This document is dedicated in memory of my brother, Ronald “Woody” Eugene Woodring (1982-1986), who, despite his short life, is long remembered and deeply missed.
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# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACKNOWLEDGMENTS</td>
<td>iv</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>x</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td>xii</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>xiii</td>
</tr>
<tr>
<td>CHAPTER</td>
<td></td>
</tr>
<tr>
<td>1  INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>The Problem</td>
<td>2</td>
</tr>
<tr>
<td>Need for the Study</td>
<td>2</td>
</tr>
<tr>
<td>Theoretical Framework</td>
<td>4</td>
</tr>
<tr>
<td>General systems theory</td>
<td>5</td>
</tr>
<tr>
<td>Bowen natural systems theory</td>
<td>6</td>
</tr>
<tr>
<td>Statement of Purpose</td>
<td>10</td>
</tr>
<tr>
<td>Research Questions</td>
<td>10</td>
</tr>
<tr>
<td>Definition of Terms</td>
<td>11</td>
</tr>
<tr>
<td>Organization of this Report</td>
<td>14</td>
</tr>
<tr>
<td>2  REVIEW OF THE LITERATURE</td>
<td>15</td>
</tr>
<tr>
<td>Fibromyalgia Syndrome</td>
<td>15</td>
</tr>
<tr>
<td>History</td>
<td>15</td>
</tr>
<tr>
<td>Diagnosis</td>
<td>16</td>
</tr>
<tr>
<td>Demographics</td>
<td>18</td>
</tr>
<tr>
<td>Treatment</td>
<td>19</td>
</tr>
<tr>
<td>Theories of Etiology</td>
<td>19</td>
</tr>
<tr>
<td>Genetic predisposition</td>
<td>20</td>
</tr>
<tr>
<td>Muscle tissue aberrations</td>
<td>21</td>
</tr>
<tr>
<td>Psychosocial factors</td>
<td>21</td>
</tr>
<tr>
<td>A Systems View of Disease Development</td>
<td>22</td>
</tr>
<tr>
<td>Bowen Natural Systems Theory</td>
<td>25</td>
</tr>
<tr>
<td>History</td>
<td>25</td>
</tr>
<tr>
<td>Major Tenets</td>
<td>25</td>
</tr>
<tr>
<td>Differentiation of Self</td>
<td>27</td>
</tr>
</tbody>
</table>
## LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Annual Household Income</td>
</tr>
<tr>
<td>2</td>
<td>Educational Level</td>
</tr>
<tr>
<td>3</td>
<td>Descriptive Statistics for the Fibromyalgia Impact Questionnaire (FIQ)</td>
</tr>
<tr>
<td>4</td>
<td>Descriptive Statistics for the Dependent Variable: Fibromyalgia Impact Questionnaire [Symptom Severity (SS) Score]</td>
</tr>
<tr>
<td>5</td>
<td>Descriptive Statistics for the Independent Variables LES, PSS, DSI-R, Age of Onset</td>
</tr>
<tr>
<td>6</td>
<td>Summary of Results of the Pearson Correlation of the IVs and DV</td>
</tr>
<tr>
<td>7</td>
<td>Multiple Linear Regression of Fibromyalgia Syndrome (FMS) on Differentiation (DSI), Age at Onset, and Negative Stressful Life Events (LES)</td>
</tr>
<tr>
<td>8</td>
<td>Stepwise Regression Model Summary for FMS Symptom Severity</td>
</tr>
<tr>
<td>9</td>
<td>Three Step Hierarchical Regression of Fibromyalgia Syndrome (FMS) on Perceived Stress (PSS), Differentiation of Self (DSI), and the Interaction of DSI and PSS Score</td>
</tr>
<tr>
<td>10</td>
<td>Three Step Hierarchical Regression of Fibromyalgia on Emotional Cutoff (EC), Perceived Stress (PSS), and the Interaction of EC and PSS Scores</td>
</tr>
<tr>
<td>11</td>
<td>Three Step Hierarchical Regression of Fibromyalgia on Emotional Reactivity (ER), Perceived Stress (PSS), and the Interaction of ER and PSS Scores</td>
</tr>
<tr>
<td>12</td>
<td>Three Step Hierarchical Regression of Fibromyalgia on I-Position (IP), Perceived Stress (PSS), and the Interaction of IP and PSS Scores</td>
</tr>
<tr>
<td>13</td>
<td>Demographics of Internet Users</td>
</tr>
<tr>
<td>14</td>
<td>Three Step Hierarchical Regression of Fibromyalgia on Fusion with Others (FO), Perceived Stress (PSS), and the Interaction of FO and PSS Scores</td>
</tr>
<tr>
<td>15</td>
<td>Summary of for the Results of the Pearson Correlation for Fibromyalgia Impact Questionnaire Symptom Severity Subscale</td>
</tr>
</tbody>
</table>
16 Descriptive Post Hoc Statistics for the Independent Variables LES, PSS, DSI-R, Age of Onset...........................................................................................................141

17 Summary of Post Hoc Results of the Pearson Correlation of the IVs and DV ......141
<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Plot of FMS Scores for Low, Medium, and High Differentiation and Low, Medium, and High Stress</td>
<td>136</td>
</tr>
<tr>
<td>2</td>
<td>Plot of FMS Scores for Low, Medium, and High Emotional Reactivity and Low, Medium, and High Stress</td>
<td>137</td>
</tr>
<tr>
<td>3</td>
<td>Plot of FMS Scores for Low, Medium, and High I-Position and Low, Medium, and High Stress</td>
<td>138</td>
</tr>
<tr>
<td>4</td>
<td>Plot of FMS Scores for Low, Medium, and High Emotional Cutoff and Low, Medium, and High Stress</td>
<td>139</td>
</tr>
<tr>
<td>5</td>
<td>Plot of FMS Scores for Low, Medium, and High Fusion with Others and Low, Medium, and High Stress</td>
<td>140</td>
</tr>
</tbody>
</table>
Abstract of Dissertation Presented to the Graduate School of the University of Florida in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy

AN EMPIRICAL EXAMINATION OF BOWEN NATURAL SYSTEMS THEORY AS IT APPLIES TO FIBROMYALGIA SYNDROME

By

Thomas L. Murray, Jr.

May 2005

Chair: M. Harry Daniels
Major Department: Counselor Education

Fibromyalgia Syndrome (FMS) is a rheumatologic disorder characterized by wide-spread, musculoskeletal pain and low pain thresholds at specific sites throughout the body. Additional symptoms may include stiffness, fatigue, depression, impaired memory, sleep and balance disturbance, dry mouth, headaches, and/or sore throats. FMS is further complicated by its apparent random onset and sensitivity to emotional and physical stress, anxiety and depression.

To date, no research explains conclusively the etiology of FMS thus making a cure for the disorder impossible. Given that more than 6 million people suffer from FMS combined with the demand for effective treatment and frequent medical utilization by sufferers, FMS is a major public health concern.

Much of the FMS research has focused on determining etiological indicators and developing interventions based on those findings. Researchers have focused much attention on psychological, physiological, neurological, and biochemical/genetic factors.
Despite previous research, little emphasis has been placed on the impact that family relationships and premorbid stressful life events have on the development and severity of FMS.

The purpose of my study was to investigate the heuristic value of several assumptions of Bowen natural systems theory (BNST) for understanding FMS. Specifically, my study focused on an examination of the relationships and interactions that level of differentiation, level of chronic anxiety, level of emotional cutoff, level of I-position, level of perceived stress, stressful life events, and demographic factors have on the symptom severity of FMS. My study attempted to identify patterns of influence on the symptom severity of FMS on sufferers, thereby revealing possible areas for support and intervention by medical and auxiliary personnel, patients, and their families.

The sample consisted of 201 participants diagnosed with FMS confirmed through self-report. Participants were collected through list-serves, websites, and chat rooms that cater to those with diagnosis of FMS. Questionnaires were administered through the Internet. Surveys measured level of differentiation of self, perceived stress, life events, and social desirability. A number of demographic questions were also asked.
Fibromyalgia Syndrome (FMS) is a rheumatologic disorder characterized by widespread, musculoskeletal pain and low pain thresholds at specific sites throughout the body. The musculoskeletal pain is not associated with an inflammatory process. Additional symptoms may include stiffness, fatigue, depression, impaired memory, sleep and balance disturbance, dry mouth, headaches, and/or sore throats (Cymet, 2003). FMS is further complicated by its apparent random onset and sensitivity to emotional and physical stress, anxiety, and depression.

Diagnosing FMS is difficult because there are no diagnostic tests to confirm its presence (Berne, 2002). Thus, patients with FMS often self-diagnose after receiving information from friends and/or the Internet (Ferraccioli et al., 1987). In fact, many professionals view FMS as an exclusionary diagnosis (i.e., a medical doctor attempts to rule out other conditions first), which can take an average of 5 years from the time symptoms present for a label to be ascribed (Cymet, 2003). Other diagnoses that must be ruled out are hepatitis, hypothyroidism, hyperparathyroidism, diabetes, hypokalemia, and hyponatremia (Berne, 2002; Cymet, 2003; Goldenberg, 1999). However, other professionals disagree with the exclusionary notion and believe that the symptom cluster is unique and that a diagnosis can be made promptly (Berne, 2002).

To date, no research explains conclusively the etiology of FMS, thus making a cure for the disorder impossible. However, many FMS patients have found relief through the use of a number of treatment modalities: pharmacotherapy, psychotherapy, and
complementary and alternative methods. Given that more than 6 million people suffer from FMS, combined with the demand for effective treatment and frequent medical utilization by sufferers, FMS is a major public health concern (Bennett, Smythe, & Wolfe, 1992; Goldenberg, 1999; Unger, 1996).

**The Problem**

Much of the existing FMS research has focused on determining etiological indicators and developing interventions based on those findings (Preece, 2001). Researchers have focused much attention on psychological (e.g., Aaron et al., 1997; Amir et al., 1997; Bolwijn, van Santen-Hoeufft, Baars, & van der Linden, 1994; Dailey, Bishop, Russell, & Fletcher, 1990), physiological (e.g., Bengtsson, Henriksson, & Larson, 1986; Drewes, Andreasen, & Schroder, 1993; Kalyan-Raman, Kalyan, Yunus, & Masi, 1984; Henriksson, 1993; Staud et al., 2003), neurological (e.g., Bell, Baldwin, Russel, Schwartz, & Hardin, 1998; Bonica, 1990; Yunus, 1992), and biochemical/genetic factors (e.g., Arnold et al., 2004; Russell et al., 1994; Vaeroy, Helle, & Forre, 1988). Despite the previous efforts to determine the etiology of FMS, no cure has been found nor has a firm etiological explanation been discovered. Moreover, one important variable has not been investigated: the combined impact that family relationships, premorbid stressful life events, and perceived stress have on the development and severity of FMS. The present study is designed to address directly this limitation by investigating the influence and interaction of family relationships, premorbid stressful life events, and perceived stress on FMS.

**Need for the Study**

The cause-and-effect model is the overarching research model used by researchers (Nichols & Schwartz, 1998) where one variable was considered to be the cause of the
symptom. The cause-and-effect research model has a long history. Beginning with Pasteur, researchers sought out specific biochemical organisms (i.e., bacteria and viruses) to understand the etiology of a specific disease process (Kerr, 1992). However, researchers also noted that people could possess germs and yet not have any clinical symptoms (Kerr, 2003). This quandary led to the development of Cassel’s (1965) theory of multiple causes, or host-agent-environment model. In short, Cassel’s theory suggests that multiple factors must be present before the development of a disease will occur (Krieger, 2001). Cassel’s theory is reflected in the disease susceptibility model presented in Appendix A. Specifically, disease susceptibility is related to the interaction among certain risk factors (e.g., virus, relationship processes, and stress).

Assuming that modern society is rampant with pathogenic agents, Cassel argued that to explain disease distribution, researchers must investigate factors affecting susceptibility (Cassel, 1976). Cassel was curious about the impact that the social environment had on interrupting a person’s natural resistance to these pathogenic agents. Moreover, Cassel believed that the neuroendocrine functioning was compromised as a result of psychosocial disturbances within various levels of the hierarchy that affect one another (Appendix A). Cassel’s list of psychosocial disturbances includes dominance hierarchies, social disorganization and rapid change, marginal status in society, including social isolation, bereavement, and, acting as a buffer to all of the above, the ‘psychosocial asset’ of the social support network (Cassel, 1976; Krieger, 2001). Ultimately, Cassel believed that the best strategy for treating individuals is to enhance their social support network rather than reduce their exposure to stressors (1976).
Cassel’s multiple-cause theory applies to the etiology of FMS. A definitive explanation for the etiology of FMS remains elusive because of FMS’ complexity. However, researchers have attempted to reduce FMS susceptibility to one agent or another. Evidence does seem to point to a number of factors such as (a) genetic predisposition (Arnold et al., 2004; Buskila, Neumann, & Carmi, 1996), (b) muscle tissue aberrations (Stoud, Cannon, Mauderli, Robinson, Price, & Vierck, 2003), and (c) psychosocial related factors (Imbierowicz & Ulrich, 2003; Van Houdenhove et al., 2001a; Walker et al., 1997). However, one causal explanation does not seem to fit all clinical presentations. Therefore, a cure that effectively ameliorates the symptoms has yet to be obtained.

While some research has considered the interaction of multiple causes in the development of chronic disease (Genst & Genst, 1987; Peng & Jick, 2004; Rahe & Ransom, 1978; Willett, 1990), still the primary focus of much of the field of medicine is to look for one particular biochemical organism and then develop interventions to neutralize the effects of that organism. In so doing, there is a great need to research the applicability of systems theories that address the development of disease from a multicausal perspective. Specifically, no research to date has applied systems theory, specifically Bowen natural systems theory, to the understanding of FMS.

Theoretical Framework

The theoretical frameworks for this study rest on Cassel’s work of multiple-causes, Bertalanffy’s General Systems Theory (von Bertalanffy, 1968), and Bowen’s Natural Systems theory (Bowen, 1985). The following is a brief overview of General Systems Theory (GST), and Bowen natural systems theory (BNST).
General systems theory

Ludwig von Bertalanffy formally proposed that laws that governed the operation of biological organisms might apply to other domains. Davidson (1983) simplified Bertalanffy’s definition of systems in the following way:

…any entity maintained by the mutual interaction of its parts, from atom to cosmos, and including such mundane examples as telephone, postal, and rapid transit systems. A Bertalanffian system can be physical like a television set, biological like a cocker spaniel, psychological like a personality, sociological like a labor union, or symbolic like a set of laws…. A system can be composed of smaller systems and can also be part of a larger system, just as a state or principality is composed of smaller jurisdictions and also is part of a nation. Consequently, the same organized entity can be regarded as either a system or a subsystem, depending on the observer’s focus of interest. (p.26)

Bertalanffy’s theory requires one to expand one’s view beyond linear, cause-and-effect thinking. In so doing, one quickly realizes that a system (e.g., individual, family, and community) is more than the sum of its parts. This position is consistent with Cassel’s theory of multiple causes (Cassel, 1976). A systemic view also requires that one focus on the relationship of those parts to one another and how the relationships produce changes, just like the relationship between oxygen and hydrogen produces water.

Bertalanffy’s description of systems made a remarkable contribution to a number of fields including marriage and family therapy (e.g., Strategic therapy and the Milan approach [Becvar & Becvar, 2000]). GST “…grew out of the assumption that similar mathematic expressions and models were applicable in biology, the behavioral and social sciences, as well as in the physical sciences (von Bertalanffy, 1968)” (Kerr & Bowen, 1988, p. 24). However, GST has been criticized because of it being primarily based on manmade systems (e.g., steam and electric machines). Most importantly, GST does not account for the forces that are behind the functioning of various living systems including
the feedback loops that occur therein (Kerr & Bowen, 1988). Despite these criticisms, GTS has applications to living systems (Davidson, 1983).

Bowen natural systems theory

Bowen natural systems theory (BNST), developed by psychiatrist Murray Bowen, has similarities to Cassel and GST, but BNST is based on concepts developed by Bowen who focused on the family as a naturally occurring system while drawing heavily from evolutionary theory (Kerr & Bowen, 1988). BNST contends that “…the human family is a multigenerational, natural, living system and that the emotional functioning of each member of the system affects the functioning of the other members in predictable ways” (Comella, 1995, p. 5). Bowen developed a systems theory of human development based on his observations working with patients and their families (Bowen, 1985). He noticed that patients and their family members interacted in predictable patterns. He also noted that anxiety seemed to transmit from one member to another. Such observations led him to believe that the emotional unit was not in the individual, as previously thought, but within the family (Bowen, 1985; Kerr & Bowen, 1988).

Bowen’s development of BNST was motivated by his desire to bridge the gap between the social and biological sciences (Kerr & Bowen, 1988). In so doing, Bowen began making comparisons of what happens within a family to that which happens at all of the different levels of living organisms (Appendix A). The patterns of behaviors he noted within families appeared to occur at the cellular, individual, family, and societal level too (Piercy & Wetchler, 1996). The natural occurrence of these repetitive patterns forms the emotional system (Gilbert, 1992).

Bowen also focused on the pathways in which a disease process occurred. He proposed that all psychological, social, behavioral, and chronic physical problems are a
product of the emotional forces operating in a family (Nichols & Schwartz, 1998). The emotional forces are Bowen’s description of the functioning of the relationships that exist between and among family members. More specifically, Bowen proposed that symptom development (e.g., academic problems, rebelliousness, drug abuse, and chronic disease) is a result of a disturbance in the balance of the emotional system (Kerr & Bowen, 1988). Such a disturbance can be brought on by a number of long-term stressors that build up over time (Kerr & Bowen, 1988). Those who are unable to adapt to those stressors are likely to develop symptoms (Murdoch & Gore, 2004). For example, according to BNST, families that experience minimal or no stress function optimally and without symptoms. However, suppose a child within the family must pass a standardized examination in order to be promoted from middle school to high school. A parent may become increasingly anxious about the examination and the child’s performance and overly focus on the child (e.g., demanding study time and restricting privileges). Such pressures on the child may increase his level of anxiety about the test, which may promote rebelliousness. The rebelliousness would likely increase the anxiety in one or both parents and the cycle continues.

Kerr (1988) stated the following regarding the impact that stress and pathogens have on determining symptoms:

While many pathogenic factors influence when an individual gets sick and how sick he gets, an individual’s level of chronic anxiety, which relates to his level of self-generated stress and his degree of adaptation to external stress, is assumed to be as important, in many instances, as pathogenic factors in determining when and if an illness occurs and how severe that illness is. (p. 243)

Existing literature on FMS lends support for the use of BNST as an alternative, conceptual medium to understand the development and course of FMS (e.g., Aaron et al., 1997; Arnold et al., 2004; Bell, Baldwin, Russek, Schwartz, & Hardin, 1998;

Bowen focused on the relationship processes that occurred between generations—the multigenerational family system—where he concentrated his attention in viewing the repetitive patterns (Kerr & Bowen, 1988). Herein, Bowen observed repetitive patterns such as togetherness/individuality forces, differentiation (i.e., the ability to maintain an autonomous self separate from the emotional field in the family, as well as the ability to think rationally in the midst of stress and anxiety), triangles (i.e., a relationship process that occurs when the tension between a two person dyad exceeds their ability to manage and one seeks an ally to deescalate the anxiety directly or indirectly), multigenerational transmission process (i.e., a relationship process where the family emotional process--anxiety that is passed within a nuclear family--is passed from generation to generation), and others. Bowen believed that the more the family exhibited emotional fusion (i.e., the inability to separate thinking from feeling, as well as the inability to separate one’s emotionality from another’s) among its members, the more susceptible an individual was to acquiring/developing symptoms (e.g., emotional illness, chronic disease, legalistic problems, and social problems) (Kerr & Bowen, 1988). Likewise, the more people could
increase their level of differentiation, the more they were protected from such symptoms (Gilbert, 1992).

Of particular concern for this study is Bowen’s application of his theory to the development of chronic disease, which is outlined in Appendix B (Schneider, 2003). The model is based on the premise that a number of factors must be present and interact for the development of a particular chronic disease to occur. The specific elements addressed in the visual model are (1) risk factors (e.g., gender, sex, stressors, sleep disorders), (2) stress level, (3) level of emotional cutoff, (4) level of chronic anxiety, and (5) level of basic self. The latter three components (i.e., emotional cutoff, chronic anxiety, and basic self) influence disease susceptibility through the relationship process within an emotional unit. However, all factors are presumed to determine disease susceptibility. Each element interacts with the other elements through the relationship process inherent within a system (Schneider, 2003).

Given that BNST is one of the most established systems models where specific hypotheses are made (Nichols & Schwartz, 1998), BNST is extremely relevant to understanding the development and chronicity of FMS. For example, BNST assumes that specific relational patterns are involved in chronic disease development, and such patterns can be tested empirically.

Finally, scientists know very little about the family-of-origin and nuclear family relationships of those who suffer from FMS. Nothing is known about their way of relating and what impact, if any, those styles of relating have on the symptom bearer. Combining relationship questions with others such as the impact of stress, this
information may be instrumental in developing greater understanding of the FMS process and designing appropriate treatments that take this new information into account.

Statement of Purpose

Micklowitz and Hooley (1998) identify four steps in going from basic psychopathology research to community treatment studies: (1) identifying basic processes associated with symptoms, (2) design, manualize and pilot treatment, (3) conduct randomized controlled efficacy trials, and (4) conduct community effectiveness research. This dissertation study satisfies step-1 by identifying basic processes associated with the development and severity of FMS.

The purpose of my study was to investigate the heuristic value of several assumptions of BNST for understanding FMS. Specifically, my study focused on an examination of the relationships and interactions that level of differentiation, level of chronic anxiety, level of emotional cutoff, level of I-position, level of perceived stress, stressful life events, and demographic factors have on the symptom severity of FMS. This research attempted to identify patterns of influence on the symptom severity of FMS on sufferers, thereby revealing possible areas for support and intervention by medical and auxiliary personnel, patients, and their families.

Research Questions

The following research questions were addressed in my study:

1. What are the demographic characteristics of people diagnosed with FMS?

2. Can one’s symptom severity be predicted by his/her level of differentiation, age-of-onset, and stressful events that occurred within a year prior to age-of-onset?

3. What is the nature of the relationship between perceived chronic stress and symptom severity?
4. What is the nature of the relationship between level of differentiation and symptom severity?

5. What is the nature of the relationship between level of emotional cutoff and symptom severity?

6. Which one of the predictor variables accounts for the greatest amount of variance associated with FMS symptoms?

7. Does level of differentiation of self moderate the relationship between perceived stress and FMS symptoms?

8. Does level of emotional cutoff moderate the relationship between perceived stress and FMS symptoms?

9. Does level of chronic anxiety moderate the relationship between perceived stress and FMS symptoms?

10. Does level of I-position moderate the relationship between perceived stress and FMS symptoms?

Definition of Terms

The following terms are used throughout this study.

Age-of-onset is defined as the date when the participant recalls when the fibromyalgia symptoms began not necessarily the date of the fibromyalgia diagnosis.

Basic self, or basic level of differentiation, is “the solid part of self that is non-negotiable in relationships” (Gilbert, 1992, p.18). In other words, basic level of differentiation describes the level of one’s functioning that is not dependent on the relationship process in which one is engaged (Kerr & Bowen, 1988). Basic level of differentiation is also determined largely by the degree of emotional separateness achieved from one’s family-of-origin.

Chronic anxiety is the instinctual response to the demands that life has on an organism to survive and adapt. Chronic anxiety also references the automatic response/reaction to a real or imagined threat. Chronic anxiety herein does not refer to worries one has about a specific life problem, nor can it be reduced to a simple phobia.
Chronic anxiety refers to the emotional reactivity that all living organisms experience. Chronic anxiety can be transmitted from generation to generation with cumulative and idiosyncratic effects. Typically, chronic anxiety is assessed by the “number of symptoms in a family, the degree of functional impairment associated with those symptoms, the amount of distance and/or conflict in relationships, and the amount of anxiety and reactivity family members appear to have” (Kerr and Bowen, 1988, p. 320).

**Chronicity** refers to the presence and severity of a chronic illness.

**Differentiation of self** “is the lifelong process of striving to keep one’s being in balance through the reciprocal external and internal processes of self-definition and self-regulation” (Friedman, 1991, p. 140). In addition, differentiation includes the following processes: (1) balancing emotional and intellectual functioning and (2) balancing the natural force of togetherness and separateness/autonomy (Skowron & Friedlander, 1998).

**Emotional cutoff** is a process that describes one way a system “manage[s] the undifferentiation (and emotional intensity [i.e., anxiety] associated with it) that exists between the generations” (Kerr & Bowen, 1988, p. 271). The occurrence of an emotional cutoff increases as the level of fusion increases within a system. Emotional cutoff, which is an example of emotional reactivity, can be characterized as physical distance and/or emotional withdraw. All families have some degree of unresolved emotional attachment, which can be managed through emotional cutoffs. An important element of family therapy is to reduce emotional cutoffs from the past (Kerr & Bowen, 1988).

**Fibromyalgia syndrome** (FMS) is a rheumatologic disorder of unknown etiology characterized by wide-spread, musculoskeletal pain and low pain thresholds at specific sites throughout the body.
Fusion is characterized by one’s place on a continuum (intensely fused to highly
differentiated) that denotes one’s degree of unresolved emotional attachment from one’s
family-of-origin and level of emotional reactivity to anxiety, which is developed before
an individual leaves one’s family-of-origin. In addition, those who are highly fused
remain fixed emotionally in their respective roles they played in their families-of-origin.
They have few firmly held beliefs and will abandon those beliefs under pressure. Finally,
highly fused individuals will seek the approval of others at the expense of other goals
(Nichols & Schwartz, 1998; Skowron & Friedlander, 1998). Emotional fusion, or
emotional attachment, is a normal and necessary component of human infant survival.
However, as children grow, they benefit from increasing levels of emotional autonomy,
or separateness.

I-position is the counterbalancing element to togetherness. “I-position defines
principle and action in terms of, ‘This is what I think, or believe’ and, ‘This is what I will
do or not do,’ without impinging one’s own values or beliefs on others” (Titelman, 1998,
p. 46).

Multigenerational transmission process is a relationship process where the family
emotional process, anxiety that is passed within a nuclear family, is passed from
generation to generation.

Stressors are events that disturb the emotional equilibrium of a family. Kerr and
Bowen (1988) describe that having the family define emotional stressors is a pivotal
component in family diagnosis. Such events can occur within the nuclear family (e.g.,
marriage, pregnancy, birth of a child, marital separation, divorce, retirement, serious
illness) or extended family (e.g., death of a parent, divorce of a sibling, an important
relative’s geographic relocation). Elements that influence a stressor’s impact on a family are (a) the magnitude of the event, (b) the number of events, and (c) the time spacing between events (Kerr & Bowen, 1988).

Togetherness force urges individuals towards closeness, attachment, conformity, and approval. “It is an emotional process among individuals in which both anxiety and self are transferred” (Gilbert, 1996, p. 13).

Triangle is a relationship process where the one who is experiencing the greatest discomfort in a dyad seeks an ally. Another triangle may occur when one becomes uncomfortable observing a tense dyad and is drawn to comfort the couple (Nichols & Schwartz, 1998).

Organization of this Report

Chapter 2 contains a review of relevant literature. Chapter 3 describes the research methodology, including statement of purpose, research design, participants, procedure, instrumentation, and data analysis. Chapter 4 contains the results of the statistical analyses of the data. Finally, Chapter 5 discusses the results of the statistical analyses of the data, the implications of the study for the theory, research, and practice of applying BNST to FMS, the limitations of the study, and areas for future research.
CHAPTER 2
REVIEW OF THE LITERATURE

The purpose of my study was to investigate the heuristic value of several assumptions of Bowen natural systems theory (BNST) for understanding Fibromyalgia Syndrome (FMS). Specifically, this study focused on an examination of the relationships and interactions of aspects of BNST (i.e., level of differentiation, level of chronic anxiety, level of emotional cutoff, level of I-position), stress (i.e., level of perceived stress and stressful life events), and demographic factors have on the symptom severity of FMS. In order to elucidate the concepts relevant for this investigation, this review of the literature is presented in the following three sections: (a) Fibromyalgia Syndrome, (b) Bowen natural systems theory, and (c) Fibromyalgia Syndrome and Bowen natural systems theory.

Fibromyalgia Syndrome

Fibromyalgia syndrome is a rheumatologic disorder characterized by wide-spread pain throughout the body. In this section, the history, diagnosis, demographics, treatment, and theories of etiology of FMS are discussed.

History

Fibromyalgia was documented in professional publications as early as 1736 (Cymet, 2003). However, evidence suggests earlier origins. For example, Hippocrates was noted to experience diffuse musculoskeletal pain and may have had FMS (Berne, 2002). Historically, FMS was known primarily as fibrositis, fibromyositis, neurasthenia, neuromyasthenia, psychalgia, muscular rheumatism, myofasciitis, myodysneuria, chronic
rheumatism, pressure point syndrome, and myofascial pain syndrome (Berne, 2002; Cymet, 2003). Several authors (Cymet, 2003; Erickson, 1992; Smythe, 1989) credit Gowers as the first to introduce the term fibrositis in 1904 to describe pain amplification, post-traumatic syndromes, sleep disturbances, and exhaustion secondary to pain. Gowers also found that when he pinched the muscle tissue, patients had lower than normal tolerance to pain.

Although Gowers coined fibrositis in 1904, it was not used in the professional literature until 1976, nor did the medical community acknowledge fibromyalgia until 1981 (Williamson, 1996). The scientific and medical community moved apprehensively in researching FMS because of the lack of laboratory indicators (e.g., blood tests) to explain the phenomenon. In 1990, the American College of Rheumatology (ACR) developed standard diagnostic criteria for FMS, which are discussed in the next section.

**Diagnosis**

American College of Rheumatology determined that FMS was not a inflammatory disease and consequently moved away from the suffix “sitis,” meaning inflammation. In 1990, ACR published revised diagnostic criteria for FMS: experiencing widespread pain for 3 months and experiencing pain, or tender points, at 11 of 18 specific points on the body (Turk, Okifuji, Sinclair, & Starz, 1996; Wolfe et al., 1990). ACR defines widespread pain as when:

…all of the following are present: pain in the left side of the body, pain in the right side of the body, pain above the waist, and pain below the waist. In addition, axial skeletal pain (cervical spine or anterior chest or thoracic spine or low back) must be present. In this definition, shoulder and buttock pain is considered as pain for each involved side. ‘Low back’ pain is considered lower segment pain. (The American College of Rheumatology, 2004, p. 1)
For a diagnosis of FMS, one must experience tender points in at least 11 of 18 areas noted by the ACR (Wolfe et al., 1990). Tender points are determined by a dolorimeter or physician palpating with an approximate force of 4kg of pressure, eliciting a painful response from the patient in at least 11 of the following areas.

- Occiput: bilateral, at the suboccipital muscle insertions
- Low cervical: bilateral, at anterior aspect of the intertransverse spaces at C5-C7
- Trapezius: bilateral, at the midpoint of the upper border
- Supraspinatus: bilateral, at origins, above the scapula spine near the medial border
- Second rib: bilateral, at the second costochondral junctions, just lateral to the junctions on upper surfaces
- Lateral epicondyle: bilateral, 2 cm distal to the epicondyles
- Gluteal: bilateral, in upper outer quadrants of buttocks in anterior fold of muscle
- Greater trochanter: bilateral, posterior to the trochnateric prominence
- Knee: bilateral, at the medial fat pad proximal to the joint line

The typical FMS patient experiences a combination of a number of symptoms: chronic pain in all quadrants of the body, not related to an inflammatory process; cold fingers and feet; impaired memory; frequency and sensation of needing to urinate; depression (not necessarily clinical); sleep and balance disturbances, muscle twitching; muscle aches; pain, dry mouth; headache; and sore throat (Cymet, 2003).

Diagnosing FMS is difficult because there are no diagnostic tests to confirm its presence (Berne, 2002). In fact, many professionals view FMS as an exclusionary diagnosis (i.e., a medical doctor attempts to rule out other conditions first), which can take on average 5 years from the time symptoms present for a label to be ascribed (Cymet, 2003). Other diagnoses that must be ruled out are hepatitis, hypothyroidism,
hyperparathyroidism, diabetes, hypokalemia, and hyponatremia (Berne, 2002; Cymet, 2003; Goldenberg, 1999). However, others physicians disagree and believe that the symptom cluster is unique and that a diagnosis can be made promptly (Berne, 2002). Patients who receive care from doctors with little or no knowledge regarding FMS are likely to feel distressed by their symptoms and self-diagnose after receiving information from friends and/or the Internet (Ferraccioli et al., 1987).

Demographics

Fibromyalgia syndrome has been associated with a number of demographic factors. FMS is found in all socioeconomic levels, most countries, and ethnic groups (Berne, 2002; Cymet, 2003); however, most FMS patients are Caucasian (Wallace & Wallace, 2003). The worldwide incidence of FMS appears to be between 1% and 12% of the population, although diagnostic criteria vary from country to country (Berne, 2002). In the United States, 3 to 6 million Americans are diagnosed with FMS (Turk, Okifuji, Sinclair, & Starz, 1996), representing about 2.5% of the population (3.4% female and 0.5% men) (Cronan, Serber, Walen, & Jaffe, 2002; Meisler, 2000). Most patients range in age from 20-50 when initially diagnosed (Berne, 2002).

Compared to men, women are more susceptible to acquiring FMS by a ratio of between 5:1 and 20:1 (Berne, 2002). Prevalence among women increases as they age and may exceed 10% between the ages of 50-60 years (Meisler, 2000). However, people of all ages can be diagnosed, including children (Conte, Walco, & Kimura, 2003).

Twenty-six to fifty percent of FMS patients report FMS history in family members (Arnold et al., 2004; Berne, 2002). Similar findings have been found in an ethnographic study as well (Erickson, 1992), which is discussed later in this review. Although some
interpret this prevalence as support for a genetic link, no genetic link has been firmly established (Arnold et al., 2004; Berne, 2002; Wallace & Wallace, 2003).

**Treatment**

Fibromyalgia syndrome is incurable, so the aim of treatment is symptom management. Physicians often prescribe antidepressants (i.e., tricyclic antidepressants, selective serotonin reuptake inhibitors [fluoxetine], selective serotonin/norepinephrine reuptake inhibitors [venlafaxine], and benzodiazepines) (Arnold, Keck, & Welge, 2000; Clauw, 1995; Russell, Fletcher, Michalek, McBroom, & Hester, 1991). Psychoeducation, exercise, biofeedback, physical therapy, manipulation, and cognitive-behavioral therapy (CBT) are also recommended (Lo et al., 1992; Vlaeyen, Teeken-Gruben, & Goossens, 1996).

Many FMS patients seek relief outside of mainstream medicine and seek treatment with complementary and alternative practitioners. Popular treatments include Eastern medical practices (e.g., acupuncture and ayurvedic medicine). Despite their popularity, there is limited empirical support for these interventions in treating FMS. For example, the dietary supplement guaifenasin is purported to remove harmful levels of phosphates in the body, although double-blind studies do not confirm its effectiveness (Cymet, 2003). Some complementary approaches have been shown to provide relief. In one study, acupuncture provided substantial relief that lasted over 20 months in 46% of patients (Vassalo, 1992). In another study, hypnosis provided more pain relief than the traditional treatment of physical therapy (Haanen, Hoenderdos, & van Romunde, 1998).

**Theories of Etiology**

Fibromyalgia syndrome is a disorder of unknown etiology (American College of Rheumatology, 2004). The purpose of the section is to review the following possible
causes for the disorder: (a) genetic predisposition, (b) muscle tissue aberrations, and (c) psychosocial related factors.

**Genetic predisposition**

Several studies have found that FMS seems to aggregate in families (Arnold et al., 2004; Buskila, Neumann, & Carmi, 1996). For example, Arnold et al. (2004) surveyed 533 relatives of patients with FMS and 272 relatives of 40 patients with Rheumatoid Arthritis (RA), a debilitating autoimmune disease characterized by inflammation of the lining of many joints, using the following instruments and procedures: the Structured Clinical Interview for DSM-IV (SCID; First, Spitzer, Gibbon, & Williams, 1995), a digital tender point examination, a self-report measure of pain severity; and the Family Interview for Genetic Studies (Maxwell, 1992).

Arnold et al. (2004) found that the likelihood of a family member of a FMS patient having FMS was 8.5 times higher than among the RA family members. The family members who were diagnosed with FMS were primarily women, suggesting that results of the aggregation were “attributed to the effect of female relatives” (p. 948). In addition, measures of tenderness and pain appeared to aggregate in families of FMS. Even though FMS male family members were less tender at pressure points than female family members of FMS patients, FMS male family members scored higher on tenderness and pain measures than male family members of RA patients. Finally, Arnold et al. found a coaggregation of major mood disorders among family members of FMS patients. Specifically, 45.9% of interviewed relatives of FMS patients had a lifetime prevalence of a major mood disorder compared to 29.2% of interviewed relatives of RA patients.
Muscle tissue aberrations

The work of Staud, Cannon, Mauderli, Robinson, Price and Vierck (2003) suggest that there is an abnormal pain processing within muscle tissue of FMS patients. This study included 24 pain-free female participants and 12 FMS patients. Researchers applied bilateral pressure to the arms (the flexor digitorum muscle) of patients to measure the amount of pressure withstood before the participant experienced pain. Participants were asked to rate their sensations. The researchers found evidence that FMS patients experienced abnormal sensitivity in the receptor cells of their muscle tissue. Patients also experienced a lower pain threshold than their pain-free counterparts. Finally, when FMS patients received repetitive muscle stimulation, they experienced greater temporal summation of pain than the control groups (Staud et al., 2003). Although the Stoud et al. (2003) study supports the muscle tissue etiology, Simms et al. (1994) present contradictory findings suggesting that FMS patients do not have muscle tissue abnormalities.

Psychosocial factors

Several studies suggest that a number of psychosocial factors are associated with FMS. For example, several studies found a high rate of victimization (physical, emotional, and sexual abuse) among FMS patients (Imbierowicz & Ulrich, 2003; Van Houdenhove et al., 2001a; Walker et al., 1997). Another study found a high prevalence of post-traumatic stress disorder among FMS patients (Amir et al., 1997). Finally, certain premorbid (i.e., before the onset of symptoms) lifestyles are associated with FMS (Van Houdenhove, Neerinckx, Onghena, Lysens, & Vertommen, 2001b), which I discuss next.

Van Houdenhove et al. (2001b) analyzed the differences between a control group and patients with FMS and chronic fatigue syndrome (CFS) using a Dutch questionnaire...
(the HAB; Dirken, 1970) that measures premorbid “action-proneness” (e.g., high achievers, type-A-like, perfectionist). The HAB contained statements such as, “I have always been an active and busy person,” “I love making a supreme effort,” and “I do not like to postpone things.” The sample consisted of 192 Belgian patients with confirmed FMS ($n = 68$) and CFS ($n = 124$) and their significant others, respectively. For all items, pronouns were changed to assess appropriately the significant other’s view. The FMS and CFS patients’ combined mean score on the HAB was 35.0, which was significantly higher than the mean reported by Dirken (i.e., 29.4; 1970). The findings of this study suggest that an overactive lifestyle (i.e., multi-tasking beyond one’s capabilities) predates the onset of symptoms and may make people more vulnerable to FMS. In addition, the authors hypothesized that an overactive lifestyle may stress the immune system enough to increase one’s vulnerability to neuroendocrine and immunological dysfunctions.

A Systems View of Disease Development

The above etiological hypotheses reflect a linear view of disease development. Despite the contribution of these hypotheses, many questions surrounding the development of FMS and other chronic diseases remain unanswered. For example, how can one person develop rheumatoid arthritis (RA) while her sister has the same level of rheumatoid in her blood and does not develop the condition (Kerr, 2003)? Also, how can one person develop a genetic-related disorder when his siblings, who have the same genetic make-up and predisposition, do not? A systems view of disease development is a useful framework for examining such questions. Brody and Sobel (1979; Appendix A) and Kerr (1981; 1992; Appendix B) describe the systems model of disease development, which helps to answer the above questions. The purpose of this section is to describe the systems view of disease.
In a linear model, the overarching research model is cause and effect. Beginning with Pasteur, researchers sought out specific bacterium and viruses to understand the etiology of a specific disease process (Kerr, 1992). However, researchers also noted that people could possess germs and yet not have any clinical symptoms. This quandary led to the development of Cassel’s (1965) theory of multiple causes. In short, Cassel’s theory suggests that multiple factors must be present in the development of disease. Cassel’s theory is reflected in the construction of Bowen natural systems theory (BNST) prospective presented in Appendix B. Specifically, disease susceptibility is related to the interactions among certain risk factors (e.g., virus, relationship processes, and stress).

A systems model of health and disease accounts for multiple influences on health. Kerr (1981) wrote:

A systems model for understanding the mechanisms of disease is a model that attempts to define all of the factors that interact to produce a particular clinical syndrome, viewing each factor as impacting on the others such that the behavior or activity of any one factor cannot be understood out of the context of its relationship to the others. Clinical disease is not the result of the presence of any one or all of the factors, but develops based on a disturbance in the balance of the relationship system between them. (p. 274)

Brody and Sobel (1979) describe a hierarchy of living systems (Appendix A) containing the following components: biosphere, homo sapiens, societies, organizations, family-group, person, organs, cells, molecules and atoms. Of the ten levels, each impacts directly and indirectly the other nine, and information is transmitted among the levels through feedback loops. For example, heart disease occurs not just at the organ level but also in relation to other factors, such as personality traits that contribute to the development of heart disease (e.g., Type A personality or the distressed personality). Moreover, the presence of heart disease in one person can also affect directly the family
members who are responsible for increasing the level of care for the individual (Karren, Hafen, Smith, & Frandsen, 1996; 2002).

Within the systems view of health, health is one’s ability to adapt to one’s changing environment, and disease is the inability to adapt to one’s changing environment, which results in disruptions to the homeostatic system (Brody & Sobel, 1979). In regard to FMS, the systems view of disease proposes that perturbation at any level of the hierarchy (e.g., family) can directly impact the other levels (e.g., individual family members). Brody and Sobel write, “The development, expression, and course of disease is seen to depend as much on the stability and adaptive capacity of the host system as on the nature of specific perturbing forces impinging on the hierarchy” (pp. 94-95). When diseases occur, it is an indication that the system failed to restore order (Brody & Sobel, 1979).

Health and disease occur at all levels of the hierarchy, including society, organization and family. Diabetes is an example of a disease that affects all levels of the hierarchy (Brody & Sobel, 1979; Karren, Hafen, Smith, & Frandsen, 2002). Genetic and environmental factors interact to create an imbalance at the biochemical level, which leads to cellular damage within the organs (e.g., eyes and kidneys). Damage to organs changes a person’s behavior, which leads to changes in one’s family and work relationships. As the individual requires greater assistance, he or she demands greater services from organizations and the government in obtaining proper medical care. When health professions consider the multi-causal factors related to a particular disease process (e.g., diabetes), they are able to intercede at any one of the ten levels of living systems to promote optimal health.
Bowen Natural Systems Theory

Bowen natural systems theory reflects the systems view of disease and attempts to describe development of emotional and physical diseases. The purposes of this section are (a) to give a brief history of BNST, (b) to describe its major tenets, and (c) to describe the BNST conceptualization of the development of physical disease.

History

Murray Bowen (1913-1990) began developing his theory of natural systems while working at the Menninger Clinic in Topeka, Kansas. He furthered his ideas during his work at the National Institute of Mental Health (NIMH) and at Georgetown University in the Bowen Center for the Study of the Family. Bowen noticed similar relational patterns among his patients, although his observations began with his work with schizophrenic patients and their families. He later realized that the same relational patterns occurred in his non-schizophrenic patients but with less intensity. Based on his observations, Bowen developed a comprehensive theory of human development to understand symptom development in humans. Bowen’s motivation was to develop a theory that could be widely accepted by the scientific community. Bowen’s comprehensive view of human phenomena is matched by no other family systems theorist (Nichols & Schwartz, 1998).

Major Tenets

Bowen natural systems theory describes the emotional functioning of a family system. Bowen countered the predominant psychoanalytic thinkers to suggest that the emotional unit was not, in fact, within the individual, but was within the family system. In this section, I discuss the role of anxiety in BNST and the major tenets of BNST.

Though anxiety does not represent an explicit tenet of BNST, the role of anxiety is a significant factor to an adequate understanding of BNST. Further, anxiety is central to
the applicability to BNST to disease development as demonstrated by Kerr. Kerr has written about the role of emotion, particularly the impact of chronic anxiety on physical diseases like cancer and psoriasis (Kerr, 1980, 1981, 1992; Kerr & Bowen, 1988).

Anxiety is the automatic response of an organism to a real or imagined threat. Most organisms experience some degree of anxiety or stress. Stress is experienced when the anxiety can not be ameliorated with adequate coping mechanisms. A distinction is made between acute stress and chronic stress. Acute stress is intense, occurs in response to real threats, and disappears quickly (Kerr, 1981; Seaward, 2004). Chronic stress may be less intense, occurs in response to imagined threats, and lingers for prolonged periods (Kerr, 1981; Seaward, 2004). People tend to adapt well to stress when they know its etiology and duration. However, during chronic stress, the source may be less clear as its presence may be conscious or outside one’s awareness. In addition, chronic stress exhausts an individual and makes one prone to mental and physical dysfunctions.

Sapolsky’s (1998) book, Why Zebras Don’t Get Ulcers, illustrates the distinction between acute and chronic stress. Sapolsky states that zebras do not get ulcers because their experience of acute stress (e.g., a lion stalking them) produces a physiological response that activates the sympathetic nervous system (SNS). The zebra either successfully escapes the threat or succumbs to it by being eaten. In essence, there is not enough time for the hyperarousal of the SNS to wreak havoc on the zebra’s digestive system and lead to ulcers. Human stress, such as outstanding credit card debt, is often of long enough duration to overwhelm the body’s defenses thus decreasing the body’s immunity to fighting the germs that are associated with ulcers.
Within the context of chronic anxiety, BNST describes eight concepts: (1) differentiation of self, (2) triangles, (3) nuclear family emotional process, (4) family projection process, (5) multigenerational transmission process, (6) sibling position, (7) emotional cutoff, and (8) societal emotional process. The aforementioned concepts are interlocking, and the most pertinent concepts will be the focus of this section: differentiation of self, multigenerational transmission process, and emotional cutoff. In addition, a discussion of how symptoms form within an individual according to BNST is discussed.

Differentiation of Self

Differentiation of self is the core concept in BNST. One’s level of differentiation, or degree of adaptability to stress, falls on a continuum that ranges from low to high differentiation. One’s place on the continuum is a product of the emotional processes in the family-of-origin—including early experiences—and the preceding generations (Kerr, 1992). In addition, one’s level of differentiation is determined primarily in adolescence and can only change in the face of extraordinary circumstances or by a long-term, structured effort (e.g., psychotherapy).

Individual differences in functioning are a result of one’s functional level of differentiation. People who adapt well to life stress demonstrate high functionality in all areas of their lives and do not impinge on the functioning of others. The least adaptive people, however, tend to function poorly in their lives and impair the functioning of others. Those who are in the middle of continuum are likely to have high functionality in one area of their life (e.g., work) and poor functionality in other areas (e.g., family; Kerr, 1992).
Intrapsychic and interpersonal properties influence differentiation. On intrapsychic development, Bowen believed that many people are hypersensitive to anxiety and are unable to separate their emotions from their intellect. (BNST defines emotions as automatic reactions to anxiety in the face of a real or imagined threat. Emotions differ from feelings, which are the conscious labels placed on emotions [Kerr & Bowen, 1988].) During high anxiety periods, a person’s intellect fuses with the emotional system, the emotional system governs behavior, and thinking becomes more subjective. This pattern often becomes circular. By responding out of anxiety, rather than objective choice, people create reverberating anxiety within the system. This increased level of anxiety produces more anxiety in others, which produces higher anxiety and reactivity in the individual (Kerr, 1992).

Murdock and Gore (2004) investigated the role that differentiation of self plays in moderating the effects of stress, as well as looking at coping styles of those with different levels of differentiation. Murdock and Gore administered the Differentiation of Self Inventory (DSI; Skowron & Friedlander, 1998), the Perceived Stress Scale (PSS; Cohen, Kamarck, & Mermelstein, 1983), the Problem-Focused Style of Coping (PFSOC; Heppner et al., 1995), the Global Severity Index (GSI) of the Brief Symptom Inventory (BSI; Derogatis, 1993). The sample consisted of 119 graduate and undergraduate students (78 female and 41 male) from a medium-sized urban midwestern university.

Murdock and Gore’s (2004) findings indicated that higher levels of differentiation were associated with lower levels of psychological symptoms and perceived stress. Analyses also supported the hypothesis that differentiation of self moderates the relationship between perceived stress and psychological functioning. Regarding coping,
Murdock and Gore found that those with higher levels of differentiation exhibited reflective coping (e.g., identifying the cause of one’s emotions to help solve one’s problems) while those with lower levels of differentiation exhibited suppressive (e.g., avoiding thinking about one’s problems) and reactive (e.g., acting too quickly and thus making the problem worse) coping. Finally, Murdock and Gore wrote, “…poorly differentiated people experiencing high stress reported significantly greater levels of psychological dysfunction than did well-differentiated people who experience similar levels of stress” (p. 332). Such findings support BNST.

Research from the field of behavioral neuroscience supports BNST assumptions. Christopher (2004) explained that the brain responds to threats with two distinct pathways. Christopher calls the first the “low road,” in which information is received through the thalamus, a limbic structure that relays neural messages between the senses and areas of the cerebral cortex, and then sent immediately to the amygdala, a limbic structure that controls fear, anger, and aggression. The “high road,” however, is characterized by information being received by the thalamus then sent to the neocortex, which enables complex forms of learning, memory, thought, and language, for consideration, and then to the amygdala if warranted. The latter pathway permits the neocortex to override, or modulate, the reactivity of the amygdala by taking into account environmental factors that can explain the misperceived threat. Either pathway only takes milliseconds (Christopher, 2004). The benefits of having a more active high road process are numerous. Certainly, the high road decreases the number of occasions that the body responds to misperceived threats thereby decreasing the demand on the body’s endocrine,
cardiovascular, immune system, et cetera. A person who is able to use the latter pathway more readily exhibits higher differentiation (Papero, 2003).

On the interpersonal level, there are two counterbalancing life forces—the togetherness force and the individuality force—that make up the family emotional system. The togetherness force represents the need for closeness and agreement, particularly within significant relationships. The individual force represents the ability of one to function autonomously within significant relationships. Within BNST, an imbalance in these two forces, or a disturbance in the harmony of relationships with significant others, contributes to the development of clinical symptoms (i.e., physical, physiological, psychological, legal, and social impairment; Kerr, 1981). However, these forces are not the cause of any illness (Kerr, 1992). A systems-focused epidemiology of a disease process considers all aspects of the hierarchy of living systems (Appendix A), without viewing one part as causal (e.g., germs).

Family systems vary in balancing togetherness and individuality, or interpersonal differentiation. Families in which togetherness is emphasized at the expense of individuality are highly fused. Fusion is represented by a continuum, and all families experience fusion to varying degrees. In addition, families with less fusion tend to be less reactive to one another and thereby less interdependent emotionally. Fused families demonstrate a need to maintain harmony at the expense of one’s sense of self/autonomy. In less fused families, members have a greater capacity to stay connected emotionally with each other and still maintain a separate self. Consequently, these families are more able to adapt to stress.
Multigenerational Transmission Process

Bowen natural systems theory views the family within a multigenerational context, and the previous generations of a family influence the functioning of the succeeding generation. Different branches of the family vary in their ability to adapt to life’s demands. Some branches produce highly differentiated individuals who present with few symptoms. Other branches of the multigenerational family system produce families that are highly symptomatic (e.g., mental/emotional illness, chronic disease, career problems, and/or legal problems). Symptomatic branches exhibit some degree of a failure to adapt. The lower the level of differentiation, the more severe the symptoms and the earlier their onset.

Earlier, I discussed family fusion in relation to differentiation. Fusion is also associated with the nuclear family projection process and multigenerational transmission process. The following section describes the nuclear family projection process. This process, when compounded over time, becomes the multigenerational transmission process.

Fusion depends on two systemic processes: mate selection and parent/child fusion. According to BNST, people select mates who have the same level of differentiation (Gilbert, 1992). Individuals with the highest level of differentiation among their siblings bond with a partner and produce children who have high levels of differentiation. Conversely, individuals with the lowest level of differentiation among their siblings bond with a partner and produce children with low levels of differentiation. “There will be variations among each sibling’s offspring, so the process is often moving toward both higher and lower levels of differentiation in every nuclear family” (Kerr, 1992, p. 107).
Parent/child fusion, or symbiosis, is natural, normal, and necessary during the early stages of a child’s development. The degree of fusion is determined by the ability of the parent/child symbiosis to differentiate as the child develops and is able to meet his/her own needs. Typically, one child is more fused with his/her parents than the siblings (creating differences among siblings in level of differentiation). A fused relational pattern between a parent and a child presents itself as a parent who is over-involved, either positively or negatively, with the child. A fused child reciprocates by being overly reliant or highly reactive to the parent, thus presenting a high degree of togetherness needs compared with the less fused siblings. Children who are less fused are able to develop a togetherness/individuality balance that is similar, or in some cases, exceeds that of their parents. These children typically exhibit few, if any, symptoms. This process occurs generation after generation.

Research supports Bowen’s concept of the multigenerational transmission process (Klever, 2004) and intergenerational fusion (Klever, 2003). In the remainder of this section, I discuss Klever’s work.

Klever (2004), using Bowen’s theory, tested the degree to which multigenerational functioning and symptomatology influenced nuclear family functioning and symptomatology by analyzing data obtained from the first five years of a 20 year study. Klever administered two assessments: the Nuclear Family Functioning Scale (NFFS; Klever, 2001) and the Multigenerational Family Functioning Questionnaire (MFFQ; Klever, 2003).

The NFFS consisted of three subscales: adult functioning (physical, emotional, and social), marital functioning (distance and conflict), and child functioning (physical,
emotional, and social). The MFFQ measured the functioning of the multigenerational family members, which included siblings, parents, parents’ siblings, grandparents, and step-family members. “The questionnaire measured functioning by assessing the preponderance and severity of symptoms of individuals in the family” (p. 343). The MFFQ contained the following five subscales of multigenerational functioning: physical, emotional, social (job and legal), marital, and child.

Klever administered the assessments to newly married couples ($n = 72$) within the wider Kansas City metropolitan area at the first and fifth year of marriage. Of the sample, 71% ($n = 51$) and 68% ($n = 49$) responded, respectively. The results indicated that that reciprocal functioning (where one spouse becomes more dysfunctional than the other as a function of a defined relationship process) and child focus (where a child is viewed as the problem or symptomatic) relational patterns within the multigenerational system correlated with reciprocal functioning ($r = .361, p = .011$) and child focus relational patterns ($r = .382, p = .020$) within the nuclear family. A non significant correlation was found for marital distance and conflict between generations ($r = .089$), which BNST would predict given the newly formed marriages for the nuclear family.

The second part of Klever’s study examined whether physical, emotional, and social symptomology in the multigenerational family was associated with physical, emotional, and social symptomology in the nuclear family. The findings supported BNST in all domains. The following describes the relationship between nuclear family function with that of the multigenerational family: physical health ($r = .381, p = .007$), emotional problems ($r = .632, p = .0001$), and social problems ($r = .284, p = .048$). Furthermore, Klever found correlations between emotional problems in the nuclear
family and physical problems in the multigenerational family ($r = .496, p = .0001$) and between physical problems in the nuclear family and emotional problems in the multigenerational family ($r = .352, p = .013$).

The findings support elements of BNST that hold that behavioral patterns within families are transmitted from generation and likewise for symptomology between generations. Klever’s work is relevant to my study because of his emphasis on symptoms in general, where other researchers have looked at the occurrence of specific disease process within families (Klever, 2004). BNST contends that the same forces are behind all symptom presentations regardless of type (Kerr & Bowen, 1988).

Klever (2003) examined whether undifferentiation/fusion between generations influenced nuclear family functioning. Klever employed a mixed-method design that consisted of a structured interview and the administration of a battery of surveys: the NFFS (Klever, 2001), the Intergenerational Fusion with Parents Questionnaire (IFPQ; Klever, 2003); the Financial Dependence with the Multigenerational Family Questionnaire (Klever, 2003); the Multigenerational Family Contact Questionnaire (MFCQ; Klever, 2003); the Family of Origin Information Questionnaire (FOIQ; Klever, 2003); Level of Differentiation of Self Scale (LDSS; Haber, 1990).

Klever administered the assessments to newly married couples ($n = 72$) within the wider Kansas City metropolitan area at the first and fifth year of marriage. Of his sample, 71% ($n = 51$) and 68% ($n = 49$) responded, respectively. For the qualitative analysis, Klever acquired the assistance of three experts in Bowen theory to evaluate the level of multigenerational fusion in 10 of the research families. Raters were given transcripts of the interview and were not informed of the symptoms in the participant’s developing
nuclear family. The raters were then asked to divide the group into two: the five most fused and the five least fused families. Interrater reliability analyzed in a chance correlated Kappa was .88 \((p < .001)\). The results indicated that nuclear family functioning was compromised by higher degrees of intergenerational fusion. “The strongest support came from the qualitative analyses with an 80 percent correspondence between multigenerational fusion and nuclear family functioning” (p. 445).

Regarding the quantitative analysis, the following results were found. A correlation \((r = .390, p = .006)\) was found between the scores on the IFPQ and the NFFS. Couple-parent fusion was correlated \((r = .448, p = .001)\) with the NFFS adult functioning subscale; however, no such findings were associated with marital or child functioning subscale. Klever also found evidence that suggested that parent-child fusion increased over time. Klever found an association between financial giving by the older generation and symptoms occurring in the nuclear family. Financial support was also associated with marital dysfunction in the fifth year of marriage \((r = .309, p = .031)\). Regarding contact with the multigenerational family, Klever found an association \((r = -.307, p = .032)\) that suggested those who had more contact with multigenerational members experienced less symptomology in the nuclear family.

Klever’s (2003) findings lend support to the deleterious effects of too much undifferentiation or fusion between generations. Of course, Klever’s research must be interpreted cautiously because of the nature of the statistical analyses (i.e., bivariate correlations), because causality cannot be assumed.

**Emotional Cutoff**

Emotional cutoff describes the way in which one generation handles emotional contact within and between generations. Emotional cutoff is a response of detaching from
self or others emotionally (e.g., anhedonia, that is feeling numb) or physically (e.g.,
moving a thousand miles from one’s family to get away from the emotional intensity) in
response to a highly anxious environment. All families experience some level of
emotional cutoff as a result of unresolved attachments from childhood (i.e.,
fusion/undifferentiation). As described earlier, the parents’ emotional reactivity and lack
of differentiation, to varying degrees, affect the development of one child in particular.
The pattern that evolves between the parent and child may be one of intense over-
involvement, closeness, dependency, high conflict and/or pseudo-independence of the
child. While all siblings are affected by their parents level of differentiation, the child
who is most fused with the parents grows to develop a lower level of differentiation.
Ultimately, children may have less differentiation, similar, or higher differentiation than
their parents, depending on the degree to which children are involved in the emotional
reactivity of their parents.

Research by scholars not affiliated with BNST supports the contention that people
who exhibit less emotional cutoff and who are able to have close relationships with
extended family members experience positive health effects (Hafen, Karren, Frandsen, &
Smith, 1996). For example, Parkerson and colleagues surveyed 249 adult patients, aged
18–49 years, about their perceived health status (using the Duke-UNC Health Profile
(DUHP); Perkerson, Gehlabach, & Wagner, 1981) and social support (using the Family
Strengths survey; Olson, Larsen, & McCubbin, 1982) and Family Inventory of Life
Events and Changes survey (FILE; McCubbin, Patterson, & Wilson, 1980). Those
participants who rated high levels of family support demonstrate higher levels of
emotional functioning (Parkerson et al., 1989).
Amerikaner, Monks, Wolfe, and Thomas (1994) executed a two-part study. Study-One measured social interest (i.e., empathy, sensitivity, and community-oriented values) and personal hardiness (i.e., internal locus of control, finishing projects, perceive change as challenges) using the Social Interest Inventory (SII; Leak & Williams, 1989) and Personal Views Survey (PVS; Hardiness Institute, 1984), respectively. The researchers assigned equal weight to the SII and PVS in defining psychological health (PH). The sample consisted of 148 introductory psychology students at a medium-sized state university in West Virginia. Those who scored “high” on both instruments were classified as “high-PH” (p. 615). Those who scored low on both instruments were classified as “low-PH” (p. 615). The high-PH group scored within the top third of the distributions for the SII and PVS. Likewise, the low-PH group scored within the bottom third of the distribution for the SII and PVS. The researchers only analyzed the scores that fell within the extreme scores. The final sample consisted of 25 high-PH participants (7 men, 18 women) and 26 low-PH participants (15 men, 11 women). The results indicated a relationship between social interest and hardiness.

In Study-Two, Amerikaner, Monks, Wolfe, and Thomas (1994) analyzed differences between perception of family relationships and psychological health using the Family Adaptability and Cohesion Evaluation Scale-III (FACES-III; Olsen, Portner, & Lavee, 1985), the Children’s Report of Parent Behavior Inventory-30 (CRPBI-30; Schuderman & Schluderman, 1988), the Parent-Adolescent Communications Scale (PAC; Olson et al., 1985), the Family Satisfaction Scale (FSS; Olson et al., 1985), and the Family Environment Scale (FES; Moos & Moos, 1986). The sample consisted of 30 high-PH participants (6 men, 24 women) and 20 low-PH participants (8 men, 12 women).
High psychological health was associated with several family variables, with family cohesion being the most pronounced. More specifically, the psychologically healthy group reported higher satisfaction with their families and perceived better communication with both parents.

Who Develops the Symptom?

One’s level of differentiation, experience of chronic anxiety and degree of emotional cutoff all contribute to the level of vulnerability to symptomatic complaints (Kerr & Bowen, 1988). However, it is the anxiety-binding mechanism that determines who in the family develops symptoms. An anxiety-binding mechanism is a relational process that provides a way for the family to displace anxiety so that the family, as a unit, remains asymptomatic. BNST proposes several mechanisms that a family may adopt that will trigger the anxiety-binding mechanism. The anxiety-binding mechanisms are (1) emotional distance and emotional cutoff, (2) emotional conflict, (3) overinvolvement with children, and the (4) existence of a compromised spouse. In other words, the aforementioned processes are employed by the system to help the family system manage anxiety in order to maintain equilibrium in the system, often at the expense of an individual. Some families will use one or two anxiety-binding mechanisms while others will shift among all four (Kerr, 1981).

Emotional distance is a mild form of emotional cutoff. Emotional distance and emotional cutoff are quantitatively different but qualitatively the same process in that anxiety within a two-person dyad is decreased and bound in the emotional or physical distance between them (Kerr & Bowen, 1988). Between married couples, for example, emotional distance results in binding the anxiety in the distance developed between the spouses (e.g., through avoidance or emotional withdrawal; Kerr, 1981). An illustration of
emotional distance within such a relationship is when spouses spend time in different parts of the house to avoid the anxiety that is present when in closer proximity to one another.

Emotional cutoff “is a distant posture carried to the extreme—a nonfunctioning relationship” (Gilbert, 1992, p. 61). Like emotional distance, cutoffs are initiated as attempts to adapt to chronic and acute anxiety within the system due to too much fusion. An example of this is two brothers who fought years earlier about an event that has since long been forgotten. Despite the years that passed, the brothers remain estranged to one another. This emotional cutoff and the related stress and anxiety may promote the development of clinical dysfunction in one or both brothers (Gilbert, 1992).

Emotional conflict, another anxiety-binding mechanism, describes the intensity that occurs within a relationship. This mechanism is characterized by both partners having an external focus where one blames the other for the problems. The blame binds the anxiety to the degree that neither partner experiences the internal turmoil of the relationship problems nor takes responsibility for his/her role in the creation of those problems (Gilbert, 1992; Kerr, 1981, 1988). An illustration of this anxiety-binding mechanism is a relationship mired by mutual accusations, physical abuse, and/or isolation (for fear of embarrassment; Gilbert, 1992). Gilbert (1992) states that partners involved in conflict typically tend to

become critical, when anxiety is high, become embroiled in blame for perceived problems, project their own problems on other people, focus more on the other than on the self, fight rather than switch, have fun, or do anything useful, and behave abusively. (p. 47)

BNST assumes that anxiety is bound within the conflict thus creating no need for symptom development in any one individual.
Over-involvement with children (also called triangling) describes the third anxiety-binding mechanism in which the parents’ level of differentiation and anxiety is focused on one or more of the children. Such a mechanism can make the spousal relationship appear harmonious at the expense of dysfunction within one or more children. The child on whom most of the anxiety is focused is likely grow to be less differentiated than the parents (who are assumed to have identical levels of differentiation obtained from their respective family-of-origins). When children have lower levels of differentiation, they are most prone to developing psychological, social, physical dysfunction or a combination thereof (Kerr, 1981). An illustration of triangling is when a conflict between spouses is lessened when a child develops a symptom like Attention Deficit Hyperactivity Disorder (ADHD). The ADHD manifestation requires the parents to join together to address the consequences of the related symptoms, thus making the spousal subsystem appear healthy at the expense of the functioning of the child. Such families are often called “child-focused families” (Gilbert, 1992, p. 74).

Bowen natural systems theory has incorporated many of the assumptions of evolutionary psychology (Papero, 2003). One assumption of evolution is that humans have been successful because parents and children, in general, develop necessary attachment to one another for the purpose of increasing the likelihood of survival of the offspring. However, BNST proposes that when the same intense level of attachment that is normal at birth continues, despite the child’s normal maturation and less need for attachment, the child is vulnerable to symptomatic complaints. Research supports this proposition. Maunder and Hunter (2001) analyzed peer-reviewed papers that were cataloged by MEDLINE and PsychInfo databases using keywords “attachment” and
“object relations” that were directly related to psychosomatic complaints (i.e., physical illness, symptoms, or physiology). Using Bowlby’s Attachment Theory (Bowlby, 1969; Bowlby, 1973; Bowlby, 1980), Ainsworth, Blehar, Waters, and Wall (1978) used the Strange Situation experiment in which the child is observed with the mother, with a stranger, left alone, and when reunited with stranger and mother. Ainsworth and colleagues’ observation of children’s reaction led to a reliable classification of the following attachment typologies: securely attached (i.e., infant is distressed by separation and seeks contact when reunited), detached/avoidant (i.e., infant cries during separation minimally, treats the stranger like he/she would the parent, and avoids contact a reunion), resistant/ambivalent (i.e., infant is likely to show distress at separation and closeness at reunion, but combine proximity seeking with angry resistance), and disorganized/disoriented (i.e., describe infants who show no consistent pattern during separation and reunion; Maunder & Hunter, 2001).

Maunder and Hunter (2001) found that young children with certain chronic illness (i.e., otitis media [a type of ear infection], cystic fibrosis, epilepsy, and asthma) have a higher prevalence of insecure attachment. Patients with congenital heart disease have a higher rate of avoidant insecurity than healthy control groups. Among adults with idiopathic spasmodic torticollis (uncontrollable and painful spasms of the neck muscles) and ulcerative colitis (an inflammatory bowel disease), there is an over-representation of avoidant attachment. Finally, secure attachment is associated with health. Maunder and Hunter (2001) cite Vaillant and Vaillant (1990) who found that boys who had relationships with their parents that were built on trust, autonomy, and initiative were likely to demonstrate positive health at age 50.
While Bowlby (1969, 1973, 1980) and Bowen’s (1985) theories are different, Skowron and Dendy (2004) did examine their convergence. Skowron and Dendy hypothesized that (a) greater levels of differentiation of self would be associated with lower levels of attachment anxiety and avoidance, and (b) greater levels of differentiation of self and lower levels of attachment anxiety and avoidance would predict greater effortful control (i.e., the ability to focus shift attention, inhibit undesirable behaviors, and perform an action despite the desire to avoid the action). To address these hypotheses, Skowron and Dendy administered the Differentiation of Self Inventory (DSI-R; Skowron & Friedlander, 1998; Skowron & Schmitt, 2003), the Experience in Close Relationships Scale (ECR, Brennan, Clark, & Shaver, 1998), the Effortful Control Scale (ATQ-S-EC; Rothbart, Ahadi, & Evans, 2000). The sample consisted of 255 participants obtained through the Internet news groups focused on issues related to family and parenting.

The results indicated that a strong relationship between Bowen’s (1985) concept of differentiation and Bowlby’s (1982) theory of attachment. In fact, the four components of self differentiation (as defined by Skowron and colleagues) predicted 40 % of the variability in attachment anxiety and 62% of variance in attachment avoidance. More specifically, a strong relationship ($r = .60, p < .001$) was found between emotional reactivity and ECR anxiety. Likewise a strong, negative relationship ($r = -.78, p < .001$) was found between emotional cutoff and ECR Avoidance. Skowron also found that those who had secure attachments better managed their stress while not relying on one’s attachment figures. High levels of differentiation also related to strong abilities to manage
one’s level of emotional reactivity and produce behaviors that led to greater adaptation to the stressors.

The dynamics of a compromised spouse (or the symptomatic spouse in the overfunctioning/underfunctioning reciprocity process) is the last, and perhaps the most crucial mechanism contributing to the development of FMS. Compromising, like other anxiety-binding mechanisms, serves to manage anxiety within the family system (Kerr, 1981). With the compromised spouse mechanism, the anxiety is absorbed through the actions of one spouse by sacrificing on important issues (i.e., giving in or compromising principles). Typically, the compromised spouse gives up the part of self that is defining in order to maintain harmony thus creating diffuse boundaries. According to BNST, persistent compromises increases one’s vulnerability to acquiring symptoms. Moreover, the symptomatic partner can be either the overfunctioner or the underfunctioner (Kerr, 1981). What’s important is, “who is giving up the most?”

Whatever the position one originally takes (i.e., overfunctioner or underfunctioner) early in the relationship, the symptomatic spouse typically becomes the underfunctioner when the chronic anxiety is persistent enough to promote an illness. Gilbert describes the following actions related to the compromised spouse: (a) asking for advice when what is needed is to think things out independently, (b) getting others to help when help really is not needed, (c) acting irresponsibly, (d) listening more than talking, (e) floating without goals much of the time, (f) setting goals but not following through with them, (g) tending to become addicted to substances, and (h) becoming mentally or physically ill frequently (pp. 67-68). The compromised spouse mechanism may also be most influential in the development of cancer (Kerr, 1981).
Bowen natural systems theory assumes that there is a symbiotic relationship between the overfunctioner and underfunctioner. Each needs the other. It would be incorrect to assume that because the overfunctioner is less symptomatic that he/she is more differentiated. BNST assumes that partners have equal level of differentiation, which is often shocking to the overfunctioner who thinks that he/she is the healthier, more adaptive of the two (Gilbert, 1992). For example, it is the spouse who seems to be functioning better professionally, emotionally, physically that often presumes a higher level of differentiation.

The following scenario illustrates this phenomenon. Mr. J is frequently ill and has several chemical sensitivities that have unknown etiologies. His health problems prevent him from enjoying vacations with his wife and children. He’s frequently concerned that Mrs. J might leave him. Mrs. J, on the other hand, is quite successful in her profession and equally healthy. She is quick to give Mr. J advice about how to improve his health and take responsibility for the management of the household. The more Mrs. J did, the more Mr. J seem to get sick. Mr. and Mrs. J exemplify a relationship where one person does well in life while the other seems to function poorly. Both agree that the dysfunctional one is the symptomatic one.

All of the above mechanisms serve a natural, biological purpose and are not deemed “good” or “bad.” All family members participate equally in anxiety-binding mechanisms. In other words, all family members are actors and reactors to the emotional anxiety within the system and seek natural means to alleviate that anxiety. These anxiety-binding mechanisms are activated by the system to preserve the family system as a whole at the expense of the least number of individuals. The choice of who binds the anxiety is
outside one’s awareness and an automatic response to the anxiety with the sole purpose of preserving harmony and balance within the family system (Kerr, 1981). Therefore, behaviors are not seen as “good” or “bad” rather as value-free events. The occurrence of the events raise the important question, “What purpose does the behavior serve?”

To summarize, BNST assumes families’ level of adaptability, or differentiation, is determined by a multigenerational emotional process that is projected from generation to generation through various means. As such, certain branches of the multiple generations develop varying levels of differentiation, or adaptability to stress and anxiety. Those with greater differentiation, or adaptability, are likely to handle chronic stress better and are able to stave off any clinical symptoms. However, those with lower levels of differentiation are likely to employ the aforementioned anxiety-binding mechanisms: (1) emotional distance and emotional cutoff, (2) emotional conflict, (3) overinvolvement with children, and the (4) existence of a compromised spouse. When anxiety is bound within the four mechanisms, the system attempts to improve its chance of survival by isolating the anxiety within those mechanisms. BNST assumes that anxiety travels the path of least resistance, and therefore those who are least differentiated are more vulnerable to developing chronic clinical symptoms.

**Bowen Natural Systems Theory and Fibromyalgia**

Bowen natural systems theory has been applied to the onset and development of physical illness, such as cancer (Kerr, 1980), acne (Kerr, 1981) and psoriasis (Kerr, 1981, 1992). Although Kerr’s writings provide a conceptual base for the application of BNST to chronic diseases, the description of methodology is so scant as to raise questions about the validity of his findings. For example, Kerr (1981) wrote generally and without hard data about his work with over 100 cancer patients in his chapter, *Cancer and the Family*.
Emotional System. He found that most patients experienced “a period of increased, intense, and sustained anxiety lasting from several months to a year or more preceding the cancer diagnosis” (p. 288). Kerr found wide variability in the intensity of anxiety experienced before the initial cancer diagnosis. Some patients experienced rather intense emotional situations, while other experienced more moderate emotional situations. Kerr’s writings on psoriasis and acne have been conceptual pieces with the latter describing his own affliction and the influence of stress and anxiety.

Although Kerr’s research provides limited evidence for the validity for Bowen’s theoretical model, other research validates the assumption of the relationship between stress/anxiety and symptom development and/or exacerbation (e.g., Bartle-Haring, Rosen, & Stith, 2002; Bell, Baldwin, Russek, Schwartz, & Hardin, 1998; Biondi & Zannino, 1997; Bryla, 1996; Dailey, Bishop, Russell, & Fletcher, 1990; Davis, Zutra, & Reich, 2001; Herrmann, Scholmerich, & Straub, 2000; McCubbin, 1988). These other researchers have not approached this relationship from a Bowenian perspective, but the data support BNST assumptions nonetheless as described in the following pages. In using BNST to describe the onset and development of FMS, the following four theoretical assumptions are made.

1. FMS is associated with Stress.
2. FMS is associated with family stress, or negative family relationships.
3. Symptom severity is related to psychosocial factors such as stress and family relationship factors.
4. Age of onset is associated with psychosocial factors, such as stress and family relationships.

No attempt to date has tried to incorporate the development of FMS into BNST.

The purpose of this section is to discuss the FMS literature that supports BNST, which is
divided into the following sections: (a) a general discussion of stress and health, (b) FMS and stress, (c) FMS and family stress, (d) FMS and psychosocial factors, and (e) FMS and age of onset.

**Stress and Health**

Regarding stress and health, BNST suggests that chronic stress and the related chronic anxiety makes one vulnerable to physical, psychological, emotional, and social dysfunction when one does not have the adequate level of differentiation to cope with the stress/anxiety (Kerr & Bowen, 1988). Consistent with BNST’s predictions, evidence suggests that stress in all of its forms has a profound effect on the body (Biondi & Zannino, 1997). Research within the developing field of psychoneuroimmunology has produced research that provides further evidence of how the body and the mind are intricately related (Hafen et al., 1996; Kiecolt-Glaser, McGuire, Robles, & Glaser, 2002). More specifically, the relationship between the mind and the body vis-à-vis stress is associated with the etiology of many diseases including asthma (Chen, Fisher, Bacharier, & Strunk, 2003), atherosclerosis (Strike & Steptoe, 2004), cancer (Bryla, 1996), chronic backache (Gonge, Jensen, & Bonde, 2002), coronary heart disease (Orth-Gomer, Rosengren, & Wilhelmsen, 1993; Orth-Gomer, Wamala, Schenck-Gustafsson, Schneiderman, & Milltleman, 2000), coronary thrombosis (von Kanel, Mills, Fainman, & Dimsdale, 2001), diabetes (Jack, 2003), eczema (Greene, 1997), epileptic attacks (Haut & Vouyiouklis, 2003), herpes (Burnette, Koehn, Kenyon-Jump, & Hutton, 1991), high blood pressure (Cottington, Matthews, Talbott, & Kuller, 1986; Greenstadt, Yang, & Shapiro, 1988), impotence (Slosarz, 1992), infertility (Baird, Wilcox, & Kramer, 1999), influenza B infection (Clover, Abell, Becker, Crawford, & Ramsey, 1989), irritable bowel syndrome (Palsson, Turner, Johnson, Burnelt, & Whitehead, 2002), migraine
headache (Huber & Henrich, 2003), multiple sclerosis (Marinelli, 2000), psoriasis (Kabat-Zinn et al., 1998), rheumatoid arthritis (Evers, Kraaimaat, Geenen, Jacobs, & Bijlsma, 2003), systemic lupus erythematosus (Lampe et al., 2001), ulcers (Morgan et al., 2004), and others (Hafen et al., 1996).

As predicted by Kerr and Bowen (1988), other researchers found that stress is the leading factor in the susceptibility to chronic diseases due to the relationship between stress and the immune system. Steven Locke, a psychiatrist affiliated with Harvard Medical School and Boston’s Beth Israel Hospital, defined the immune system as “a surveillance mechanism that protects the host from disease-causing micro-organisms. It regulates susceptibility to cancer, infectious diseases, allergies and autoimmune diseases” (Hafen et al., 1996, p. 70). When the immune system of an individual is compromised by the family’s preferred anxiety-binding mechanism, the surveillance mechanism of family members becomes weakened. The surveillance mechanism becomes dysfunctional within some level of the living system. This may mean that breakdown in the surveillance mechanism may occur at any level of the system but affect the entire system as represented in Appendix A.

FMS and Stress

Regarding FMS and stress, BNST would suggest that people with FMS have levels of differentiation that fall short of what is needed to handle the chronic stress and anxiety in their lives. In other words, those with FMS, or any chronic disease for that matter, have a greater vulnerability to effects of stress. Consistent with BNST’s prediction, research by Davis, Zutra, Reich (2001) and others (Copeland & Starlanyl, 1996; Aaron et al., 1997) supports the theory.
Davis, Zautra, and Reich (2001) conducted a two-part study to investigate the vulnerability to negative effects of stress among women with FMS and osteoarthritis (OA). Study 2 is discussed in this section and Study 1 is discussed in the FMS and Psychosocial Factors section. Next, I discuss the effects of stress on the trigger points that are the hallmark of FMS, the effects of day-to-day stress compared to major life events on the FMS patient, and effects of emotional trauma on the FMS patient compared to others.

Davis, Zautra, and Reich (2001) analyzed the differences in vulnerability to interpersonal stress between FMS and OA participants by assessing participants’ affect (using the Positive and Negative Affect Scale; Watson, Clark, & Tellegen, 1998), pain (using a 101-point numeric rating scale that best described the average level of pain the participant experienced over the past week), and physiological arousal (using pulse rate, systolic blood pressure, diastolic blood pressure as indicators) before, during, and after being presented with an interpersonal stressor. The sample consisted of 20 women with FMS and 21 women with OA. The researchers were interested in the participants’ response to negative affective stressors. Participants were assigned randomly from each group into either a negative mood induction or a neutral mood control condition, and then the participants discussed a stressful event while the researchers assessed the participants affect, pain, fatigue, and physiological arousal. The results indicated that only FMS participants experienced an increase in stress-related pain after exposure to negative mood induction. In addition, the FMS participants also reported less positive affect when they experienced pain during stress, where the OA group had no change. These findings
suggest, as BNST would predict, that FMS patients may be particularly vulnerable to the negative effects of social stress.

Stress also appears to affect the trigger points (TrPs) that are the hallmark of FMS. TrPs are extremely sore points within the muscle tissue that can occur throughout the body. TrPs, when touched, can send pain to different parts of the body (Copeland & Starlanyl, 1996). When one experiences high levels of tension, the muscles respond to the tension by bracing (i.e., the tensing of muscles in response to stress; Seaward, 2004). When muscles respond to stress, even when the person is unaware consciously of the stress, the body remains in sustained tension. An active muscle, or myofacia, uses oxygen and food and excretes toxic waste. Trigger point areas exhibit this reaction (Starlanyl & Copeland, 1996).

Starlanyl and Copeland (1996) also found that emotional stress can also trigger TrPs. “These are not the psychological results of tension; they can be the physiological effects in the body resulting from long-term emotional abuse or mental trauma” (p. 24). When a person tenses constantly his or her muscles, a change in the body’s musculature patterns is likely (Starlanyl & Copeland, 1996).

Dailey, Bishop, Russell, and Fletcher (1990) analyzed the relationship among stress, social support, and pain among fibromyalgia patients, rheumatoid arthritis patients, and pain-free controls using the Life Experience Survey (that measures stress due to life events; Sarason, Johnson, & Siegal, 1978), the Hassles Scale (that measures stress due to everyday events; Kanner, Coyne, Schaefer, & Lararus, 1981), and the Uplifts Scale (that measures events that moderated or alleviated stress; Kanner et al., 1981). The Inventory of Socially Supportive Behaviors (ISSB; Barrera, Sandler, & Ramsay, 1981) assessed the
frequency of receiving support by others, while the Arthritis Impact Measurement Scale (AIMS; Meenan, Gertman, Mason, & Dunaiff, 1982) measured the physical, social and mental health status of patients with rheumatic disorders. The sample consisted of 28 FMS participants, 20 RA participants, and 28 healthy control participants. The FMS group reported higher incidences of daily minor stress than either the RA or the healthy control group. However, the FMS group reported lower incidences of major life stressors. All groups reported nonsignificant differences in daily uplifts. Dailey, Bishop, Russell, and Fletcher’s (1990) findings support previous studies on the relationship between stress and FMS (Herrmann, Scholmerich, & Straub, 2000). These findings suggest the daily stressors exacerbate the perception of pain more than major life events (e.g., death of a relative). BNST suggests that chronic stress, often associated with daily hassles, has the most profound effect on health compared to acute stress, like that of the death of a loved one. However, a death of a loved one may create enough disequilibrium within the system to create a situation ripe with chronic stress (e.g., loss of a significant source of income and related problems; Bowen, 1985).

In addition, Aaron et al. (1997) analyzed the relationship between perceived physical and emotional trauma that occurred before or initiated the onset of FMS assessing or measuring perceived physical trauma (i.e., patients were asked about the date of initial onset of symptoms, whether it coincided with a physical or emotional trauma, and, if applicable, the description of the event), pain threshold levels (using a dolorimeter that measures the amount of pressure that can be applied to a site before pain is felt), history of sexual and physical abuse interview (Taylor, Trotter, & Csuka, 1995), frequency of healthcare utilization, status of disability compensation (i.e., receipt of
either social security disability, state employment disability, or worker’s compensation benefits), functional disability (using the Fibromyalgia Impact Questionnaire; Burckhardt, Clark, & Bennett, 1991), and fatigue (using the Fatigue Severity Scale; Krupp, LaRocca, Muir-Nash, & Steinberg, 1989). The sample consisted of 80 FMS patients (who were recruited through a university Rheumatology Clinic database) and 33 non-patients with FMS (i.e., this group contained community volunteers who reported muscle aches and pain and qualified for the FMS diagnosis but had not sought treatment). The results indicated that FMS patients who experienced emotional trauma were more likely to experience functional disability, become fatigued, and utilize healthcare services than their non-patient FMS counterparts.

FMS and Family Stress

People who have strong, healthy families reap many benefits that protect them from stress and disease (Berkman, 2000; Hafen et al., 1996). Conversely, when one’s family is marked by high levels of stress (including diffuse boundaries) without adequate coping mechanisms, there are many deleterious effects on health (Craddock, 1983). When a stressful event occurs within a family with healthy relationships, the impact of the stress is shared by everyone, minimizing the effects on any one person. Families that are cutoff emotionally or physically from one another presumably do not have the same level of benefits. For example, Gilbert (1992) writes that emotionally cutting off from previous generations is a hallmark of the history of the United States given its immigrant history. Gilbert suggests that increased levels of emotional cutoff increase the vulnerability to stress and disease. Some support for this phenomenon is found within the FMS literature. “Some researchers have observed an increased prevalence [of FMS] among first-generation immigrant families in the United States” (Wallace & Wallace, 2002, p. 15).
Researchers have examined the effects that FMS has on the family, or social network in general, after the onset of FMS (Bolwijn, van Santen-Hoeufft, Baars, & van der Linden, 1994; Soderberg & Lundman, 2001). However, the focus of this section is to examine the nature of family relations of many people with FMS before the onset. In this section, I present research that discusses the following topics: restricted social network, victimization, family roles, and childhood experiences.

Bolwijn, van Santen-Hoeufft, Baars, and Linden (1994) analyzed the trends in the personal social network of FMS (n = 10) and RA (n = 10) participants using the Maastricht Social Network Analysis (Baars, Uffing, & Dekkers, 1990), which is a structured interview. During the interview, the participants named all of the family, friends, and social contacts with whom they connected during the previous 12 months. Information was gathered about the size, demographics, physical distance, contact duration, and contact frequency of the social network. In addition, information about who initiated contact and degree that the individuals in the social network provided for the needs of the participant was also obtained. The FMS and RA group reported a similar mean number of contacts (27 vs. 26), and most contacts were family members for both groups. Most of the FMS participants’ families lived in the same town versus the RA participants’ families lived who were more dispersed. While each group had similar numbers within their social network, the FMS group reported fewer of those within their social network were intimate contacts. In fact, the FMS group reported that most of the intimate contact and support came from one or two people. Often, these persons were the husband and/or the physician. Moreover, most acquaintances were either neighbors or the colleagues of the participant’s husband, not directly connected to the patient herself.
While this research must be interpreted with caution due to the low number of participants, it supports BNST’s assumption that emotional and physical distance/cutoffs are related to symptom development and severity. Moreover, despite the findings that most of the social network consisted of family members, it was clear that these relationships were not intimate ones. BNST would suggest that developing more one-on-one relationships with those in the family-of-origin may contribute to the relief of symptoms. Finally, these findings may suggest that husbands may perform an overfunctioning role by continuing to be the only source of support for the FMS participant.

Regarding victimization, Van Houdenhove et al. (2001) analyzed the prevalence and characteristics of different forms of victimization among patients with chronic fatigue syndrome (CFS) and FMS using the “Vragenlijst naar Belastende Ervaringen” (“Questionnaire on Burdening Experiences;” Nijenhuis, Van der Hart, & Vanderlinden, 1996) and a psychological test battery (which was not elaborated). Victimization was defined as experiencing emotional neglect, emotional abuse, physical abuse, sexual harassment (no physical contact), and sexual abuse. The sample consisted of 95 participants, 54 fulfilled CDC-criteria of CFS and 41 ACR-criteria of FMS. Van Houdenhove and colleagues used RA patients \( n = 26 \) and multiple sclerosis patients \( n = 26 \) as controls. Victimization rates were highest among the FMS/CFS group (64.1%) as compared to the RA/MS group (42.3%) and healthy control group (49.4%) with the latter two not being significantly different. In addition the authors separated the victimization classification into three groups: Childhood Victimization Only (< 14 years), Adult Victimization Only, and Lifelong Victimization. A significantly greater number of
FMS/CFS participants experienced Lifelong Victimization (38.9%) than the other classifications (Childhood Only, 13.7%; Adulthood Only, 11.6%). Incidentally, the rate of Lifelong Victimization was also higher in FMS/CFS group than either the RA/MS group (7.6%) or control group (11.6%) (Van Houdenhove et al., 2001).

Regarding family-of-origin experiences, FMS/CFS groups experienced greater levels of emotional neglect, emotional abuse, and physical abuse compared to the RA/MS group. Similarly, the FMS/CFS group reported higher levels of emotional neglect, emotional abuse, and physical abuse than did the healthy control group. FMS/CFS also reported greater emotional abuse by other family members compared to RA/MS patients and healthy controls. Sixty-nine percent of the FMS/CFS report that their partners were the primary perpetrator. No significant differences were found between the FMS and the CFS groups (Van Houdenhove et al., 2001).

Walker et al. (1997) found similar findings related to the level of victimization. Walker and colleagues analyzed the differences between FMS and RA patients regarding level of sexual, physical and emotional abuse using the Child Maltreatment Interview (Briere, 1992) that measures presence of child abuse, the Dissociative Experience Scale (Carlson, Putnam, & Ross, 1993) that measures dissociatiation, and the neuroticism scale of the NEO personality inventory (Costa & McCrae, 1980) that measures anger, disgust, sadness, anxiety, and other negative emotions. The sample consisted of FMS (n = 36) and RA (n = 33) patients who visited the University of Washington Medical Center for treatment during January 1994 through May 1994 acquiring a continuous, sequential sample. The results indicated that FMS patients had significantly higher rates of childhood physical assault (41.7% vs. 16.7%), adult physical assault (47.2% vs. 16.7%)
and sexual assault (66.7% vs. 13.3%), and a trend toward greater incidence of childhood sexual assaults involving penetration (33.3% vs. 16.7%) compared to RA patients. Overall, FMS patients presented with significantly higher rates of abuse either as children, as adults, or throughout the lifetime. FMS groups reported more unhappy childhoods, more emotionally abusive experiences, and lower scores on parental psychological availability compared to their RA counterparts.

The findings of the studies described in this section suggest that an intense nuclear family emotional process, childhood trauma, and/or adult trauma are associated with FMS (Walker et al., 1997). The intensity comes in many forms but all related to the poorly maintained boundaries on behalf of the abuser, which is typical of family violence (Busby, 1996). In addition, the stress response associated with chronic emotional, physical, and/or psychological abuse can increase the vulnerability to disease development by weakening the surveillance mechanism of the immune system. Such level of chronic stress may lead to the hypervigilence associated with the high prevalence of posttraumatic stress disorder among FMS patients (Amir et al., 1997). Furthermore, BNST suggests that during a child’s development, if he/she is unable to develop an autonomous Self separate from the family system, particularly the parent(s) (which is unlikely during abuse), then the level of differentiation is stunted (Kerr & Bowen, 1988).

The above studies on victimization provide an alternative explanation to the studies that assume a genetic link because of the rate of symptomology within first-degree parents (i.e., biological mothers and fathers; see Arnold et al., 2004). BNST predicts that the first-degree family members (i.e., biological brother, sister, father, and mother) of symptomatic individuals will show signs of clinical symptoms given that first-degree
family members are in the same emotional system with similar levels of differentiation. Moreover, first-degree family members who do not show symptoms may not have higher levels of differentiation, but they simply may bind their anxiety in the other ways (e.g., conflict, distance/cutoff, or symptomatic child; Kerr & Bowen, 1988).

Evidence exists to support the BNST contention that it may not be a gene that is passed but the vulnerability to stress. Conte, Walco and Kumra (2003) analyzed differences among healthy control children, children with RA, and children with juvenile primary fibromyalgia syndrome (JPFMS) and the parents of all groups. Primary FMS differs from secondary FMS in that primary FMS denotes that there is no other comorbid diagnosis or clear precipitating event that triggered the onset of the FMS. Conte and colleagues administered the Dimensions of Temperament Survey-Revised (DOTS-R; Windle & Lerner, 1986), State-Trait Anxiety Inventory (Spielberger, Edwards, Lushene, Monuori, & Platzek, 1973), Children’s Depression Inventory (Kovacs, 1992), Family Environment Scale (FES; Moos & Moos, 1986), Sensitivity Temperament Inventory for Pain (STIP; Baum, 1994), and the Youth Self-Report (Achenbach, 1991), which that measures adolescents’ perceptions of their thoughts and behaviors. All of the children’s parents completed the DOTS-R, FES, STIP, Child Behavior Checklist (which measures parents’ perceptions of their child’s thoughts and behaviors; Achenbach, 1991), and Symptom Checklist-90-Revised (Derogatis, 1992). Subjects represented three distinct groups from a university medical center: JPFMS ($n = 16$), juvenile rheumatoid arthritis (JRA) and spondyloarthropathy (a classification that denotes abnormalities of the joints in the spine), which were grouped together ($n = 16$). A control group ($n = 16$) was
acquired through local pediatrician offices. No significant age differences were found between groups. Females outnumbered males, but the differences were not significant.

The results suggested that JPFMS group had lower mood states, irregular daily habits, lower task orientation and higher distractibility. The JPFMS group also had more behavioral problems, internalized behaviors, somatization, and attention problems compared with the other two groups. The withdrawal and anxiety/depression scores were only significantly different from the arthritis group. The JPFMS also experienced greater levels of anhedonia, negative mood, ineffectiveness, negative self-esteem, and total overall depression than those in the other two groups.

Parents of the JPFMS reported about themselves as adults more attention problems, withdrawal, thought problems, somatic complaints, and delinquent behavior, internalizing, externalizing, and overall behavioral problems than did the parents of the other two groups. In addition, JPFMS parents had higher levels of depression and anxiety and higher total global symptom scores than those parents in the healthy control. There were no differences between the JPFMS parents and parents in the RA group.

These findings pose an unanswerable question, “Did the parents’ symptoms exist before the development of symptoms within their child, or did the parental symptoms develop in response to the child’s symptoms?” I contend that this question is irrelevant. If BNST assumptions are true, that one’s vulnerability to stress and disease is passed from generation to generation, then the fact that the parents have symptoms at all suggests that they have a greater vulnerability to stress and thus to disease.

Regarding childhood experiences, Erickson (1992) performed an ethnographic study of 20 patients with FMS who attended support groups for FMS and/or chronic
fatigue syndrome (CFS) in New Mexico and Texas. All participants described their family-of-origin as dysfunctional. Fifteen of the 20 patients reported experiencing chronic stress before the onset of symptoms. Five of the 20 remembered acquiring a viral infection, and the same ratio remembered that headaches were early symptoms (Erickson, 1992). Erickson’s investigation led her to classify patients into the following childhood roles: caretaker, hero, scapegoat, lost child, and/or clown. Patients said that they developed their roles to best tolerate the intense family dynamics of their dysfunctional families.

Most patients described their parents as either chronically ill, depressed, having chronic muscle pain, or having allergies. In addition, 12 said that one or both parents were absentee guardians, at least emotionally. Half of fathers (n = 10) were described as abusive and/or legalistic (i.e., incurred legal trouble); six rated their mothers as such. Only four and five patients rated that the mothers and fathers, respectively, loved them unconditionally. However, eight felt that their fathers, and the same number for mothers, loved them conditionally (Erickson, 1992). All participants had at least one sibling, and all stated that one or more siblings were either depressed, chronically ill, had allergies or muscle pain, or a combination thereof. None stated that all of their siblings were healthy (Erickson, 1992).

The impact of the family on the FMS patient is not a linear one. From the research discussed above, emotional distance/cutoff, victimization, and early childhood experiences are all associated with FMS. As discussed earlier, when boundaries of family members are not clearly defined, or are violated, this may create systemic problems that contribute to the development and maintenance of FMS.
FMS and Psychosocial Factors

A number of psychosocial factors are associated with FMS. Nicassio (2001) states that FMS patients had “more emotional disturbance, a more deficient pain coping repertoire, a smaller social network, and more negative social ties than their counterparts” (p. 147). For example, Walker, Keegan, Gardner, Sullivan, Katon, and Bernstein (1997) surveyed 36 patients with FMS and 33 patients with RA. The following instruments were used: the NIMH Diagnostic Interview Schedule (DIS); the SF-36, which measures functional disability; the Appraisal of Diabetes Scale, which was altered to reflect FMS; a pain assessment using a 10-point Likert scale; a sleep questionnaire; and the Framingham Type-A Scale. The FMS patients (90% vs. 49%) reported a higher lifetime prevalence of one or more psychiatric disorders than the RA group. The FMS group scored higher on anxiety scales compared to the RA group. FMS group presented with higher levels of pain, pain complaints, sleep disturbances, impaired coping, and perceived loss of control over their lives. The FMS group had disability levels equal or higher in physical, emotional, family, social, and occupational functioning compared to the RA group on every subscale. Finally, the FMS group had a greater number of medically unexplained physical symptoms compared to their RA counterparts.

Davis, Zautra, and Reich (2001) in Study 1, the researchers measured pain and functioning (using Short Form-36; Ware, Snow, Kosinski, & Gandek, 1993), negative social ties (instrument unnamed; Finch et al., 1989), social support (using the MOS social support survey; Sherbourne & Stewart, 1991), coping (using the Vanderbild Multidimensional Pain Coping Inventory; Smith & Wallston, 1997), affect (using the Positive and Negative Affect Scale (PANAS); Watson et al., 1998), interpersonal sensitivity (using the Interpersonal Sensitivity Measure; Boyce & Parker, 1989), and
emotionality (using the General Emotionality subscale of the Scale of Emotional Arousability; Braithwaite, 1987). The sample consisted of 101 female participants 50-78 years old with FMS \((n = 50)\) and OA \((n = 51)\). The OA group was further divided between those with knee pain who were planning surgery \((n = 29)\) and those who were not \((n = 22)\). While the OA groups and FMS group appeared to have similar levels of pain, the FMS group was significantly different on the other variables. The results indicated that the FMS group had poorer health perception compared to the OA groups despite equal levels of physical functioning. The FMS group experienced more emotional disturbances and less positive affect than either OA group. In addition, the FMS group had fewer positive affective resources (i.e., frequency of positive emotions experienced) and more likely to use avoidant coping (i.e., catastrophizing, mental disengagement, wishful thinking, and self-isolation) to deal with pain than either OA group. The FMS group reported having fewer individuals in their social network and more negative social ties than the OA surgery group.

**FMS and Age of Onset**

Bowen natural systems theory suggests that when children develop chronic diseases, it may indicate the existence of an intensely fused family system (Kerr & Bowen, 1988). In addition, BNST suggest that there is an inverse relationship between the age of onset of a chronic disease and one’s level of differentiation. BNST also suggests that those who develop a chronic disease earlier in their development will likely experience more severe symptoms than their older counterparts with the same chronic disease. Finally, BNST suggests an inverse relationship between symptom severity and level of differentiation. While, little research exists to confirm or refute all of the above assumptions, research does exist that address aspects thereof.
Cronan, Serber, Walen, and Jaffe (2002) analyzed the influence of age of onset and wellbeing using the McGill Pain Questionnaire (Byrne et al., 1982), the Center for Epidemiologic Studies—Depression Scale (Radloff, 1977), the Pittsburgh Sleep Quality Index (Buysee, Reynolds, Monk, Berman, & Kupfer, 1989), the Fibromyalgia Impact Questionnaire (Burckhardt et al., 1991), the Quality of Well-being Scale (Kaplan & Anderson, 1990), the Ways of Coping Questionnaire (Folkman & Lazarus, 1988), the Arthritis Self-efficacy Scale (Lorig, Chastain, Shoor, & Holman, 1989), the Arthritis Helplessness Index (Stein, Wallston, & Nicassio, 1987), and HMO records. The sample consisted of 600 FMS participants (95% female) who belonged to a large health maintenance organization (HMO). Cronan and colleagues grouped the participants in the following categories: young (20-39 years), middle aged (40-59), and older (60-85). The findings suggest that the middle-aged group and the older group experienced less symptomology compared to their younger counterparts despite no differences among the groups in their coping mechanisms. In other words, coping, self-efficacy, and helplessness were not related to differences in the symptoms experienced among the three groups, which is supported by other research (Keefe & Williams, 1990). In addition, depression scores seem to decrease with age, as the mean score for the young, middle-aged, and older on the depression inventory was 24.24, 20.74, and 16.52, respectively.

Burckhardt, Clark, and Bennett (2001) found similar results. Burckhardt and colleagues analyzed the differences between 343 FMS patients in the United States (n = 244) and Sweden (n = 99) using the following instruments: the Quality of Life Scale (Burckhardt, Clark, & Bennett, 1993), the Coping Strategies Questionnaire (Jensen & Linton, 1993; Lawson, Reesor, Keefe, & Turner, 1990), the Fibromyalgia Impact
Questionnaire (Burckhardt et al., 1991), the Beck Depression Inventory (Beck, Steer, & Barbin, 1988), the Rheumatology Attitudes Questionnaire (Callahan, Brooks, & Pincus, 1988), and the Number of Tender Points and Pain in Tender Points (Myalgia Score; Wolfe et al., 1990). Burckhardt et al. divided the participants into three age groups: 20-34 years, 35-54 years, and 55-65 years. The youngest group had significantly more tender point pain (i.e., greater pain severity) than the older groups. The youngest group also had lower scores on the physical functioning and well-being subscales compared to the other two groups. In short, for younger people with FMS, “the impact of the FMS is higher and the quality of life lower than the oldest subgroup” (p. 13). Unlike previous research cited above, this study found that the youngest group used fewer coping mechanisms (e.g., leaving the house and socializing with others) and had more catastrophizing cognitions.

While only 28% of FMS patients report that their symptoms began in childhood or early adulthood (Conte et al., 2003), for those who do, their symptoms appear to be more severe than their older counterparts, which supports one of BNST’s assumptions. However, no research to date has analyzed the relationship between level of differentiation, age of onset, and symptoms severity. The above studies contradict one another in terms of differences in coping mechanisms. The Cronan et al. study found no differences in coping mechanisms among the different age groups, but the Burckhardt study found differences, especially socializing with others. BNST does assume that emotional or physical distance would contribute to disease development and symptom severity as demonstrated by the latter study.

Summary

Fibromyalgia is a complex disorder with no known etiology (American College of Rheumatology, 2004), though some proposals have empirical merit. Despite the number
of available treatments, both traditional and complementary, to help manage the discomfort associated with the widespread pain, no cure exists. The systems view of health and disease (Appendix A) provides a useful context for considering FMS. Bowen natural systems theory (BNST) is one application of the systems view that provides the framework for understanding the development of FMS (Appendix B). BNST provides a conceptualization to better understand the onset and development of FMS. BNST presumes that multi-causal factors are related to the development of chronic disease as a result of the interaction of level of differentiation, chronic anxiety, and relationship processes, as well as other factors, like genetic predisposition, psychological stress, and others. Despite attempts by other researchers to apply BNST to the development of other chronic diseases, no empirical research exists currently. Furthermore, the existing research that supports BNST’s assumptions do not use the BNST model as a conceptual lens. I propose that the following assumptions of BNST can be studied empirically: (a) FMS is associated with stress, (b) FMS is associated with family stress, or negative family relationships; (c) symptom severity is related to psychosocial factors such as stress and family relationship factors; and (d) age of onset is associated with psychosocial factors, such as stress and family relationships. These theoretical assumptions serve as a guide for the research questions proposed for my study.
CHAPTER 3
METHODOLOGY

The purpose of my study was to investigate the heuristic value of several assumptions of Bowen natural systems theory (BNST) for understanding fibromyalgia syndrome (FMS), namely the influence that family relationships and stress have on the development and symptom severity of FMS. This chapter is divided into the following sections: (a) Statement of Purpose, (b) Research Design, (c) Participants, (d) Research Variables, (e) Procedure, (f) Research Questions & Hypotheses, (g) Instrumentation, and (h) Data Analysis.

Statement of Purpose

Micklowitz and Hooley (1998) describe the necessary components to move from basic research to clinical trials: (1) identify basic processes associated with symptoms, (2) design and pilot a manualized treatment, (3) conduct randomized controlled efficacy trials, and (4) conduct community effectiveness research. My study addresses step-1 of Micklowitz and Hooley’s model by examining the relationships among FMS symptoms (including symptom severity and age of onset) and the following basic processes: emotional cutoff, level of chronic anxiety, level of differentiation, stressors, demographic variables, nuclear and multigenerational family processes. Through examining these relationships, my study may lead to treatment components that could be initiated to address the remaining three steps of Micklowitz and Hooley’s (1998) research design.
Research Design

This cross-sectional study used data collected from respondents to postings on FMS Internet websites and listserves. Individuals diagnosed with FMS by a physician (MD or DO) were asked to complete a battery of surveys. Respondents were surveyed using the following instruments: the Fibromyalgia Impact Questionnaire (FIQ; Burckhardt, Clark, & Bennett, 1991), the Perceived Stress Scale (PSS; Cohen, Kamarck, & Mermelstein, 1983), the Differentiation of Self Inventory (Skowron & Friedlander, 1998; Skowron & Schmitt, 2003), the Life Experiences Survey (Sarason, Johnson, & Siegal, 1978), and the Marlowe-Crown Social Desirability Scale (SOCDES; Fischer & Fick, 1993).

Population

FMS has been associated with a number of demographic factors. FMS is found in all socioeconomic levels, in most countries, and ethnic groups (Berne, 2002; Cymet, 2003); although most FMS patients are Caucasian (Wallace & Wallace, 2003). The worldwide incidence of FMS appears to be between 1% and 12% of the population with diagnostic criteria varying from country to country (Berne, 2002). In the United States, 3 to 6 million Americans are diagnosed with FMS (Turk, Okifuji, Sinclair, & Starz, 1996) representing about 2.5% of the population (3.4% female and 0.5% men) (Cronan, Serber, Walen, & Jaffe, 2002; Meisler, 2000). Most patients range in age from 20-50 years when diagnosed initially (Berne, 2002).

Compared to men, women are more susceptible to acquiring FMS by a ratio of between 5:1 and 20:1 (Berne, 2002). Prevalence among women increases as they age and may exceed 10% between the ages of 50-60 years (Meisler, 2000). However, people of all ages can be diagnosed, including children (Conte, Walco, & Kimura, 2003).
Twenty-six to fifty percent of FMS patients report FMS history in family members (Arnold et al., 2004; Berne, 2002). Similar findings have been found in an ethnographic study as well, which was discussed in Chapter 2 (Erickson, 1992). Although some interpret this prevalence as support for a genetic link, no genetic link has been firmly established (Arnold et al., 2004; Berne, 2002; Wallace & Wallace, 2003).

Participants

I recruited participants from FMS websites, e-mail listserves, and electronic bulletin boards on the Internet. A nonrandomized convenience sample was obtained within a four to six week recruitment period. Each participant was asked to verify that he/she received a FMS diagnosis from a physician before having access to the survey battery. Only adults (18 years and older) were permitted to complete the survey. I requested information regarding gender, race, and income levels.

Research Variables

All variables of this study were obtained using four questionnaires and demographic information. The independent variables include (1) Level of Chronic Anxiety, (2) Level of Basic Self, (3) Level of I-position, (4) Level of Emotional Cutoff, (5) Stress Perception, (6) Stressful Life Events and (7) demographic variables. The measured variables used to quantify the independent variables include (1) the Emotional Reactivity subscale of the DSI-R, (2) the Differentiation of Self full scale score of the DSI-R, (3) the Emotional Cutoff subscale of the DSI-R, (4) the I-position subscale of the DSI-R, (5) Life Experience Survey (negative and total scores), (6) Perceived Stress Scale total score, and (7) a demographic questionnaire. The dependent variable is symptom severity, which is measured by the Fibromyalgia Impact Questionnaire.
Procedure

Research utilizing the Internet lends to a greater access to a more heterogeneous group (Pittenger, 2003). Several researchers provide guidelines regarding Internet research that was employed during this study to address such issues as confidentiality and anonymity; providing several follow-up reminders; and providing multiple electronic means for participants to return data (Harris & Dersch, 1999; Pittenger, 2003; Schaefer & Dillman, 1998). I recruited participants from Internet postings on FMS websites, e-mail listserves, and electronic bulletin boards by first contacting the webmaster or list-serve moderator (Appendix C). If the webmaster or coordinator agreed to my request, then an invitation was sent to their subscribers (Appendix D). Participants were directed to a survey battery hosted by www.surveymonkey.com. I constructed a page to introduce the scope of the study and give the participant several options for downloading, completing, and returning the survey. Respondents were able to complete the survey directly from the Internet or ask for an electronic or regular mail version to be sent to them.

When the participants accessed the survey battery on www.surveymonkey.com, they viewed an introductory statement and consent form (Appendix E), and a series of questionnaires. The questionnaire packet included demographics, the FIQ (Burckhardt, Clark, & Bennett, 1991), the PSS (Cohen, Kamarck, & Mermelstein, 1983), the DSI-R (Skowron & Friedlander, 1998; Skowron & Schmitt, 2003), the LES (Sarason, Johnson, & Siegal, 1978), and SOCDES (Fischer & Fick, 1993). I reposted weekly reminders to websites/list-serves. The survey was available for six weeks.
Instrumentation

In this section, I provide information regarding the instruments included in my study: the Differentiation of Self Inventory-Revised, the Fibromyalgia Impact Questionnaire, Perceived Stress Scale and the Life Experiences Survey.

Differentiation of Self Inventory-Revised (DSI-R)

This recently revised measure was taken from the assessment Skowron and Schmitt (2003) developed for use in measuring one’s level of differentiation. The scale was normed using a sample of 225 adults (79% women and 21% men) with a mean age of 36.21 years. Questions on the instrument ask respondents about intrapsychic and interpersonal dynamics including current family-of-origin relationships. Specifically, the DSI-R assesses emotional functioning, intimacy and autonomy in interpersonal relationships. Skowron and Schmitt’s (2003) survey provides a full-scale Level of Differentiation (Cronbach’s alpha internal consistency reliability coefficient (α) = .92) as well as four subscales consistent with BNST: (1) Emotional Reactivity (α = .89), (2) “I” Position (α = .81), (3) Emotional Cutoff (α = .84), and (4) Fusion with Others (α = .86).

In this section, I define the subscales. Skowron (Skowron, 2000; Skowron & Friedlander, 1998; Skowron & Schmitt, 2003) based her scales on the work of Bowen (Bowen, 1985) when constructing items for the DSI-R. Skowron defines emotional reactivity as one’s response to others’ emotionality. Those with high emotional reactivity are prone to make decisions based on other people’s behavior rather than on one’s own principles. In other words, they tend to behave based on what “feels right”. The “I” position is one’s ability to adhere to one’s principled self, despite the pressure from the surrounding system to behave differently. The “I” position should not be confused with rebelliousness, because rebelliousness is a manifestation of emotional reactivity. The “I”
position is expressed when one behaves in ways that reflect clear thought and planning. Emotional cutoff, as defined in Chapter 1, describes a process where one disengages physically and/or emotionally from one’s family and operating with pseudo-independence. Finally, fusion with others describes the process in which there is too much borrowing and lending of self is present. For example, people does for others what they can do for themselves or has others do for self what he/she can do for him-herself.

**Perceived Stress Scale (PSS)**

This survey, developed by Cohen, Kamarck and Mermelstein (1983), measures one’s perception of stress related to his/her daily life. The PSS is based on the rationale that one’s perception of stressful life events has a more profound effect on one’s health than the actual event itself. The authors state:

> The PSS can be used to determine whether ‘appraised’ stress is an etiological (or risk) factor in behavioral disorders or disease. It can also be used to look more closely at the process by which various moderators of the objective stressor/pathology relationship operates. (p. 393)

The authors surveyed three groups: two of co-ed groups of college students \( n = 332; n = 114 \) and one group of male and female participants \( n = 64 \) in a smoking cessation program. In addition to the PSS, these participants completed a battery of surveys that measured the following variables: life events, social anxiety, depressive symptoms, and physical symptomology. Age and gender were not significantly related to scores on the PSS. The authors report that their samples are representative of the general population. The PSS has a good internal consistency, with an alpha of .78 to .86. The following are examples of survey items: “In the last month, how often have you been upset because of something that happened unexpectedly?”, and “In the last month, how
often have you felt difficulties were piling up so high that you could not overcome them?” (Cohen, Kamarck, & Mermelstein, 1983).

**Fibromyalgia Impact Questionnaire (FIQ)**

This survey, developed by Burckhardt, Clark and Bennett (1991) contains 20 items that measure the current health status of patients with FMS using the following domains: physical, psychological, social and global well-being. The respondents answer the questions based on their experiences from the previous seven days. The first 10 items requires respondents to rate their ability to perform large-muscle group tasks (e.g., shopping, laundry, food preparation, etc.) on a Likert scale. The twelfth item requests information regarding number of days within the past week that the participant “felt good.” The thirteenth item requests information about the number of days of missed work within the past week. The final items (14-20) ask the participant to rate various symptoms (i.e., ability to work, pain, fatigue, morning tiredness, stiffness, anxiety and depression) using a 100mm visual analog scale.

The FIQ and the Arthritis Impact Measurement Scales (AIMS; Meenan, Gertman, Mason, & Dunaif, 1982) were administered for purposes of correlation to two groups of women with confirmed diagnoses of FMS. The first group contained 64 women range in age from 24 to 66 years. The second group contained 25 women with confirmed cases of FMS. The latter group was not significantly different from the former group on demographic variables with the exception that the latter group was diagnosed with FMS for a shorter duration. For each item on the FIQ, the test-retest reliability correlations ranged from an average of 0.56 to 0.95 over six one-week intervals (Burckhardt, Clark, & Bennett, 1991).
Life Experiences Survey (LES)

This survey, developed by Sarason, Johnson, and Siegal (1978) contains 57 items that allows respondents to select a number of significant life events and to report the level of impact that the events had on the participant. For example, a respondent would select “marriage” if it occurred in the recent past, and then indicate its impact using a seven-point Likert scale (extremely negative, -3; moderately negative, -2; somewhat negative, -1; no impact, 0; slightly positive, +1; moderately positive, +2; extremely positive, +3). The LES contains two sections. The first section contains 47 items for use with the general public. The LES is a modified version of the Schedule of Recent Experiences (SRE; Holmes and Rahe, 1967) that has 34 events similar to those found in the SRE. The authors include three additional blank spaces for the participant to write any significant event that the participant experience but was not listed in the original 47. The second section of the LES contains an additional 10 events that are geared toward college age population. The LES demonstrated reliability coefficients ranging from .56 to .88 (Sarason, Johnson, & Siegal, 1978).

Support for the use of the LES among FMS patients has been established by Dailey, Bishop, Russell and Fletcher (1990). Dailey et al. used the LES with FMS patients, instead of the popular SRE, for two reasons: (a) the LES provides for an evaluation of the personal impact of stressful life events rather than using normative weights, and (b) the LES allows for greater flexibility in interpreting the results (Sarason, Johnson, & Siegal, 1978).

Demographic Questionnaire

The demographic questionnaire, which was adapted from Tuason and Friedlander’s (2000) research, contained questions pertaining to participants’ age, age at onset of
symptoms, gender, ethnic origin, religious background, marital status, sexual orientation, parental status, number of children (male and female children individually), educational attainment, occupation and previous counseling experience (Tuason & Friedlander, 2000). Respondents will also be asked whether they reside with their parents’ home and the frequency of contact with their parents.

Research Questions

The following research questions and corresponding null hypotheses will be evaluated in the analyses of the data:

5. What are the demographic characteristics of people diagnosed with FMS (gender, sexual orientation, relationship status, relationship length, number of marriages, number of children and gender, sibling position, employment status and occupation, level of education, level of income, ethnicity, religious background, years of symptoms, rate of symptom onset, date of symptom onset and date of diagnosis)?

6. Can one’s symptom severity be predicted by his/her level of differentiation, age of onset, and stressful events that occurred within a year prior to age of onset?

   H1: Level of differentiation, age of onset, and stressful life events do predict symptom severity.

7. What is the nature of the relationship between perceived stress and symptom severity?

   H2: Higher levels of perceived stress will be related to greater symptom severity.

8. What is the nature of the relationship between level of differentiation and symptom severity?

   H3: Lower levels of differentiation will be related to greater symptom severity.

9. What is the nature of the relationship between level of emotional cutoff and symptom severity?

   H4: Higher levels of emotional cutoff will be related to greater symptom severity.
10. Which one of the predictor variables accounts for the greatest amount of variance associated with FMS symptoms?

   H5: Each predictor variable exerts differing degrees of influence on FMS symptoms.

11. Does level of differentiation of self moderate the relationship between perceived stress and FMS symptoms?

   H6: Level of differentiation of self does moderate the relationship between perceived stress and FMS symptoms.

12. Does level of emotional cutoff moderate the relationship between perceived stress and FMS symptoms?

   H7: Level of emotional cutoff does moderate the relationship between perceived stress and FMS symptoms.

13. Does level of chronic anxiety moderate the relationship between perceived stress and FMS symptoms?

   H8: Level of chronic anxiety does moderate the relationship between perceived stress and FMS symptoms.

14. Does level of I-position moderate the relationship between perceived stress and FMS symptoms?

   H9: Level of I-position moderate the relationship between perceived stress and FMS symptoms.

Data Analysis

In order to address the first research question, univariate descriptive statistical analyses will be computed for each of the demographic variables. Means and standard deviations will be calculated for each of the continuous variables (i.e., age, years of marriage, number of hours worked per week, years of FMS symptoms experienced, age of onset of FMS symptoms). For each of the categorical variables, frequencies and percentages were calculated (i.e., gender, sexual orientation, relationship status, length of relationship, number of spouses, number of offspring and their respective gender, sibling position, employment status, occupation classification, income level, number of years of
education, ethnicity, religious background, speed of symptom onset, mental health provider [e.g., marriage and family therapist, psychologist, clinical social worker]).

Question 2 was answered with a multiple linear regression. Regressions use the correlations that occur between variables to develop a prediction equation. A multiple regression permit the use of correlations between multiple predictor variables and the dependent variable (Munro, 1993).

Questions 3-5 was answered with a Pearson R correlation.

Questions 6 was answered with a stepwise multiple regression. A stepwise multiple regression allows for all of the IVs to be entered in sequence and their value assessed. Those values contributing to the model were retained while others were rejected. This procedure insured that the model would contain the smallest possible set of predictor variables.

Questions 7-10 were answered with hierarchical linear regression. Hierarchical linear regression permits the researcher “to force the order of entry of variables into the equation” (Munro, 1993, p. 212) based on a theoretical model. In addition, hierarchical linear regression permits the researcher to find the smallest group of variables that account the greatest amount of variance in the dependent variable (Munro, 1993).
CHAPTER 4
RESULTS

The purpose of my study was to investigate the heuristic value of several assumptions of Bowen natural systems theory (BNST) for understanding fibromyalgia syndrome (FMS), namely the influence of family relationship styles and perceived stress on the symptom severity of FMS. Results of the analyses of my research hypotheses are presented in this chapter. This chapter begins with a description of biographic characteristics of the sample of participants followed by a description of the data and analyses.

Description of Sample

Patients with FMS were recruited through Internet websites, list-serves, and chat-rooms that served the FMS population. In all, 288 participants accessed the survey through www.surveymonkey.com, an Internet-based survey service that collects and analyzes responses. A decision rule was designed to eliminate those responses that had more then 10% of the data missing. The decision rule resulted in the elimination of 78 (27%) participants, yielding 201 usable data sets. Participants \(n = 201\) indicated by accepting the consent form that a medical doctor or osteopath diagnosed them with FMS. Participants ranged in age from 21 to 90 years of age with the mean age of 47 years \(SD = 10.368\). Of the participants, 84\% \(n = 169\) identified themselves as female, 15\% \(n = 31\) identified themselves as male, and 0.5\% \(n = 1\) was identified as transgender. Ninety-eight percent \(n = 196\) identified themselves as Caucasian, one percent \(n = 2\) as American Indian, half percent \(n = 1\) as Bi-Racial, and half percent \(n = 1\) as Multi-
rational. Thirty-five percent ($n = 71$) of the participants were currently employed and 64 percent ($n = 129$) were not. This sample indicated experiencing symptoms from 1 to 62 years (mean = 15.81; $SD = 14.17$). Age of onset ranged from birth to 62 years (mean = 31, $SD = 13.55$). The description of annual household income and education are presented in Table 1 and 2, respectively.

**Table 1. Annual Household Income**

<table>
<thead>
<tr>
<th>Household Income</th>
<th>$f$</th>
<th>$P$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under $9,000</td>
<td>16</td>
<td>8.2</td>
</tr>
<tr>
<td>$10,000-19,000</td>
<td>26</td>
<td>13.3</td>
</tr>
<tr>
<td>$20,000-29,000</td>
<td>19</td>
<td>9.7</td>
</tr>
<tr>
<td>$30,000-39,000</td>
<td>31</td>
<td>15.4</td>
</tr>
<tr>
<td>$40,000-49,000</td>
<td>21</td>
<td>10.4</td>
</tr>
<tr>
<td>$50,000-59,000</td>
<td>18</td>
<td>9.0</td>
</tr>
<tr>
<td>$60,000-69,000</td>
<td>11</td>
<td>5.6</td>
</tr>
<tr>
<td>$70,000-above</td>
<td>53</td>
<td>27.2</td>
</tr>
</tbody>
</table>

**Table 2. Educational Level**

<table>
<thead>
<tr>
<th>Education level</th>
<th>$f$</th>
<th>$P$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than or equal to 12 years</td>
<td>21</td>
<td>10.4</td>
</tr>
<tr>
<td>13-14 years</td>
<td>49</td>
<td>24.4</td>
</tr>
<tr>
<td>15-16 years</td>
<td>62</td>
<td>30.8</td>
</tr>
<tr>
<td>17-18 years</td>
<td>25</td>
<td>12.4</td>
</tr>
<tr>
<td>19-20 years</td>
<td>10</td>
<td>5.0</td>
</tr>
<tr>
<td>21+ years</td>
<td>18</td>
<td>9.0</td>
</tr>
</tbody>
</table>

**Description of Data**

Participants completed five assessments that measured fibromyalgia symptoms (Fibromyalgia Impact Questionnaire [FIQ]; Burckhardt, Clark, & Bennett, 1991), perceived stress [Perceived Stress Scale [PSS]; Cohen, Kamarck, & Merrellstein, 1983), stressful life events (Life Experience Survey [LES]; Sarason, Johnson, & Siegal, 1978), level of differentiation (Differentiation of Self Inventory-Revised [DSI-R]; Skowron & Schmitt, 2003), and social desirability (SOCDES; Fischer & Fick, 1993).
Three of the instruments involved subscales: (1) FIQ, (2) LES, and (3) DSI-R. For the purpose of this study, a subscale consisting of seven items from the FIQ was generated to obtain a symptom severity subscale score. The items pertaining to symptom severity (i.e., job ability, pain, fatigue, morning tired, stiffness, anxious, and depression) yielded an overall Chronbach’s alpha coefficient of .792, suggesting considerable reliability, thus justifying the use of this subscale score as an indication of symptom severity. The correlation matrix for the symptom severity subscale is provided in Appendix F.

Regarding the LES, which contains three subscale scores (i.e., positive life experiences, negative life experiences, and a total scores), only the negative life events subscale score was used in my study. Lastly, the DSI-R provided five subscale scores: Differentiation of Self; Emotional Cutoff; I-Position; Fusion with Others; and Emotional Reactivity. The Fusion with Others subscale was not used in my study; however the analysis for this instrument is found in Appendix F.

Scales and subscale scores of the instruments were used for the independent and dependent variables. The dependent variable was symptom severity measured by the subscale score developed for this study. The independent variables included the following: overall level of differentiation (DSI); level of emotional cutoff (EC); level of I-position (IP); level of emotional reactivity (ER), and negative life events experienced (neg_LES). An additional independent variable included the age at onset of FMS symptoms. Group means and standard deviations for the dependent and independent variables can be found in Tables 3-5.
Table 3. Descriptive Statistics for the Fibromyalgia Impact Questionnaire (FIQ)

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Range</th>
<th>Min.</th>
<th>Max.</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Level of functioning</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>2.18</td>
<td>0.62</td>
</tr>
<tr>
<td>Feel Good</td>
<td>7</td>
<td>0</td>
<td>7</td>
<td>5.86</td>
<td>1.42</td>
</tr>
<tr>
<td>Work Missed</td>
<td>7</td>
<td>0</td>
<td>7</td>
<td>3.93</td>
<td>2.44</td>
</tr>
<tr>
<td>Job Ability</td>
<td>10</td>
<td>0</td>
<td>10</td>
<td>7.73</td>
<td>2.29</td>
</tr>
<tr>
<td>Pain</td>
<td>9</td>
<td>1</td>
<td>10</td>
<td>7.05</td>
<td>2.09</td>
</tr>
<tr>
<td>Fatigue</td>
<td>10</td>
<td>0</td>
<td>10</td>
<td>8.25</td>
<td>2.07</td>
</tr>
<tr>
<td>Morning Tired</td>
<td>10</td>
<td>0</td>
<td>10</td>
<td>8.38</td>
<td>2.12</td>
</tr>
<tr>
<td>Stiffness</td>
<td>10</td>
<td>0</td>
<td>10</td>
<td>8.15</td>
<td>2.00</td>
</tr>
<tr>
<td>Anxious</td>
<td>10</td>
<td>0</td>
<td>10</td>
<td>5.30</td>
<td>3.20</td>
</tr>
<tr>
<td>Depression</td>
<td>10</td>
<td>0</td>
<td>10</td>
<td>5.09</td>
<td>3.27</td>
</tr>
</tbody>
</table>

Table 4. Descriptive Statistics for the Dependent Variable: Fibromyalgia Impact Questionnaire [Symptom Severity (SS) Score]

<table>
<thead>
<tr>
<th>SS</th>
<th>Range</th>
<th>Min.</th>
<th>Max.</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>55</td>
<td>15</td>
<td>70</td>
<td>49.96</td>
<td>11.60</td>
</tr>
</tbody>
</table>

Table 5. Descriptive Statistics for the Independent Variables LES, PSS, DSI-R, Age of Onset

<table>
<thead>
<tr>
<th>LES Score</th>
<th>Range</th>
<th>Min.</th>
<th>Max.</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>46</td>
<td>.00</td>
<td>46</td>
<td>4.31</td>
<td>7.36</td>
</tr>
<tr>
<td>Negative</td>
<td>102</td>
<td>.00</td>
<td>102</td>
<td>16.61</td>
<td>18.39</td>
</tr>
<tr>
<td>Total</td>
<td>132</td>
<td>.00</td>
<td>132</td>
<td>20.92</td>
<td>19.62</td>
</tr>
<tr>
<td>PSS</td>
<td>36</td>
<td>1</td>
<td>37</td>
<td>23.08</td>
<td>7.11</td>
</tr>
<tr>
<td>DSI-R</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DSI</td>
<td>4.48</td>
<td>1.30</td>
<td>5.78</td>
<td>3.65</td>
<td>0.93</td>
</tr>
<tr>
<td>ER</td>
<td>5.00</td>
<td>1.00</td>
<td>6.00</td>
<td>3.08</td>
<td>1.23</td>
</tr>
<tr>
<td>IP</td>
<td>4.55</td>
<td>1.45</td>
<td>6.00</td>
<td>3.82</td>
<td>0.97</td>
</tr>
<tr>
<td>EC</td>
<td>5.00</td>
<td>1.00</td>
<td>6.00</td>
<td>4.01</td>
<td>1.19</td>
</tr>
<tr>
<td>FO</td>
<td>4.83</td>
<td>1.17</td>
<td>6.00</td>
<td>3.65</td>
<td>1.03</td>
</tr>
<tr>
<td>Age of Onset</td>
<td>62</td>
<td>0</td>
<td>62</td>
<td>31.33</td>
<td>13.45</td>
</tr>
</tbody>
</table>

Note: LES = life events scale; PSS = perceived stress scale; DSI = differentiation of self-revised total score; ER = emotional reactivity; IP = I-position; EC = emotional cutoff; FO = fusion with others.

For purposes of understanding the relationship among the dependent and independent variables, a series of Pearson product moment correlation coefficients were
computed. Table 6 provides a matrix of these correlations. Thirty-four of the 36 correlations were significant at the .01 level; two were not significant. Specifically, social desirability was significantly related to six of the eight variables—the exceptions were symptom severity and negative life experiences. The magnitude of the relationships that were significant to social desirability was not enough to stop the research. Of the significant correlations, the magnitude of the correlations ranged from .18 to .91. All correlations were in the expected direction.

Table 6. Summary of Results of the Pearson Correlation of the IVs and DV

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>.37**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>.52**</td>
<td>.39**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>-.38**</td>
<td>-.38**</td>
<td>-.67**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>-.34**</td>
<td>-.37**</td>
<td>-.67**</td>
<td>.91**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>-.23**</td>
<td>-.18**</td>
<td>-.51**</td>
<td>.77**</td>
<td>.61**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>-.37**</td>
<td>-.38**</td>
<td>-.51**</td>
<td>.81**</td>
<td>.67**</td>
<td>.44**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>-.31**</td>
<td>-.30**</td>
<td>-.57**</td>
<td>.88**</td>
<td>.78**</td>
<td>.65**</td>
<td>.56**</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>-.05</td>
<td>-.09</td>
<td>-.26**</td>
<td>.32**</td>
<td>.29**</td>
<td>.28**</td>
<td>.21**</td>
<td>.30**</td>
</tr>
</tbody>
</table>

Note: ** = Correlation is significant at the .01 level (2-tailed). 1 = symptom severity; 2 = negative experiences; 3 = perceived stress; 4 = DSI-R total score; 5 = emotional reactivity; 6 = I-position; 7 = emotional cutoff; 8 = fusion with others; 9 = social desirability.

Research Questions

**Question 2**: Can one’s symptom severity be predicted by his/her level of differentiation, age-of-onset, and stressful events that occurred within a year prior to age-of-onset? The Null Hypothesis was that level of differentiation, age-of-onset, and stressful events that occurred within a year prior to age-of-onset would not predict current levels of FMS symptom.

This question was answered using the simultaneous multiple regression method to test the following formula:
The variables entering the model as predictors were level of differentiation and stressful life events ($R = .44$, Adjusted $R^2 = .192$). The analysis of variance (ANOVA) results, $F_{3,197} = 16.80, p < .0001$, indicate there is a good fit for the model. The results of the analysis are found in Table 7, which indicates the significance levels of the variables in this model. The model is significant in predicting the dependent variable of symptom severity of FMS and accounts for 19% of the variance. Age-at-onset did not prove to be statistically significant predictor of FMS symptom severity.

My analysis is different from that of Burckhardt, Clark, and Bennett (2001) and Cronan, Serber, Walen, and Jaffe (2002) who found that those who were younger experienced more severe FMS symptoms. However, both studies measured chronological age, whereas my study examined age at onset. This difference may account for the discrepancy.

Table 7. Multiple Linear Regression of Fibromyalgia Syndrome (FMS) on Differentiation (DSI), Age at Onset, and Negative Stressful Life Events (LES)

<table>
<thead>
<tr>
<th></th>
<th>$R^2$</th>
<th>$R^2 \Delta$</th>
<th>$F\Delta$</th>
<th>$\beta$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>.192</td>
<td>.204</td>
<td>16.802**</td>
<td>- .278**</td>
</tr>
<tr>
<td>DSI</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NEG_LES</td>
<td></td>
<td></td>
<td></td>
<td>.270**</td>
</tr>
<tr>
<td>Age at onset</td>
<td></td>
<td></td>
<td></td>
<td>-.045</td>
</tr>
</tbody>
</table>

**Question 3**: What is the nature of the relationship between perceived stress and symptom severity? The Null Hypothesis was that there would be no relationship between perceived stress and symptom severity.

This question was answered using a bivariate correlation, Pearson r. As presented in Table 6, there was a significant positive correlation between perceived stress and
symptom severity \((r = .52, n = 201, p < 0.001, \text{two-tailed})\). Therefore, as perceived stress increased so did one’s level of symptom severity.

This finding is consistent with Murdock and Gore (2004) who found that perceived stress significantly correlated positively with symptom severity. In their case, they studied distress and found a higher correlation \((r = .63, p < .01)\). The difference in the magnitude of the relationship may be a product of the difference in dependent variable. Murdock and Gore measured distress as their dependent variable, which may be a more restrictive variable compared to the symptom severity of FMS.

**Question 4:** What is the nature of the relationship between level of differentiation and symptom severity? The Null Hypothesis was that there would be no relationship between level of differentiation and symptom severity.

This question was answered using a bivariate correlation, Pearson r. As presented in Table 6, there was a significant negative correlation between level of differentiation and symptom severity \((r = -.38, n = 201, p < 0.001, \text{two-tailed})\). Therefore, as levels of differentiation of self increased, symptom severity decreased.

My findings are consistent with the findings of Murdock and Gore (2004) who found that differentiation of self and symptom severity significantly correlated negatively with symptom severity (i.e., distress). Murdock and Gore found a correlation \((r = .57, p < .01)\) higher than my study. Similar to the previous question, the difference in the magnitude of the relationship may be a product of the difference in dependent variable. Murdock and Gore measured distress as their dependent variable, which may be a more restrictive variable compared to the symptom severity of FMS.
**Question 5**: What is the nature of the relationship between level of emotional cutoff and symptom severity? The Null Hypothesis was that there would be no relationship between level of emotional cutoff and symptom severity.

This question was answered using a bivariate correlation, Pearson r. As presented in Table 6, there was a significant negative correlation between level of emotional cutoff and symptom severity ($r = -.37, n = 201, p < 0.001$, two tailed). Skowron and Dendy (2004) found a similar correlation between differentiation and symptoms (i.e., anxiety associated with relationships, $r = -.35, p < .01$, and symptoms associated with discomfort in close relationships, $r = -.78, p < .01$).

Three out of four of the DSI-R subscales required reverse scoring in order to indicate greater levels of differentiation. Thus, with this construct, emotional cutoff was reversed scored so that higher scores indicated greater levels of differentiation. Therefore, as levels of emotional cutoff decreased, the level of symptom severity decreased.

**Question 6**: Which predictor variables account for the greatest amount of variance associated with FMS symptoms? The Null Hypothesis was that all of the variables would account for the variance equally.

A stepwise multiple regression was used to answer this question using the following formula:

$$SS = PSS + neg\_LES + DSI + EC + ER + IP + age \ at \ onset + e$$

All of the IVs were entered in sequence and their value assessed. Those values contributing to the model were retained while others were rejected. This procedure
insured that the model would contain the smallest possible set of predictor variables. The regression indicated two significant predictor models. The first variable entering the first model was PSS \((R = .52, R^2 = .27)\). The analysis of variance (ANOVA) results, \(F_{1,199} = 74.886, p < .0001\), indicate there is a good fit for the model. The model is significant in predicting FMS symptom severity and accounts for 27% of the variance.

In the second model, negative life events was also included along with PSS \((R = .55, R^2 = .30)\). The ANOVA results, \(F_{2,198} = 43.505, p < .0001\), indicate there is a good fit for this model. The model is significant in predicting FMS symptom severity and accounts for 30% of the variance; an increase of 3% over the first model. The results of the regression predicting FMS symptom severity are found in Table 8.

**Table 8 Stepwise Regression Model Summary for FMS Symptom Severity**

<table>
<thead>
<tr>
<th>Model</th>
<th>(R^2)</th>
<th>(R^2) Δ</th>
<th>(F)Δ</th>
<th>β</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSS</td>
<td>.27</td>
<td></td>
<td>74.886**</td>
<td>.52**</td>
</tr>
<tr>
<td>PSS</td>
<td>.298</td>
<td>.032</td>
<td>9.083**</td>
<td>.447**</td>
</tr>
<tr>
<td>neg_LES</td>
<td></td>
<td></td>
<td></td>
<td>.194**</td>
</tr>
</tbody>
</table>

**\(\text{**p < .01}\)**

PSS = perceived stress scale; neg_LES = negative life events.

**Question 7**: Does level of differentiation of self affect the direction and/or strength of the relationship between perceived stress and FMS symptoms? The Null Hypothesis was that level of differentiation does not affect the direction and/or strength of the relationship between perceived stress and FMS symptoms.

This question was answered using a hierarchical multiple regression to test the following model:
The results of the hierarchical multiple regression predicting FMS scores are found Table 9. In the first step of the regression, PSS was entered and accounted for 27% of the variance. In the second step, DSI was added and did not contribute significantly to the explained variance. The optimal solution was observed in the final step where the PSS x DSI interaction was added to the previous two steps. This final procedure contributed an additional 1% of the variance associated with FMS.

Table 9. Three Step Hierarchical Regression of Fibromyalgia Syndrome (FMS) on Perceived Stress (PSS), Differentiation of Self (DSI), and the Interaction of DSI and PSS Score

<table>
<thead>
<tr>
<th>Step 1</th>
<th>$R^2$</th>
<th>$R^2$ $\Delta$</th>
<th>$F\Delta$</th>
<th>$\beta$</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSS</td>
<td>.27</td>
<td></td>
<td>74.886**</td>
<td>.52**</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Step 2</th>
<th>$R^2$</th>
<th>$R^2$ $\Delta$</th>
<th>$F\Delta$</th>
<th>$\beta$</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSS</td>
<td>.27</td>
<td>.001</td>
<td>.314</td>
<td>.49**</td>
</tr>
<tr>
<td>DSI</td>
<td></td>
<td></td>
<td></td>
<td>-.05</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Step 3</th>
<th>$R^2$</th>
<th>$R^2$ $\Delta$</th>
<th>$F\Delta$</th>
<th>$\beta$</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSI</td>
<td>.28</td>
<td>.019</td>
<td>5.237*</td>
<td>.393</td>
</tr>
<tr>
<td>PSS</td>
<td></td>
<td></td>
<td></td>
<td>1.059**</td>
</tr>
<tr>
<td>DSI x PSS</td>
<td></td>
<td></td>
<td></td>
<td>-.446*</td>
</tr>
</tbody>
</table>

*p < .05, **p < .01

PSS = perceived stress scale; DSI = differentiation of self inventory

The final equation to predict FMS symptoms included PSS, differentiation of self score, and their interaction ($R = .54, R^2 .283$). The ANOVA results, $F(3,197) = 27.26, p < .0001$, indicate there is a good fit for the model. The model is significant in predicting FMS symptom severity and accounts for 28% of the variance. Although the model was significant, examination of the beta values indicate that the strength of PSS may be so great that DSI did not prove to be a statistically significant predictor of FMS severity.
Thus, PSS and the interaction scores were the significant predictors in the final equation. This finding suggests that differentiation does affect the relationship between PSS and FMS, but differentiation does not appear to account for a large proportion of the observed variance.

My findings are comparable to those of Murdock and Gore (2004) who used the same independent variables in their study to examine distress. However, Murdock and Gore found that DSI, PSS, and their interaction accounted for 48% of the variance, considerably larger than what was found in my study. Despite this large difference in variance accounted for, the introduction of DSI into the model in step 2 only contributed an additional 6%, and the introduction of the interaction in step 3 only contributed an additional 2% of the variance.

**Question 8:** Does level of emotional cutoff affect the direction and/or strength of the relationship between perceived stress and FMS symptoms? The Null Hypothesis was that emotional cutoff does not affect the direction and/or strength of the relationship between perceived stress and FMS symptoms.

This question was answered using a hierarchical multiple regression to test the following formula:

\[ SS \neq B + PSS + EC + PSS \times EC + e \]

The results of the hierarchical multiple regression predicting FMS scores are found in Table 10. In the first step of the regression, PSS was entered and accounted for 27% of the variance. In the second step, EC was added and did not contribute significantly to the
explained variance. The optimal solution was observed in the final step where the PSS x EC interaction was added to the previous two steps. This final procedure contributed an additional 2% of the variance associated with FMS.

The final equation to predict FMS symptoms included PSS, EC, and their interaction ($R = .55, R^2 = .292$). The ANOVA results, $F(3, 197) = 28.54, p < .0001$, indicate there is a good fit for the model. The model is significant in predicting FMS symptom severity and accounts for 29% of the variance. Although the model was significant, examination of the beta values indicate that the strength of PSS may be so great that EC did not prove to be a significant predictor of FMS severity. Thus, PSS and the interaction scores were the significant predictors in the final equation. This finding suggests that emotional cutoff does affect the relationship between PSS and FMS symptoms, but level of emotional cutoff does not appear to account for a large proportion of the observed variance.

Table 10. *Three Step Hierarchical Regression of Fibromyalgia on Emotional Cutoff (EC), Perceived Stress (PSS), and the Interaction of EC and PSS Scores*

<table>
<thead>
<tr>
<th>Step</th>
<th>$R^2$</th>
<th>$R^2$ $\Delta$</th>
<th>$F$ $\Delta$</th>
<th>$\beta$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>.27</td>
<td></td>
<td>74.886**</td>
<td>.523**</td>
</tr>
<tr>
<td>PSS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Step 2</td>
<td>.28</td>
<td>.015</td>
<td>4.035**</td>
<td>.452**</td>
</tr>
<tr>
<td>PSS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC</td>
<td></td>
<td></td>
<td></td>
<td>-.140**</td>
</tr>
<tr>
<td>Step 3</td>
<td>.29</td>
<td>.015</td>
<td>4.236**</td>
<td>.304</td>
</tr>
<tr>
<td>EC</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PSS</td>
<td></td>
<td></td>
<td></td>
<td>.928**</td>
</tr>
<tr>
<td>EC x PSS</td>
<td></td>
<td></td>
<td></td>
<td>-.474**</td>
</tr>
</tbody>
</table>

*p < .05, **p < .01

PSS = perceived stress scale; EC = emotional cutoff
Question 9: Does level of chronic anxiety affect the direction and/or strength of the relationship between perceived stress and FMS symptoms? The Null Hypothesis was that level of chronic anxiety does not affect the direction and/or strength of the relationship between perceived stress and FMS symptoms.

This question was answered using a hierarchical multiple regression to test the following formula:

\[ SS \neq B + PSS + ER + PSS \times ER + e \]

The results of the regression predicting FMS scores are found Table 11. In the first step of the regression, PSS was entered and accounted for 27% of the variance. In the second step, ER was added and did not account for contribute significantly to the explained variance. The optimal solution was observed in the final step where PSS x ER interaction was added to the previous two steps. This final procedure contributed an additional 2% of the variance associated with FMS.

The final equation to predict FMS symptom severity included PSS, ER, and their interaction \((R = .545, R^2 = .287)\). The ANOVA, \(F(3, 197) = 27.81, p < .0005\), indicate there is a good fit for the model. The model is significant in predicting FMS symptoms severity and accounts for 29% of the variance. Unlike DSI and EC, an examination of the beta values indicate that ER remained significant in the final model. In other words, ER, PSS, and their interaction significantly predict FMS symptom severity. Although the model and the related beta values were significant, EC does not appear to account for a large proportion of the observed variance.
Table 11. *Three Step Hierarchical Regression of Fibromyalgia on Emotional Reactivity (ER), Perceived Stress (PSS), and the Interaction of ER and PSS Scores*

<table>
<thead>
<tr>
<th>Step</th>
<th>$R^2$</th>
<th>$R^2$ Δ</th>
<th>$F$ Δ</th>
<th>β</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>.27</td>
<td></td>
<td>74.886</td>
<td>.523**</td>
</tr>
<tr>
<td>PSS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Step 2</td>
<td>.266</td>
<td>.000</td>
<td>.034</td>
<td>.533**</td>
</tr>
<tr>
<td>PSS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ER</td>
<td></td>
<td></td>
<td>.015</td>
<td></td>
</tr>
<tr>
<td>Step 3</td>
<td>.287</td>
<td>.024</td>
<td>6.708**</td>
<td>.500**</td>
</tr>
<tr>
<td>ER</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PSS</td>
<td></td>
<td></td>
<td></td>
<td>.972**</td>
</tr>
<tr>
<td>ER x PSS</td>
<td></td>
<td></td>
<td></td>
<td>-.407**</td>
</tr>
</tbody>
</table>

**p < .01

PSS = perceived stress scale; ER = emotional reactive

**Question 10:** Does level of I-position affect the direction and/or strength of the relationship between perceived stress and FMS symptoms? The Null Hypothesis was that level of I-position does not affect the direction and/or strength of the relationship between perceived stress and FMS symptoms.

This question was answered using a hierarchical multiple regression to test the following formula:

$$SS \neq B + PSS + IP + PSS \times IP + e$$

The results of the hierarchical regression predicting FMS scores are found Table 12. In the first step of the regression, PSS was entered and accounted for 27% of the variance. In the second step, IP was added and did not contribute significantly to the explained variance. The optimal solution was observed in the final step where the PSS x IP...
interaction was added to the previous two steps. This final procedure did not contribute any significant proportion of the variance either.

The final equation to predict symptom severity included PSS, IP, and their interaction ($R = .529, R^2 = .27$). The ANOVA, $F(3,197) = 25.52, p < .0001$, indicate there is a good fit for the model. The model is significant in predicting FMS symptom severity and accounts for 27% of the variance. Although the model was significant, examination of the beta values indicate that the strength of the PSS may be so great that IP, and the interaction, does not prove to be a significant predictors of FMS severity. This finding suggests that I-position does affect the relationship between PSS and FMS symptoms, but level of I-position does not appear to account for a large proportion of the observed variance.

### Table 12. Three Step Hierarchical Regression of Fibromyalgia on I-Position (IP), Perceived Stress (PSS), and the Interaction of IP and PSS Scores

<table>
<thead>
<tr>
<th>Predictor</th>
<th>$R^2$</th>
<th>$R^2 \Delta$</th>
<th>$F \Delta$</th>
<th>$\beta$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1 PSS</td>
<td>.270</td>
<td>0.002</td>
<td>1.208</td>
<td>.248</td>
</tr>
<tr>
<td>Step 2 PSS</td>
<td>.268</td>
<td>0.002</td>
<td>0.551</td>
<td>.550**</td>
</tr>
<tr>
<td>Step 2 IP</td>
<td>.268</td>
<td>0.002</td>
<td>.551</td>
<td>.052</td>
</tr>
<tr>
<td>Step 3 IP</td>
<td>.269</td>
<td>0.004</td>
<td>1.208</td>
<td>.248</td>
</tr>
<tr>
<td>Step 3 PSS</td>
<td>.269</td>
<td>0.004</td>
<td>1.208</td>
<td>.804**</td>
</tr>
<tr>
<td>Step 3 IP x</td>
<td>.269</td>
<td>0.004</td>
<td>1.208</td>
<td>-.237</td>
</tr>
</tbody>
</table>

**$p < .01$**

PSS = perceived stress scale; IP = I position

### Summary

The results of the statistical analyses performed to determine the impact that differentiation of self, perceived stress, age at onset, and negative life events had on the
symptom severity of fibromyalgia syndrome were provided here. An separate analysis
was completed using Fusion with Others, the final subscale for the DSI-R, and the results
are located in Appendix F. The relevance of my study’s findings for clinicians and
researchers who work with fibromyalgia patients and their families are discussed in
Chapter 5.
The purpose of my study was to investigate the heuristic value of several assumptions of Bowen natural systems theory (BNST) for understanding fibromyalgia syndrome (FMS), namely the influence of family relationship styles and perceived stress on the symptom severity of FMS. The intent of this study was to determine the relationship among differentiation of self and related concepts, perceived stress, and life events before the onset of FMS symptoms.

To date, no research explains conclusively the etiology of FMS, thus making a cure for the disorder impossible. Given that more than 6 million people suffer from FMS, combined with the demand for effective treatment and frequent medical utilization by sufferers, FMS is a major public health concern that warrants greater attention (Bennett, Smythe, & Wolfe, 1992; Goldenberg, 1989; Unger, 1996).

The cause-and-effect model is the overarching research model used by researchers (Nichols & Schwartz, 1998) where one variable is considered to be the cause of the symptom. The cause-and-effect research model has a long history. Beginning with Pasteur, researchers sought out specific biochemical organisms (i.e., bacteria and viruses) to understand the etiology of a specific disease process (Kerr, 1992). However, researchers also noted that people could possess germs and yet not have any clinical symptoms (Kerr, 2003). This quandary led to the development of Cassel’s (1965) theory of multiple causes, or host-agent-environment model. In short, Cassel’s theory suggests that multiple factors must be present before the development of a disease will occur.
(Krieger, 2001). Cassel’s theory is reflected in the disease susceptibility model presented in Appendix A. Specifically, disease susceptibility is related to the interaction among certain risk factors (e.g., virus, relationship processes, and stress).

Assuming that modern society is rampant with pathogenic agents, Cassel argued that to explain disease distribution, researchers must investigate factors affecting susceptibility (Cassel, 1976). Cassel was curious about the impact that the social environment had on interrupting a person’s natural resistance to these pathogenic agents. Moreover, Cassel believed that the neuroendocrine functioning was compromised as a result of psychosocial disturbances within various levels of the hierarchy that affect one another (Appendix A). Cassel’s multiple-cause theory may apply to the etiology of FMS because a definitive explanation for the etiology of FMS has not been found despite researchers attempt to reduce FMS susceptibility to one agent or another. Therefore, finding a cure that effectively ameliorates the symptoms has yet to be obtained. Ultimately, Cassel believed that the best strategy for treating individuals is to enhance their social support network rather than reduce their exposure to stressors (1976).

The paucity of research about the development of disease from a multicausal perspective provides the need to examine the applicability of relevant systems theories. In keeping with the philosophy of the systems view of health and disease, BNST is one such systems theory that incorporates the components asserted by Cassel. BNST places great emphasis on the influence of the family system, vis-à-vis the emotional system, to create and ameliorate symptom development. However very little research has been done to investigate the heuristic value of the assumptions made by BNST.
Bowen focused on the pathways in which a disease process occurred. He proposed that all psychological, social, behavioral, and chronic physical problems are a product of the emotional forces operating in a family (Nichols & Schwartz, 1998). The emotional forces are Bowen’s description of the functioning of the relationships that exist between and among family members. More specifically, Bowen proposed that symptom development (e.g., academic problems, rebelliousness, drug abuse, and chronic disease) is a result of a disturbance in the balance of the emotional system (Kerr & Bowen, 1988). A disturbance can be brought on by a number of long-term stressors that build up over time (Kerr & Bowen, 1988). Those who are unable to adapt to those stressors are likely to develop symptoms (Murdock & Gore, 2004).

Of particular concern for this study is the heuristic value of BNST to the development of chronic disease, which is provided in Appendix B (Schnieder, 2003). The visual model is based on the premise that a number of interacting factors must be present for the development of a particular chronic disease to occur. The specific elements addressed in the model are (1) risk factors (e.g., genes, gender, sex, stressors, sleep disorders), (2) stress level, (3) level of emotional cutoff, (4) level of chronic anxiety, and (5) level of basic self. The latter three components (i.e., emotional cutoff, chronic anxiety, and basic self) influence disease susceptibility through the relationship process within an emotional unit. However, all factors taken together are presumed to determine disease susceptibility. Each element interacts with the other elements through the relationship process inherent within a system (Schneider, 2003). To this end, the existing literature appears to support many of the above assumptions, however to date, no one has investigated the utility of these assumptions specifically to FMS.
The purpose of my study was to investigate the heuristic value of several assumptions of BNST for understanding the etiology FMS. Specifically, my study focused on an examination of the relationships and interactions that level of differentiation, level of chronic anxiety, level of emotional cutoff, level of I-position, level of perceived stress, stressful life events, and demographic factors have on the symptom severity of FMS. My research attempted to identify patterns of influence related to the symptom severity of FMS, thereby revealing possible areas for support and intervention by medical and auxiliary personnel, patients, and their families.

The participants in my study included 201 patients diagnosed with FMS who were recruited through Internet websites, list-serves, and chat-rooms that served the FMS population. Participants ranged in age from 21 to 90 years of age with the mean age of 47 years. This cross-sectional study used data collected from respondents to postings on FMS Internet websites and listserves. Individuals diagnosed with FMS by a physician (MD or DO) were asked to complete a battery of surveys. Respondents were surveyed on the following topics: (a) FMS symptoms, (b) perceived stress levels, (c) level of differentiation, and the type and emotional appraisal of life events.

Conclusions and Discussion

The conclusions and discussion of the research questions and hypotheses are presented sequentially. In general, all the analyses supported the heuristic value of BNST in understanding FMS.

Question 1

What are the demographic characteristics of people diagnosed with FMS?

Participants ranged in age from 21 to 90 years of age with the mean age of 47 years. Of the participants, 84% identified themselves as female, 15% identified
themselves as male, and 0.5% was identified as transgender. The following percentages represent the racial make-up of the sample: 90% identified themselves as Caucasian, 1% as American Indian, ½% as Bi-Racial, and ½% as Multi-racial. The following represent their employment status: 35% were currently employed and 64% were not. This sample indicated experiencing symptoms from 1 to 62 years. Age of onset ranged from birth to 62 years.

Compared to the literature, most FMS patients are Caucasian (Wallace & Wallace, 2003). Compared to men, women are more susceptible to acquiring FMS by a ratio of between 5:1 and 20:1 (Berne, 2002). I compared the observed scores of research that administered the instrument to FMS participants where possible. For both independent and dependent variables, the observed means scores fell within one standard deviation of the means for the Differentiation of Self Inventory-Revised (Skowron & Friedlander, 1998), and Perceived Stress Scale (PSS; Dedert, Studts, Weissbecker, Banis, & Sephton, 2004). The Fibromyalgia Impact Questionnaire (Burckhardt, Clark, & Bennett, 1991) Symptom Severity subscale was developed for my study, therefore, no data was available to compare. However, the Chronbach’s alpha for the Symptom Severity subscale for the present sample equaled .792. When I analyzed the individual means and standard deviations for the observed and reported FIQ data, I found that Job Ability (i.e., how much did the participants’ pain interfere with their job) and Pain (i.e., how bad was their pain) were greater than one standard deviation of the observed scores. My participants reported higher scores on Job Ability and Pain. Given the features of the sample data in its entirety, I concluded that participants’ responses were reliable and valid.
Question 2

Can one’s symptom severity be predicted by his/her level of differentiation, age-of-onset, and stressful events that occurred within a year prior to age-of-onset? This question was tested with the Null Hypothesis that participants’ symptom severity could not be predicted by their level of differentiation, age-of-onset, and appraisal of stressful events that occurred within a year prior to age-of-onset. The results indicated that the level of differentiation and appraisal of stressful life events that occurred in the year prior to the age of onset predicted participants’ current level of symptom severity. Age at onset did not contribute significantly to the overall predictive quality of the theoretical model, which counters BNST. Based on the results found for this question, I rejected the Null Hypothesis. My findings differ from the work of Burckhardt, Clark, and Bennett (2001) and Cronan, Serber, Walen, and Jaffe (2002) who found that those who were younger experienced more severe FMS symptoms. However, neither group of authors measured age at onset, as my study does.

In order to explicate this finding, a discussion of the theory is required. Differentiation is identified as the corner stone of BNST (Kerr & Bowen, 1988). Level of differentiation describes several interpersonal and intrapersonal dynamics, including one’s ability to separate intellectual and emotional functioning. Intellectual functioning is a byproduct of evolution and is operated by the more evolved part of the human brain—the cortex. The emotional functioning, on the other hand, is a byproduct of the limbic system—a more primitive part of the human brain. Those with greater levels of differentiation have greater capacity to function using intellectual functioning during times of stress and make decisions (fact oriented, objective, and neutral) that originate
from such functioning. Those with less differentiation are less able to manage the functioning of the limbic system under periods of stress and make decisions (subjective oriented, reactive, and myopic) that are greatly influenced by the limbic system.

Bowen theory assumes that those with lower levels of differentiation will appraise life events more subjectively and be negatively impacted by their subjective appraisal. The subjective appraisal would impact the functional equilibrium of the person. For example, the stress would impact the various biological systems of the body (Hafen et al., 1996). When the functional equilibrium of the person is impacted, this also impacts the family system. For example, family members act and react to the stress in other members within the system in various ways that create disruptions within the family system to where symptoms are possible (Kerr & Bowen, 1988). During such times of stress, those with greater levels of differentiation are also able display another aspect of differentiation that consists of one’s ability to remain a self during interaction with others. This characteristic minimizes the effects of the reverberations that stem from the systems’ members reaction to the stressors.

Finally, Bowen theory assumes that when chronic anxiety (i.e., stressful life events and the impact thereof) interacts with one’s level of differentiation, symptoms may develop if the stressors exceed the level of differentiation needed to manage the stress. The lower one’s level of differentiation the more severe the symptoms and the younger the person will be at symptom presentation. From this perspective, one’s vulnerability to diseases is hypothesized to be passed down from one generation to another with people within the same nuclear family having relatively the same level of vulnerability. This
level of vulnerability parallels one’s level of differentiation, which too is passed down from generation to generation.

The findings related to Question 1 are in keeping with BNST’s assumption. The level of differentiation, which determines the participants’ ability to appraise and manage the stressful life events that occurred within the year before the onset of the symptoms does predict current symptom severity levels.

Upon reflecting on the results, I did not realize that there was a cut-off for the LES at approximately age 18. For the purpose of this study, a decision rule was made to redo the relevant analyses to only include one and half standard deviation of the mean age, which resulted in a cut-off of 11 years whereby the average mean age of onset was 33.68 years ($SD = 11.24$) from originally 31.33 years ($SD = 13.45$). The t tests indicated no significant differences on the independent variables between the original group ($n = 201$) and the original group minus those who reported symptom onset before age 11 years ($n = 185$). Regarding Question 2, the secondary analysis yielded significant findings ($R = 37$; Adjusted $R^2 = .14$; $F_{3, 181} = 9.67, p < .0001$), however the amount of variance predicted decreased by 5%. See Appendix H and I for graphs of the interactions and reconfigured tables, respectively.

**Question 3**

What is the nature of the relationship between perceived chronic stress and symptom severity? This question was tested with the Null Hypothesis that there would be no relationship between perceived stress and symptom severity. The results indicated that there was a positive linear relationship between one’s perceived stress level and one’s level of FMS symptoms, that is, as participants perceived stress levels increased so did
their symptom severity. Given the findings the null was not accepted. The significance of this finding may hinge on the large sample size. Moreover, there may be a third factor, differentiation level, that influences the strength of this correlation.

In order to explicate this further, a discussion of the theory is warranted. Bowen theory (Kerr & Bowen, 1988) assumes that level of differentiation will predict the degree to which situations in one’s life are appraised as stressful. A separate analysis of my data lends support this assumption as well. In this analysis, I examined how much of the level perceived stress was accounted for by level of differentiation using linear regression. My findings indicate that level of differentiation predicted 45% of the observed variance associated with perceived stress ($R = .672$, Adjusted $R^2 = .448$. The ANOVA results, $F_{1,199} = 163.571$, $p < .0001$, indicate there is a good fit for the model.). This finding is due in part to the relationship between intellectual and emotional functioning discussed earlier. Those with lower levels of differentiation will appraise life situations as stressful and subsequently have the biological reactions to stress (e.g., endocrine system producing stress related hormones like cortisol) which occurs when emotional functioning is activated. While an in depth discussion of psychoneuroimmunology is beyond the scope of this chapter, the evidence is clear regarding the interaction of the brain-mind-body connection vis-à-vis the development of disease (Girdano, Dusek, & Everly, 2005; Sapolsky, 1998).

My findings are in keeping with BNST in that perceived stress was correlated with symptom severity. My findings also compare to those of Murdock and Gore (2004) who found that perceived stress significantly correlated positively with symptom severity. In their case, they studied distress. Despite this difference in dependent variable, Bowen
theorized that the type or classification of the particular disease process is arbitrary. In fact, BNST assumes that the same emotional processes are involved regardless of the symptom. Be it distress or FMS, BNST assumes that the same rules apply.

**Question 4**

What is the nature of the relationship between level of differentiation and symptom severity? This question was tested with the Null Hypothesis that there would be no relationship between level of differentiation and symptom severity. The results of my study demonstrated that level of differentiation was negatively related to FMS symptoms. In other words, those who reported greater amounts of differentiation experienced less intense symptoms associated with FMS. The significance of this finding may hinge on the large sample size. Nevertheless, given the findings, the Null Hypothesis was rejected.

In my discussion of Question 3, I noted how level of perceived stress was related to differentiation of self. This information is also pertinent to understanding the results for Question 4. Level of differentiation helps to determine if the limbic system will be activated during stress. When the limbic system is activated and the stress response initiated by the body, the endocrine system produces a flood of hormones (e.g., cortisol, epinephrine, norepinephrine; Girdano, Dusek, & Everly, 2005). While these hormones are essential to the survival of the species under acute stress, the stress response can be damaging (e.g., coronary heart disease) when repeatedly activated as a result of chronic stress (Hafen et al., 1998). The same principles are assumed to be involved in the development of FMS and the severity thereof. Specifically, when FMS patients indicate higher amounts of stress, and their ability to manage that stress is compromised as a
result of the level of differentiation, their symptoms are worsened. The results of my research support this assumption as explained in the discussion for Question 7.

Several researchers have found a comparable relationship between differentiation of self and symptom severity in general. Murdock and Gore (2004) found that these two variables significantly correlated negatively when measuring distress severity. In addition, Peleg-Popko’s (2002) found a positive relationship between differentiation and social anxiety and physiological symptoms. Similar findings linked differentiation and various symptoms, for example adolescent problems (Gavazzi, Goettler, & Solomon, 1993, 1994), personal adjustment (Gavazzi & Sabatelli, 1990), and depression and anxiety levels (Anderson & Sabtelli, 1992).

**Question 5**

What is the nature of the relationship between level of emotional cutoff and symptom severity? This question was tested with the Null Hypothesis that there would be no relationship between level of emotional cutoff and symptom severity. The findings of my study demonstrate that the level of emotional cutoff was positively related to FMS symptoms. In other words, those who reported greater amounts of emotional cutoff experienced greater amounts of symptom severity. The significance of this finding may hinge on the large sample size. Nevertheless, given the findings, the Null Hypothesis was rejected.

Emotional cutoff describes the way in which one generation handles emotional contact within and between generations by means of detaching emotionally from self (e.g., anhedonia) or others physically (e.g., moving a thousand miles from one’s family to get away from the emotional intensity) in response to a highly anxious environment.
BNST assumes that all families manage anxiety through some degree of cut off that ranges from distancing to actual ending of the relationship.

The incidence of emotional cutoffs increase in proportion to one’s parents’ level of emotional reactivity and lack of differentiation. If child/parent relationships are characterized by over-involvement, too much closeness, dependency, high conflict and/or pseudo-independence of the child, then child will not develop significant levels of differentiation. The relationship between cut off and differentiation is such that individuals who are less differentiated from their families-of-origin are more fused with the family emotional system. This emotional fusion makes them more allergic to the anxiety of the system, which in turn increases the likelihood that emotional cutoffs will occur. In the end, emotional cutoffs may serve to reduce anxiety, but at the expense of the person because people no longer have access to the healthful benefits that a family support system offers.

My findings are in keeping with BNST in that those participants who reported greater level of symptom severity also reported higher levels of emotional cutoff. Research by scholars not affiliated with BNST supports my findings. Hafen, Karren, Frandsen, and Smith (1996) report that those who indicate having close relationships with extended family members experienced positive health effects. In addition, Amerikaner, Monks, Wolfe, and Thomas (1994) analyzed differences between perception of family relationships and psychological health among college students and found that those who perceived having healthy relationships with their family also showed signs of increased psychological health. Franks, Cronan, & Oliver (2004) found that larger social support networks were associated with lower levels of depression, helplessness, mood
disturbances, impact of FMS, higher levels of self-efficacy for function and symptom management, as well as overall psychological health.

Finally, Gilbert (1992) writes that emotionally cutting off from previous generations is a hallmark of the history of the United States given its immigrant history. Gilbert suggests that increased levels of emotional cutoff increase the vulnerability to stress and disease. Some support for this phenomenon is found within FMS literature. “Some researchers have observed an increase prevalence [of FMS] among first-generation immigrant families in the United States” (Wallace & Wallace, 2002, p. 15).

**Question 6**

Which one of the predictor variables account for the greatest amount of variance associated with FMS symptoms? This question was tested with the Null Hypothesis that each of the predictor variables would equally account for the variance associated with FMS. The observed results indicated that level of perceived stress, which describes the degree by which one appraises life situations as stressful, had the greatest influence on symptom severity. Given this finding, the Null Hypothesis was rejected.

Bowen theory suggests that the interaction of chronic anxiety and differentiation would account for the greatest amount of variance associated with symptoms (Kerr & Bowen, 1988). Sapolsky (1998) provided evidence that humans misperceive much of their stress and react physiologically to non-life threatening stimuli as if they were life threatening, which ultimately can affect health. This misperception results in increased levels of chronic anxiety. The Perceived Stress Scale measures the degree to which situations in one’s life are appraised as being stressful. From this perspective, the PSS is a cognitive appraisal grounded in emotional, reactive functioning, rather than solely in
intellectual functioning. The BNST concept of chronic anxiety parallels precisely the pattern that Sapolsky identified. I suspect that participants’ responses to level perceived stress were tapping into the BNST concept of chronic anxiety.

Those with higher levels of differentiation will not misperceive daily hassles or major life events as stressful. In fact BNST assumes that differentiation level will predict one’s ability to objectively appraise the events in one’s life, which was supported and addressed in Question 3. Therefore, the finding that perceived stress would account for the greatest amount of variance is consistent with theory. This finding is supported by the work of Murdock and Gore (2004) who also found that perceived stress levels also accounted for the greatest amount of variance on symptom severity of distress.

Upon reflecting on the results, I did not realize that there was a cut-off for the LES at approximately age 18. For the purpose of this study, a decision rule was made to redo the analysis to only include one and half standard deviation of the mean age, which resulted in a cut-off of 11 years. The secondary analysis yielded that level of perceived stress was the variable that accounted for 25% variance associated with FMS, down from 27% in the original analysis. Negative life events no longer had significant predictive power after the secondary analysis.

**Question 7**

Does level of differentiation of self moderate the relationship between perceived stress and FMS symptoms? This question was tested with the Null Hypothesis that level of differentiation did not moderate the relationship between perceived stress and FMS symptoms. Though the regression model used to answer this question resulted in significant findings, in that 28% of the variance was accounted for by the proposed
variables, a substantial amount of variance, 72%, can be attributed to other variables and/or error. Given this consideration and that model was still shown to be significant, some tentative conclusions can be drawn. Specifically, an increase in FMS symptoms, associated with increased levels of perceived stress, was more pronounced for FMS patients of lower levels of differentiation compared to FMS patients with higher levels of differentiation. In other words, those with lower levels of differentiation who also experienced higher levels of perceived stress reported more severe symptoms than those with higher levels of differentiation who experienced similar levels of perceived stress. Given the findings, the Null Hypothesis was not accepted.

Bowen theory assumes that the higher one’s level of differentiation the less likely they are to perceive their stress as unmanageable. In turn, the stress response would not be initiated, which would moderate one’s level of symptoms. The findings of my study support this contention. In addition, my findings are comparable to those of Murdock and Gore (2004) who used the same independent variables (i.e., perceived stress and differentiation) in their study to examine distress. However, Murdock and Gore found that level of differentiation, perceived stress levels, and their interaction accounted for 48% of the variance, considerably larger than what was found in my study. This difference may be due to the their dependent variable, which was distress level. Distress levels may represent a narrow construct compared to FMS symptoms thus contributing to the disparity between the finding my study and the Murdock and Gore study.

The results from the hierarchical multiple regression that was used to respond to this question require further explanation. Although support for the influence of differentiation on symptoms and perceived stress was observed in my study, an
examination of the results indicate that the strength of perceived stress may have been so
great that the addition of level of differentiation to the equation was not significant (see
step 2). However, when the level of perceived stress and the interaction between
perceived stress and level of differentiation was considered (see step 3) an additional 2%
to the variance associated with FMS symptoms. This finding suggests that when
differentiation is considered with level of perceived stress, this does affect the
relationship between perceived stress level and FMS, but level of differentiation does not
appear to account for a large proportion of the observed variance.

Question 8:

Does level of emotional cutoff moderate the relationship between perceived stress
and FMS symptoms? This question was tested with the Null Hypothesis that emotional
cutoff would not moderate the relationship between perceived stress and FMS symptoms.
Though the regression model used to answer this question resulted in significant findings,
in that 29% of the variance was accounted for by the proposed variables, a substantial
amount of variance, 71%, can be attributed to other variables and/or error. Given this
consideration and that model was still shown to be significant, some tentative conclusions
can be drawn. Specifically, an increase in FMS symptoms associated with increased
levels of perceived stress was more pronounced for FMS patients with higher levels of
emotional cutoff compared to FMS patients with lower levels of emotional cutoff. In
other words, those with higher levels of emotional cutoff who also experienced higher
levels of perceived stress reported more severe symptoms than those with lower levels of
emotional cutoff who experienced similar levels of perceived stress. Given the findings,
the Null Hypothesis was rejected.
Bowen theory postulates that an emotional cutoff will intensify the emotional fusion within the nuclear family. Thus, when one experiences considerable stress, the anxiety is concentrated within a dyad or triad rather than shared through the mutual support of a family and social network. This concentration is a product of the level of differentiation of the members, which Bowen presumes is homogenous within a family or group of significant others. In addition, when stress occurs within a family with lower levels of differentiation, the togetherness force is activated, which urges individuals towards closeness, attachment, conformity, and approval. “It is an emotional process among individuals in which both anxiety and self are transferred” (Gilbert, 1996, p. 13).

While this togetherness force is appropriate and vital under the conditions of acute stress, it is detrimental to a family or individual during periods of chronic stress. The togetherness force creates anxiety in its own right because of the extensive compromise each member makes in order to establish conformity. In these instances, people with lower levels of differentiation can become “allergic” to the tension that builds under the pressure to conform. The tension, and the allergy to it, results in people cutting off the relationship in order to alleviate themselves of the associated anxiety creating an artificial end to the relationship.

The findings of my study supported this theoretical assumption that level of cutoff moderates the relationship between perceived stress and FMS symptoms. Although the model was significant, examination of the results indicate that the strength of perceived stress levels may be so great that level of emotional cutoff did not prove to be a significant predictor of FMS severity. Thus, perceived stress levels and the interaction between perceived stress level and level of emotional cutoff were the significant
predictors in the final equation. This finding suggests that emotional cutoff does affect the relationship between perceived stress levels and FMS symptoms, but level of emotional cutoff does not appear to account for a large proportion of the observed variance.
Question 9

Does level of chronic anxiety moderate the relationship between perceived stress and FMS symptoms? This question was tested with the Null Hypothesis that chronic anxiety does not moderate the relationship between perceived stress and FMS symptoms. Though the regression model used to answer this question resulted in significant findings, in that 29% of the variance was accounted for by the proposed variables, a substantial amount of variance, 71%, can be attributed to other variables and/or error. Given this consideration and that model was still shown to be significant, some tentative conclusions can be drawn. Specifically, an increase in FMS symptoms associated with increased levels of perceived stress was more pronounced for FMS patients with higher levels of chronic anxiety compared to FMS patients with lower levels of chronic anxiety. In other words, those with higher levels of chronic anxiety who also experienced higher levels of perceived stress reported more severe symptoms than those with lower levels of chronic anxiety who experienced similar levels of perceived stress. Given the findings, the Null Hypothesis was not accepted.

Bowen theory suggests that chronic anxiety, which describes the instinctual response to the demands that life when an individual is forced to adapt in order to survive, has an affect on the individual’s sense of adaptation to stressors and subsequently the vulnerability to disease. Chronic anxiety is also referred as the automatic response, or emotional reactivity, to a real or imagined threat. BNST assumes that as chronic anxiety increases, one will perceive life events as unmanageable thus initiating the stress response. The stress response would then be involved in exacerbating the symptoms.
In this study, level of chronic anxiety was measured using the level of emotional reactivity subscale of the Differentiation of Self Inventory-Revised (Skowron & Schmitt, 2003). Level of emotional reactivity was positively related to the symptom severity. That is, the higher one’s level of emotional reactivity, the more severe one’s FMS symptoms. Unlike the other variables related to differentiation (overall level of differentiation, emotional cutoff and I-position), an examination of the results indicated that emotional reactivity remained significant in the final model. In other words, level of emotional reactivity, level of perceived stress, and their interaction significantly predict FMS symptom severity. Although the model and the results were significant, emotional cutoff does not appear to account for a large proportion of the observed variance.

**Question 10:**

Does level of I-position moderate the relationship between perceived stress and FMS symptoms? This question was tested with the Null Hypothesis that I-position would not moderate the relationship between perceived stress and FMS symptoms. Though the regression model used to answer this question resulted in significant findings, in that 27% of the variance was accounted for by the proposed variables, a substantial amount of variance, 73%, can be attributed to other variables and/or error. Given this consideration and that model was still shown to be significant, some tentative conclusions can be drawn. Specifically, an increase in FMS symptoms associated with increased levels of perceived stress was more pronounced for FMS patients with lower levels of I-position compared to FMS patients with higher level of I-position. In other words, those with lower level of I-position who also experienced higher levels of perceived stress reported
more severe symptoms than those with higher level of I-position who experienced similar levels of perceived stress. Given the findings, the Null Hypothesis was not accepted.

Bowen theory assumes that there are two life forces: a togetherness force and an individuality force. The togetherness force is best understood in the context of stress. When stress or anxiety is present, an individual is likely to require the cooperation of its multiple to help insure survival. The togetherness force is a necessary part of the survival of the individual, especially during acute stress. However, under periods of calm the individuality force engages. This force is represented by the BNST concept of I-position—the counterbalancing element to togetherness. “I-position defines principle and action in terms of, ‘This is what I think, or believe’ and, ‘This is what I will do or not do,’ without impinging one’s own values or beliefs on others” (Titelman, 1998, p. 46). Those who are able to maintain a separate identity from the group while remaining a part of the group are purportedly able to manage their own anxiety better and thus to provide protection from symptom development.

The results of my study support Bowen’s theory. Although the model was significant, examination of the results indicate that the strength of the perceived stress level may be so great that I-position level, and the interaction, did not prove to be significant predictors of FMS severity. In other words, this finding suggests that I-position does affect the relationship between PSS and FMS symptoms, but level of I-position does not appear to account for a large proportion of the observed variance.

This study investigated 10 questions that address different dimensions of BNST. The first question addressed demographic features of the sample. Of the other nine
questions, all of the Null Hypothesis were rejected. The following is the list of the conclusions and a detailed summary appears in Appendix G:

- FMS patients’ level of symptom severity could be predicted by their level of differentiation and appraisal of stressful life events that occurred within a year prior to the age of onset.
- There was a relationship between FMS patients’ level of perceived stress and their level of FMS symptom severity.
- There was a relationship between FMS patients’ level of differentiation and their level of FMS symptom severity.
- There was a relationship between FMS patients’ level of emotional cutoff and their level of FMS symptom severity.
- Level of perceived stress was the predictor variable that accounted for the greatest amount of variance associated with FMS symptoms, therefore the variables did not account equally.
- Level of differentiation does moderate the relationship between perceived stress and FMS symptoms.
- Level of emotional cutoff does moderate the relationship between perceived stress and FMS symptoms.
- Level of chronic anxiety does moderate the relationship between perceived stress and FMS symptoms.
- Level of I-position does moderate the relationship between perceived stress and FMS symptoms.

Implications

The findings of this study have important implications for research, theory, and practice. This section consists of a discussion of the relevant implications.

Research

The purpose of my research was to investigate the heuristic value of several assumptions of BNST for understanding FMS. Though the proportion of the variance accounted for by the variables proposed in my study is slight to modest at best, the
findings, nonetheless, were significant and contribute to the scant body of empirical based knowledge of BNST. With these findings, this study contributes to establishing a foundation for moving further towards the development of a family-based treatment program for those with FMS. Moreover, my study provides a jumping point for additional research towards designing manualized pilot interventions and eventual efficacy trials and community effectiveness research (Micklowitz & Hooley, 1998).

Utilizing Micklowitz and Hooley’s approach would allow for the examination of several questions: Does family therapy or individual systems-based therapy improve differentiation? If so, does an increase in differentiation coincide with a decrease or amelioration of symptoms, regardless of their manifestation? Does an increase in the patient’s level of differentiation result in changes within the family system vis-à-vis their level of differentiation and functioning? Is there a significant decrease in medical utilization as a result of increases in levels of differentiation?

Future research may utilize a mixed research design combining quantitative and qualitative approaches. This approach may produce a better understanding of the nuances that occur within the family. Moreover, given that a family can manifest cutoff, fusion, distance, conflict, overfunctioning/underfunctioning, and triangling in many different ways, a qualitative approach may allow for the variability by asking a range of questions, which would be impossible to have an exhaustive list utilizing only psychometric method.

Along with what was mentioned above, more research should be done similarly to the work of Klever (2001, 2003, 2004) who is using a longitudinal, mixed methodology
design to investigate the assumptions of BNST. While his results are promising in support of BNST, he has not published more complex statistical analyses.

Finally, Bowen theory suggests that people examine two to five previous generations preceding themselves in order to fully appreciate the complexity of the family system as well as to understand the unique ways in which the family manages anxiety. Therefore, future research should interview multiple persons within the nuclear family of the patient as well as the family-of-origin and preceding generations. Such information would yield a more accurate picture of the interaction of level of differentiation and chronic anxiety that would make symptom development possible.

Theory

Bowen theory assumes that symptom category (e.g., cancer, psychopathology, dermatitis, juvenile delinquency) is unimportant (Kerr & Bowen, 1988). The theory implies that all of the assumptions apply to all symptom formation regardless of its manifestation. However, very little research has been done to test these assumptions. Murray Bowen was noted to have said that one can not chi square a feeling and thus research testing his hypotheses were less important than developing further his theory. However, I argue that there are assumptions embedded within BNST that are testable even if the theory as a whole is not. Moreover, given the demands that medical and allied professions have on accountability, such philosophy is difficult to maintain.

For example, I extrapolated several of BNST assumptions and tested them using FMS patients and I found support for the assumptions. However, two minor assumptions were not supported. First, Bowen theory proposes that the earlier one develops symptoms, the lower his level of differentiation and more severe the symptom presentation (Bowen, 1985; Kerr & Bowen, 1988). The results of this investigation did
not support this assumption. In fact, age at onset did not predict differentiation level or symptom severity. My findings contradict the work of Cronan, Serber, Walen, and Jaffe (2002) and Burckhardt, Clark, and Bennett (2001) who found that those who were younger experienced more severe FMS symptoms than their older counterparts; level of differentiation was not measured in these studies. Perhaps one explanation is that I analyzed my data using age as a continuous variable where the aforementioned authors made age a categorical variable. Moreover, the aforementioned researchers measured current age while I was interested in age at onset.

Finally, one may notice that the $R^2$ values for each of the heirarchical regressions were remarkably similar. In fact, the $R^2$ values ranged from 0.27-.29. These findings are consistent with BNST. Bowen (1985) and Kerr and Bowen (1988) explain that the variables such as emotional cutoff, differentiation, emotional reactivity, fusion with others, and I-position are intricately related. One cannot explain the function of one variable without describing the function of the others and how they all interact. Given that BNST is also a systems theory provides additional support for the findings.

Clinical Practice

The findings of this investigation may inform the clinical practice of medical family therapists and others who treat patients with medical problems and their families. By using instruments such as the Differentiation of Self Inventory-Revised, clinicians can ascertain problematic areas within the family that may contribute to the exacerbation of symptoms (e.g., fusion, emotional reactivity, and emotional cutoff). For instance, in this investigation, emotional cutoff and perceived stress accounted for the greatest amount of variance associated with FMS, therefore clinicians can help clients manage stress better as well as develop healthier relationships with their families-of-origin and nuclear family.
Clinicians are encouraged to adopt a systems view of health and disease as previously described by Cassel’s work on multiple-causes (1976), Bowen’s theory (Bowen, 1985), and Brody and Sobel discussion of health and disease (1979). That is, clinicians should keep in mind that health and disease does no occur in a vacuum and is influenced by multiple factors that interact bi-directionally.

Limitations

My study represents exploratory research that seeks to examine for the first time how differentiation of self impacts symptom severity of FMS. Therefore, the purpose of this research was to provide a beginning point for future research in theory building and intervention. There are six limitations that should be considered when interpreting my results, including (a) generalizability, (b) contamination of sample, (c) technological limitation, (d) number of possible participants, (e) sample pool, and (f) instrumentation.

Generalizability

The most fundamental limitation of this study is its generalizability. Given the cross sectional nature of the study, inferences about causality among the variables cannot be made. However, from a systems perspective, causality is a moot point. One could say that it is difficult to know whether, for example, low differentiation causes FMS symptoms, or FMS symptoms lead to low differentiation. Bowen theory suggests that the root of the problem lies in the emotional system, which is outside of the individual and has its origin in the many generations that came before. Therefore, systems theory, with its concept of feedback loops, suggests that we are probably dealing with mutual two-way effects (Peleg-Popko, 2002).

In addition, participants were limited to those who actively engaged in or otherwise visited FMS related websites and/or listserves thus excluding anyone from the study not
using the Internet; thus, my research uses a convenience sample. The Pew Internet &
American Life Project (2004) surveyed 3,114 adults regarding Internet usage. In Table
13, I present their findings. Given the disparity among certain populations, and when
efforts are not made to obtain a stratified sample, caution should be applied when
generalizing these findings to diverse populations.

Sample Contamination

During the process of collecting data, one participant contacted repeatedly the lead
researcher, the chair of the department, and the Institution Review Board (IRB) because
she was offended with the web-host of the Internet-based survey. A possible limitation
was that I was not able to deliver directly the invitations to participate in my study to the
listserves because their memberships are limited to those with FMS. Therefore, I was not
able to be aware of any contamination of the sample by those who may have commented
on the research positively or negatively.

Number of Possible Participants

Because I emailed an unspecified number of listserves moderators and webmasters,
I was not able to determine the number of webmasters or moderators who participated in
my survey nor the number of members to whom my survey invitation reached.
Webmasters and listserv moderators could have conceivably posted the invitation
without notify me. This limitation thus makes it difficult to determine any type of
response rate (possible participants: actual participants).

Sample Pool

One possible concern is that much of the research on FMS patients are within
clinical settings. Future research would need to assess if there are any significant
differences between those populations obtained through the Internet versus those obtained through, say, a rheumatology clinic.

Furthermore, the participants confirmed through self-report that they were diagnosed with FMS. Therefore, there was no means to independently verify that the participants indeed had FMS. While the only way to confirm independently that a diagnosis of FMS was ascribed would be through access to rheumatology clinics, or other physicians’ offices, this may pose a significant confound. One can reasonably assume that those who have FMS and are actively seeking treatment would represent a subset of the overall FMS population therefore skewing the results towards those whose symptoms are severe enough to warrant active intervention. Using BNST as the lens for this research suggests that those who are actively seeking treatment may have significantly lower levels of differentiation and/or experiencing significantly higher levels of chronic anxiety than those not actively seeking treatment. Using the Internet helps to insure that a greater range of participants are surveyed.
Table 13. *Demographics of Internet Users*

<table>
<thead>
<tr>
<th>Demographic Category</th>
<th>Go Online</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
</tr>
<tr>
<td>Total Adults</td>
<td>59%</td>
</tr>
<tr>
<td>Women</td>
<td>58%</td>
</tr>
<tr>
<td>Men</td>
<td>61%</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
</tr>
<tr>
<td>18-29</td>
<td>72%</td>
</tr>
<tr>
<td>30-49</td>
<td>69%</td>
</tr>
<tr>
<td>50-64</td>
<td>59%</td>
</tr>
<tr>
<td>65+</td>
<td>24%</td>
</tr>
<tr>
<td><strong>Race/ethnicity</strong></td>
<td></td>
</tr>
<tr>
<td>White, Non-Hispanic</td>
<td>62%</td>
</tr>
<tr>
<td>Black, Non-Hispanic</td>
<td>45%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>52%</td>
</tr>
<tr>
<td><strong>Household Income</strong></td>
<td></td>
</tr>
<tr>
<td>Less than $30,000/yr</td>
<td>43%</td>
</tr>
<tr>
<td>$30,000-50,000</td>
<td>65%</td>
</tr>
<tr>
<td>$50,000-75,000</td>
<td>80%</td>
</tr>
<tr>
<td>More than $75,000</td>
<td>84%</td>
</tr>
<tr>
<td><strong>Educational Attainment</strong></td>
<td></td>
</tr>
<tr>
<td>Less than High School</td>
<td>22%</td>
</tr>
<tr>
<td>High School</td>
<td>48%</td>
</tr>
<tr>
<td>Some College</td>
<td>75%</td>
</tr>
<tr>
<td>College +</td>
<td>82%</td>
</tr>
</tbody>
</table>

N=3,114 adults 18 and older. Margin of error is ±2% for results based on full sample.
In addition, one disadvantage of using the Internet as a means to recruit participants and gather data is the inability to verify that the participants indeed have been diagnosed by a physician with having FMS.

**Instrumentation**

My study relied heavily on retrospective data whereby participants were asked to recall stressful life events within the year prior to the onset of their symptoms, as well as, their perceptions of their ability to manage stress over the past month. Finally, this study suffered from monomethod bias in that all measures employed were self-report in nature.

Finally, Bowen never intended for his differentiation of self scale to be a paper-pencil inventory (Kerr & Bowen, 1988); In fact, he clearly stated that his scale was hypothetical. It is the contention of Kerr (1981) and others that in order to obtain one’s true level of differentiation one must accumulate a large amount of historical information, which would necessitate lengthy personal interviews. Such interviews with FMS patients and their nuclear and family-of-origin would provide more accurate details about the biopsychosocial interactions.

**Summary**

Medical family therapists, physicians, and other health professionals who work closely with families with fibromyalgia, or any chronic disease, should consider the complex interactions between the patient and her environment. Murray Bowen believed that the emotional unit was found, not in the individual, but within the family. By viewing the family as a natural organism, trying to survive and adapt to the environment the best way it can, the practitioner can be better informed in managing the complex systemic forces that contribute to or protect one from developing a chronic disease.
The findings of my research suggest that level of differentiation and perceived stress are important factors to consider when working with individuals with fibromyalgia. Regarding level of differentiation, emotional cutoff appears to be the most influential when combined with perceived stress. The existence of emotional cutoff within the family then limits one’s access to the sources of strength that can be found therein.

Despite the findings of my study, further research must be done to apply this new knowledge towards developing interventions that can be tested experimentally. Given that there is no cure for FMS to date, over 6 million people are eager to employ strategies that will help alleviate the intense, chronic pain associated FMS.
APPENDIX A
INFORMATION FLOW IN THE HIERARCHY

BIOSPHERE
flow of resources and deposition of wastes
HOMO SAPIENS
cultural norms and values
SOCieties
economic and political forces
ORGANIZATIONS
exchange of policies, symbols, goods, & resources
FAMILY-GROUP
language and symbolic communication
PERSON
neural impulses, hormones, and sensory awareness
ORGANS
ionic equilibria and fluid flow
CELLS
enzymes, gene activators and repressors, ionic equilibria
MOLECULES
chemical bonds, reactions, and electrostatic forces
ATOMS

APPENDIX C
INVITATION TO WEBMASTER AND LIST SERVE MODERATOR

I am asking moderators and webmasters of FMS websites and listserves to invite their subscribers on behalf of me and the University of Florida to participate in a fully confidential and anonymous survey about family life and stress that FMS patients experience. Below is the invitation that I ask that you make available on your website or through any FMS listserves of which you may be a part. Such information will be used to help families better cope with the real impact that FMS has on the patient and his/her family. Please let me know if you are willing to participate.
Having fibromyalgia (FMS) is very difficult to deal with, especially because of the emotional and physical demands, as well as the impact that FMS has on relationships with others. Scientists have yet to find a cure for FMS; more importantly research is needed to develop strategies to help patients AND their families best adjust psychologically and emotionally to FMS. My goal is to help in that mission and I need your help to do so.

My name is Tom Murray, and I am a doctoral candidate studying Marriage and Family Counseling at the University of Florida. I invite you to participate in a research study considering the influence of family relationships and stress on the development and management of fibromyalgia symptoms. Participation in this study is voluntary; you may choose whether to participate or not.

Your moderator has generously offered to post this questionnaire to this forum. In order to participate in this survey, you simply need to follow one initial step: Please click on this address (http://www.surveymonkey.com/s.asp?u=96110624165) or you may cut and past the URL unto the address bar. You will be immediately taken to information that speaks further about the study. (Surveymonkey.com is an independent server that I pay to host the survey. They collect the information and send it to me in order to maintain the highest level of scientific rigor, as well as confidentiality and anonymity.)

If you have any questions or problems with the questionnaire or have questions about how to return it to me, please email me at univoffl@ufl.edu
Thank you for helping to further understand the impact of FMS on your life.

Sincerely,

Tom Murray
APPENDIX E
INTRODUCTION AND CONSENT FORM

My name is Thomas L. Murray, Jr., and I am a doctoral candidate studying
Marriage and Family Counseling at the University of Florida. I invite you to participate
in a research study considering the influence of family relationships and stress on the
development and management of fibromyalgia symptoms. Participation in this study is
voluntary—you may choose whether to participate or not. Below I will briefly outline
this study. If you have additional questions please feel free to contact Dr. Harry Daniels
or myself at (352) 392-0731.

I am interested in learning how personality, family relationships, and stress
experienced at onset of fibromyalgia symptoms influence the development of
fibromyalgia symptoms later. Your participation in this study will contribute to
researchers and clinicians understanding of how to best treat FMS patients and their
families. My desire is to use the information I gather in this study to develop family
based interventions that will assist families who live under the burden of this chronic
illness every day.

All information you provide will be kept anonymous and confidential. No personal
information (phone, address, etc.) will be requested. The Institutional Review Board of
the University of Florida requires me to obtain consent from those who wish to
participate in my study.

The risks involved in answering the questionnaires are minimal. However, some of
the questions involved are about family relationships and may bring up feelings and
questions you wish to explore further. If for any reason you desire to examine these questions further you are invited to call the Westminster Counseling Center at (352) 378-0940 for further assistance. You have the right to withdraw from the study, without penalty, at any time.

By clicking “I agree” at the bottom of this page, you attest that all of your questions have been answered and that you wished to voluntarily participate in my research study. You also attest that you are over the age of 18.
APPENDIX F
SEPARATE ANALYSES

Table 14. Three Step Hierarchical Regression of Fibromyalgia on Fusion with Others (FO), Perceived Stress (PSS), and the Interaction of FO and PSS Scores

<table>
<thead>
<tr>
<th>Predictor</th>
<th>$R^2$</th>
<th>$R^2$ Δ</th>
<th>$F$ Δ</th>
<th>β</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>.270</td>
<td></td>
<td>74.886**</td>
<td>.523**</td>
</tr>
<tr>
<td>PSS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Step 2</td>
<td>.266</td>
<td>.000</td>
<td>.043</td>
<td>.514**</td>
</tr>
<tr>
<td>PSS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FO</td>
<td></td>
<td></td>
<td></td>
<td>-.015</td>
</tr>
<tr>
<td>Step3</td>
<td>.277</td>
<td>.014</td>
<td>3.846*</td>
<td>.394</td>
</tr>
<tr>
<td>FO</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PSS</td>
<td></td>
<td></td>
<td></td>
<td>.987**</td>
</tr>
<tr>
<td>FO x PSS</td>
<td></td>
<td></td>
<td></td>
<td>-.427*</td>
</tr>
</tbody>
</table>

*p < .05, **p < .01
PSS = perceived stress scale; FO = fusion with others

Table 15. Summary of Table for the Results of the Pearson Correlation for Fibromyalgia Impact Questionnaire Symptom Severity Subscale

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.61**</td>
<td></td>
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<td>.28**</td>
<td>.25**</td>
<td>.21**</td>
<td>.21**</td>
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</table>

Note: ** = Correlation is significant at the .01 level (2-tailed). 1 = job ability; 2 = pain; 3 = fatigue; 4 = morning tired; 5 = stiffness; 6 = anxiety; 7 = depression. The overall scale Cronbach’s alpha coefficient was a = .792.
Hypothesis 1

H₀: Level of differentiation, age-of-onset, and stressful life events would not predict current level of FMS symptoms.

Tested: Simultaneous multiple regression

\[ R^2 = .19; F = 16.80, p < .0001, \text{ indicating good model fit.} \]

Rejected

Age of onset did not contribute greatly to the predictive power of the model.

The results indicated that level of differentiation and stressful life events predicted current levels of FMS symptoms. Age of onset was not a significant predictor.

Hypothesis 2

H₀: There would be no relationship between level of perceived stress and symptom severity.

Tested: Bivariate correlation, Pearson r.

\[ r = .52, p < .001. \]

Rejected

The results of my study demonstrated that level of perceived stress was negatively related to FMS symptoms.

The significance of the findings may hinge on the size of the sample.
Hypothesis 3

$H_0$ : There would be no relationship between level of differentiation and symptom severity.

Tested: Bivariate correlation, Pearson r.

$r = -.38, p < .001$.

Rejected

The results indicated that there was a negative linear relationship between level of differentiation and symptom severity.

The significance of the findings may hinge on the size of the sample.

Hypothesis 4

$H_0$ : There is no relationship between level of emotional cutoff and symptom severity.

Tested: Bivariate correlation, Pearson r.

$r = -.37, p < .001$.

Rejected

The findings demonstrated that the level of emotional cutoff was positively related to FMS symptoms.

The significance of the findings may hinge on the size of the sample.
Hypothesis 5

$H_0$: All predictor variables account for equal amounts of variance associated with FMS symptoms.

Tested: Stepwise multiple regression

$R^2 = .27; F = 74.886, p < .0001$

Rejected

The results indicated that level of perceived stress had the greatest influence on the symptom severity of the variables under consideration for this study.

Negative life events contributed an additional 3% of the variance.

Hypothesis 6

$H_0$: Level of differentiation of self does not moderate the relationship between perceived stress and FMS symptoms.

Tested: Hierarchical multiple regression

$R^2 = .283; F = 27.26, p < .0001$

Rejected

An increase in FMS symptoms, associated with increased levels of perceived stress, was more pronounced for FMS patients of lower levels of differentiation compared to FMS patients with higher levels of differentiation.

Beta values indicate the strength of PSS.
**Hypothesis 7**

$H_0$: Level of emotional cutoff does not moderate the relationship between perceived stress and FMS symptoms.

Hierarchical multiple regression

$R^2 = .292; F = 28.54, p < .0001.$

Rejected

An increase in FMS symptoms, associated with increased levels of perceived stress was more pronounced for FMS patients with higher levels emotional cutoff compared to FMS patients with lower levels of emotional cutoff.

**Hypothesis 8**

$H_0$: Level of chronic anxiety does not moderate the relationship between perceived stress and FMS symptoms.

Hierarchical multiple regression

$R^2 = .287; F = 27.81, p < .0005.$

Rejected

An increase in FMS symptoms associated with increased levels of perceived stress was more pronounced for FMS patients with higher levels of chronic anxiety compare to FMS patients with lower levels of chronic anxiety.
Hypothesis 9

H₀ : Level I-position does not moderate the relationship between perceived stress and FMS symptoms.

Hierarchical multiple regression

R² = .27; F = 25.52, p < .0001

Rejected

An increase in FMS symptoms associated with increased levels of perceived stress was more pronounced for FMS patients with lower levels of I-position compared to FMS patients with higher levels of I-position.
Figure 1. Plot of FMS Scores for Low, Medium, and High Differentiation and Low, Medium, and High Stress.
Figure 2. Plot of FMS Scores for Low, Medium, and High Emotional Reactivity and Low, Medium, and High Stress
Figure 3. Plot of FMS Scores for Low, Medium, and High I-Position and Low, Medium, and High Stress
Figure 4. Plot of FMS Scores for Low, Medium, and High Emotional Cutoff and Low, Medium, and High Stress
Figure 5. Plot of FMS Scores for Low, Medium, and High Fusion with Others and Low, Medium, and High Stress
APPENDIX I
POST HOC TABLES

Table 16. Descriptive Post Hoc Statistics for the Independent Variables LES, PSS, DSI-R, Age of Onset

<table>
<thead>
<tr>
<th>Variable</th>
<th>Range</th>
<th>Min.</th>
<th>Max.</th>
<th>M</th>
<th>SD</th>
</tr>
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<td>62</td>
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</table>

Note: LES = life events scale; PSS = perceived stress scale; DSI = differentiation of self-revised total score; ER = emotional reactivity; IP = I-position; EC = emotional cutoff; FO = fusion with others.

Table 17. Summary of Post Hoc Results of the Pearson Correlation of the IVs and DV

<table>
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</table>

Note: ** = Correlation is significant at the .01 level (2-tailed). 1 = symptom severity; 2 = negative experiences; 3 = perceived stress; 4 = DSI-R total score; 5 = emotional reactivity; 6 = I-position; 7 = emotional cutoff; 8 = fusion with others; 9 = social desirability.
LIST OF REFERENCES


BIOGRAPHICAL SKETCH

Thomas L. Murray, Jr., was born on September 29, 1976, in Williamsport, Pennsylvania, to Thomas L. Murray, Sr., and Jaquelyn R. Drabic Murray Woodring Novinger. Tom has three half-sisters and two half-brothers, as well as five step-sisters and two step-brothers. After graduating from Williamsport Area High School, Tom was the first in his family to attend college. At Bloomsburg University of Pennsylvania, Tom double-majored in secondary education-social studies and psychology with a minor in family, children and youth and was active in residence life as a resident assistant, senior resident assistant, and coordinator of student receptionists. Tom graduated cum laude in May, 1999.

Upon graduation, Tom moved to Gainesville, Florida, to work in the Division of Housing as a hall director and to enroll in the marriage and family counseling program in the Department of Counselor Education at the University of Florida. During his time in graduate school, Tom served as the Counselor Education Student Association (CESA) President, as well as the Chi Sigma Iota Beta Chapter Professional Development Chair. During his master's program, Tom obtained a small grant from the Presbytery of Saint Augustine to provide free counseling to those who volunteered in their community. After taking a year to obtain additional clinical experience, Tom returned to UF to enter into the doctoral program in marriage and family counseling. Tom taught Drug and Alcohol Abuse and Stress and Anxiety Management to undergraduates. Furthermore, he served as an adjunct at Santa Fe Community College in the Department of Student Development.
Instruction. Tom’s clinical practicum and internship experience involved working with clients across the life span in the following settings: Teen Court, Westside Baptist Church, The Family Church, Santa Fe Community College Counseling Center, Health and Rehabilitation Psychology, as well as professional experience as the Long-term Care Social Services Director for North Florida Rehabilitation and Specialty Care Center. Tom is a National Certified Counselor, Licensed Professional Counselor (Pennsylvania), and Licensed Marriage and Family Therapist (Pennsylvania).


The Murrays will be relocating to Greensboro, NC, during the summer of 2005.