control. Note that in the correlation matrix, there were significant correlations between several of the study variables. I highlighted these findings in a later section of this chapter, and discussed their implications in Chapter 5.

See Table 7 for descriptive statistics for ACEs broken down into the three subscales of physical punishment, emotional abuse, and sexual events. From a review of this table, 82% of study participants reported that they often experienced some type of emotional abuse prior to age 18 (i.e., they were put down, ridiculed, ignored, treated coldly/unloved, and/or their needs were not understood). Sixty-five percent of participants reported that they experienced some type of physical punishment prior to age 18 (i.e., they were slapped, burned, punched/kicked, hit with an object, and/or pushed/shoved). Fifty-nine percent of participants reported a sexual event prior to age 18 (i.e., they were touched in an intimate area, had genitals rubbed against them, they were forced/coerced to touch another in an intimate area, forced/coerced to have genital sex, forced/coerced to have oral sex, and/or forced/coerced to kiss someone in a sexual way). In Chapter 5, I discuss how these ACE findings compared to findings reported in previous studies.

Table 6

Mean (M), Standard Deviation (SD), Range, and Correlation Coefficients for Study Variables (N = 231)

Variable	M	SD	Range	PC	TC	ACEs	PHY	EMO	SEX	SUND	PSS
PC	20.15	3.76	11-30	—	.495**	-.051	-.043	-.003	-.073	-.023	.175*
TC	13.44	3.46	5-23		—	-.027	-.035	.043	-.055	-.160*	.295**
ACEs	6.46	4.62	0-16			—	.830**	.834**	.806**	.340**	-.348**
PHY	1.81	1.75	0-5				—	.491**	.488**	.210**	-.245**
EMO	2.85	1.86	0-5					—	.378**	.106	-.254**
SEX	1.80	2.01	0-6						—	.232**	-.324**
SUND	13.21	4.87	7-28							—	-.444**
PSS	54.05	15.13	13-84								—

Note. PC = personal control, TC = treatment control, PSS = perceived social support, SUND = social undermining, ACEs = all adverse childhood experiences, PHY = physical punishment, EMO = emotional abuse, SEX = sexual events. * $p < .05$, two tailed. ** $p < .001$, two-tailed.

Table 7

Total Number of Physical, Emotional, and/or Sexual Abuse Events Prior to Age 18 (N = 231)

Variable	Total Number of Events and Percent									
	0	%	1-4	%	5-8	%	9-12	%	13-16	%
ACEs (all)	23	10	65	28	72	31	42	18	29	13
	0	%	1-5	%						
Physical punishment	81	35	150	65						
Emotional abuse	42	18	189	82						
	0	%	1-6	%						
Sexual events	94	41	137	59						

Note. ACEs (all) includes the combined physical, emotional, and sexual subscales. Physical punishment and emotional abuse subscales have five questions each. The sexual events subscale has six questions.

Analysis of Research Questions

Research Question 1. Is exposure to ACEs (i.e., physical punishment, emotional abuse, and sexual events) a predictor of illness perceptions of personal control and treatment control among individuals with fibromyalgia?

H₀1: Exposure to ACEs, as measured by the ETISR-SF, is not a predictor of illness perceptions of personal control and treatment control, as measured by the IPQ-R among individuals with fibromyalgia.

I performed a bivariate correlation analysis to examine Research Question 1. There was no significant relationship between ACEs (i.e., all physical, emotional, and sexual subscales of the ETISR-SF) and personal control, $r(220) = -.05, p = .45$, or treatment control, $r(224) = -.03, p = .69$. Further, there were no significant correlations between physical, emotional, and sexual subscales of the ETISR-SF and personal control or treatment control. Based on the results of this analysis, I failed to reject the null hypothesis for Research Question 1.

Research Question 2. Does perceived social support act as a primary moderator in the relationship between ACEs and illness perceptions of personal control and treatment control among individuals with fibromyalgia?

H₀2: Perceived social support, as measured by the MSPSS, does not have a primary moderating effect on the relationship between ACEs and illness perceptions of personal control and treatment control among individuals with fibromyalgia.

Research Question 2 was dependent on a significant finding for Research Question 1. Perceived social support could not function as a moderator if there was no

significant correlation between ACEs, or any of the subscales of ACEs, and illness perceptions of personal control and treatment control. I confirmed this finding while testing whether variables met the assumptions for multiple regression analysis. I discuss the multiple regression analyses under additional findings at the end of this chapter. Based on the results of the statistical analyses, I failed to reject the null hypothesis for Research Question 2.

Research Question 3. Does social undermining act as a secondary moderator in the relationship between ACEs and illness perceptions of personal control and treatment control among individuals with fibromyalgia?

H₀₃: Social undermining, as measured by the SUND, does not have a secondary moderating effect on the relationship between ACEs and illness perceptions of personal control and treatment control among individuals with fibromyalgia.

I did not immediately accept the null hypothesis for Research Question 3 based on the same assumptions made in Research Question 2. I examined this research question using PROCESS (Hayes, 2013). PROCESS generates output that evaluates the interaction effect at all levels of the moderating variables. The PROCESS analysis revealed that there was not a significant three-way interaction for personal control, $F(7, 201) = 1.22, p = .29$ or for treatment control, $F(7, 205) = 3.32, p = .94$. Further, social undermining did not act as a secondary moderator, $F(3, 218) = 2.05, p = .11$. Based on these results, I failed to reject the null hypothesis for all combined subscales of the ETISR-SF.

For this research question, I also evaluated the three-way interaction using the individual subscales of the ETISR-SF. I created three new variables to represent physical, emotional, and sexual abuse by combining questions associated with each of these domains. Output generated by PROCESS allowed me to determine if there was a significant three-way interaction at any levels of reported physical, emotional, or sexual abuse, perceived social support, and social undermining.

The overall model for a three-way interaction between sexual events, perceived social support, and social undermining on perceptions of personal control was significant, $R^2 = .29$, $F(7, 174) = 1.28$, $p < .001$. The R^2 change due to the three-way interaction was $.022$, $F(5, 174) = 5.26$, $p = .02$. However, the significant three-way interaction (i.e., sexual events x perceived social support x social undermining) only occurred for three specific combinations of the two moderating variables. See Table 8 for t -scores and probability for each significant interaction in this model. In Chapter 5, I provide an interpretation of these statistical results.

Table 8

Conditional Effect of Sexual Abuse on Personal Control at Values of the Moderators

Criterion Variable	SUND	MSPSS	t	p
Personal Control	12.77	53.94	-2.02	.04
	12.77	67.63	-2.43	.02
	16.68	67.63	-2.47	.01

Note. Statistical controls = treatment control, physical punishment, and emotional abuse.

A further examination of the results of the PROCESS analysis revealed that both perceived social support and social undermining significantly moderated the relationship between sexual events and illness perceptions of personal control. Social undermining was a significant secondary moderator when the values of this variable were at moderate to high levels. Refer to Table 9 for results and Chapter 5 for an interpretation of the statistical findings.

The overall three-way interaction models for physical punishment and treatment control and personal control were not significant, $F(7, 223) = 2.25, p = .32$ and $F(7, 223) = .77, p = .61$, respectively. Similarly, the overall interaction models for emotional abuse and treatment control and personal control were not significant, $F(7, 185) = 1.65, p = .12$ and $F(7, 185) = .67, p = .70$, respectively. Further, there were no statistically significant points within the range of the moderators for either physical or emotional abuse.

Based on the results of the PROCESS analyses, I failed to reject the null hypothesis for physical punishment and emotional abuse. I conditionally rejected the null hypothesis for sexual abuse based on the conditions and values presented in Tables 8 and 9. I discussed the implications of the findings for Research Question 3 in Chapter 5.

Table 9

Conditional Effect of Sexual Events X Perceived Social Support on Personal Control at Values of the Secondary Moderator (Social Undermining)

Social Undermining (Score)	Effect (B)	se	95% CI	t	p
13.69	-.020	.010	[-.041, .000]	-1.97	.050
14.20	-.023	.011	[-.044, -.002]	-2.18	.030
15.00	-.027	.011	[-.050, -.005]	-2.44	.016
15.80	-.032	.012	[-.056, -.008]	-2.60	.010
16.60	-.036	.013	[-.063, -.010]	-2.71	.007
17.40	-.041	.015	[-.069, -.012]	-2.76	.006
18.20	-.045	.016	[-.077, -.013]	-2.79	.006
19.00	-.050	.018	[-.084, -.015]	-2.80	.006
19.80	-.054	.019	[-.091, -.016]	-2.79	.006
20.60	-.058	.021	[-.099, -.017]	-2.78	.006
21.40	-.062	.023	[-.107, -.018]	-2.77	.006
22.20	-.067	.024	[-.114, -.019]	-2.75	.007
23.00	-.071	.026	[-.122, -.020]	-2.74	.007

Note. B = regression coefficient/constant for equation that describes effect of moderator on predictor; se = standard error for B.

Additional Findings

Several significant correlations between the study variables emerged during the preliminary tests to determine if the data met the assumptions for a multiple regression analysis. There were significant negative correlations between ACEs and perceived social support, $r(224) = -.35$, $r^2 = .12$, $p < .001$, and between social undermining and treatment control, $r(219) = -.16$, $r^2 = .03$, $p < .05$. Significant positive correlations were found between perceived social support and treatment control, $r(218) = .30$, $r^2 = .03$, $p < .001$, and personal control, $r(213) = .18$, $r^2 = .03$, $p < .05$. The effect size for these correlations was small to medium.

In association with assumption testing for multiple regression analysis, I conducted two regression analyses in IBM®SPSS® with ACEs and perceived social support as predictors for personal control and treatment control. The combination of these variables significantly predicted treatment control, $F(3, 209) = 7.72, p < .001$. The multiple coefficient for this model was .087, indicating that approximately 8.7% of the variance of treatment control in the sample was accounted for by the combination of ACEs, perceived social support, and social undermining. However, the only significant predictor for this model was perceived social support, $t(209) = 4.18, p < .001$.

Perceived social support, social undermining, and ACEs were also predictive of personal control, $F(3, 205) = 2.63, p = .05$. The multiple coefficient for this model was .04, indicating that approximately 4% of the variance of personal control was accounted for by the combination of variables. Again, perceived social support was the only significant predictor in the model, $t(208) = 2.69, p = .008$. Refer to Tables 10 and 11 for ANOVA results for these multiple regression analyses. Refer to Table 12 for a standard regression summary of results for both treatment control and personal control.

Table 10

ANOVA Results for Treatment Control as Dependent Variable

Model	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>p</i>
Regression	3	262.82	87.61	7.719	< .001
Residual	209	2372.06	11.35		
Total	212	2634.87			

Note. *SS* = sum of squares, *MS* = mean square, *df* = degrees of freedom.

Table 11

ANOVA Results for Personal Control as Dependent Variable

Model	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>p</i>
Regression	3	107.84	35.95	2.627	.05
Residual	205	2805.43	13.69		
Total	208	2913.27			

Note. *SS* = sum of squares, *MS* = mean square, *df* = degrees of freedom.

Table 12

Standard Regression Summary of Results for Treatment Control and Personal Control

Variable	<i>B</i>	95% CI	β	<i>sr</i>	<i>p</i>
DV = Treatment Control					
Perceived social support	.07	[.04, .11]	.316	.02	< .001
Social undermining	-.96	[-4.43, 2.51]	-.04	1.76	.59
ACEs	.07	[-.04, .18]	.09	.06	.22
DV = Personal Control					
Perceived social support	.05	[.01, .09]	.21	.02	.008
Social undermining	2.17	[-1.63, 5.97]	.09	1.93	.261
ACEs	-.01	[-.13, .11]	-.01	.06	.898

Note. *B* = regression coefficient/constant for equation; CI = confidence interval for *B*; β = standardized regression coefficient; *sr* = semipartial correlation.

Summary

I included the results of the preliminary correlation and multiple regression analyses in this chapter because they may have implications for future research. In Chapter 4, I outlined the statistical analysis process and results for the study hypotheses tests. There were no significant findings for Research Questions 1 and 2, leading to acceptance of the null hypotheses for these two questions. ACEs were not a significant predictor of personal control or treatment control facets of illness perceptions; therefore, perceived social support could not moderate this relationship.

The results of the statistical analyses for Research Question 3 required more interpretation. When all domains of the ETISR-SF were included, there were no significant three-way interactions. Perceived social support and social undermining did not moderate a relationship between ACEs and illness perceptions. However, an interaction was observed between sexual events, perceived social support, social undermining and personal control. Sexual events predicted personal control moderated by social support when levels of social support were moderate to high. Further, sexual events also predicted personal control when values of social undermining were moderate, even when perceived social support was moderate to high. These findings led to a conditional rejection of the null hypothesis for Research Question 3.

In Chapter 5, I provide a summary of study and an interpretation of the results. I discuss conclusions that can be drawn from the findings. In this concluding chapter, I discuss the study limitations that may have led to limited findings related to the research questions and hypotheses. I also provide recommendations for future research, propose

alternative hypotheses, and highlight social change implications relevant to study findings.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

The purpose of this quantitative study was to examine the moderating roles of perceived social support and social undermining on the relationship between ACEs (i.e., physical punishment, emotional abuse, and sexual events) and illness perceptions (i.e., personal control and treatment control) among individuals with fibromyalgia. Previous researchers have found a correlation between ACEs and disease or illness in adulthood (Danese & McEwen, 2012; Danese et al., 2007; Felitti et al., 1998; Imbierowicz & Egle, 2003), as well as a relationship between ACEs and physical, emotional, cognitive, and social interaction problems in adulthood (Felitti et al., 1998; Middlebrooks & Audage, 2008; National Scientific Council on the Developing Child, 2007; Norman et al., 2012). Additionally, researchers have shown that perceived social support and social undermining affect illness perceptions, health-related behaviors, and health outcomes (Holt-Lunstad et al., 2010; Newsom et al., 2005; Uchino et al., 2004).

Researchers have found that illness perceptions have an influence on health outcomes and health-related behaviors (Petrie et al., 2007; Petrie & Weinman; van Wilgen et al., 2008). A meta-analysis conducted by Sim and Madden (2008) revealed that illness perceptions have been studied among individuals with fibromyalgia; however, no studies were found on the relationships between ACEs, perceived social support, social undermining, and illness perceptions in this population. Further, I did not identify any fibromyalgia studies where researchers examined these variables. This study was conducted because of this identified gap in the literature.

I used four measurement instruments (i.e., MSPSS, SUND and subscales of the ETISR-SF and IPQ-R) to assess the levels of ACEs, perceived social support, social undermining, and illness perceptions of personal and treatment control in a sample of 231 individuals with fibromyalgia. I obtained this sample through purposive convenience sampling and online recruitment methods. Following initial data screening and deletion of incomplete surveys, I used bivariate correlation and moderated multiple regression analyses to examine the research questions and hypotheses in this study.

Key Findings

The key findings of the correlation and multiple regression analyses did not support two of the three study hypotheses. There was no observed correlation between all domains of the ETISR-SF (i.e., physical punishment, emotional abuse, and sexual events) and illness perceptions of personal control or treatment control; therefore, I failed to reject the null hypothesis for Research Question 1. Research Question 2 was dependent on a significant finding for Research Question 1. Due to the lack of a relationship between ACEs and personal control or treatment control, neither perceived social support nor social undermining could act as moderators. This led to rejection of the null hypothesis for Research Question 2.

The findings for Research Question 3 required additional investigation and interpretation. Although there were no significant interaction effects when all domains of the ETISR-SF were examined together, there was a significant finding when I conducted the analyses using the individual domains of the ETISR-SF. These findings led to the conditional rejection of the null hypothesis for Research Question 3. An interaction

between sexual abuse, perceived social support, social undermining, and personal control was observed, but only for specific combinations the two moderators. I was able to discover these significant interactions within the regression model because PROCESS software provides statistics for all levels of each moderating variable. I discuss the implications of this conditional rejection of the null hypothesis for Research Question 3 later in this chapter. Refer to Table 13 for a summary of the key study findings. In Table 13, I provide an interpretation of the results as they pertain to each of the study questions. See Appendix G for syntax and output for the PROCESS analysis.

Table 13

Summary of Key Study Findings

Research Question	Statistical Result	Action	Interpretation of Finding
<p>RQ 1:</p> <p>Is exposure to ACEs a predictor of illness perceptions of personal control and treatment control among individuals with fibromyalgia?</p>	<p>No statistically significant correlation.</p>	<p>Accept the null hypothesis.</p> <p>Exposure to ACEs is not a predictor of illness perceptions of personal control and treatment control among individuals with fibromyalgia.</p>	<p>Among individuals with fibromyalgia, the number of reported ACEs does not influence their perceived level of control over the course of their illness nor the effectiveness of available treatments.</p>
<p>RQ 2:</p> <p>Does perceived social support act as a primary moderator in the relationship between ACEs and illness perceptions of personal control and treatment control among individuals with fibromyalgia?</p>	<p>Perceived social support is not a statistically significant moderator.</p>	<p>Accept the null hypothesis.</p> <p>Perceived social support does not have not have a primary moderating effect on the relationship between ACEs and illness perceptions of personal control and treatment control among individuals with fibromyalgia.</p>	<p>Among individuals with fibromyalgia, perceived social support cannot act as a moderator because there was not an observed relationship between ACEs and illness perceptions.</p>
<p>RQ 3:</p> <p>Does social undermining act as a secondary moderator in the relationship between ACEs and illness perceptions of personal control and treatment control among individuals with fibromyalgia?</p>	<p>Social undermining is not a statistically significant secondary moderator.</p>	<p>Accept the null hypothesis.</p> <p>Social undermining does not have a secondary moderating effect on the relationship between ACEs and illness perceptions of personal control and treatment control among individuals with fibromyalgia.</p>	<p>Among individuals with fibromyalgia exposed to ACEs, social undermining does not influence perceptions concerning the course of illness nor the effectiveness of treatment options. The reported level of perceived social support has no influence this finding.</p>

Table continues

Research Question	Statistical Result	Action	Interpretation of Finding
<p>RQ 3a (Sexual Events):</p> <p>Does social undermining act as a secondary moderator in the relationship between sexual events and illness perceptions of personal control and treatment control among individuals with fibromyalgia?</p>	<p>Finding 1: Statistically significant 3-way interactions between sexual events, perceived social support, and social undermining on personal control. Only observed when perceived social support is at moderate to high levels and social undermining is at a moderate level.</p> <p>Finding 2: Social undermining is a significant secondary moderator in a moderated relationship between ACEs, perceived social support, and personal control. Social undermining is only a significant secondary moderator when it is at moderate to high levels.</p>	<p>Conditional rejection of the null hypothesis.</p>	<p>Finding 1: Individuals with fibromyalgia who reported a high number of sexual events prior to age 18 are more likely to have negative perceptions of their ability to control their illness when they also experience moderate levels of social undermining. They are more likely to have negative perceptions about their level of control over their illness even if they currently experience moderate to high levels of perceived social support. This finding might suggest that exposure to sexual abuse makes it more difficult to deal with negative social interactions in adulthood, even if individuals also have positive social support from friends, family, or a significant other.</p> <p>Finding 2: For individuals who reported a high number of sexual events prior to age 18, moderate to high levels of social undermining had a negative influence on their perceptions of how much control they have over the course or their illness. These findings suggest that exposure to sexual abuse might cause an individual to become more sensitive to the negative effects of social undermining.</p>

Additional Findings

Several statistically significant correlations and multiple regression models were revealed during the preliminary data analyses phase of this study (i.e., the statistical tests to ensure the data complied with the assumptions for a multiple regression analysis). A significant positive correlation was found between perceived social support and illness perceptions of treatment control and personal control. In addition, a significant positive correlation was found between ACEs and social undermining. Significant negative correlations were found between ACEs and perceived social support and social undermining. A multiple regression analysis, conducted during testing of variables for multiple regression assumptions, produced a statistically significant model for both personal control and treatment control. In this model, ACEs and perceived social support were entered as predictors; however, only perceived social support was a significant predictor of personal control and treatment control. Refer to Table 14 for a complete synopsis and interpretation of these additional preliminary study findings.

In addition to these findings, further examination of the ETISR-SF descriptive statistics revealed that 65% of individuals in this study reported one to five physical punishment events during childhood. Eight-two percent of the participants reported one to five events of emotional abuse; and 59% of participants reported one to six events of sexual abuse prior to age 18. I discuss the significance and implications of these incidental findings in a later section of this chapter.

Table 14

Summary of Additional Significant Study Findings Resulting from Preliminary Statistical Analyses

Statistically Significant Result	Interpretation of Finding
Positive correlation between perceived social support and personal control	Individuals with fibromyalgia who perceived that they had social support from their friends, family, and/or a significant other were more likely to form positive beliefs concerning their ability to control the outcome of their illness.
Positive correlation between perceived social support and treatment control	Individuals with fibromyalgia who perceived that they had social support from their friends, family, and/or a significant other were more likely to form positive beliefs concerning the effectiveness of treatment options for their illness.
Negative correlation between ACEs and perceived social support	Individuals with fibromyalgia who were exposed to a higher number of ACEs prior to the age of 18 were less likely to perceive that social support was available from friends, family, or a significant other.
Negative correlation between social undermining and treatment control	Individuals with fibromyalgia who were exposed to social undermining as adults were more likely to have negative beliefs concerning the effectiveness of available treatments for their illness.
Perceived social support a predictor of personal control and treatment control	Among individuals with fibromyalgia, reported levels of perceived social support can be used to predict their beliefs concerning the effectiveness of treatment options and their level of perceived control over the course of their illness.

Interpretation of the Findings

I based the research questions and hypotheses developed for this study on peer-reviewed empirical research and an identified gap in the literature. In a qualitative study, Mengshoel and Heggen (2004) reported that the participants in their study who were exposed to social undermining or low levels of social support felt that this led them to

form negative perceptions regarding their ability to cope with their fibromyalgia (i.e., increased negative beliefs about their illness). In several quantitative studies, researchers found that social undermining had a negative effect on health-related beliefs and behaviors (Brooks & Dunkel-Schetter, 2011; Croezen et al., 2012; Petrie & Weinman, 2006). Newsom et al. (2008) concluded that negative social interactions decreased both feelings of well-being and increased psychological distress, whereas positive social exchanges only increased feelings of well-being.

These previous findings are in alignment with the results of the correlation and multiple regression in this study. A significant correlation was found between social undermining and treatment control. The higher the level of social undermining, the more negative the belief that a treatment would be effective. In addition to this correlation, the moderated regression analysis showed that social undermining had a negative effect on illness perceptions of personal control when levels of social undermining were moderate to high, even when levels of perceived social support were moderate. However, this effect was only observed among individuals with fibromyalgia who reported sexual abuse prior to age 18. These findings might suggest that individuals exposed to sexual abuse during childhood are more sensitive to the influence of social undermining than individuals exposed to physical or emotional abuse during childhood

Previous researchers found a positive relationship between perceived social support and illness perceptions (Petrie & Weinman, 2006; Stafford et al., 2009). Based on the correlation results in this study, I provide further support for these previous research findings. There were significant positive correlations between perceived social support

and illness perceptions of both treatment control and personal control among the individuals with fibromyalgia who participated in this study.

The observed correlations in this study between ACEs and social undermining and ACEs and perceived social support were not reported in previous research. When I developed the research questions for this study, I hypothesized that there would be a direct link between ACEs and illness perceptions. However, the link found in this study was from ACEs to perceived social support/social undermining, and from perceived social support/undermining to illness perceptions.

According to House et al. (1988), perceived social support can function as a dependent, independent, or moderating variable in relationships between ACEs, stress, health outcomes, and illness perceptions. The results of the multiple regression analyses conducted in this study are in alignment with this statement. In this study perceived social support was a significant predictor of illness perceptions of personal control and treatment control among individuals with fibromyalgia. Perceived social support was not a moderator, as I hypothesized.

Lastly, the majority of participants in this study experienced some type of physical, emotional, or sexual abuse during childhood. The reported incidence of these three categories of childhood abuse was 90%, much higher than the rates reported in previous research studies. The incidence of ACEs among individuals with fibromyalgia in previous studies ranged from 32 to 64% (Goldberg, 1999; van Houdenhove et al., 2001; Walker et al., 1997). In these previous studies, reported childhood abuse rates among individuals with fibromyalgia and chronic fatigue were significantly higher than

rates for a control group of healthy individuals (Imbierowicz & Egle, 2003; van Houdenhove et al., 2001).

Limitations

Several factors may have influenced the statistical analyses and findings in this study, including survey length and question specificity, measurement instruments, selection of predictor and moderating variables, and lack of normality for some study variables. I discuss these factors in the sections that follow. One or more of these factors may have contributed to acceptance of the null hypotheses for Research Questions 1 and 2, and conditional rejection of the null hypothesis for Research Question 3. With consideration of these factors and their potential influence on reliability and validity, any significant correlations observed in this study should be interpreted and generalized with caution.

Survey Length and Measurement Instruments

The measurement instruments used in this study were selected, in part, due to their brevity. My goal in this study was to assess levels of ACEs, perceived social support, social undermining, and illness perceptions, but develop a survey that could be completed quickly and easily. I made this decision because of the fatigue and pain experienced by many individuals with fibromyalgia, factors that could prevent them from completing a lengthy survey. This trade-off resulted in selection of only two of the five domains of the IPQ-R, limiting a full assessment of all aspects of illness perceptions and their relationship to ACEs. If I had included all domains of illness perceptions, there may have been additional significant findings in this study. I considered using the nine item

Brief IPQ (Broadbent, Petrie, Main, & Weinman, 2006), but I found limited data on its reliability and validity.

The limitation on time and number of questions also influenced selection of an instrument to measure childhood abuse or neglect. An exhaustive review of instruments used to measure ACEs revealed that many of these are quite lengthy; therefore, they were not suited for use in the study survey. I selected the ETISR-SF because it assessed the number of physical, sexual, and emotional events that occurred prior to age 18. Due to the general nature of the questions in the ETISR-SF; it was not possible to determine if reported abuse constituted an isolated event, or if it was something that occurred frequently during childhood. To fully assess the impact of ACEs for purposes of this study, it would have been advantageous to know the type of abuse or neglect, along with the duration, frequency, and age that it occurred.

Methodology

The use of an online survey may have influenced the results of this study. According to researchers, individuals are more likely to answer questions about trauma or abuse in an anonymous online setting (Alessi & Martin, 2010; Gosling et al., 2004). However, in-person interviews, or surveys with open-ended questions would have allowed me to gather richer detail on the type, length, and severity of childhood abuse and neglect. Due to the somewhat exploratory nature of this study, it might have been better to start with a qualitative or mixed methods study that would have allowed for deeper exploration into the variables of interest.

I selected ACEs as the predictor variable, but researchers have stated that perceived social support could function as a predictor or moderating variable in health outcomes (House et al., 1988). Based on results of the multiple regression analysis, perceived social support was a significant predictor of illness perceptions of personal control and treatment control. Again, if I had obtained richer detail concerning childhood abuse and neglect, ACEs may have also been a significant predictor of illness perceptions.

Additionally, any of the following methodological factors could have influenced the results of this study: (a) selection of a survey design, (b) convenience purposive sampling (i.e., nonrandom sampling), (c) failure to identify important predictor variables, and/or (d) accuracy/legitimacy of retrospective reports of ACEs. Further, the use of an online survey could have been a source of bias. According to Eysenbach (2004) and Wright (2005), individuals with certain characteristics (e.g., age, gender, education level) may be more likely to visit websites or respond to online announcements than other individuals in the target population. All of these factors could have affected the external validity of this study; therefore any findings should be generalized with caution.

Normality of Variables

As I pointed out in Chapter 4, tests for normality indicated that the ETISR-SF and SUND variables exhibited deviations from normality. The distribution for the ETISR-SF was flat (i.e., exhibited platykurtosis), and the distribution for the SUND exhibited a significant negative skew. A log₁₀, inverse, and square root transformation did not

significantly improve the normality of the ETISR. The log10 transformation for the SUND resulted in improvement in normality.

Normality is an assumption that must be met for multiple regression analysis, but there is no standard for the amount of deviation from normality that will affect results of a statistical analysis (Tabachnick & Fidell, 2007). Tabachnick and Fidell (2007) stated that deviations from normality can weaken the results of a multiple regression analysis, but they do not invalidate the results. Although I transformed the SUND and created a variable with a more normal distribution, it is unclear what impact the lack of normality observed in the SUND and ETISR-SF had on the internal validity of this study.

Recommendations for Future Research

As discussed in the previous section, the acceptance/conditional rejection of the null hypotheses in this study could be due to methodological issues, selection of predictor and moderating variables, and/or lack of relationship between the variables. The later seems unlikely due to the extant empirical research and significant findings presented in Chapter 2, and the significant correlations observed in this study. Based on the results obtained in this study, the correlations between perceived social support and illness perceptions, ACEs and perceived social support, ACEs and social undermining, social undermining and the treatment control may deserve further investigation.

Based on the findings summarized in the literature review, and the results obtained in this study, I recommend further examination of the relationship between sexual abuse and social, cognitive, and psychological factors associated with fibromyalgia. I also recommend further investigation of the link between cortisol

hyperresponsivity and childhood sexual abuse. Expanding on the research conducted by Carpenter et al. (2009), it would be important to gain a better understanding of the influence of cortisol levels on illness perceptions among individuals with fibromyalgia. It would also be valuable to examine whether individuals with cortisol hypersensitivity are also more sensitive to the negative effects of social undermining and/or the positive effects of social support.

The results of the multiple regression analysis indicated that perceived social support was a significant predictor of illness perceptions. This finding could warrant further examination into the role of perceived social support as a predictor of other facets of illness perceptions (e.g., illness identity, consequences, timeline, and cause) among individuals with fibromyalgia. Further, the observed correlation between ACEs and perceived social support may indicate that it should be considered as a moderator, rather than a predictor variable, in an examination of the relationship between perceived social support and illness perceptions. If I were to conduct this study again, I would change the title to reflect the role of perceived social support in predicting illness perceptions. Additionally, I would alter the hypotheses in this study to reflect the role of perceived social support as a predictor of illness perceptions, with social undermining and ACEs as potential moderators.

As a final note, I would recommend a qualitative or mixed methods study to explore the relevance of ACEs, perceived social support and social undermining on illness perceptions among individuals with fibromyalgia. In-person interviews with open-ended questions would allow for additional themes to emerge concerning the relationship

between these variables. Additional studies such as this might also allow other important variables or relationships related to illness perceptions to emerge.

Implications for Positive Social Change

In this study, I adopted a multidisciplinary approach to the investigation of fibromyalgia. In an attempt to gain a broader understanding of the possible cause and treatment of fibromyalgia, I integrated findings from biological, social, psychological, and cognitive research. Due to this expanded approach to the study of fibromyalgia, the implications for positive social change are potentially far-reaching. The results of this study may impact the individual living with fibromyalgia, the health care professional treating his or her symptoms, and researchers studying this syndrome. On an even broader scale, the results of this study may have an influence on health institutions and organizations responsible for developing and instituting policies and health care protocols to address the specific needs of fibromyalgia patients.

For individuals with fibromyalgia, this study serves to support the legitimacy of fibromyalgia and the realness of its symptoms, thus reducing some of the stigma attached to this syndrome. The information in this study may motivate fibromyalgia patients to seek a health care professional who can address their symptoms and refer them to appropriate complementary treatments or therapies. After reading the study report, many individuals with fibromyalgia may take steps to improve their social network interactions. They may also be prompted to consider and address the impact that illness beliefs have on their overall health and ability to cope with fibromyalgia.

For health care professionals, the findings in this study emphasize the complexity of fibromyalgia, thus underscoring the advantage of forming an integrative treatment team for fibromyalgia patients. This study may encourage more health care professionals to screen fibromyalgia patients for anxiety/depression and exposure to ACEs, especially childhood sexual abuse. With an awareness of the importance of examining ACEs, social networks, social interactions, and illness beliefs among individuals with fibromyalgia, a primary health care provider may be more inclined to refer patients to an appropriate mental health professional or social worker. Such an expanded therapeutic approach could strengthen the effectiveness of treatments and improve patients' ability to cope with their fibromyalgia.

The findings of this study add to the body of scientific knowledge on fibromyalgia. Many of the relationships between variables that I found in this study serve to strengthen the evidence concerning the importance of social support in the lives of individuals who suffer from fibromyalgia. The high rate of ACEs observed in the participants in this study serves to strengthen evidence of a possible relationship between ACEs and fibromyalgia. As the body of knowledge builds with the addition of each new or supportive finding, researchers may come closer to discovering how to ease the suffering of those with fibromyalgia.

The positive social change implications of this study also extend to health care institutions. For medical institutions, awareness of the study findings could encourage those serving at the administrative level to develop and implement expanded screening protocols for fibromyalgia patients. These screening protocols would include an

assessment of patients' childhood abuse history and an evaluation of social, psychological, and cognitive factors that can affect overall patient health and well-being. Due to the high prevalence of depression and anxiety among individuals with fibromyalgia, new treatment protocols could draw on research and clinical practice interventions used for patients who suffer from these conditions.

In conclusion, the implications of this study extend beyond the individual who suffers from this syndrome, or even the researcher trying to discern the cause or discover a cure. This study may bring greater awareness of the impact of ACEs on mental and physical health, thus providing evidence for increased funding for educational initiatives and programs designed to reduce the incidence of childhood abuse. It is my hope that the implications of this study impact those who have the ability to make changes in the way that fibromyalgia patients are treated by health care practitioners, and by those responsible for developing health care policies. For the millions of individuals who suffer with the debilitating symptoms of fibromyalgia, expanding the scope of treatment modalities available to them could significantly improve their quality of life and productivity.

Conclusion

This was the first study of its kind to examine the relationships between ACEs, perceived social support, social undermining and illness perceptions among individuals with fibromyalgia. In the literature review, I attempted to synthesize findings from several different areas and across several different disciplines to highlight the importance of studying fibromyalgia through a wide lens. The interconnections between the study

variables, along with the significant findings that emerged during data analysis, helped to strengthen the connection between social, medical, and psychological knowledge about fibromyalgia.

This study has significant implications for the individual and for the research and health care communities. For those individuals who suffer from fibromyalgia, creating or maintaining positive, supportive, and nurturing relationships with friends and family members may assist them in improving some of the symptoms or consequences associated with their syndrome. If health care providers could help fibromyalgia patients address any negative relationships or sources of negative social interactions, these actions could aid in improving that patient's perceptions of his or her control over the symptoms, treatment, and progression of the syndrome.

From the results of this study and other empirical research, quality personal relationships appear especially important for individuals suffering from fibromyalgia as they attempt to cope with the consequences of their syndrome. The synthesis of knowledge from many disciplines concerning physical, psychological, and social factors and their relation to disease or illness may prompt health care providers to explore all these factors in their patients' lives. For fibromyalgia patients, knowing that they can take steps to improve areas of their lives that may impact their health and ability to cope with their symptoms could be empowering, and lead to an improvement in their overall quality of life.

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Appendix A: Instruments and Items Included in Study Survey

Revised Illness Perception Questionnaire

Purpose. I am interested in your own personal views of how you now see your current fibromyalgia.

Directions. Please indicate how much you agree or disagree with the following statements about your fibromyalgia by clicking on the appropriate box.

Treatment Control

1. There is very little that can be done to improve my fibromyalgia.

Strongly Disagree *Disagree* *Neither Agree nor Disagree* *Agree* *Strongly Agree*

2. My treatment will be effective in curing my fibromyalgia.

Strongly Disagree *Disagree* *Neither Agree nor Disagree* *Agree* *Strongly Agree*

3. The negative effects of my fibromyalgia can be prevented (avoided) by my treatment.

Strongly Disagree *Disagree* *Neither Agree nor Disagree* *Agree* *Strongly Agree*

4. My treatment can control my fibromyalgia.

Strongly Disagree *Disagree* *Neither Agree nor Disagree* *Agree* *Strongly Agree*

5. There is nothing which can help my fibromyalgia.

Strongly Disagree *Disagree* *Neither Agree nor Disagree* *Agree* *Strongly Agree*

Personal Control

1. There is a lot which I can do to control my symptoms.

Strongly Disagree *Disagree* *Neither Agree nor Disagree* *Agree* *Strongly Agree*

2. What I do can determine whether my fibromyalgia gets better or worse.

Strongly Disagree *Disagree* *Neither Agree nor Disagree* *Agree* *Strongly Agree*

3. The course of my fibromyalgia depends on me.

Strongly Disagree *Disagree* *Neither Agree nor Disagree* *Agree* *Strongly Agree*

4. Nothing I do will affect my fibromyalgia.

Strongly Disagree *Disagree* *Neither Agree nor Disagree* *Agree* *Strongly Agree*

5. I have the power to influence my fibromyalgia.

Strongly Disagree *Disagree* *Neither Agree nor Disagree* *Agree* *Strongly Agree*

6. *My actions* will have no affect on the outcome of my fibromyalgia.

Strongly Disagree *Disagree* *Neither Agree nor Disagree* *Agree* *Strongly Agree*

Multidimensional Scale of Perceived Social Support

Purpose. I am interested in how you feel about the following statements.

Directions. Read each statement carefully. Indicate how you feel about each statement by checking the appropriate box.

1. There is a special person who is around when I am in need.

<i>Very Strongly Disagree</i>	<i>Strongly Disagree</i>	<i>Mildly Disagree</i>	<i>You are Neutral</i>	<i>Mildly Agree</i>	<i>Strongly Agree</i>	<i>Very Strongly Agree</i>
-----------------------------------	------------------------------	----------------------------	----------------------------	-------------------------	---------------------------	--------------------------------

2. There is a special person with whom I can share my joys and sorrows.

<i>Very Strongly Disagree</i>	<i>Strongly Disagree</i>	<i>Mildly Disagree</i>	<i>You are Neutral</i>	<i>Mildly Agree</i>	<i>Strongly Agree</i>	<i>Very Strongly Agree</i>
-----------------------------------	------------------------------	----------------------------	----------------------------	-------------------------	---------------------------	--------------------------------

3. My family really tried to help me.

<i>Very Strongly Disagree</i>	<i>Strongly Disagree</i>	<i>Mildly Disagree</i>	<i>You are Neutral</i>	<i>Mildly Agree</i>	<i>Strongly Agree</i>	<i>Very Strongly Agree</i>
-----------------------------------	------------------------------	----------------------------	----------------------------	-------------------------	---------------------------	--------------------------------

4. I get the emotional help and support I need from my family.

<i>Very Strongly Disagree</i>	<i>Strongly Disagree</i>	<i>Mildly Disagree</i>	<i>You are Neutral</i>	<i>Mildly Agree</i>	<i>Strongly Agree</i>	<i>Very Strongly Agree</i>
-----------------------------------	------------------------------	----------------------------	----------------------------	-------------------------	---------------------------	--------------------------------

5. I have a special person who is a real source of comfort to me.

<i>Very Strongly Disagree</i>	<i>Strongly Disagree</i>	<i>Mildly Disagree</i>	<i>You are Neutral</i>	<i>Mildly Agree</i>	<i>Strongly Agree</i>	<i>Very Strongly Agree</i>
-----------------------------------	------------------------------	----------------------------	----------------------------	-------------------------	---------------------------	--------------------------------

6. My friends really try to help me.

<i>Very Strongly Disagree</i>	<i>Strongly Disagree</i>	<i>Mildly Disagree</i>	<i>You are Neutral</i>	<i>Mildly Agree</i>	<i>Strongly Agree</i>	<i>Very Strongly Agree</i>
-----------------------------------	------------------------------	----------------------------	----------------------------	-------------------------	---------------------------	--------------------------------

7. I can count on my friends when things go wrong.

Very Strongly Disagree *Strongly Disagree* *Mildly Disagree* *You are Neutral* *Mildly Agree* *Strongly Agree* *Very Strongly Agree*

8. I can talk about my problems with my family.

Very Strongly Disagree *Strongly Disagree* *Mildly Disagree* *You are Neutral* *Mildly Agree* *Strongly Agree* *Very Strongly Agree*

9. I have friends with who I can share my joys and sorrows.

Very Strongly Disagree *Strongly Disagree* *Mildly Disagree* *You are Neutral* *Mildly Agree* *Strongly Agree* *Very Strongly Agree*

10. There is a special person in my life who cares about my feelings.

Very Strongly Disagree *Strongly Disagree* *Mildly Disagree* *You are Neutral* *Mildly Agree* *Strongly Agree* *Very Strongly Agree*

11. My family is willing to help me make decisions.

Very Strongly Disagree *Strongly Disagree* *Mildly Disagree* *You are Neutral* *Mildly Agree* *Strongly Agree* *Very Strongly Agree*

12. I can talk about my problems with my friends.

Very Strongly Disagree *Strongly Disagree* *Mildly Disagree* *You are Neutral* *Mildly Agree* *Strongly Agree* *Very Strongly Agree*

Social Undermining Scale

Purpose. I am interested in how you feel about the following questions.

Directions. Read each question carefully while you think about one significant person in your life. This person can be a friend, family member, or partner. Indicate how you feel about each question by clicking on the appropriate box.

1. How often does this significant person in your life act in an unpleasant or angry manner toward you?

Never

Once in a While

Fairly Often

Very Often

2. How often does this significant person in your life act in ways that show he/she dislikes you?

Never

Once in a While

Fairly Often

Very Often

3. How often does this significant person in your life make your life difficult?

Never

Once in a While

Fairly Often

Very Often

4. How often does this significant person in your life make you feel unwanted?

Never

Once in a While

Fairly Often

Very Often

5. How often does this significant person in your life get on your nerves?

Never

Once in a While

Fairly Often

Very Often

6. How often does this significant person in your life criticize you?

Never

Once in a While

Fairly Often

Very Often

7. How often does this significant person in your life insult you even if he/she did not mean to?

Never

Once in a While

Fairly Often

Very Often

Early Trauma Inventory Self Report-Short Form

Purpose. I am interested in knowing if you experienced any of the events listed below before you were 18 years old.

Directions. Answer “yes” or “no” to the following questions.

Physical Punishment. Before the age of 18

- | | | |
|---|----------|---------|
| 1. Were you ever slapped in the face with an open hand? | Yes ____ | No ____ |
| 2. Were you ever burned with hot water, a cigarette, or something else? | Yes ____ | No ____ |
| 3. Were you ever punched or kicked? | Yes ____ | No ____ |
| 4. Were you ever hit with an object that was thrown at you? | Yes ____ | No ____ |
| 5. Were you ever pushed or shoved? | Yes ____ | No ____ |

Emotional Abuse. Before the age of 18

- | | | |
|---|----------|---------|
| 1. Were you ever put down or ridiculed? | Yes ____ | No ____ |
| 2. Were you often ignored or made to feel that you didn't count? | Yes ____ | No ____ |
| 3. Were you often told you were no good? | Yes ____ | No ____ |
| 4. Most of the time were you treated in a cold, uncaring way or made to feel like you were not loved? | Yes ____ | No ____ |

5. Did your parents or caretakers often fail to understand you or your needs? Yes ____ No ____

Sexual Events. Before the age of 18

1. Were you ever touched in an intimate or private part of your body (e.g., breast, thighs, genitals) in a way that surprised you or made you feel uncomfortable? Yes ____ No ____

2. Did you ever experience someone rubbing their genitals against you? Yes ____ No ____

3. Were you ever forced or coerced to touch another person in an intimate or private part of their body? Yes ____ No ____

4. Did anyone ever have genital sex with you against your will? Yes ____ No ____

5. Were you ever forced or coerced to perform oral sex on someone against your will? Yes ____ No ____

6. Were you ever forced or coerced to kiss someone in a sexual rather than an affectionate way? Yes ____ No ____

Please provide the following demographic information:

What is your age? _____

What is your gender?

- ____ Male
- ____ Female

What is your marital status?

- ____ Married
- ____ Separated
- ____ Divorced
- ____ Same sex partner
- ____ Single (never married)
- ____ Widowed

How many years of school have you completed? _____

What year did you receive a diagnosis of fibromyalgia? _____

Appendix B: Study Recruitment Announcement

Hello,

My name is Susan Fay and I am a Ph.D. candidate at Walden University. As part of my doctoral research, I am conducting a study on fibromyalgia. I will be investigating whether negative childhood experiences and adult social interactions influence how people with fibromyalgia view their illness.

I am currently recruiting volunteers who have a clinical diagnosis of fibromyalgia to take part in this study. You are eligible to participate in this study if you have a diagnosis of fibromyalgia and are over 18 years of age. This survey will only be available in English.

I know that your time is valuable, so I have developed a survey that should take approximately 15 minutes to complete. By completing this survey, you will make a valuable contribution to fibromyalgia research.

If you are interested in participating, visit www.studyfibro.com for further information and to access the study survey. You may also contact Susan Fay at susan.fay@waldenu.edu if you have any additional questions.

Thank you for your interest in this study!

Susan Fay

Ph.D. candidate, Walden University

Walden Institutional Review Board Approval #: 07-01-14-0173542

Expires: June 30, 2015

Appendix C: Informed Consent Agreement

You are invited to participate in a fibromyalgia research study. The purpose of this study is to determine if negative childhood experiences can influence individuals' beliefs about their fibromyalgia. Of additional interest to the researcher is how current interactions with friends, family, and significant others contribute to positive or negative beliefs about their fibromyalgia.

To participate in this study, you must be over the age of 18 and have a clinical diagnosis of fibromyalgia.

This form is part of a process called "informed consent" to allow you to understand this study before deciding whether to participate.

This study is being conducted by a researcher named Susan Fay who is a doctoral student at Walden University. Susan Fay is under the supervision of Dr. Sandra Rasmussen.

Background Information

The purpose of this study is to gain a better understanding of factors that may contribute to the development of fibromyalgia, as well as to identify social factors that help or hinder an individual's ability to cope with this syndrome.

Procedures:

This study survey contains 51 questions. It will take you approximately 15 minutes to complete.

If you agree to participate, you will be asked to answer some questions about yourself, including your age, gender, education level, marital status, and the year you received a diagnosis of fibromyalgia.

You will also be asked some questions about whether your friends and family provide you with positive support; if you have a close friend or family member who treats you in a negative manner; and whether you were exposed to physical, sexual, or emotional abuse during childhood. Please do not agree to participate in this study if answering these types of questions would be too distressful.

Voluntary Nature of the Study

Your participation in this study is strictly voluntary. If you decide to withdraw once you have entered the survey, just exit the survey and your responses will not be saved. You may skip questions that are stressful, or questions you feel are too personal. Your

responses will only be used if you click the “Done” button at the end of the survey. You will not be penalized in any way if you decide not to complete the survey.

Anonymity and Confidentiality

All your survey answers will remain confidential and will only be known to the researcher. Your identity will remain anonymous and the researcher will not use your responses for any purpose outside of this research project. Please do not provide your name or any other identifying information on the survey.

As required by Walden University, all data for this study will be kept in a secure location and will be destroyed after 5 years.

Risks and Benefits of Participating in this Study

Being in this type of study involves a minimal risk of emotional or psychological discomfort. Some individuals may experience anxiety or stress when asked to recall childhood experiences of abuse or neglect. Please do not agree to take part in this study if you think that recalling childhood experiences related to physical, sexual, or emotional abuse/neglect will cause you distress or harm. Being in this study will not pose a risk to your safety or wellbeing.

If you take the survey and find that you need assistance, contact the Substance Abuse and Mental Health Services Administration (SAMHSA) Helpline at 1-800-662-HELP (4357). They can provide information and referrals to mental health practitioners or appropriate support groups/organizations in your area. The helpline is free and available 24/7. The SAMHSA website can be accessed by clicking on the “Study Contact” tab (above).

Your participation is beneficial because you will help increase knowledge about this complex syndrome. This knowledge may one day lead to more effective and personalized therapies for fibromyalgia patients. It may also provide you, and other people who suffer from fibromyalgia, additional insights into the condition.

Compensation

You will not receive monetary compensation for participation, but you will have access to a report summarizing the results of this study. The report will be published on this website at the conclusion of this research project.

Contacts and Questions:

You may contact the researcher, Susan Fay, if you have any questions about the study, either before or after you take the online survey. Susan Fay may be reached by email at

susan.fay@waldenu.edu. Dr. Rasmussen may be reached by email at sandra.rasmussen@waldenu.edu.

If you want to talk privately about your rights as a participant, you may contact Dr. Leilani Endicott. She is the Walden University representative who can discuss this with you. Her phone number is 1-612-312-1210 (for U.S. based participants) or 001-612-312-1210 (for participants outside the U.S.). Walden University's approval number for this study is 07-01-14-0173542 and it expires on June 30, 2015.

Please download or print this consent form for your records.

Clicking on the "Survey" button (below) will be interpreted as your consent to participate in this research study.

Appendix D: Website Text and Design

Report Announcement for Study Website:

The results are in!

Click on the “Study Report” tab (above) if you are interested in reading about the results of the study entitled: The Relationship Between Adverse Childhood Experiences and Illness Perceptions Among Individuals with Fibromyalgia.

I thank all of you who participated in this important research project!

Please contact Susan Fay at susan.fay@waldenu.edu, or click on the “Study Contacts” tab (above) if you have any questions or would like to discuss the findings of this report.

Note: This text will be added to the first page of the website when the study report is completed.

Report Announcement for Recruitment Websites:

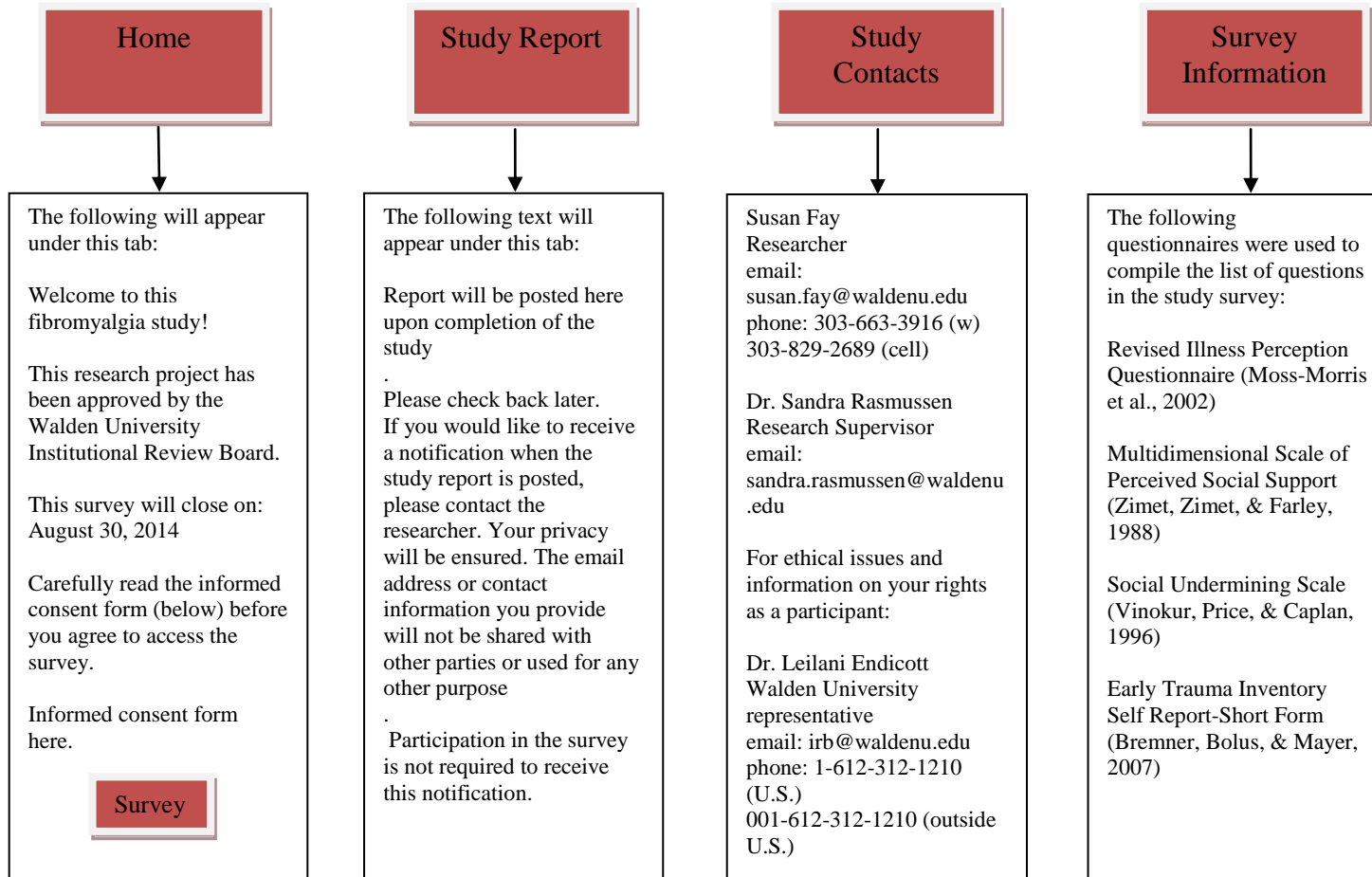
Click on the link www.studyfibro.com if you are interested in reading about the results of the study entitled: The Relationship Between Adverse Childhood Experiences and Illness Perceptions Among Individuals with Fibromyalgia.

I thank all of you who participated in this important research project!

Please contact Susan Fay at susan.fay@waldenu.edu if you have any questions or would like to discuss the findings of this report.

Note: This announcement will be posted on the four websites used to recruit study participants (i.e., National Fibromyalgia Facebook page, HealingWell.com, and the Social Psychology Network and American Psychological Society websites).

Study Website Design



Appendix E: Correspondence from Instrument Developers

Walden University Mail - RE: Early Trauma Inventory

<https://mail.google.com/mail/u/1/?ui=2&ik=677b320a97&view=pt&...>

Susan Fay <susan.fay@waldenu.edu>

RE: Early Trauma Inventory

2 messages

Bremner, James Douglas <jdbremn@emory.edu>
 Reply-To: "Bremner, James Douglas" <jdbremn@emory.edu>
 To: Susan Fay <susan.fay@waldenu.edu>

Thu, Jan 16, 2014 at 12:46 PM

It is free to use.

J. Douglas Bremner, M.D.
 Professor of Psychiatry and Radiology
 Director, Emory Clinical Neuroscience Research Unit (ECNRU)
 Emory University School of Medicine
 Director, Mental Health Research,
 Atlanta VA Medical Center
 (404) 712-0560
 jdbremn@emory.edu

<http://userwww.service.emory.edu/~jdbremn/><http://www.dougbremner.com>

From: Susan Fay [mailto:susan.fay@waldenu.edu]
Sent: Wednesday, January 08, 2014 5:57 PM
To: Bremner, James Douglas
Subject: Early Trauma Inventory

Dear Dr. Bremner,

I am working on my dissertation and would like to use the Early Trauma Inventory Self Report-Short Form

Walden University Mail - RE: Early Trauma Inventory-Short Form (... <https://mail.google.com/mail/u/1/?ui=2&ik=677b320a97&view=pt&...>)



Susan Fay <susan.fay@waldenu.edu>

RE: Early Trauma Inventory-Short Form (ETISR-SF)

1 message

Bremner, James Douglas <jdbremn@emory.edu>
To: Susan Fay <susan.fay@waldenu.edu>

Wed, Mar 26, 2014 at 12:05 PM

I think that would be okay as they are validated within domain.

Some sticklers might disagree.

See attached

J. Douglas Bremner, M.D.

Professor of Psychiatry and Radiology

Director, Emory Clinical Neuroscience Research Unit (ECNRU)

Emory University School of Medicine

Director, Mental Health Research,

Atlanta VA Medical Center

(404) 712-9560

jdbremn@emory.edu

<http://userwww.service.emory.edu/~jdbremn/>

<http://www.doughbremner.com>

From: Susan Fay [<mailto:susan.fay@waldenu.edu>]
Sent: Wednesday, March 19, 2014 11:14 AM
To: Bremner, James Douglas
Subject: Early Trauma Inventory-Short Form (ETISR-SF)

Susan Fay <susan.fay@waldenu.edu>**RE: Multidimensional Scale of Perceived Social Support (MSPSS)**

2 messages

Zimet, Gregory D <gzimet@iu.edu>

Fri, Mar 14, 2014 at 11:10 AM

Reply-To: "Zimet, Gregory D" <gzime@iu.edu>To: Susan Fay <susan.fay@waldenu.edu>

Dear Susan,

You have my permission to use the MSPSS in your dissertation research. There is no charge for use. I have attached a copy of the scale and a document that lists several studies that have reported on the psychometric properties of the MSPSS.

Good luck with your dissertation.

Best regards,

Greg Zimet

=====

Gregory D. Zimet, PhD

Professor of Pediatrics & Clinical Psychology

Section of Adolescent Medicine

Indiana University School of Medicine

Health Information & Translational Sciences

410 W. 10th Street, HS 1001

Indianapolis, IN 46202

USA

Phone: 317-274-6812

Fax: 317-274-0125

e-mail: gzimet@iu.edu

<http://pediatrics.iu.edu/center-hpv-research/about-us/>

<http://pediatrics.iu.edu/sections-and-faculty/adolescent-medicine/our-team/faculty/bio-zimety>

Walden University Mail - Re: Social Undermining Scale

<https://mail.google.com/mail/u/1/?ui=2&ik=677b320a97&view=pt&...>

Original E-mail

From : Amiram Vinokur [avinokur@umich.edu]
Date : 01/27/2014 04:07 PM
To : Susan Fay [susan.fay@waldenu.edu]
Subject : Re: Social Undermining Scale

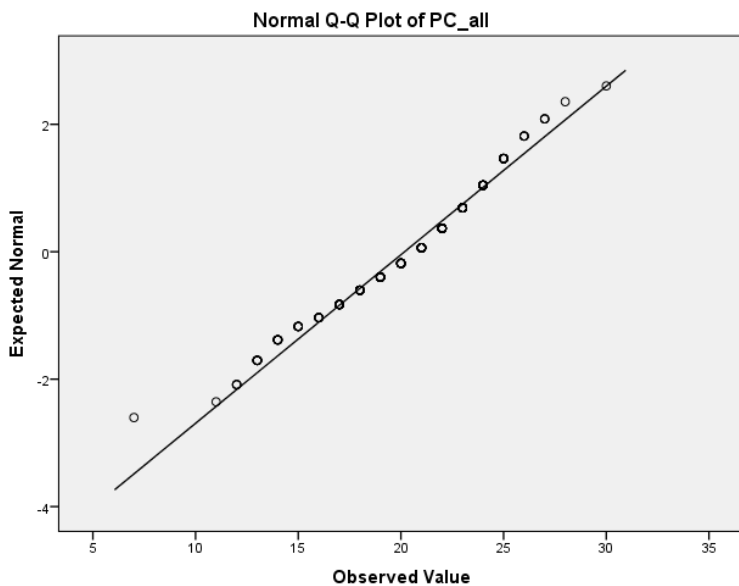
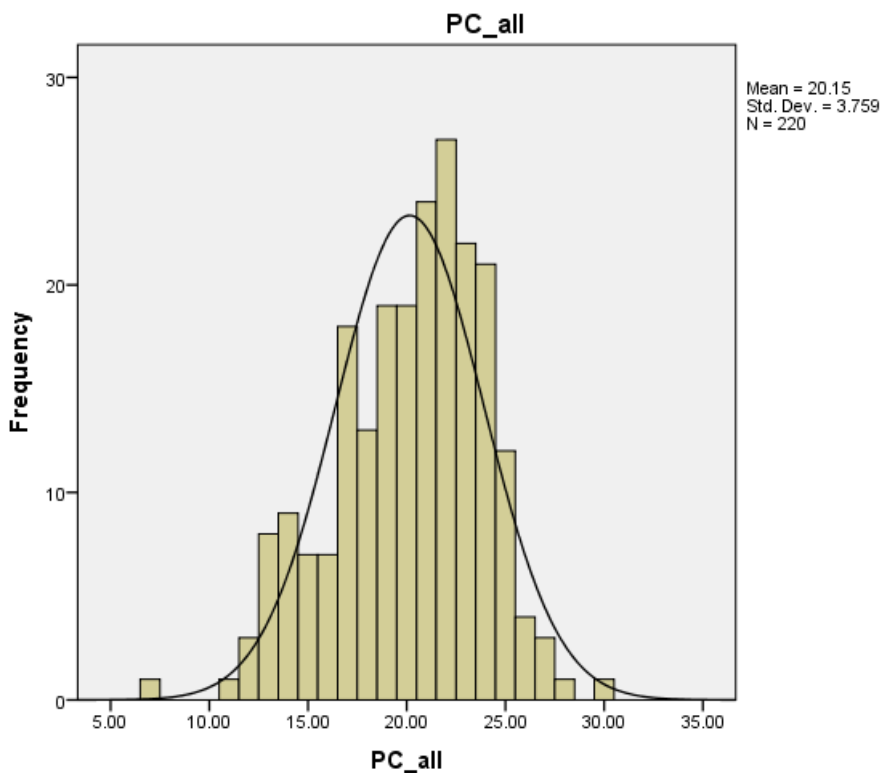
You have my permission to use the social undermining scale that is described in Vinokur, Price and Schul (1996). There are no costs or fees for using the scale and no restrictions.
Best, Amiram Vinokur.

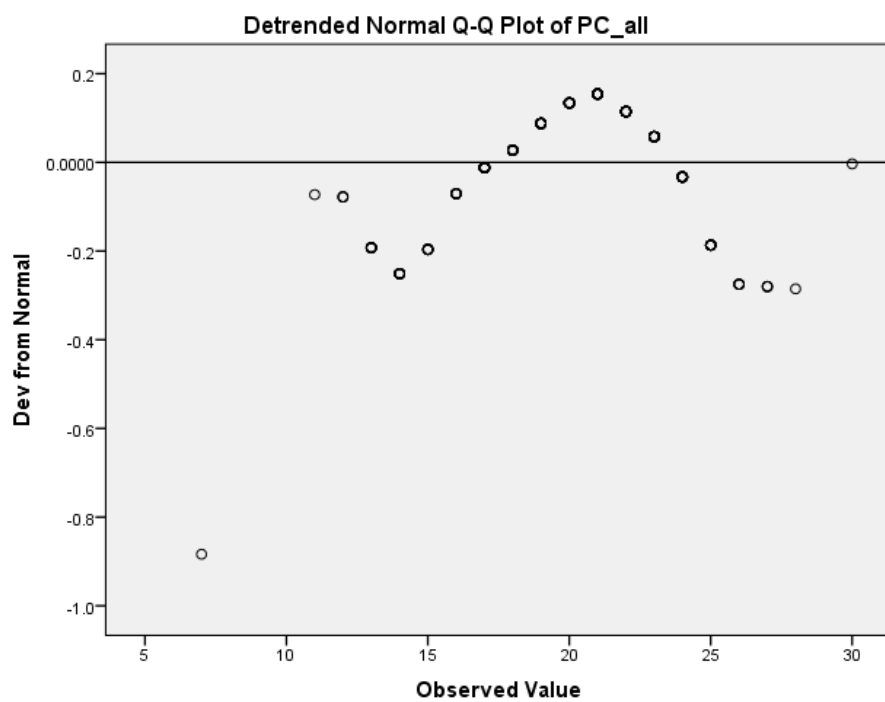
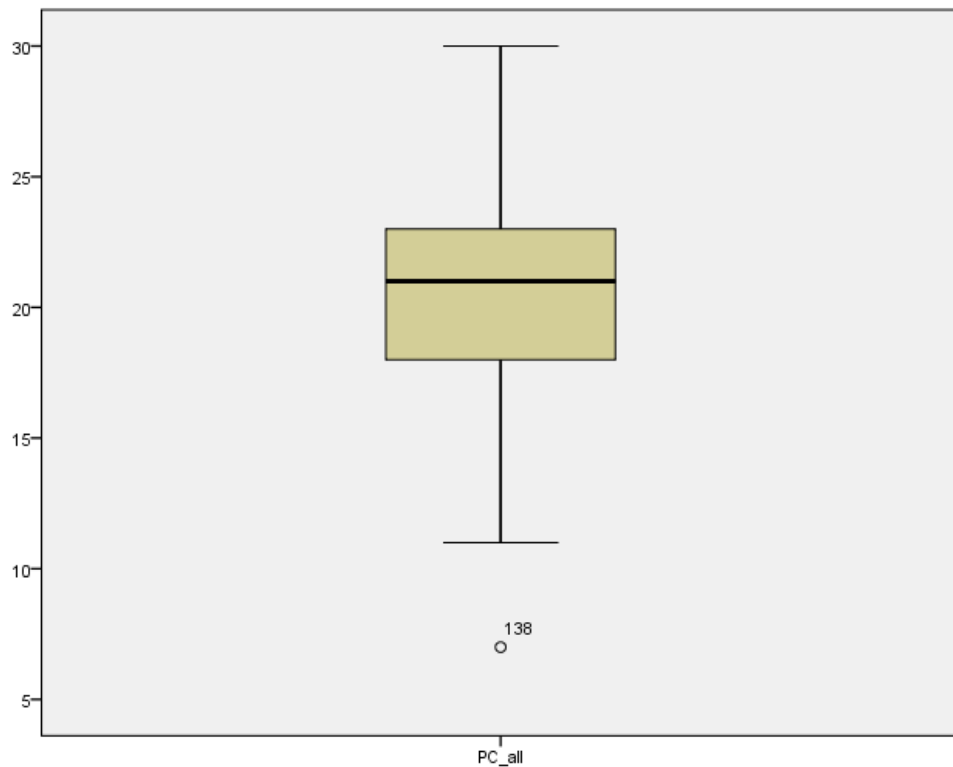
Amiram D. Vinokur avinokur@umich.edu
Research Professor
Institute for Social Research
426 Thompson Street
Ann Arbor, MI 48106 Tel. 734-647-0858

----- Forwarded message -----
From: Amiram Vinokur <avinokur@umich.edu>
To: Susan Fay <susan.fay@waldenu.edu>
Cc:

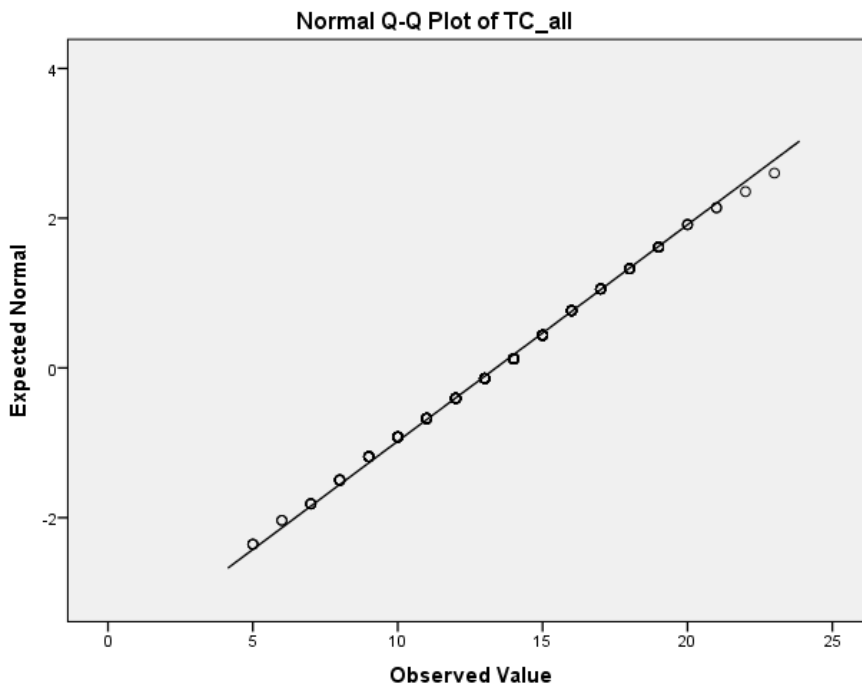
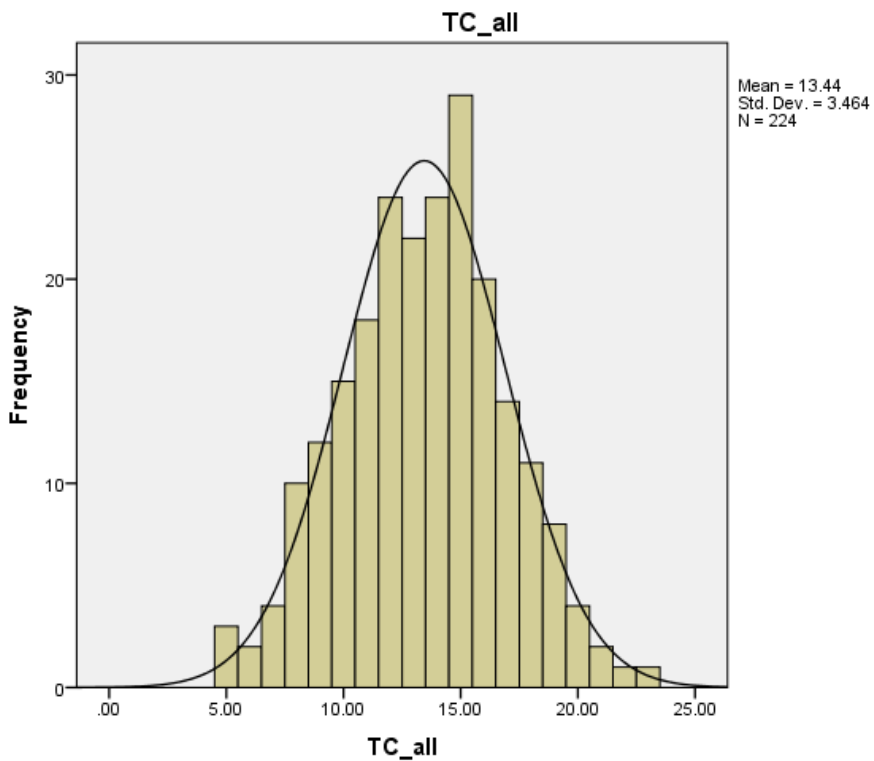
Appendix F: Histograms and Normality Plots for Study Variables

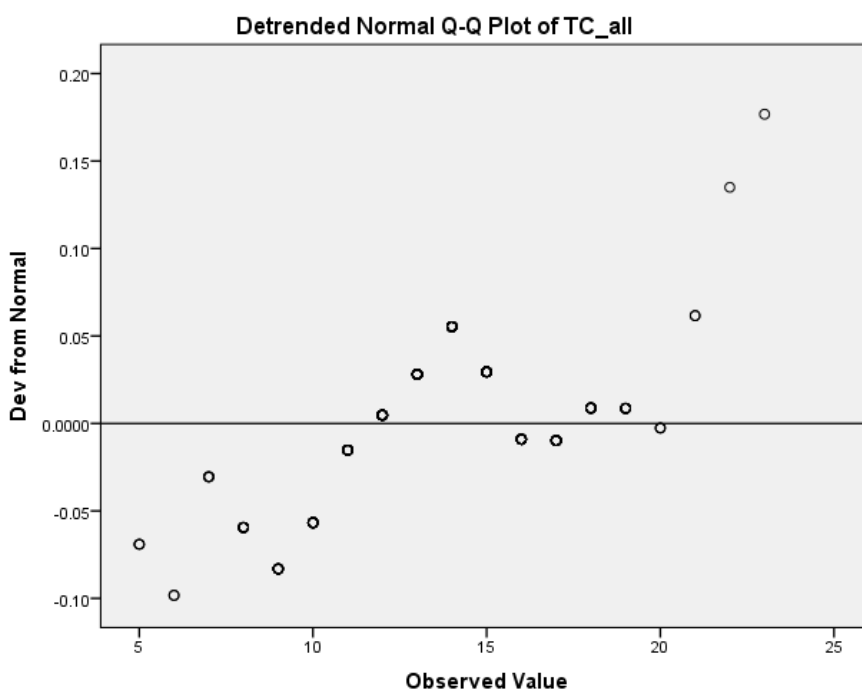
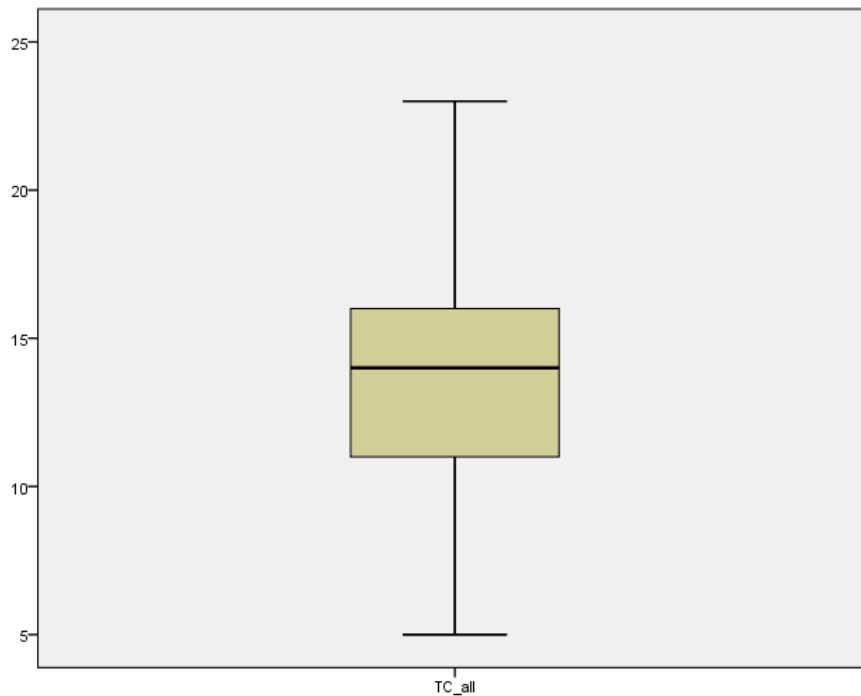
IPQ-R: Personal Control



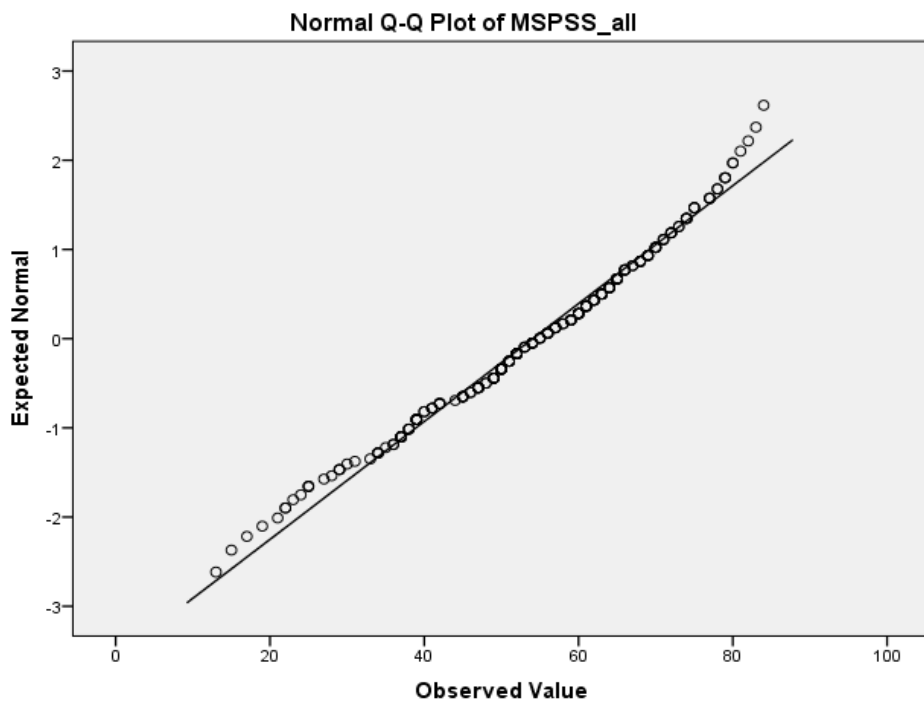
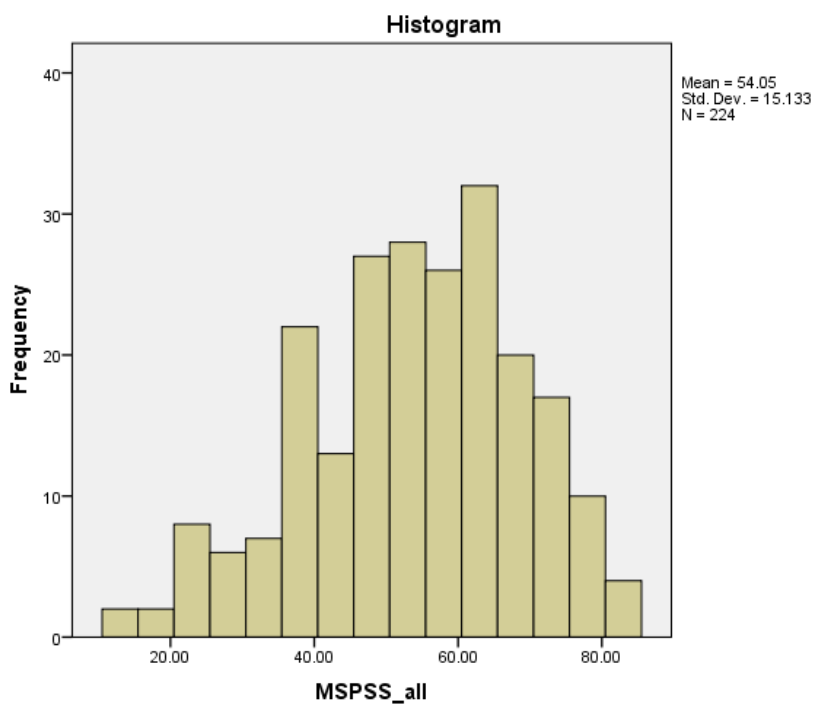


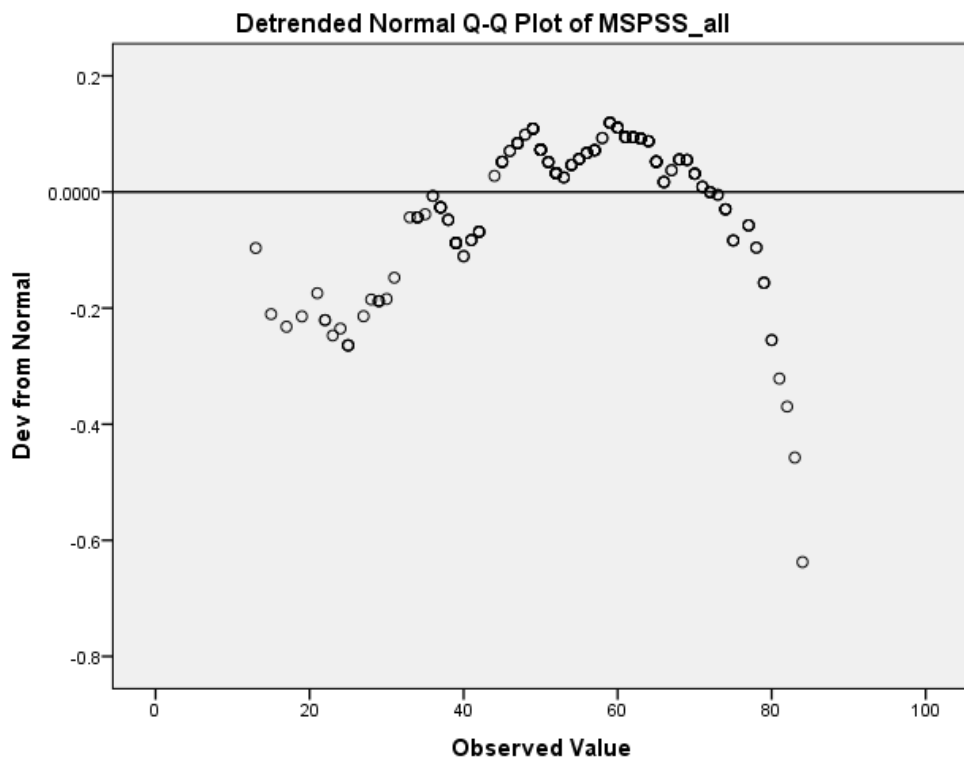
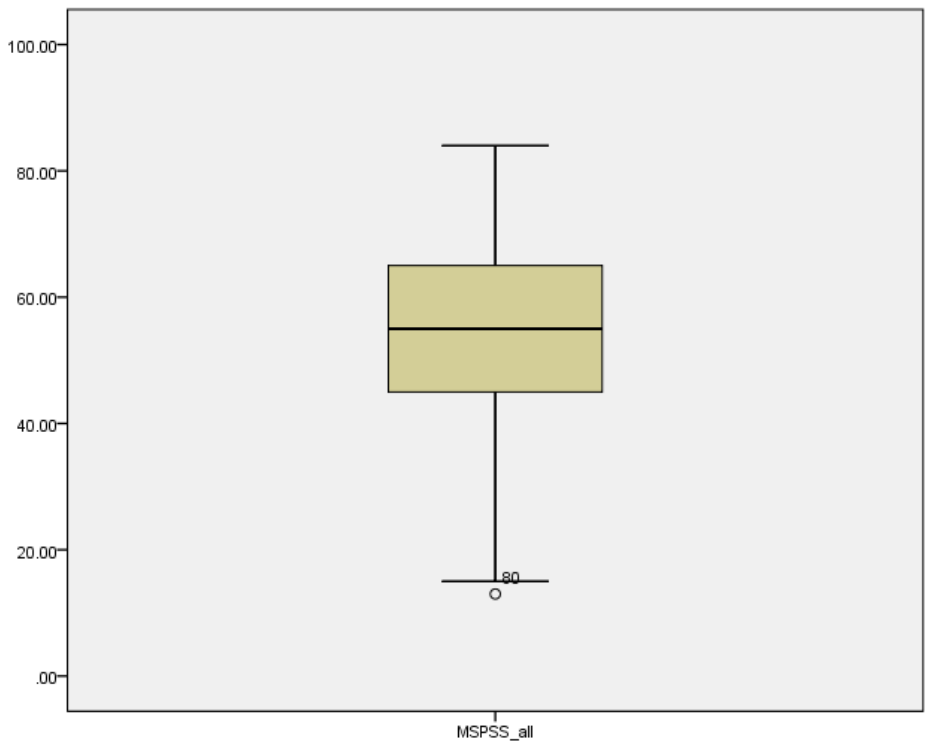
IPQ-R: Treatment Control

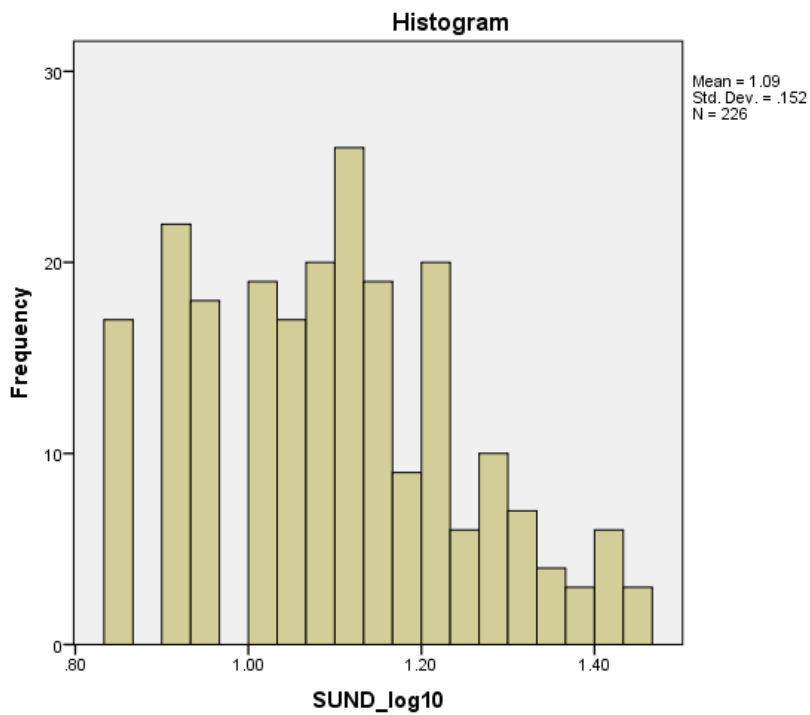
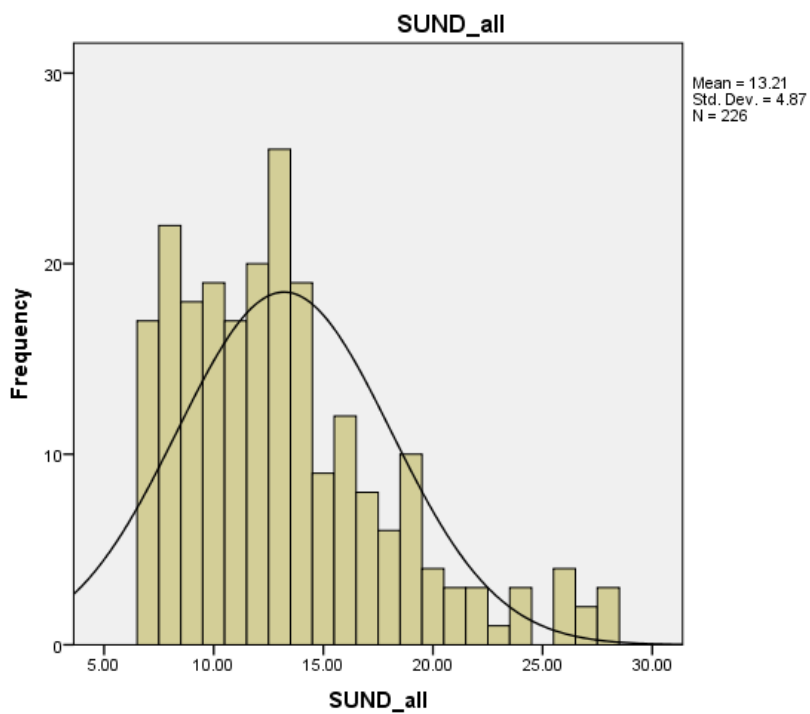


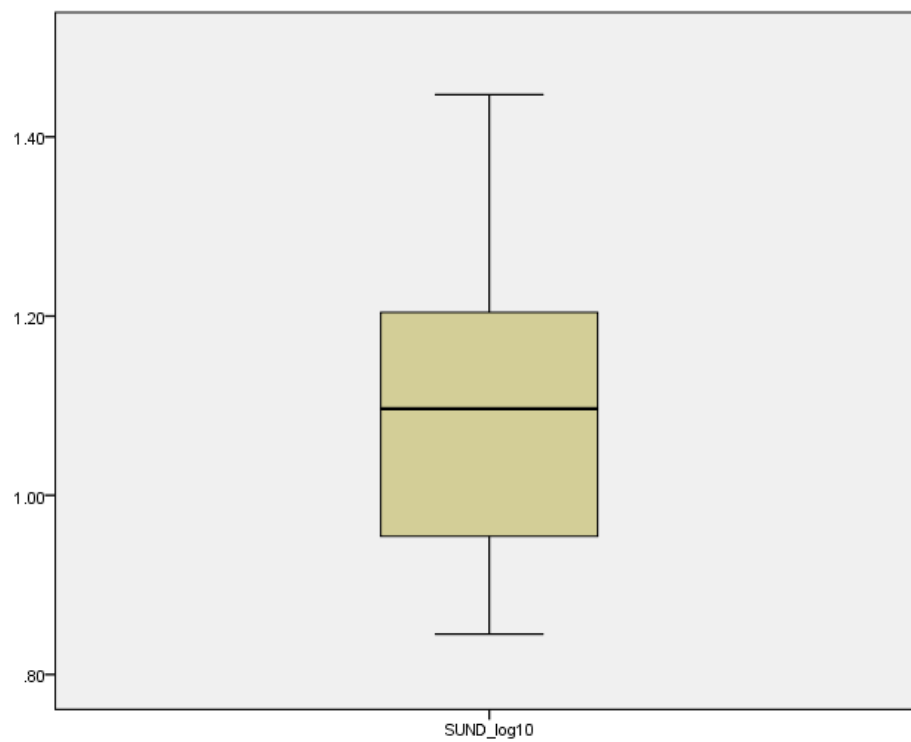
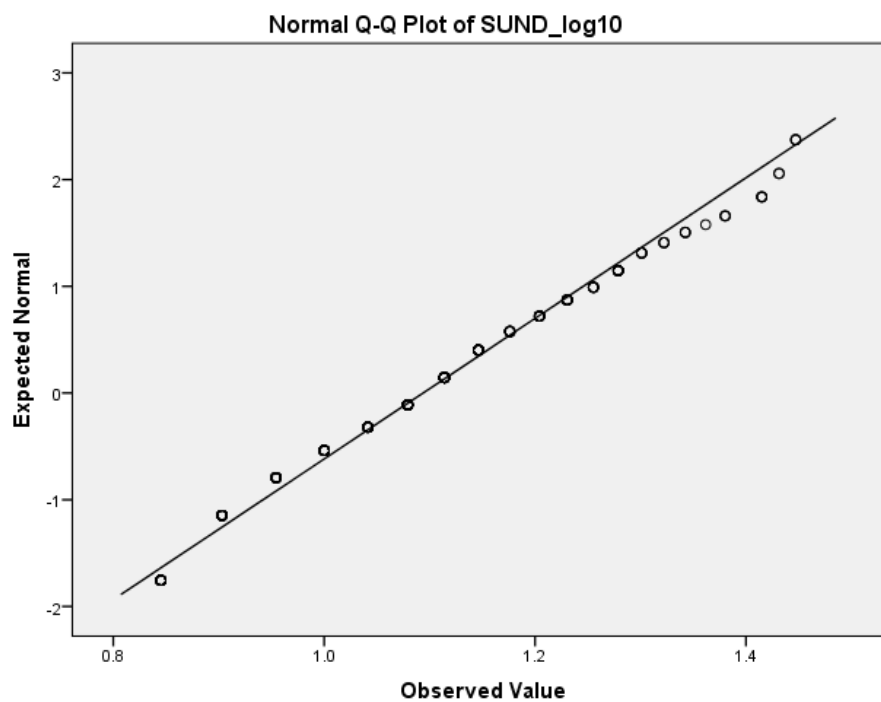


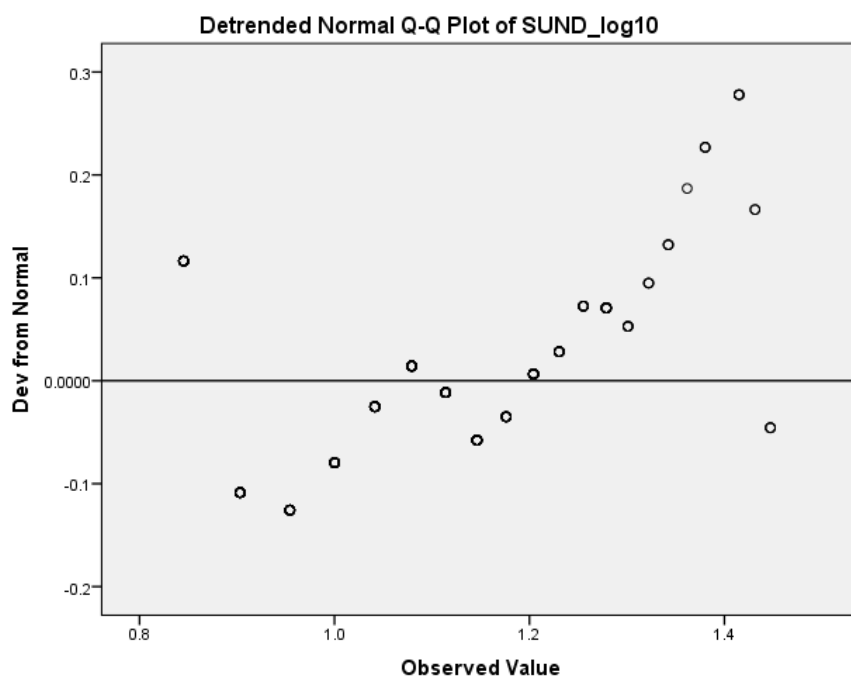
MSPSS

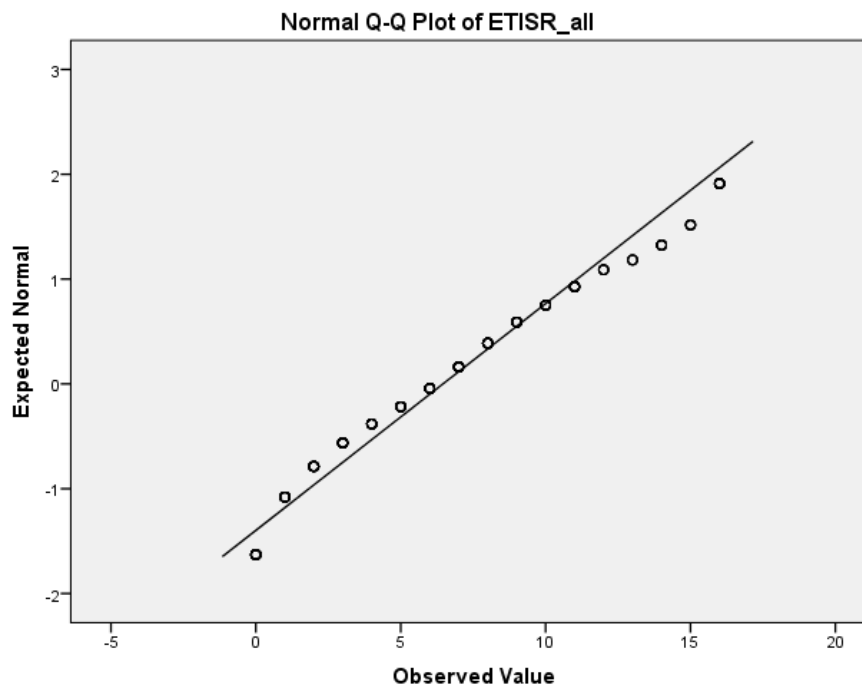
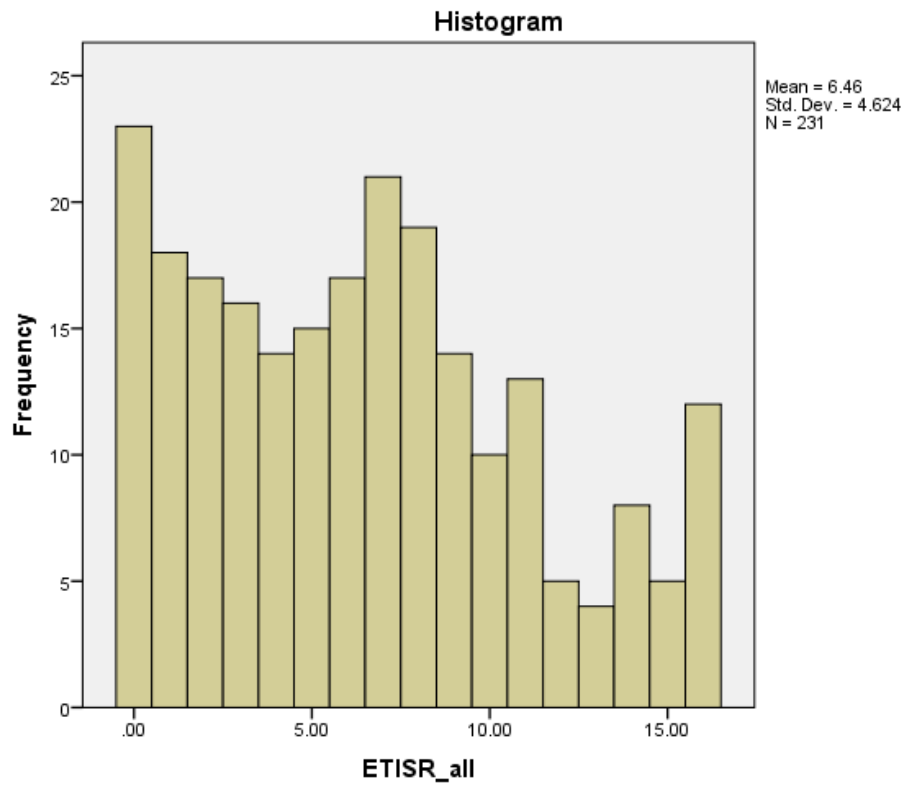


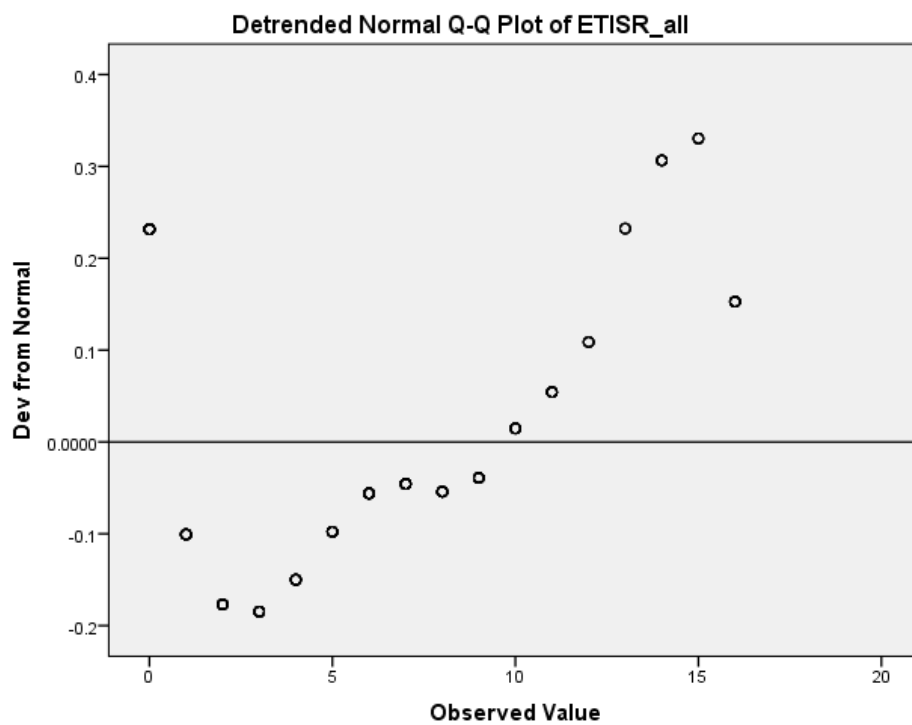
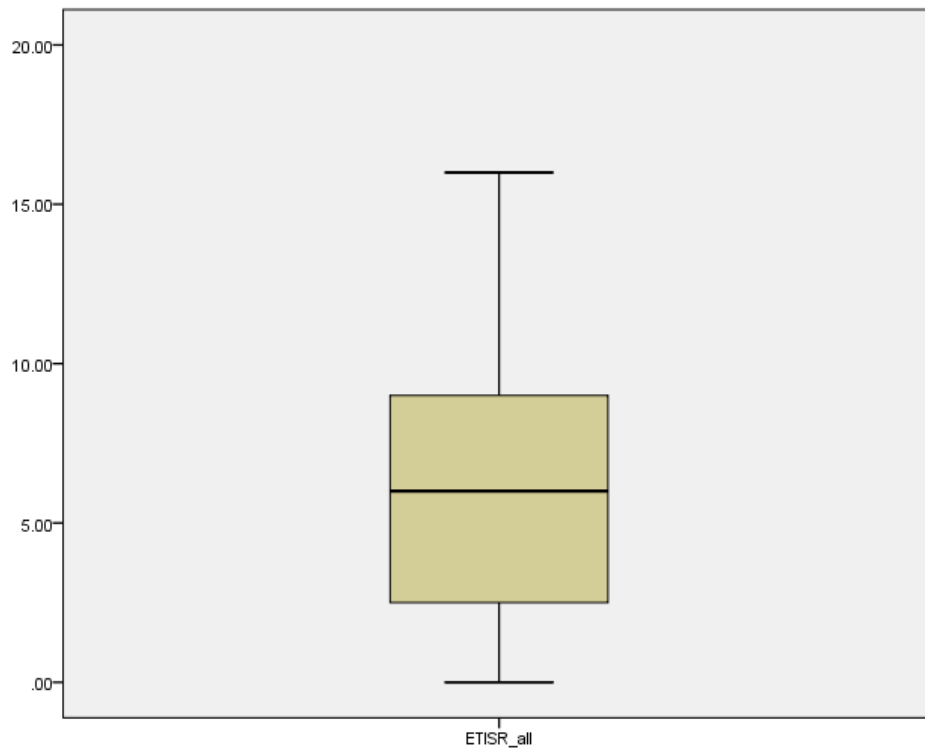


SUND and SUND Log 10 Transformation

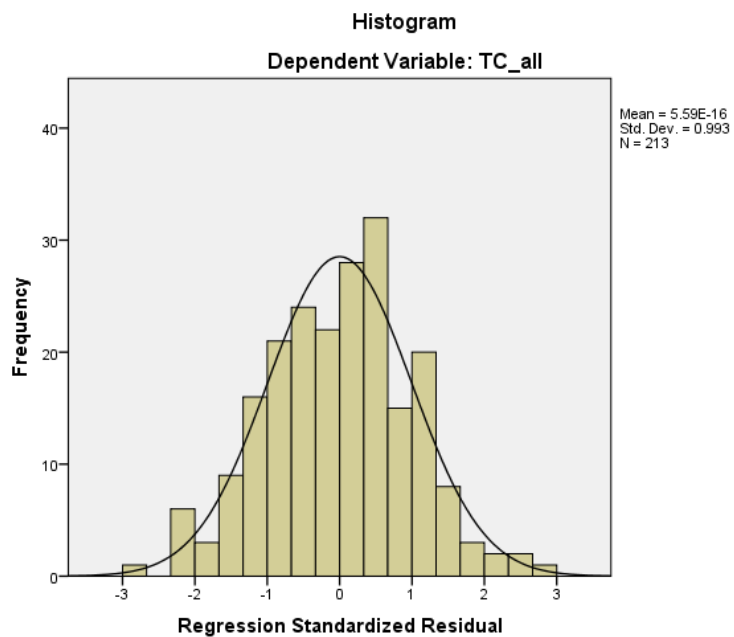




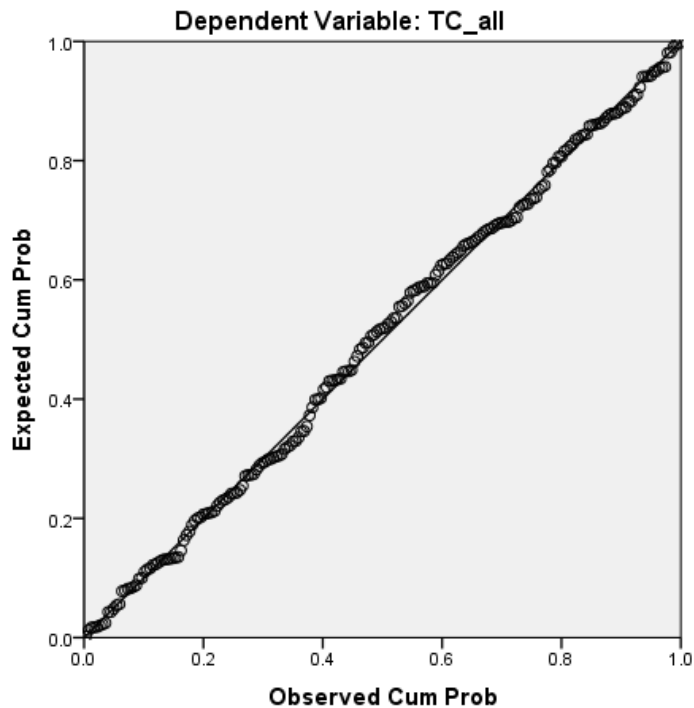
ETISR-SF

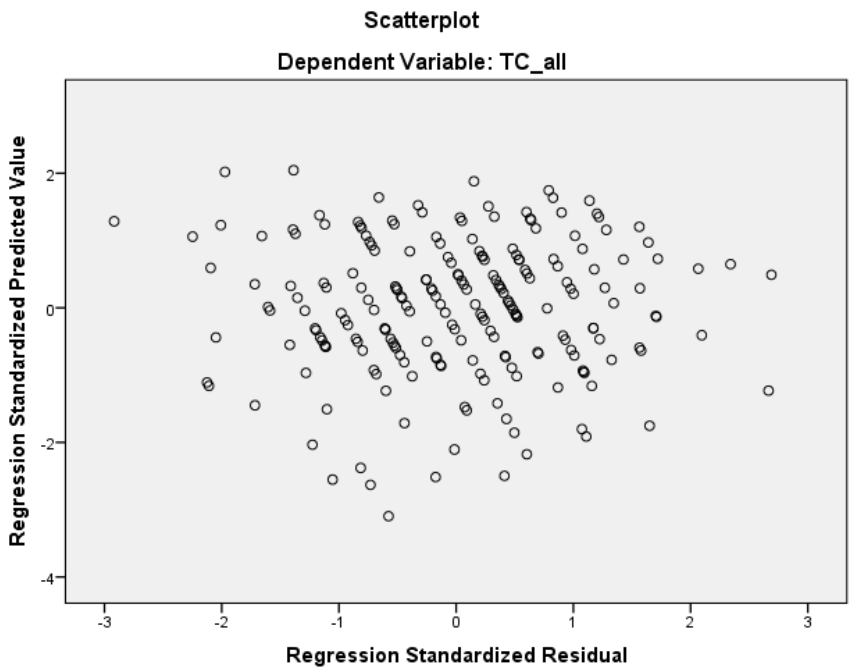


Multivariate Analysis: DV = Treatment Control

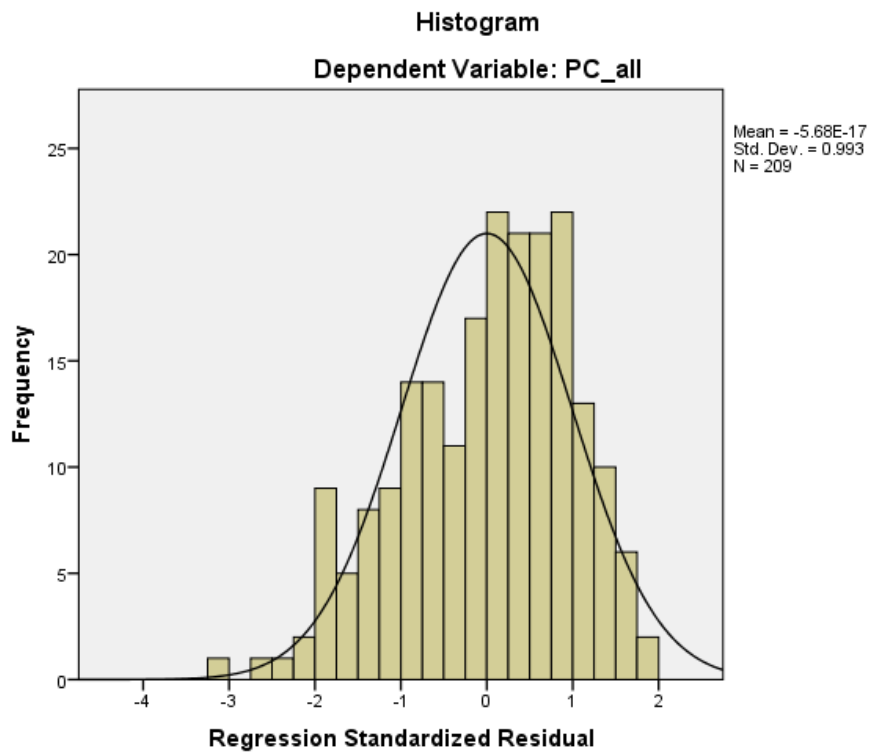


Normal P-P Plot of Regression Standardized Residual

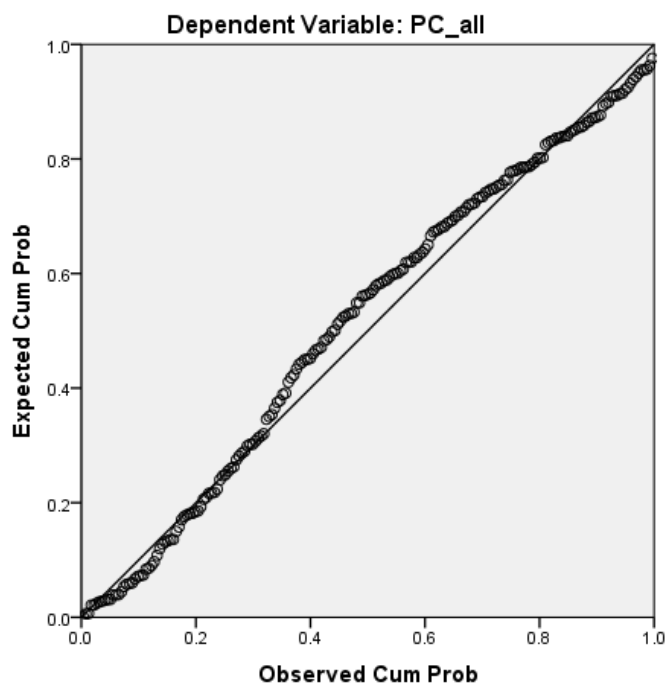




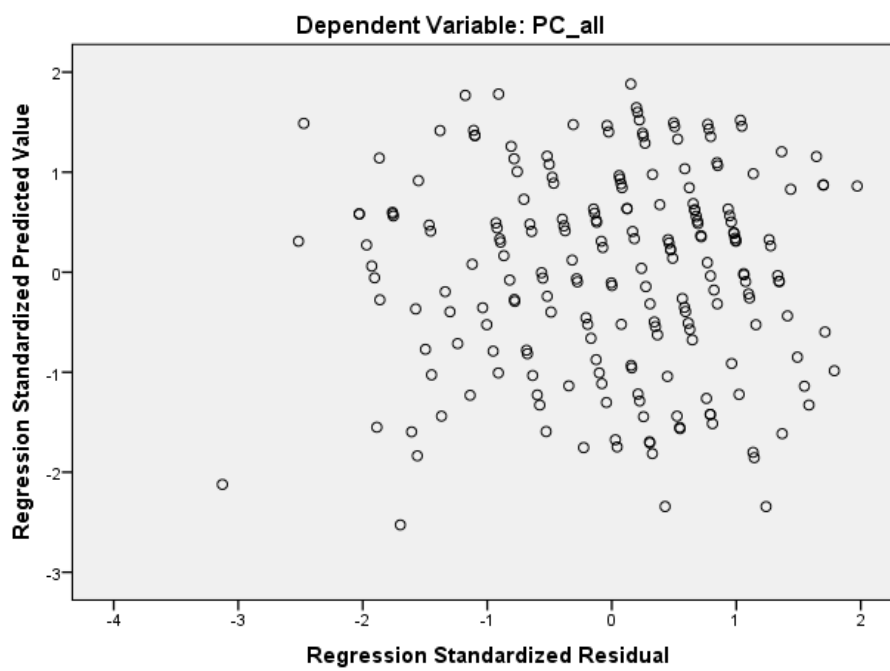
Multivariate Analysis: DV = Personal Control



Normal P-P Plot of Regression Standardized Residual



Scatterplot



Appendix G: Syntax and Output for PROCESS Analysis

```

DATASET ACTIVATE DataSet1.
process vars=PC TC MSPSS SUND ETISRemotional ETISR_physical
ETISR_sexual/y=TC/y=PC/x=ETISRemotional/x=ETISR_physical/x=ETISR_sexual/m=MSPSS
/model=3/w=SUND/jn=1/plot=1.
Run MATRIX procedure:

```

***** PROCESS Procedure for SPSS Release 2.12.2 *****

Written by Andrew F. Hayes, Ph.D. www.afhayes.com
Documentation available in Hayes (2013). www.guilford.com/p/hayes3

```

Model = 3
Y = PC
X = ETISR_se
M = MSPSS
W = SUND

```

```

Statistical Controls:
CONTROL= TC ETISRemo ETISR_ph

```

```

Sample size
185

```

Outcome: PC

Model Summary

	R	R-sq	MSE	F	df1	df2	p
	.5381	.2896	9.7089	7.0928	10.0000	174.0000	.0000
	coeff	se	t	p	LLCI	ULCI	Model
constant	20.2299	4.9714	4.0693	.0001	10.4179	30.0420	
MSPSS	-.1394	.0837	-1.6658	.0976	-.3045	.0258	
ETISR_se	-3.0956	1.8138	-1.7067	.0897	-6.6755	.4843	
int_1	.0539	.0322	1.6735	.0960	-.0097	.1175	
SUND	-.6749	.3691	-1.8284	.0692	-1.4033	.0536	
int_2	.2851	.1258	2.2671	.0246	.0369	.5334	
int_3	.0124	.0067	1.8614	.0644	-.0008	.0256	
int_4	-.0054	.0024	-2.2940	.0230	-.0101	-.0008	
TC	.5634	.0720	7.8204	.0000	.4212	.7056	
ETISRemo	.1458	.1922	.7587	.4491	-.2335	.5252	
ETISR_ph	-.1032	.1665	-.6196	.5363	-.4318	.2255	

Interactions:

```
int_1  ETISR_se  X  MSPSS
int_2  ETISR_se  X  SUND
int_3  MSPSS     X  SUND
int_4  ETISR_se  X  MSPSS   X  SUND
```

R-square increase due to three-way interaction:

	R2-chng	F(1,df2)	df2	p
int_4	.0215	5.2626	174.0000	.0230

*****Condit
ional effect of X on Y at values of the moderator(s):

	SUND	MSPSS	Effect	se	t	p	LLCI	ULCI
8.8619	40.2507		-.3333	.3005	-1.1089	.2690	-.9265	.2599
8.8619	53.9404		-.2532	.1899	-1.3335	.1841	-.6279	.1215
8.8619	67.6301		-.1731	.2348	-.7372	.4620	-.6365	.2903
12.7724	40.2507		-.0721	.1913	-.3770	.7066	-.4497	.3055
12.7724	53.9404		-.2825	.1396	-2.0229	.0446	-.5581	-.0069
12.7724	67.6301		-.4928	.2027	-2.4312	.0161	-.8929	-.0927
16.6829	40.2507		.1890	.1960	.9641	.3363	-.1979	.5759
16.6829	53.9404		-.3117	.1979	-1.5753	.1170	-.7023	.0788
16.6829	67.6301		-.8125	.3287	-2.4721	.0144	-1.4612	-.1638

Values for quantitative moderators are the mean and plus/minus one SD from mean.

Values for dichotomous moderators are the two values of the moderator.

Conditional effect of X*M interaction at values of W:

	SUND	Effect	se	t	p	LLCI	ULCI
8.8619		.0058	.0140	.4181	.6764	-.0218	.0335
12.7724		-.0154	.0102	-1.5122	.1323	-.0354	.0047
16.6829		-.0366	.0135	-2.7132	.0073	-.0632	-.0100

***** JOHNSON-NEYMAN TECHNIQUE *****

Moderator value(s) defining Johnson-Neyman significance region(s)

Value	% below	% above
13.6914	62.7027	37.2973

Conditional effect of X*M on Y at values of the moderator (W)

	SUND	Effect	se	t	p	LLCI	ULCI
7.0000		.0160	.0173	.9211	.3583	-.0182	.0501
7.8000		.0116	.0158	.7338	.4641	-.0196	.0428
8.6000		.0073	.0144	.5041	.6148	-.0212	.0357
9.4000		.0029	.0131	.2229	.8239	-.0230	.0289
10.2000		-.0014	.0120	-.1171	.9069	-.0252	.0223
11.0000		-.0057	.0111	-.5164	.6063	-.0277	.0162
11.8000		-.0101	.0105	-.9609	.3380	-.0308	.0106

12.6000	-.0144	.0102	-1.4169	.1583	-.0345	.0057
13.4000	-.0188	.0102	-1.8377	.0678	-.0389	.0014
13.6914	-.0204	.0103	-1.9737	.0500	-.0407	.0000
14.2000	-.0231	.0106	-2.1829	.0304	-.0440	-.0022
15.0000	-.0274	.0113	-2.4357	.0159	-.0497	-.0052
15.8000	-.0318	.0122	-2.6035	.0100	-.0559	-.0077
16.6000	-.0361	.0134	-2.7055	.0075	-.0625	-.0098
17.4000	-.0405	.0147	-2.7617	.0064	-.0694	-.0115
18.2000	-.0448	.0161	-2.7882	.0059	-.0765	-.0131
19.0000	-.0491	.0176	-2.7960	.0058	-.0838	-.0145
19.8000	-.0535	.0192	-2.7926	.0058	-.0913	-.0157
20.6000	-.0578	.0208	-2.7826	.0060	-.0988	-.0168
21.4000	-.0622	.0225	-2.7690	.0062	-.1065	-.0179
22.2000	-.0665	.0242	-2.7535	.0065	-.1142	-.0188
23.0000	-.0708	.0259	-2.7372	.0068	-.1219	-.0198

Data for visualizing conditional effect of X on Y

Paste text below into a SPSS syntax window and execute to produce plot.

DATA LIST FREE/ETISR_sexual SUND MSPSS PC.

BEGIN DATA.

-.0626	8.8619	40.2507	21.0577
1.9405	8.8619	40.2507	20.3901
3.9437	8.8619	40.2507	19.7225
-.0626	8.8619	53.9404	20.6536
1.9405	8.8619	53.9404	20.1464
3.9437	8.8619	53.9404	19.6393
-.0626	8.8619	67.6301	20.2495
1.9405	8.8619	67.6301	19.9028
3.9437	8.8619	67.6301	19.5560
-.0626	12.7724	40.2507	20.3603
1.9405	12.7724	40.2507	20.2158
3.9437	12.7724	40.2507	20.0713
-.0626	12.7724	53.9404	20.6403
1.9405	12.7724	53.9404	20.0745
3.9437	12.7724	53.9404	19.5087
-.0626	12.7724	67.6301	20.9204
1.9405	12.7724	67.6301	19.9332
3.9437	12.7724	67.6301	18.9460
-.0626	16.6829	40.2507	19.6629
1.9405	16.6829	40.2507	20.0415
3.9437	16.6829	40.2507	20.4201
-.0626	16.6829	53.9404	20.6270
1.9405	16.6829	53.9404	20.0025

3.9437	16.6829	53.9404	19.3781
-.0626	16.6829	67.6301	21.5912
1.9405	16.6829	67.6301	19.9636
3.9437	16.6829	67.6301	18.3360

END DATA.

GRAPH/SCATTERPLOT=ETISR_sexual WITH PC BY MSPSS/PANEL ROWVAR=SUND.

* Estimates are based on setting covariates to their sample means. Level of confidence for all confidence intervals in output: 95.00

Curriculum Vitae

Susan Fay

OBJECTIVES

To use the skills and knowledge acquired through life and educational experiences to assist others in achieving personal goals, overcoming adversity, and improving physical and mental health.

EDUCATION

- 2014** **Ph.D. Candidate, General Psychology: Research and Evaluation Specialization**
Walden University, Minneapolis, MN
- 2014** **PSYCH-K Facilitator**
- 2014** **Clinical Hypnotherapist/Master Hypnotist**
America's Academy of Coaching, Counseling, & Hypnotherapy
Greenwood Village, CO
- 1994** **Master of Science, Environmental Science**
Drexel University, Philadelphia, PA
- 1994** **Certificate in Geographic Information Systems**
University of Denver, Denver, CO
- 1983** **Bachelor of Science, Land Use**
Summa Cum Laude
Metropolitan State University of Denver, Denver, CO

EMPLOYMENT HISTORY

- 1994-2008** **Equestrian Facility Manager/Trainer/Owner**
River Song Morgans, Meeker, CO
- 1991-1993** **Humane Educator**
Women's Humane Society, Philadelphia, PA
- 1989-1990** **Outdoor Recreation Planner**
National Park Service, Philadelphia, PA

1984-1989 Environmental Scientist II/Environmental Specialist/Aerial Photo Interpreter

Hillsborough County Development Review Department/Environmental Protection Commission/Markel Labs, Tampa/St. Petersburg, FL

AWARDS, ACHIEVEMENTS, AND ACADEMIC HONORS

- Inducted into Psi Chi Honors Society, School of Psychology, Walden University
- Golden Key International Honour Society
- Graduated Summa Cum Laude, Metropolitan State University of Denver
- Colorado Scholars Award, Metropolitan State University of Denver
- Who's Who Among Students in American Colleges and Universities, Metropolitan State College
- Outstanding Achievement Award, Hillsborough County, FL
- World and Reserve World Championships in dressage, Morgan Grand National and World Championship Morgan Horse Show, 2004 and 2008
- United States Equestrian Federation Region 9 Horse of the Year Award, 2008
- Numerous regional and local championships in open horse competitions

CERTIFICATIONS

- PSYCH-K Facilitator
- Clinical Hypnotherapist/Master Hypnotist
- Johrei Reiki Master
- Certified Equine Specialist, Equine Assisted Growth and Learning Association (EGALA) pending completion of final course
- Neuro-Linguistic Programming Practitioner (Certification training in progress, expected completion in 2015)