THE BIOBEHAVIORAL FAMILY MODEL: TESTING EUDAIMONIC WELL-BEING AS AN ADDITIONAL MEDIATOR

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ABSTRACT

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The current study examined eudaimonic well-being as an additional mediating variable in the Biobehavioral Family Model (BBFM; Wood, 1993). Data from a nationally representative sample of adults, N = 1255, Midlife in the United States II (Ryff et al., 2012) was used to test whether family emotional climate was associated with eudaimonic well-being (i.e., purpose in life, self-acceptance, environmental mastery, and personal growth), and whether eudaimonic well-being was in turn associated with biobehavioral reactivity (i.e., anxiety, depression and allostatic load). This hypothesis, and the original pathways of the BBFM, were tested using two operationalizations of the family emotional climate in separate models: a family model *(n* = 1050) and an intimate partner model *(n* = 810). Structural equation modeling was used to conduct path analyses and to test indirect effects. Results indicated that eudaimonic well-being is a significant mediating factor in the BBFM, contributing to how family relationships affect physical health outcomes for adults. This study highlights the need for therapeutic interventions to improve resilience at both the individual and family level, and emphasizes the need for increased collaboration between medical and mental health providers.

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CHAPTER I

INTRODUCTION

Families have a unique ability to affect an individual's health in a multitude of ways, both positively and negatively. Numerous studies have shown that healthy, positive family interactions can act as a protective mechanism for individual family members against both mental and physical health problems (Minuchin, et al., 1975; Wood, Klebba, & Miller, 2000; Wood, 1993; Wood et al., 2006; Wood et al., 2008; Priest, Woods, Maier, Parker, Benoit, & Roush, 2015). The Biobehavioral Family Model (BBFM; Wood, 1993) provides a theoretical mechanism to explain how specific aspects of a family's emotional climate can interact and affect an individual family member's biobehavioral reactivity (e.g., allostatic load, anxiety, and depression). This theoretical model also explains how an individual's biobehavioral reactivity can both directly and indirectly affect disease development and activity (Wood, 1993). The BBFM accounts for a large amount of information regarding why some individuals are able live well with certain diagnoses (e.g., asthma) while others do not respond to treatment and require more medical intervention. However, this theoretical model fails to take into account individual factors such as psychological well-being, which can be a critical factor in determining adults' positive health outcomes (Martín-María et al., 2017).

Resilience

Resilience is also a critical concept when examining the associations between families and health. It may also be a critical piece when incorporating individual factors that are predictive of health outcomes into the BBFM. At an individual level, resilience is the ability to thrive and flourish in the face of adversity (Atkinson, Martin, & Rankin, 2009). Wagnild & Young (1990) described a resilient individual as someone who "is not immune or hardened to stress, but [someone who is] able to re-establish equilibrium following an adverse experience" (p. 253). When a person is exposed to stress, the body responds physiologically, in part by activating allostatic mechanisms, in order to adapt and bring the body back to pre-stress homeostasis (Karatsoreos & McEwen 2011). When a person is unable to successfully re-establish equilibrium after repeated stressful events, this can lead to an overload of the biobehavioral stress reactivity (i.e., allostatic) systems which can ultimately result in a cascade of poor health outcomes (Karatsoreos & McEwen 2011).

Resilience is not only found at the individual level, but at the family level as well. Walsh (2016) has developed a core theoretical approach to conceptualizing family-level resilience. Seminal resilience research highlighted that individuals can endure the same types of stressful situations, but often their outcomes are different (Kaufman & Ziegler, 1987). Findings in this area lead to the hypothesis that unique aspects of resilience were functioning to mediate the relationship between stress and adaptation. As a result, Walsh (1996) developed a family resilience model, based on systemic principles, which posits that adverse events challenge a whole family unit. According to Walsh's (2002)

framework, there are nine key transactional process that occur within the family which mediate an individual's ability to adapt and cope. These interactive and dynamic, systemic processes include; meaning making, positive outlook, transcendence (i.e., purpose in life), organizational processes, connectedness, social and economic resources, clarity, open emotional sharing, and collaborative problem solving. As Walsh (2016) highlights, a growing amount of research has focused on resilience, and the use of her model, for examining family relationships and resilience tied to mental health and chronic illness.

In evaluating the BBFM's ability to explain family-health associations, a focus on broadening the model to include resilience is indicated. Walsh's (2016) family resilience model highlights specific areas in which the BBFM may be expanded to more meaningfully capture individual factors reflective of resilience, as well as family-level functioning. Specifically, Walsh's (2016) key processes of resilience (meaning making, positive outlook, transcendence, flexibility, connectedness, social and economic resources, clarity, open emotional sharing, collaborative problem solving) have a great deal of overlap with the four main dimensions of the family emotional climate (proximity, generational hierarchy, relationship quality and responsivity) in the BBFM (Wood, 2018). However, there are three key processes in Walsh's model that are not represented in the BBFM's constructs. These include meaning making, positive outlook, and transcendence which fall within the belief systems portion of Walsh's family resilience model. These key processes are critical to both individual and family resilience; it may be that including these belief system processes in the BBFM could

significantly strengthen the model. More specifically, eudaimonic well-being is a construct represented in alternate areas of the literature that includes six personality traits (purpose in life, self-acceptance, positive relationships, environmental mastery, autonomy, and personal growth) that closely resemble Walsh's (2106) three belief systems processes of resilience, and may be a meaningful expansion of the BBFM's theoretical focus.

Eudaimonic Well-Being: Expanding the BBFM

Eudaimonic well-being is a type of psychological well-being that is constructed from six different individual traits, including: autonomy, environmental mastery, personal growth, positive relations with others, purpose in life, and self-acceptance (Ryff, Heller, Schaefer, Van Reekum, & Davidson, 2016). Eudaimonic well-being has been found to have direct effects on health and mortality; therefore, it is a critical factor to consider when estimating variability in comorbidity and health outcomes (e.g., Singer & Ryff, 1999; Ryff, Singer & Love, 2004; Ryff & Singer, 2000; Ryff et al., 2016; Friedman & Ryff, 2012, Kim, Sun, Park, & Peterson, 2013; Brooks, Gruenewald, Karlamangla, Hu, Koretz & Seeman, 2014). The BBFM's mediation pathway from the family's emotional climate, to individual levels of biobehavioral reactivity and disease activity is empirically supported (e.g., Wood et al., 2008, Priest et al., 2015; Woods & Denton, 2014; Woods, 2014). However, there have been no studies to date that assess the BBFM with the inclusion of individual psychological factors predictive of health outcomes and reflective of resilience, as represented in the construct of eudaimonic well-being.

Statement of the Problem

Family systems researchers have identified specific mechanisms through which family interactions play a pivotal role in disease development and maintenance (e.g., Minuchin et al., 1975; Wood et al., 2000; Wood, 1993; Wood et al., 2006; Wood et al., 2008; Priest et al., 2015). The BBFM specifically defines the mediating pathway between family process, regulation, and illness in both children and adults (see Figure 1.) (Wood et al., 2006; Woods & Denton, 2014). However, the BBFM fails to take into consideration important individual psychological factors reflective of resilience, such as eudaimonic well-being, that have been proven to have direct effects on health (Singer & Ryff, 1999; Ryff, 2004; Ryff & Singer, 2000; Ryff et al., 2016; Friedman & Ryff, 2012, Kim, et al., 2013; Brooks et al., 2014). Without considering the role of resilience, and individual psychological factors reflective of resilience such as eudaimonic well-being, the BBFM misses potentially important elements that could play a major role in determining the underlying factors of health disparities across multiple populations.

Purpose of the Study

This study seeks to expand the BBFM to include eudaimonic well-being in order to better understand the underlying mechanisms of health outcomes. Testing an expansion of this model provides an advance on the prior science, which has already produced empirical support for this theoretical approach (e.g., Wood et al., 2000; Wood, 1993; Wood et al., 2006; Wood et al., 2008; Priest et al., 2015; Woods et al., 2014; Woods & Denton, 2014). Further, this information may assist clinicians in better

predicting which patients would benefit from specific, targeted family interventions. Numerous studies have shown that eudaimonic well-being plays a pivotal role in health across the lifespan (Singer & Ryff, 1999; Ryff, 2004; Ryff & Singer, 2000; Ryff et al., 2016; Friedman & Ryff, 2012, Kim, et al., 2013; Brooks et al., 2014), but research has yet to examine this construct in the context of the BBFM. The latest research on families has proven how intricately family environment is related to individual psychology and health (Carr and Springer, 2010; Priest et al., 2015; Woods et al., 2014; Woods & Denton, 2014). The current study seeks to combine these aspects of the literature, and expand a critical theoretical model, in order to better understand how family process and individual attributes interact to affect health outcomes.

Research Question and Hypotheses

The BBFM can be used to explain the mediating mechanism of individual family member biobehavioral reactivity, which is theorized to connect the family emotional climate and health outcomes. Families with an overall positive emotional climate provide greater resilience to stress and ultimately become a protective factor for disease development (Walsh, 2015; Wood et al., 2006). Each individual family member also has unique resilience processes and individual abilities to cope with stress; these abilities have a reciprocal relationship with the family emotional climate (Walsh, 2015; Wood et al., 2006). Specific to individual factors, eudaimonic well-being has been supported as a factor that protects individuals from the effects of many different aversive and stressful situations (Singer & Ryff, 1999; Ryff et al., 2004; Ryff & Singer, 2000; Ryff et al., 2016;

Friedman & Ryff, 2012, Kim et al., 2013; Brooks et al., 2014). Therefore, the mediation relationship posited by the BBFM will be expanded to include the construct of eudaimonic well-being in the present study.

Wood et al., (2000) expanded the BBFM to demonstrate how parental attachment could mediate the pathway between the family emotional climate and biobehavioral reactivity. This project intends to expand the BBFM in the same way by including eudaimonic well-being as a mediating variable, believed to arbitrate the relationship between family emotional climate and biobehavioral reactivity. In previous tests of the BBFM (e.g., Wood et al., 2000; Priest et al., 2015, Woods & Denton, 2014; Woods, et al., 2014), the first three mediation hypotheses are postulated:

(1) Family emotional climate is significantly directly associated with biobehavioral reactivity;

(2) Biobehavioral reactivity is significantly directly associated with disease activity; and,

(3) A nonsignificant pathway occurs between family emotional climate and disease activity, such that a significant indirect relationship between family emotional climate and disease activity occurs, as mediated by biobehavioral reactivity (see Figure 1).

Specific to the present project, the following mediation hypotheses are additionally posited:

(4) Family emotional climate is significantly directly associated with eudaimonic well-being;

(5) Eudaimonic well-being is significantly directly associated with biobehavioral reactivity; and,

(6) A nonsignificant pathway occurs between family emotional climate and biobehavioral reactivity, such that a significant indirect relationship between family emotional climate and biobehavioral reactivity occurs, as mediated by eudaimonic well-being (Figure 2).

The latter hypothesis expands the original BBFM, such that in the present project, a nonsignificant pathway between family emotional climate and biobehavioral reactivity is predicted. In other words, the original first hypothesis stated above is *not* predicted in the present study; a nonsignificant pathway is predicted between the family emotional climate which is mediated by eudaimonic well-being.

Summary

The current study sought to expand the BBFM and examine eudaimonic well-being as an additional mediating variable in the model. Research has already established the strong role of the family emotional climate on biobehavioral reactivity and disease activity. The present project aimed to establish whether individual levels of eudaimonic well-being play a pivotal role in mediating the effects of the family emotional climate on measures of biobehavioral reactivity, further impacting individual family members' disease activity.

CHAPTER II

LITERATURE REVIEW

Biobehavioral Family Model

Minuchin's psychosomatic family model was the first of its kind to describe how dysfunctional family structure could affect disease activity in chronically ill children, specifically those diagnosed with diabetes mellitus (Minuchin et al., 1975). One of the main criticisms of this pioneering model was the fact that it failed to take into account individual influence on the course of disease development (Wood, 1993). There was also a great deal of criticism with regards to Minuchin's experimental methods and data interpretation (Wood, Watkins, Boyle, Nogueira, Zimand, & Carroll, 1989). In response to criticisms of the model, Wood (1993) developed the BBFM. In this new systemic, multilevel theoretical model, Wood (1993) illustrated how family structure and processes interacted with individual psychophysiological responses hypothesized as mediators for the development and regulation of disease activity (see Figure 1).

Family Emotional Climate

The family emotional climate is one of two main structures in the BBFM that have been found to contribute to the development and pattern of disease activity. Specifically, the family emotional climate is a measure of the intensity of positive and negative family exchanges and overall family atmosphere (Wood et al., 2008). The

family emotional climate was originally composed of family structure constructs including proximity, general hierarchy, quality of parental relationship, triangulation, and responsivity of parents (Wood, 1993). Later, Wood included parent-child attachment in the model after studies confirmed that attachment does in fact function as a buffer between the family environment and disease development (Wood et al., 2000). In the latest version of the model, relational security has been added to encompass parent-child attachment and the construct of security. This new concept highlights the fact that children must feel secure in order to more effectively regulate their emotions, which then leads to lower levels of biobehavioral reactivity and, subsequently, less disease activity (Wood et. al., 2008; Wood et al., 2016). Though the model was originally tested in children it has since been substantiated with adult populations (e.g., Woods & Denton, 2014; Woods et al., 2014; Priest et al., 2015).

Biobehavioral Reactivity

With respect to the BBFM, biobehavioral reactivity is the second critical determinant of disease activity. This is the "pivotal construct" in which emotional dysregulation or regulation by an individual, combine with the influences of the family emotional climate and relational security to produce or reduce physical or emotional symptoms of disease activity (Wood et al., 2008). According to Wood et al. (2008), biobehavioral reactivity regulates the interaction of the emotional and biological systems such as the autonomic nervous system (ANS) and the hypothalamic-pituitary-adrenal axis

(HPA). Overactivation of these systems results in a biological shift in allostatic load, which eventually leads to disease development (Priest et al., 2015).

Allostatic Load

Allostasis is the way in which our bodies maintain balance or homeostasis for all of the bodies biological systems. Allostatic load is what occurs when our physiological and emotional systems are confronted with stressors that requires continuous activation of biological systems. This then causes the biological over production of mediating chemicals resulting in increased aging, mortality, and disease development (McEwen, 1998). When stress becomes extreme or chronic the allostatic process become over stimulated, resulting in continuous activation and dysregulation at multiple levels. Activation of one system produces chemical by-products that other systems must then work overtime to compensate in an attempt to bring the body back to homeostasis (Juster, McEwen, & Lupien, 2010). The process of adapting to chronic stress results in changes in three main systems; the cardiovascular system, the immune system and the neurological systems including the ANS, sympathetic nervous system (SNS) and the HPA (McEwen, 1998).

Allostatic process and the BBFM. The original BBFM uses biobehavioral measures of anxiety and depression for support but fails to use physiological markers to test reactivity. Priest et al. (2015) expanded the model by examining the physiological data to determine individual levels of biobehavioral reactivity. Priest et al. found that a negative family emotional climate predicted self-reports of anxiety and depression consistent with other studies. This study also expanded the model by examining multiple

biological system measures and found that allostatic load was elevated in participants with a negative family emotional climate (Priest et al., 2015).

Biobehavioral reactivity in the BBFM is related to allostatic load because prolonged activation of allostatic process results in chemical imbalances in the brain. It is these imbalances that can lead to anxiety and depressive disorders (McEwen, 2000). Prolonged anxiety and anticipatory anxiety have both been correlated with increases in allostatic load (McEwen, 1998). Also, physiological changes in the brain have been documented, specifically atrophy in the amygdala and hippocampus, as a result of increased allostatic load in patients who have been diagnosed with major depressive disorder. This suggest that the chemical imbalance resulting from the over activation of these areas due to allostatic load, results in physical damage to the brain and other organs (McEwen, 2003). This emphasizes the fact that the process of disease development and biobehavioral reactivity are strongly related.

Research on the BBFM. There is a great deal of research supporting the BBFM (Wood et al., 2000; Wood et al., 2006; Wood et al., 2008; Priest et al., 2015; Woods & Denton, 2014; Woods et al., 2014). This model was developed originally in response to observations of chronically ill children and the ways in which emotional responses of the family, along with other stressors, affected their physiological symptoms (Wood, 1993). In one of the earlier papers regarding this model, Miller and Wood (1997) found that emotional states (e.g., happiness and sadness) in children who had been diagnosed with asthma could cause changes in airway reactivity and pulmonary function. Happiness led to better pulmonary function and sadness increased biobehavioral reactivity, causing

anxiety that resulted in a decreased in pulmonary function (Miller & Wood, 1997). In a later study, researchers found evidence for the link between parent-child relationship and depression, noting that insecure attachment is highly correlated with depressive symptoms in children (Bleil, Ramesh, Miller, & Wood, 2000). This finding strengthened support for the idea that the family emotional climate has a direct effect on biobehavioral reactivity and supported the need for the addition of parent-child attachment to the model (Wood et al., 2000). In 2008, Wood et al. (2008) tested the effects of a negative family emotional climate on asthma symptoms and activity. They found that a negative family emotional climate was strongly linked to adolescent depression, which then predicted disease severity with regards to asthma symptoms.

Additional research has further demonstrated that the BBFM is an effective fit for populations other than chronically ill children, and applicable to conceptualizing the health of adult family members. For example, Woods and Denton (2014) examined family functioning and romantic relationships separately to study the effects of the family emotional climate on adult health outcomes. Measures of anxiety, depression, physical illness, and physical functioning were used to assess biobehavioral reactivity and disease activity. Results showed support for the model in a low-income population of adult primary care patients (Woods & Denton, 2014). Negative marital interactions and low social support have also been explored as exogenous factors in the BBFM. Both variables predicted biobehavioral reactivity, and in this particular study biobehavioral reactivity predicted disease activity (Woods et al., 2014).

Resilience

Resilience is an important concept when investigating health outcomes. Resilience is our ability to withstand and recover from the stress of everyday life, whether chronic or acute (Walsh, 2015). Resilience can be conceptualized at two important levels: the family level and the individual level. In terms of the BBFM, the family emotional climate is where family resilience can be conceptualized. Walsh (2016) has found that there are nine key processes that can be observed in resilient families. The key processes in Walsh's family resilience model include: meaning making of adversity, positive outlook, transcendence, flexibility, social and economic resources, connectedness, clarity in family communication, open emotional sharing, and collaborative problem solving (Walsh, 2016). Many of these key processes are reflected in the primary components of the family emotional climate such as proximity, generational hierarchy, parental relationship quality, and responsivity (Wood et al., 2006). When families have a positive emotional climate, this is believed to act as a protective factor for families experiencing high levels of stress (Walsh, 2016; Wood et al., 2006).

Though the BBFM and Walsh's model are similar, the family emotional climate fails to take into consideration meaning-making of adversity, positive outlook, and purpose in life. These concepts are further reflected in the research on eudaimonic well-being. Therefore, it may be that assessing both an individual's level of eudaimonic well-being and the effects of the family emotional climate could create a stronger measure of individual- and family-level resilience. Adding eudaimonic well-being to the BBFM may

strengthen the ability of the model to predict disease outcomes by accounting for resilience at both the individual and family level.

Eudaimonic Well-Being

According to Aristotle (1947), the highest achievement for any humans is to find happiness. How a society defines well-being is important across many different social practices from governments, parenting, teaching and preaching (Ryan & Deci, 2001). We are constantly striving to have a better life, to live longer, be happier and healthier. There are two types of happiness that have been defined by psychologists: eudaimonic happiness, or happiness that comes from authentic fulfillment of the self, and hedonic happiness, which is related to pleasure seeking and is referred to as subjective well-being (Ryff, 1989). Over the years, there has been a great deal of debate as to which type of happiness is more important with regards to positive functioning, physical, and emotional health (Deiner, Sapyta, & Suh, 1998; Ryff & Singer, 1998). This debate has led to the acceptance that both types of well-being are important, but in different ways. Well-being in general, whether subjective or eudaimonic, is an important construct when examining a person's daily experiences and overall psychological health.

More specifically, eudaimonic well-being is more than simply trying to find happiness. It is improving one's well-being through the fulfilment of psychological and emotional needs by participating in activities and relationships that make us fully engaged and authentic (Waterman, 1993). According to Waterman (1993), these types of

activities allow for “personal growth and development,” which leads to a type of happiness and fulfillment that hedonic happiness is not able to provide (p. 678).

Research on Eudaimonic Well-Being and Health

Ryff and Keys (1995) were the first to propose and test a model that defined the constructs that make up eudaimonic well-being. Ryff and Keys found that self-acceptance, personal growth, purpose in life, positive relations with others, environmental mastery, and autonomy were the most important constructs when conceptualizing eudaimonic well-being. Since its development, this model has allowed researchers to examine the effects of eudaimonic well-being on many different biological systems (Ryff & Singer, 2000).

Recently, researchers have been interested in eudaimonic well-being and its effects on different areas of health. Multiple studies have found associations between eudaimonic well-being and decreased mortality (Martín-María et al., 2017; Ryff, 2017). In a recent meta-analysis, it was found that eudaimonic well-being was strongly correlated with increased survival (Martín-María et al., 2017, Ryff, 2017). Studies have found that high levels of eudaimonic activity lowers cortisol levels, indicating that this type of well-being has effects at the HPA axis (Heller et al., 2013), one of the main systems affected by allostatic activation (McEwen, 2000). Three of the subscales of eudaimonia (i.e., purpose in life, positive relationships, and personal growth) have also been associated with changes in the brain including increased grey matter in the right insular cortex. This demonstrates the intricate link between well-being and biology

(Lewis, Kanai, Rees, & Bates, 2014). Also, this same region of the brain has been linked to increases in agency (Lee & Reeve, 2012), which from previous research, has positive associations with well-being (Helgeson, 1994).

Positive affect, including hope, has also been found to have protective effects in diseased populations. Tsenkova, Karlamangla, and Ryff (2016) examined the risk of developing diabetes in families where there was a parental history of the disease. The researchers found that subjects with a parental history of diabetes were at an increased risk for developing the disease. However, Tsemkova, Karlamangla & Ryff (2016) also found that positive affect was significantly associated with a statistically lower risk of developing diabetes even with a strong genetic predisposition.

Having purpose in life has been shown to be a protective factor for many different age-related health problems. Having a strong purpose in life has been found to significantly reduce the risk of stroke in older adults (Kim et al., 2013). Purpose in life has also been found to predict better health outcomes and improve longevity in aging populations (Ryff et al., 2016). These benefits have been documented for older adults who have comorbid conditions. For many aging adults, biological indicators of inflammation increase with the number of diagnosed diseases, but in patients with higher scores on purpose in life and positive relationship measures, their biological levels of inflammation actually decreased despite having multiple comorbidities (Friedman, & Ryff, 2012).

Environmental mastery, as defined by Ryff and Keyes (1995), is an ability to feel competent and control aspects of a person's external life. Though no health-related

studies have been done on this construct with relation to well-being, environmental mastery closely mirrors the psychological construct of locus of control. Health psychologist have looked at the effects of internal locus of control and health for many years. They have found that having an internal locus of control promotes better health behaviors such as not smoking, managing weight, following medical recommendations and other health promoting behaviors (Wallston, Wallston, & DeVellis, 1978).

Personal relationships are another important aspect of eudaimonic well-being and its effect on health. With regards to allostatic load, one study found that intimacy between couples has a buffering effect for work-related stress, based on measures of salivary cortisol levels (Ditzen, Hoppmann, & Klumb, 2008). Singer and Ryff (1999) also found that positive social relationships protected individuals against the development of high allostatic load in economically disadvantaged populations. In terms of families, higher levels of negative interactions were associated with higher levels of allostatic load (Brooks et al., 2014). Each of these studies emphasizes the effects that eudaimonic well-being can have on health outcomes and disease activity. Adding eudaimonic well-being to the BBFM would expand the model and potentially strengthen its ability to explain and predicting health outcomes and disease activity.

Resilience and Eudaimonic Well-Being

Each individual also has a unique ability to cope with stress that can enhance or diminish the relationship with the family emotional climate. For individuals facing adversity like low socioeconomic status (SES), mastery of the environment and personal

growth have been found to protect against decreases in self-rated health when compared to individuals with high SES (Lachman & weaver, 1998). For older adults, having a positive purpose in life (Friedman & Ryff, 2012), better social relationships and a higher sense of control was found to result in better health ratings and less physical disability in a longitudinal study of ageing (Cotter & Lachman, 2010). These findings all support the hypothesis that eudaimonic well-being plays a key role in resilience and is critical to overall health and morbidity.

Summary

The BBFM is a well-supported model that explains associations between a family's emotional climate, individual family members' biobehavioral reactivity, and disease activity. When examining the inclusion of individual factors that promote resilience and health in the BBFM, it is important to consider levels of eudaimonic well-being because of its well-established ability to also mediate health outcomes. Including eudaimonic well-being in the BBFM may create a stronger theoretical model with a better ability to predict and explain variability in health outcomes. Table 1 provides a summary of each of the three theoretical models variable and how they overlap.

CHAPTER III

METHODOLOGY

The study used publicly available data from the National Survey Midlife in the United States (MIDUS) (Ryff et al., 2012) to determine whether eudaimonic well-being serves as an additional mediating variable in the BBFM (Figure 2). The original MIDUS study is a national survey that assessed psychological function, demographic information, and health (Love, Seeman, Weinstein, & Ryff, 2010). The MIDUS II, Project 1 and 4 studies are follow-up data collections to MIDUS I. Project 4, the Biomarker Project, assessed bioindicators such as neuroendocrine, cardiovascular and immune function as well as measures of heart rate variability, cortisol, and blood pressure (Love et al., 2010). For the study, data from MIDUS II, Projects 1 and 4 was used. The following chapter will explain the specific sample and the measures used to test the current hypotheses.

Sample

The sample was obtained from the MIDUS II dataset, which was funded by the McArthur Foundation Research Network on Successful Midlife Development (Delaney, 2014). Data collection for the first wave took place from 1995 to 1996 and used mail-in surveys and random digit dialing to collect the surveys. It consists of 7,108 participants who range from 25 to75 years old. The sample included 54% females with an average age of 55. Further, 74.3% were caucasian, 66% were married, 31 % were college educated, and the average salary was $27,100 per year (Radler & Ryff, 2010).

The MIDUS data has been collected over the course of the last twenty years and has been published in three different waves, two subsequent to the initial 1995-1996 collection. The content surveyed includes a broad range of topics from demographic, socioeconomic, health histories, relational and social network characteristics, behavior patterns, dietary information, religious choices, future hopes, childhood characteristics and occupational information (Delaney, 2014).

The study included participants who completed both MIDUS II, Project 1 (N = 4006) and Project 4, the Biomarker Project (N = 1255), resulting in a sample size of 1,054. The data for this project was collected between 2004 and 2005, 10 years after the initial data collection of MIDUS I. Participants from the MIDUS II Project 1 were surveyed using phone interviews which were conducted over an 8-day period. For the MIDUS II project 4, the Biomarker Project, a subsample of Project 1, participants were required to travel to data collection sites and stay overnight for sample collection. Sample collections included a fasting blood draw, 12-hour urine collection and saliva. Specific to Project 4, the average age was 54, there were 56.8% females, 78% were white, 69% were married, 52% had a high school education, and 42% were college graduates. The average income for Project 4 participants was $41, 538 (Love et al., 2010).

The MIDUS II dataset is publicly available and used to test the current hypotheses. Before the data could be analyzed, pertinent data was filtered from the dataset. This was accomplished by first creating a codebook using source codes provided by the MIDUS project (Ryff et al., 2012) and matching that with the corresponding

responses. Once the codebook was complete, all unused variables were filtered out using SPSS. Finally, the remaining variables were analyzed using a structural equation model.

Measures

Family Emotional Climate

According to the BBFM, family constructs such as proximity, generational hierarchy, triangulation, spouse relationship quality, and responsivity all make up the family emotional climate (Wood et al., 2006). Therefore, similar to prior research investigating the BBFM (Priest et al., 2015), the following scales were used to measure family emotional climate: family support, family strain, intimate partner support, and intimate partner strain.

Family support. Family support was measured using data from the MIDUS II Project 1 data set. The family support scale is a 4-item scale with four Likert answer categories ranging from "a lot" to "not at all." The questions on the scale are as follows: (a) "Not including your spouse or partner, how much do members of your family really care about you?" (b) "How much do they understand the way you feel about things?" (c) "How much can you rely on them for help if you have a serious problem?" (d) "How much can you open up to them if you need to talk about your worries?" This family support measure was completed by a large portion of the MIDUS II sample (n = 4,003) with a Cronbach's alpha of .84 (Ryff et al., 2012).

Family strain. Family strain was also measured using a 4-item scale with 4 Likert answer categories ranging from "often" to "never." The items in this scale are as follows:

(a) Not including your spouse or partner, how often do members of your family make too many demands on you?" (b) "How often do they criticize you?" (c) "How often do they let you down when you are counting on them?" (d) "How often do they get on your nerves?" This scale has a sample size of N = 4003 and a Cronbach's alpha of .79.

Both the family support scale and the family strain scale were reverse coded and then averaged so that higher scores represented greater family support and less family stain (Ryff et al., 2012). Family support and strain data from the MIDUS II Project 4 subsample has been previously tested with the BBFM and found to have significant associations with measures of biobehavioral reactivity and disease activity (Priest et al., 2015).

Intimate partner support. This construct was measured using a 6-item Likert scale. Participants answered using four Likert categories ranging from "a lot" to "not at all." The items on the intimate partner support questionnaire are as follows: (a) "How much does your spouse or partner really care about you?" (b) "How much does he or she understand the way you feel about things?" (c) How much does he or she appreciate you?" (d) "How much do you rely on him or her for help if you have a serious problem?" (e) "How much can you open up to him or her if you need to talk about your worries?" (f) "How much can you relax and be yourself around him or her?" The scores were reverse coded and then averaged so that higher scores reflected greater support (Ryff et al., 2012). The total sample size for this scale was N=3049 and the Cronbach's alpha for this subscale was .90.

Intimate partner strain. This construct was measured using a 6-item scale with four Likert categories as answer options. Specific for this subscale, the answer categories range from “often” to “never.” The items on the questionnaire are as follows: (a) “How often does your spouse or partner make too many demands on you?” (b) “How often does he or she argue with you?” (c) “How often does he or she make you feel tense?” (d) “How often does he or she criticize you?” (e) “How often does he or she let you down when you are counting on him or her?” (f) “How often does he or she get on your nerves?” These scales were also reverse coded and then averaged so that higher scores reflect higher levels of strain (Ryff et al., 2012). The total sample for this sub scale is N= 3047 and the Cronbach’s alpha is .87.

Both the intimate partner support and intimate partner stain measures have been used previously to test intimate partner emotional climate in the context of the BBFM (Priest et al., 2015).

Biobehavioral Reactivity

According to the BBFM, biobehavioral reactivity is determined by a person’s emotional responsiveness and reactivity to family and environmental stress (Woods & Denton, 2014). The ANS plays a central role in the mediation of stress and can produce anxiety and depression symptoms when an individual is confronted with intensive emotional and external stressors (Wood et al., 2000). Therefore, the study used measures of depression, anxiety, and allostatic load to assess biobehavioral reactivity. Replicating Priest et al. (2015), in which the authors determined depression and anxiety operated as

one latent construct representing biobehavioral reactivity, and allostatic load as a separate manifest construct, the researcher entered the following three variables similarly in the analyses.

Depression. The Center for Epidemiological Studies Depression Inventory (CES-D) was be used to measure depression. This is a short form, self-report scale used to measure depressive symptoms in general populations (Lewinsohn, Seeley, Roberts, Allen, 1997). The inventory is a 20-item scale that uses Likert scale categories answers for coding. The answers range from "rarely or none of the time" to "most or all of the time." The CES-D includes the following example questions: "During the past week…" (a) "I was bothered by things that don't usually bother me." (b) "I did not feel like eating; my appetite was poor." (c) "I felt that I could not shake off the blues even with the help of my family and friends." (d) "I felt that I was just as good as other people." The sample size for the CES-D inventory in the Project 4 dataset was 1,255 participants, and the measure had a Cronbach's alpha of .89 (Ryff, Seeman, & Weinstein, 2013).

Anxiety. The Mood and Symptom Questionnaire was used to assess both depressive and anxious symptoms in MIDUS II, Project 4 participants (MASQ; Clark & Watson, 1991). Because the CES-D covered many of the same depressive symptoms, the present project utilized only two subscales from the MASQ that relate to anxiety, specifically the general distress-anxious symptoms and anxious arousal scales. Both subscales use a Likert scale coding for participant answers. The answer options range from "not at all" to "extremely." Both subscales add item scores to determine overall

levels of anxiety; higher scores equate to a greater number of symptoms and worse anxiety (Ryff, et al., 2013).

The general distress-anxious symptoms scale included the following questions: "How much have you felt or experienced things this way during the past week;" (a) "Felt afraid" (b) "Had diarrhea. (c) "Felt nervous." (d) "Felt uneasy." (e) "Had a lump in my throat." (f) "Had an upset stomach (g) "Felt keyed up, on edge, was unable to relax." (h) "Felt nauseous." (i) "Felt tense or high strung. (j) "Muscles were tense or sore." The sample size for the general distress-anxious symptom scale was N = 1255 and had a Cronbach's alpha of .818 (Ryff et al., 2013).

The anxious arousal scale included the following example questions: "How much have you felt or experienced things this way during the past week, including today:" (a) "Startled easily," (b) "Hands were shaky," (c) "Was short of breath," and (d) "Felt faint." The sample size for the anxious arousal scale was N = 1255 and the Cronbach's alpha level was .81 (Ryff et al., 2013).

Allostatic load risk. Participants in the MIDUS II, Project 4 Biomarker Project provided full medical histories and biological samples including blood, urine, and saliva that were used to assess the participant's major biological systems. Cardiovascular function was measured using a cholesterol panel, specifically looking gat levels of HA1c. Neuroendocrine levels were tested by measuring levels of cortisol, epinephrine, norepinephrine, dopamine and creatinine. Inflammatory responsiveness in participants was measured as a function of Fibrinogen, E-selectin, CRP, ICAM, IL-6, and sIL6r (Love et al., 2010). Previous studies have substantiated these measures including the allostatic

load risk score calculated by Brooks et al. (2014) and Priest et al. (2015); the latter specifically used allostatic load as a latent construct in a test of the BBFM. Contrary to Priest et al. (2015), however, the present study used the allostatic load risk score, which was calculated based on previous research (Brooks, et al., 2014) to reflect all seven allostatic load systems.

Eudaimonic Well-Being

Eudaimonic well-being is comprised of Ryff's (1989) six key constructs, including autonomy, personal growth, self-acceptance, purpose in life, positive relations with others, and mastery of the environment (Ryff et al., 2016). The MIDUS II Project 1 dataset, N = 4006, provides data from the self-administered, 7-item inventory to assess each of the six key constructs of eudaimonic well-being. This inventory was derived from the theoretical model developed by Ryff and Keyes (1995) that was used to identify and substantiate the six main factors of eudaimonic well-being. Because some of the constructs of eudaimonic well-being have a stronger overlap with Walsh's (2016) resilience model, this study only includes the most pertinent variables, including environmental mastery, personal growth, self-acceptance and purpose in life. Each of these scales was found to have high internal consistency and strong test-retest validity (Ryff et al., 2012). The answer options for each of the sections includes a 7-item Likert scale coding option that ranges from "strongly agree" to "strongly disagree" (Ryff et al., 2012). This inventory has previously been used to establish levels of eudemonic well-being (Keyes, Shmotkin, & Ryff, 2002) as well as to predict subjective health in relation

to overall well-being in a comparison study between American and German populations (Staudinger, Fleeson, & Baltes, 1999).

Previous research (Abbott et al., 2006) has demonstrated that only four of the six measures (environmental mastery, personal growth, self-acceptance, and purpose in life) are necessary to determine psychological well-being. Abbot et al. (2006) used factor analysis to determine that the four constructs mentioned above were the only measures necessary to determine psychological well-being. Therefore, the study used only those four constructs in the analysis.

Self-acceptance. Self-acceptance was measured using the following measures: (a) "When I look at the story of my life, I am pleased with how things have turned out." (b) "In general, I feel confident and positive about myself." (c) "I feel like many of the people I know have gotten more out of life than I have." (d) "I like most parts of my personality." (e) "In many ways, I feel disappointed about my achievements in life." (f) "My attitude about myself is probably not as positive as most people feel about themselves." (g) "When I compare myself to friends and acquaintances, it makes me feel good about who I am." The sample size for the self-acceptance scale was N = 4015 and it has a Cronbach's alpha of .84 (Ryff et al., 2012).

Environmental mastery. Scale items for environmental mastery included the following statements: (a) "In general, I feel I am in charge of the situation in which I live." (b) "The demands of everyday life often get me down." (c) "I do not fit very well with the people and the community around me." (d) "I am quite good at managing the many responsibilities of my daily life." (e) "I often feel overwhelmed by my

responsibilities." (f) "I have difficulty arranging my life in a way that is satisfying to me." (g) "I have been able to build a living environment and lifestyle for myself that is much to my liking." The sample size for the environmental mastery sub-scale was N = 4015 and it has a Cronbach's alpha of .78 (Ryff et al., 2012).

Personal growth. Scale items for personal growth included the following statements: (a) "I am not interested in activities that will expand my horizons." (b) I think it is important to have new experiences that challenge how you think about yourself and the world." (c) when you think about it, I haven't really improved much as a person over the years." (d) "I have a sense that I have developed a lot as a person over time." (e) "For me, life has been a continuous process of learning, changing, and growth." (f) "I gave up trying to make big improvements or changes in my life a long time ago." (g) "I do not enjoy being in new situations that require me to change my old familiar ways of doing things." The sample size for the personal growth scale was N = 4015 and it has a Cronbach's alpha of .75 (Ryff et al., 2012).

Purpose in life. Scale items used to measure purpose in life include the following: (a) "I live life one day at a time and don't really think about the future." (b) "I have a sense of direction and purpose in life." (c) I don't have a good sense of what it is I'm trying to accomplish in life." (d) "My daily activities often seem trivial and unimportant to me." (e) "I enjoy making plans for the future and working to make them a reality." (f) Some people wander aimlessly through life, but I am not one of them." (g) "I sometimes feel as if I've done all there is to do in life." The sample size for the purpose in life scale was N = 4015 and it has a Cronbach's alpha of .70 (Ryff et al., 2012).

Disease Activity

Specific to the present project, the following measures were used to assess disease activity: number of prescription medications, number of diagnosed physical health conditions, and symptoms (Ryff et al., 2013). Both number of prescription medications and number of health conditions measures of disease activity have been substantiated in prior research examining the BBFM and using MIDUS data (Priest et al., 2015).

Analysis

To test the present hypotheses, structural equation modeling (SEM) was used. Specifically, SEM was utilized to determine if the pathways between eudaimonic well-being, family emotional climate, biobehavioral reactivity, and disease activity are significant and whether significant mediation effects occur. SEM was chosen because there are multiple independent variables in this study and because it is the best option when there is missing data, like there is within the MIDUS II Project 1 dataset and the MIDUS II Project 4 dataset (Enders & Bandalos, 2001). To conduct SEM, Mplus statistical software (Version 7) was used (TYPE = GENERAL), with maximum likelihood with robust standard errors (MLR) to account for missing data (Priest et al., 2015).

Two models were used to test the above hypotheses, because the data includes both measures for family relationships and intimate partner relationships, reflective of family emotional climate. The first model, Figure 2, tested the associations between family emotional climate (i.e., family support and family strain), eudaimonic well-being,

biobehavioral reactivity, and disease activity with the full sample (n = 1050). The second model, Figure 3, tested the association between family emotional climate (i.e., as measured by intimate partner support and intimate partner strain), eudaimonic well-being, biobehavioral reactivity, and disease activity with a subsample of participants who indicate they are currently in a committed intimate partnership. (n = 810; Priest et al., 2015). A model trimming approach was used in order to identify significant pathways and to utilize the most parsimonious model.

This analytical approach replicated the method used by Priest et al. (2015). Specifically, dependent variables will be included in models as continuous indicators in order to produce model fit statistics and estimations of mediation. Overall, the chi-square test, standardized root mean square residual (SRMR), comparative fit index (CFI), and the root mean square error approximation (RMSEA) evaluated to assess model fit. Similar to Priest et al. (2015), the model was assumed to have a good fit to the data based on the fact that the chi-square statistic was small and nonsignificant, the SRMR less than .10, the CFI greater than .95, and the RMSEA less than .05 (Kline, 2011). Although the chi-square statistic provides the initial evaluation of model significance, this estimate provides a poor estimation of model fit when large samples are used. Therefore, the additional model fit statistics, which do not fluctuate in response to sample size, were also evaluated.

CHAPTER IV

RESULTS

Structural equation modeling was used to test both hypothetical models, with two unique operationalizations of the family emotional climate: Model 1, the family model and Model 2, the partner model. The standardized path coefficients along with indirect mediation effects and standard errors were estimated using Mplus Version 7 (Muthen & Muthen, 2012). As described in Chapter III, good model fit was indicated if the SRMR was less than .01, the CFI was greater than .95, and the RMSEA was less than .05 (Kline, 2011).

Model One: Family Model

The family model used a subset of participants from the National Survey of Midlife in the U.S. (MIDUS II; Ryff et. al, 2012) who also took part in MIDUS II, Project 4, the Biomarker Project (n = 1050). Model 1 tested the pathways between family emotional climate (using measures of family strain and family support), eudaimonic well-being (as a latent construct), biobehavioral reactivity (as measured by depression and anxiety as a latent construct and allostatic load as manifest), and disease activity (as a latent construct; see Figure 2).

The model demonstrated a good fit to the data (x^2 = 208.094, p = .000, RMSEA = 0.07, CFI = 0.95, SRMR = 0.04). Despite a large, significant x^2, this fit statistic is

sensitive to large sample size, as described above. Therefore, an evaluation of the remaining fit statistics demonstrates support for Model 1.

Specific to the hypothesized model expansion of the present project, standardized path coefficients demonstrated that family strain is directly and significantly associated with eudaimonic well-being (p = .047). Though the association between family support and eudaimonic well-being was not significant, it neared significance at p = 0.050. Additionally, eudaimonic well-being was directly and significantly associated with biobehavioral reactivity, as measured by depression and anxiety (p = 0.000). In support of the mediational hypothesis specific to eudaimonic well-being, the pathways from family strain to biobehavioral reactivity (i.e., depression and anxiety symptoms), and from family support to biobehavioral reactivity (i.e., depression and anxiety symptoms), were nonsignificant. Neither family emotional climate measures nor eudaimonic well-being were significantly related to allostatic load risk as a measure of biobehavioral reactivity, contrary to previous research (e.g., Priest et al., 2015).

In addition, as indicated by the original BBFM (Wood, 1993), standardized path coefficients demonstrated that biobehavioral reactivity (as a latent construct of depression and anxiety symptoms, as well as a manifest variable of allostatic load risk) is directly associated with disease activity (p = 0.000, for both), whereas neither family strain nor family support were significantly associated with the model's endogenous variable.

In summary, family strain was indirectly associated with biobehavioral reactivity, as measured by depression and anxiety symptoms, through eudaimonic well-being. In turn, eudaimonic well-being was indirectly associated with disease activity, through

biobehavioral reactivity (i.e., depression and anxiety). Family support neared significance, while allostatic load risk was only significantly associated with disease activity. The path coefficients for Model 1 can be found in Figure 4.

Mediation Effects

The results of the tests of indirect effects for Model 1 demonstrated partial support for the study's hypotheses (see Table 2). Specifically, the indirect effects of family strain on biobehavioral reactivity (i.e., measured as depression and anxiety symptoms), through eudaimonic well-being, were significant. While the tests of indirect effects of family strain on disease activity, through biobehavioral reactivity, represent the original BBFM hypotheses, the total effects include the additional mediators of eudaimonic well-being and allostatic load risk. Therefore, the nonsignificant total and total indirect effects are contrary to the original BBFM hypotheses, but reflect a more complicated analysis, and additional constructs, than indicated by the original BBFM pathways. These results, however, support the hypothesis specific to this project. Additionally, MPlus does not estimate indirect effects of family strain on disease activity with each of the three mediators in the model (i.e., eudaimonic well-being, biobehavioral reactivity measured as a latent construct consisting of depression and anxiety symptoms, and biobehavioral reactivity measured as allostatic load risk). Therefore, these results should be interpreted with caution.

Similar results were found for tests of indirect effects of family support on biobehavioral reactivity, which demonstrated a significant total and indirect effect on

depression and anxiety symptoms, with a nonsignificant direct effect (see Table 2). In addition, family support did not produce a significant total, or indirect effect on disease activity. As with the above mediation analyses, this specific test of indirect effects should be interpreted with caution given the multiple mediators, and differing pathways, across the hypothesized model.

Although not specifically hypothesized, the results of a test of indirect effects of eudaimonic well-being on disease activity are also reported (see Table 2). Both the total and indirect effects of eudaimonic well-being on disease activity were significant; the direct effect was nonsignificant, indicating full mediation.

In total, the mediation hypothesis for an indirect association between family emotional climate, as measured by family strain, and biobehavioral reactivity (measured by depression and anxiety symptoms) was supported. This result renders the original mediation hypothesis of the BBFM nonsignificant, such that eudaimonic well-being conveys the effects of family emotional climate on biobehavioral reactivity indirectly; therefore, family strain is associated with disease activity through the indirect effects of eudaimonic well-being on depression and anxiety, and depression and anxiety symptoms predictive of disease activity. The hypotheses specific to allostatic load risk as a measure of biobehavioral reactivity are not supported.

Model Two: Intimate Partner Model

The intimate partner model used a subset of participants from Model 1 that reported being in a committed romantic relationship (n = 810). Model 2 tested the

hypothesized associations between intimate partner stain and support as exogenous measures of family emotional climate, eudaimonic well-being (as a latent construct), biobehavioral reactivity (measured by depression and anxiety symptoms as a latent construct, and allostatic load as manifest; see Figure 5).

Model fit statistics demonstrated a good fit of the hypothesized model to the data (x^2 = 213.762 p = 0.000, REMSEA = 0.081, CFI = 0.929, SRMR = 0.035). As expected the x^2 value was large due to its sensitivity to sample size (Kline, 2011).

The standardized coefficients for the intimate partner model demonstrated support for the researcher's hypothesis. Specifically, intimate partner strain was significantly (p = 0.048) associated with eudaimonic well-being, which in turn was significantly (p = 0.000) associated with biobehavioral reactivity, which was measured by depression and anxiety symptoms. Biobehavioral reactivity was significantly (p = 0.000) associated with disease activity, which was measured using the individual's total number of prescriptions, conditions and symptoms. While the intimate partner support-eudaimonic well-being pathway neared significance, the p-value remained above threshold (p = .051), contrary to hypotheses. Neither intimate partner strain nor support was significantly associated directly with biobehavioral reactivity, as hypothesized.

In summary, the original hypothesized pathways of the BBFM are attenuated in the hypothesized model, and in the present results, such that eudaimonic well-being conveys the effects of intimate partner strain to biobehavioral reactivity (i.e., measured as depression and anxiety symptoms). The direct pathway of intimate partner strain to depression/anxiety is, therefore, no longer significant. However, the mediating variable of

biobehavioral reactivity (i.e., depression and anxiety) remains the meaningful contributor to disease activity, such that all other tested pathways to disease activity were nonsignificant. These results support the BBFM theory that individual emotion dysregulation and reactivity specific to relational stress is the contributing factor to psychophysiological processes that promote disease. However, the results suggest a potential meaningful shift in the model to include individual partners' eudaimonic well-being (a measure of resilience) as a meaningful mediator, through which the intimate partner emotional climate effects biobehavioral reactivity.

The results of Model 2 reflect the results of Model 1's path analyses, such that relational support is not significantly associated with eudaimonic well-being nor either measure of biobehavioral reactivity. Additionally, allostatic load risk is predictive of disease activity, but not associated with the family emotional climate nor eudaimonic well-being. Lastly, neither family or intimate partner emotional climate nor eudaimonic well-being are significantly associated with disease activity; all direct effects occur through depression and anxiety.

Mediation Effects

The results of the test of indirect effects for Model 2 demonstrated partial support for the study's hypothesis (see Table 3). Specifically, the indirect effects of intimate partner strain on biobehavioral reactivity (i.e., depression and anxiety), through eudaimonic well-being, were significant. The test of indirect effects of intimate partner strain on disease activity, representative of the original BBFM model, and were found to be nonsignificant. Though intimate partner support did not produce significant direct or

indirect effects on disease activity, the indirect effects, which included eudaimonic well-being as a mediating factor, neared significance ($p = 0.051$). The nonsignificant results were contrary to the original BBFM hypothesis, and reflect a more complicated analysis and the addition of eudaimonic well-being as a mediator representative of individual resilience.

Overall, the mediation hypothesis for Model 2 for an indirect association between the intimate partner emotional climate, as measured by intimate partner strain and biobehavioral reactivity (measured by anxiety and depression symptoms) was supported. As with the results from Model 1, these results render the original mediation hypothesis of the BBFM nonsignificant. Specifically, adding eudaimonic well-being to the model reduces the effects of the association between the intimate partner emotional climate on biobehavioral reactivity so much so that it renders it nonsignificant. Therefore, partner strain is associated with disease activity through the indirect effects of eudaimonic well-being on biobehavioral reactivity and biobehavioral reactivity on disease activity.

CHAPTER V

DISCUSSION

The family resilience model and the Biobehavioral Family Model (BBFM) have both become important theories for understanding how families and individuals differ in terms of resilience and health outcomes, respectively (Walsh, 2002; Wood, 1993). The current study sought to overlay these theoretical models in order to better understand the relationship that family emotional climate has on individual psychological well-being, including aspects of resilience, and the consequential effects of these processes on health. The researcher chose to include eudaimonic well-being as a representative variable for resilience within the framework of the BBFM, in order to better understand family influences on health outcomes. Therefore, the present study sought to expand upon current research utilizing the BBFM to investigate associations between individual psychological health, family emotional climate, and health outcomes (e.g., Walsh, 2018; Wood et al., 2006). Although the validity of the BBFM had been well established (e.g., Wood et al., 2000; Wood, 1993; Wood et al., 2006; Wood et al., 2008; Priest et al., 2015; Woods et al., 2014; Woods & Denton, 2014), the effects of individual characteristics, beyond the model's construct of individual biobehavioral reactivity, have yet to be substantiated. Conversely, resilience (conceptualized as eudaimonic well-being) had not been studied in connection to biobehavioral reactivity and disease activity. In this way,

the current project not only expands the research on the BBFM, but also on Walsh's (2016) resilience model.

Summary of Hypotheses

This study was conducted to expand the BBFM to include eudaimonic well-being as an additional mediating factor in the family emotional climate in order to more fully understand the effects that an individual's psychological resilience has on biobehavioral reactivity and ultimately disease activity. Two separate models, utilizing unique family emotional climate variables, were used to test the hypotheses. The first was a family emotional climate model and the second was an intimate partner model. These models were used to replicate earlier tests of the following hypotheses:

1) Family emotional climate is significantly, directly associated with biobehavioral reactivity;

2) Biobehavioral reactivity is significantly, directly associated with disease activity; and,

3) A nonsignificant pathway occurs between the family emotional climate and disease activity, such that a significant indirect relationship between family emotional climate and disease activity occurs, as mediated by biobehavioral reactivity. These hypotheses had been previously confirmed.

For this project, the following hypotheses are specific to the mediation pathways and, as described in Chapter 1.

4) The family emotional climate is significantly, directly associated with eudaimonic well-being;

5) Eudaimonic well-being is significantly, directly associated with biobehavioral reactivity; and,

6) A nonsignificant pathway occurs between family emotional climate and biobehavioral reactivity, such that a significant indirect relationship between emotional climate and biobehavioral reactivity occurs, as mediated by eudaimonic well-being (see Figure 2). These hypotheses outline the previously tested relationships that have been defined by the BBFM with the addition of the mediator variable eudaimonic well-being.

Model One – Family Emotional Climate

The model, Figure 4, supported expanding the BBFM to include resilience, operationalized as eudaimonic well-being, as an additional mediator in the model. Specifically, family emotional climate (FEC; measured as family strain and family support) significantly predicts biobehavioral reactivity (as measured by depression and anxiety symptoms), indirectly through eudaimonic well-being. In addition, results supported biobehavioral reactivity as a significant direct predictor of disease activity: higher levels of anxiety and depression symptoms were associated with greater disease activity (i.e., increased number of diagnoses, number of prescribed medications and symptomology).

The analysis indicated that eudaimonic well-being was a significant mediator of biobehavioral reactivity when the family emotional climate was strained, as compared to

when the emotional climate was supportive. This could indicate that in a strained family environment, individual resilience is more important in regulating stress, because these individuals lack the nurturance and resilience provided in a supportive family environment. It is possible that supportive family environments offer a protection that strained families do not, and therefore require that individual family members be more psychologically resilient to stress in order to maintain lower levels of biobehavioral reactivity and subsequent disease activity.

The data used for this study was cross-sectional and, therefore, potentially limited the significance of allostatic load. Allostatic load was not directly or indirectly associated with the family emotional climate nor eudaimonic well-being, though it was significantly associated with disease activity. Higher allostatic risk scores were associated with increased disease activity. Allostatic load measures long-term wear and tear of the biological systems. Because these measures were only taken at one point in time, there is decreased possibility for finding significance. Similar to prior research, the analysis did find that allostatic load was associated with disease activity, however this model failed to connect it with measures of the family emotional climate.

Model Two – Intimate Partner Emotional Climate

Model 2, Figure 5, also found support for expanding the original BBFM to include eudaimonic well-beings as an additional mediator representative of resilience. Model 2 demonstrate significant associations between the intimate partner climate (measured as support and strain), biobehavioral reactivity (measured as depression and

anxiety symptoms), and disease activity (number of disorders, prescriptions and symptoms). The results of this analysis failed to find support for the hypothesis specific to the BBFM, but did find support for the hypothesis specific to this project.

Specific to this study, intimate partner strain was significantly associated with eudaimonic well-being and anxiety and depression. Having higher levels of eudaimonic well-being allowed individuals in this study to maintain lower levels of biobehavioral reactivity, despite the strain in the partner relationship. The analysis did not demonstrate a significant relationship between partner support, eudaimonic well-being, and biobehavioral feedback. This could indicate that supportive relationships provide additional protections, which increase resilience, but that are independent of an individual's eudaimonic well-being. As hypothesized, eudaimonic well-being was significantly associated with biobehavioral reactivity. Therefore, the mediation hypothesis was supported in that there was an indirect pathway between the intimate partner emotional climate and biobehavioral reactivity when mediated by eudaimonic well-being.

Limitations and Future Research

Results of the current study should be considered with regards to the study's limitations. First, the data were not ethnically or economically diverse. The majority of participants were caucasian and middle class. Also, the data were cross-sectional, and in order understand fully the effects of allostatic over-functioning by biological systems would require the use of longitudinal data. Using a cross-sectional design also makes it

difficult to make long-term assumptions regarding health outcomes or psychological well-being. Future research could benefit from testing these models using longitudinal data.

Another limitation of the data set was the measure from which the analysis was conducted. Specifically, the measures for family and partner support and stain were limiting and should be expanded in future research. Family relationships were also not differentiated in this study. Future research should look at the types, longevity and number of family relationships in order to expand the model further.

The data came from a secondary data source from which the researcher was unable to control the measures used and how the data were collected. Many of the measures were self-reports (i.e., eudaimonic measures and partner/family measures). This could have affected how participants answered the questions. Also, answers could have varied from day to day based on current stress level, mood or health at that time. Because the measures were self-reports, interpretation of a question's meaning could have also affected individual answers.

Implications

Model Implications

The results of this study suggest that eudaimonic well-being should be included in the BBFM as a measure of individual resilience. The current study failed to find support for the original BBFM hypothesis when eudaimonic well-being was included in the analysis. This indicates that without the inclusion of individual measure of psychological

well-being, that the model is incomplete and is not longer the best predictor of biobehavioral reactivity and disease activity.

Clinical Implications

Understanding how individual psychological traits, family systems and health are connected can be useful for both medical and mental health applications. The results from Models 1 and 2 highlighted the fact that families and intimate partners affect health and well-being in a variety of ways. Quick assessments in medical clinics could be used to determine a person's current level of family support, which could then be used to flag individuals who would benefit from referrals for additional mental health support.

This study also found strong support for the importance of an individual's psychological well-being. Well-being therapy is an empirically tested therapeutic model that has been used in conjunction with Cognitive Behavioral Therapy in which interventions aimed at improving the six constructs of Ryff's well-being model are implemented (Fava, 1998; Fava & Ruini, 2003). The use of a well-being therapeutic model has been found effective in treating generalized anxiety and recurrent depression in individuals (Fava & Tomba, 2009). This model has not yet been tested in family therapy. Including this type of model in a family therapy setting could work to improve a family's overall level of resilience, while increasing individual levels of eudaimonic well-being.

This study was intended to expand the BBFM by including individual psychological measures of well-being, which were reflective of resilience in order to

improve our understanding of how families and individual psychological traits affect health outcomes. Both models emphasize the importance of psychological well-being and its ability to shield against the effects of strain in both family and in intimate partner relationships. This study highlights the need for therapists to include assessments of individual levels of psychological well-being for all family members, especially in families where there is high stress or conflict.

Conclusion

The present study sought to expand the current research on health and families to highlight the importance of resilient families. It is clear that the psychological well-being of each individual family member is important and can act as a protection against a strained family environment. Research on the BBFM has already revealed how the family emotional climate can affect health and illness through an individual's level of biobehavioral reactivity. The current study has established that individual levels of eudaimonic well-being it can serve as an additional mediator between the family environment and biobehavioral reactivity. This is meaningful because the more mental and medical health professionals understand about health outcomes, the more adept they will be at providing interventions and treatments that could provide the best care possible.

This research also highlights the importance of collaboration between the medical and mental health fields. Everything is connected and, in an effort, to give every patient the best care possible, it is critical that both medical and mental health providers understand the intricate association between individuals, their family systems and their

health. If mental health and medical professionals could one day create a better system that is able to incorporate each of these variables, then health outcomes could be greatly improved for this generations and many to come.

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APPENDIX A

Tables and Figures

Table 1.

Table of variables from each of the theoretical models with highlighting to indicate model overlap.

Family Emotional Climate (Wood, 1993)	Eudaimonic Well-being (Ryff, 2017)	Walsh's Family Resilience Model (Walsh, 2016)
Proximity	Purpose in life	Spirituality & Transcendence (Purpose in Life)
General Hierarchy	Personal Growth	Positive outlook
Responsivity	Autonomy	Meaning making
Relational quality	Self-acceptance	Social and economical resources
	Environmental mastery	Collaborative problem solving
	Personal relationships	Connectedness
		Flexibility
		Clarity
		Sharing

Table 2.
Tests of indirect and direct effects, Model 1 (n = 1050)

	Estimate	Standard Error	*p*-value
Family Support → BBR			
Total	-3.106	1.574	0.048
Indirect			
Support→EWB→BBR	-1.378	0.706	0.051
Direct			
Support→BBR	-1.728	0.913	0.058
Family Strain → BBR			
Total	3.052	1.524	0.045
Indirect			
Strain→EWB→BBR	1.388	0.701	0.048
Direct			
Strain→BBR	1.664	0.872	0.056
Family Support → DA			
Total	-1.629	0.883	0.065
Indirect			
Support→BBR→DA	-0524	0.309	0.089
Indirect			
Support→BBR & EWB→ DA	-0.418	0.238	0.079
Direct			
Support→DA	-0.448	0.391	0.251
Family Strain → DA			
Total	1.610	0.864	0.062
Indirect			
Strain→BBR→DA	0.505	0.295	0.087
Indirect			
Strain→BBR & EWB→ DA	0.421	0.237	0.075
Direct			
Strain→DA	0.463	0.391	0.236
Family Support → ALrisk			
Total	-0.320	0.328	0.330
Indirect			
Support→ EWB→ ALrisk	-0.133	0.123	0.279
Direct			
Support→ALrisk	-0.187	0.313	0.550
Family Strain → ALrisk			
Total	0.263	0.317	0.407
Indirect			

Strain→ EWB→ ALrisk	0.134	0.123	0.277
Direct			
Strain→ALrisk	0.129	0.308	0.675

EWB→DA			
Total	-0.234	0.042	0.000
Indirect			
EWB→BBR→DA	-0.164	0.040	0.000
Direct			
EWB→DA	-0.053	0.053	0.317

BBR = Biobehavioral Reactivity, DA = Disease Activity, EWB = Eudaimonic Well-Being, ALrisk = Allostatic Risk.

Table 3.

Tests of indirect and direct effects, Model 2 (n = 877)

	Estimate	Standard Error	*p*-value
Partner Support → BBR			
Total	-2.167	1.122	0.054
Indirect			
Support→EWB→BBR	-1.445	0.741	0.051
Direct			
Support→BBR	-0.721	0.477	0.130
Partner Strain → BBR			
Total	2.073	1.066	0.052
Indirect			
Strain→EWB→BBR	1.456	0.737	0.048
Direct			
Strain→BBR	0.617	0.437	0.158
Partner Support → DA			
Total	-0.403	0.457	0.378
Indirect			
Support→BBR→DA	-0.265	0.188	0.158
Indirect			
Support→BBR & EWB→ DA	-0.530	0.292	0.069
Direct			
Support→DA	0.432	0.452	0.340
Partner Strain → DA			
Total	0.367	0.448	0.413
Indirect			
Strain→BBR→DA	0.226	0.171	0.186
Indirect			
Strain→BBR & EWB→ DA	0.534	0.291	0.066
Direct			
Strain→DA	-0.430	0.448	0.338
Partner Support → AR			
Total	-0.230	0.319	0.471
Indirect			
Support→ EWB→ AR	-0.006	0.110	0.956
Direct			
Support→AR	-0.224	0.337	0.506
Partner Strain → AR			
Total	0.211	0.317	0.507
Indirect			

Strain→ EWB→ ALrisk	0.006	0.111	0.956
Direct			
Strain→ALrisk	0.204	0.335	0.542

BBR = Biobehavioral Reactivity, DA = Disease Activity, ALrisk = Allostatic Risk, EWB = Eudaimonic Well-Being.

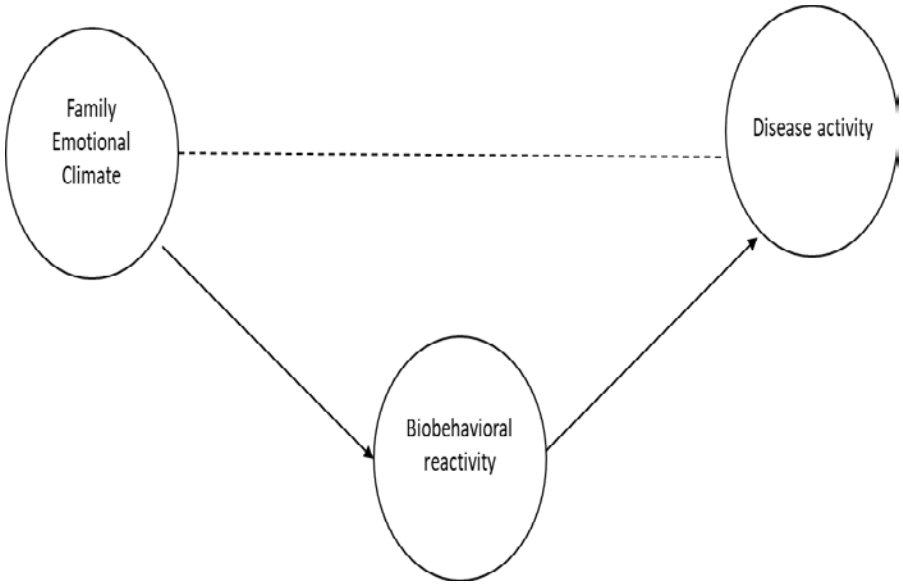


Figure 1. Biobehavioral Family Model (Wood, 1993)

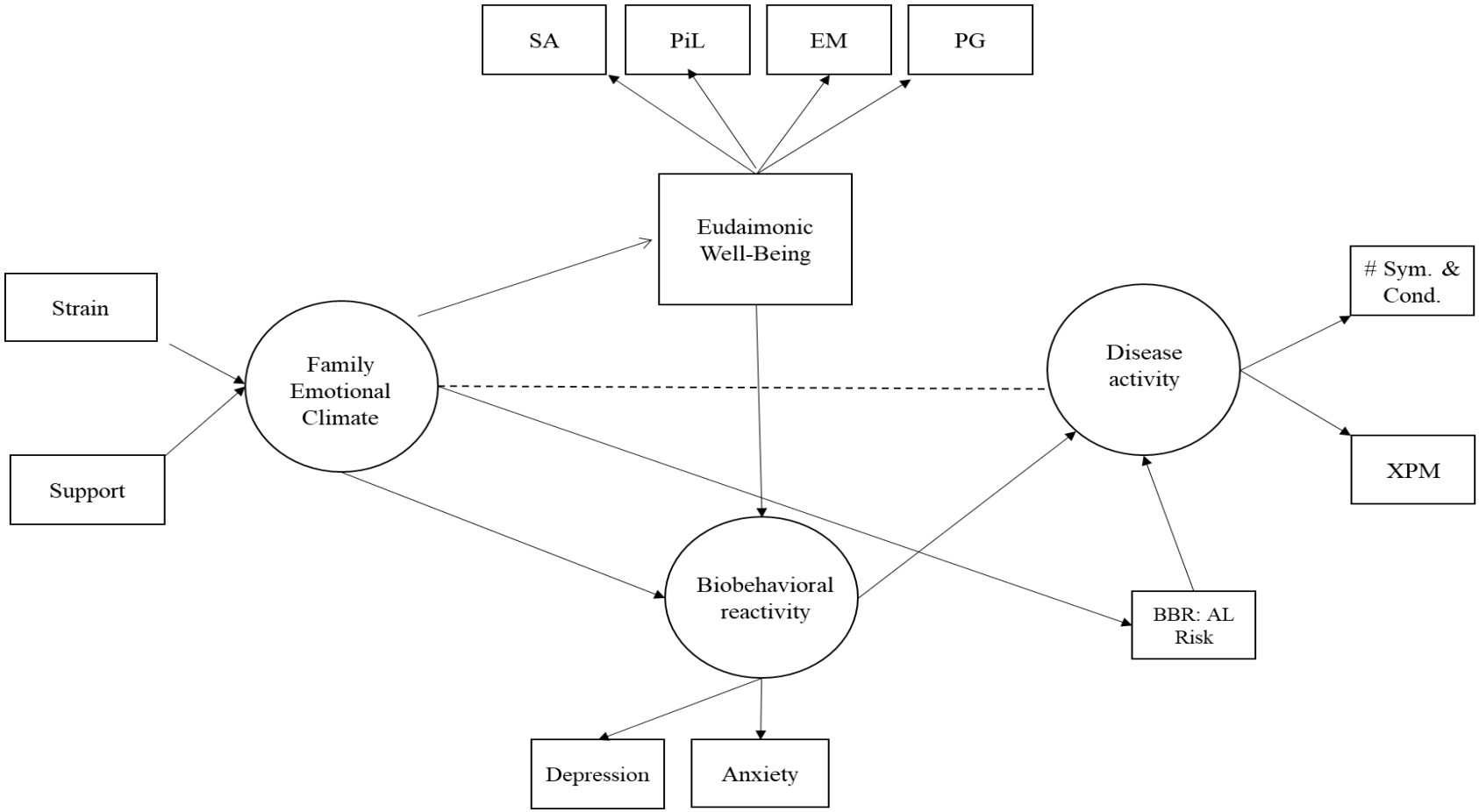


Figure 2. Hypothesized Model 1, SA = Self-acceptance, PiL = Purpose in life, EM = Environmental mastery, PG = Personal growth, #Sym. & Cond. = Number of symptoms and conditions, XPM = Total number of prescriptions, BBR = biobehavioral reactivity, AL Risk = Allostatic load risk score.

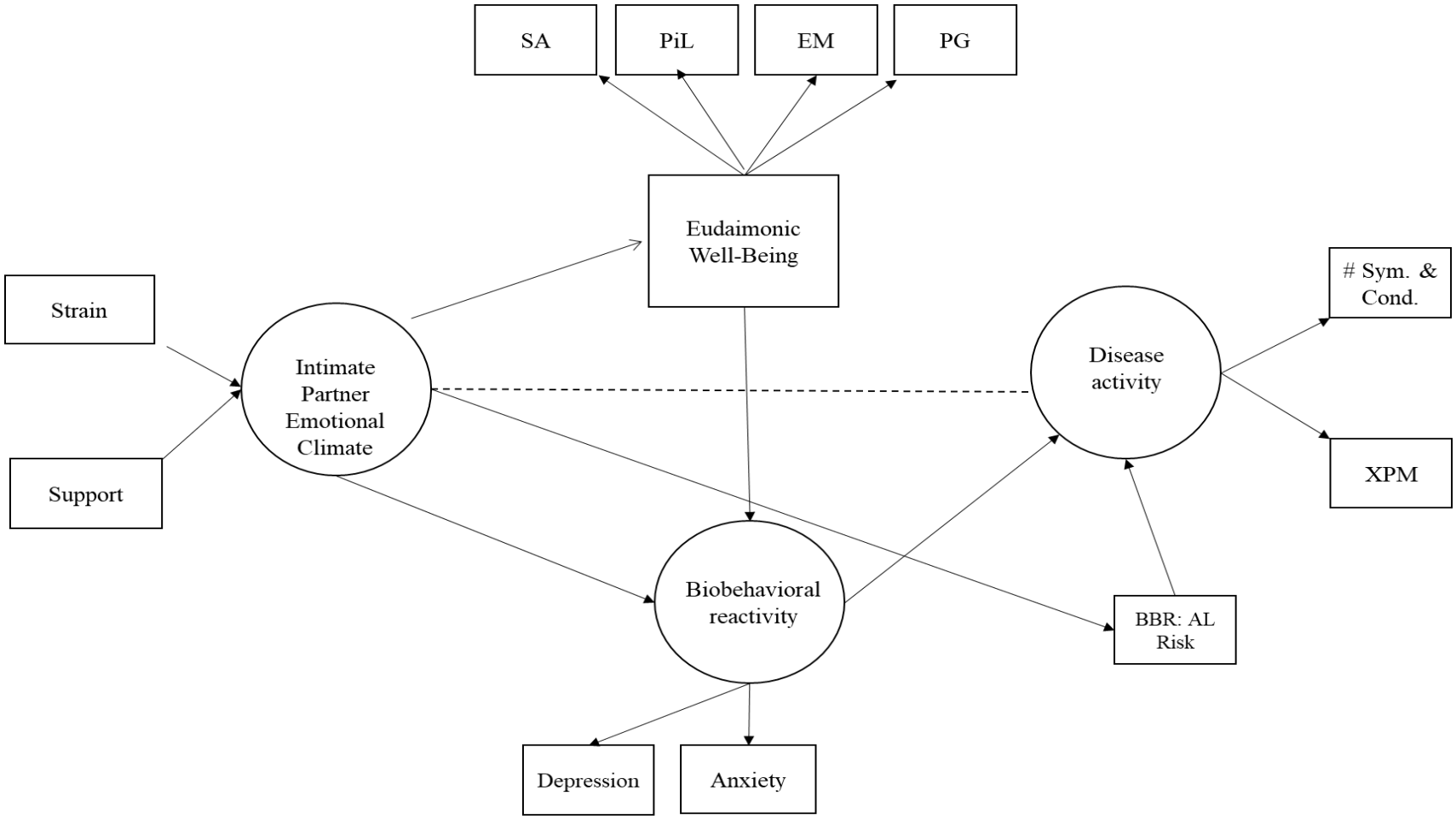
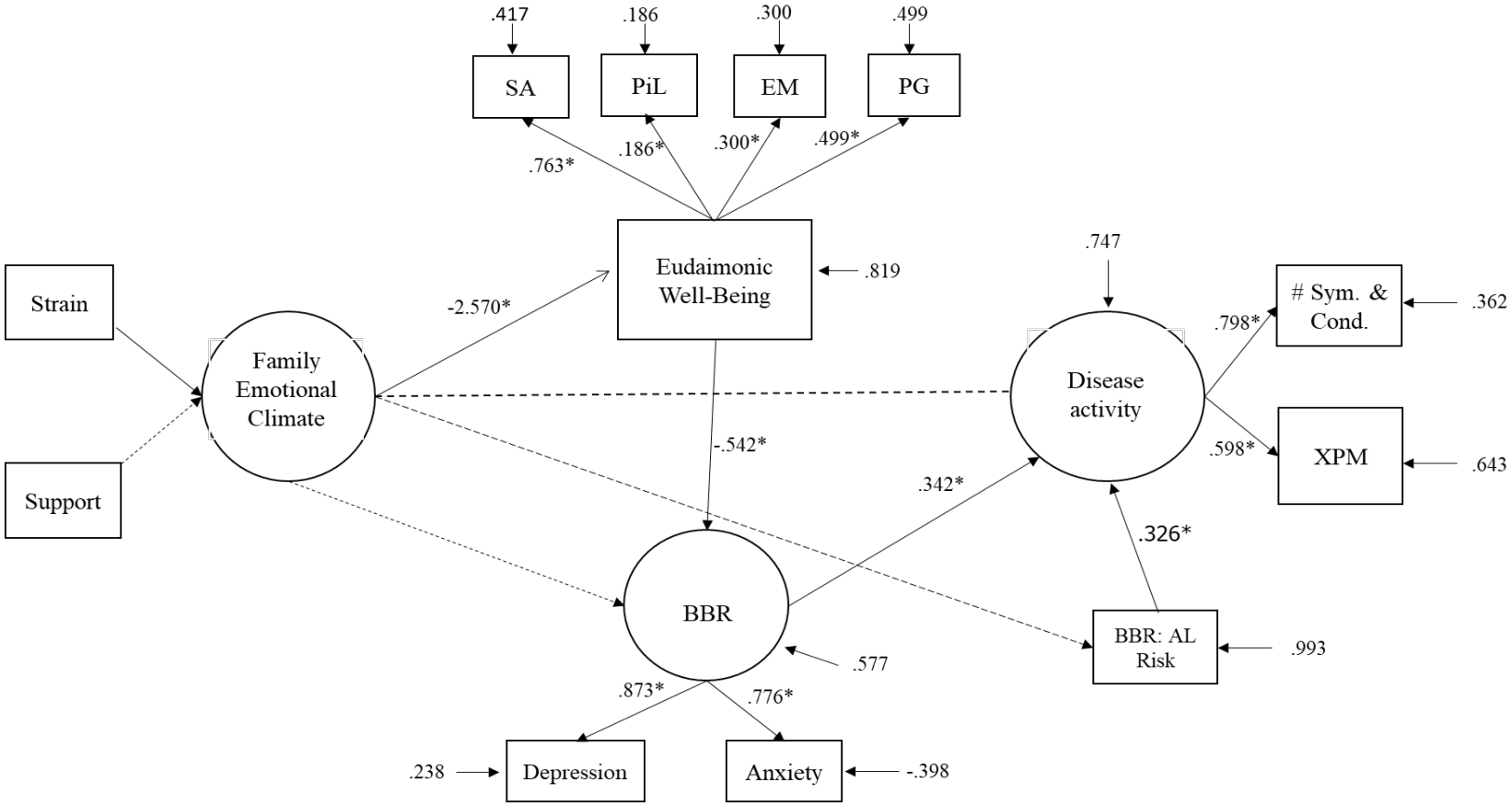
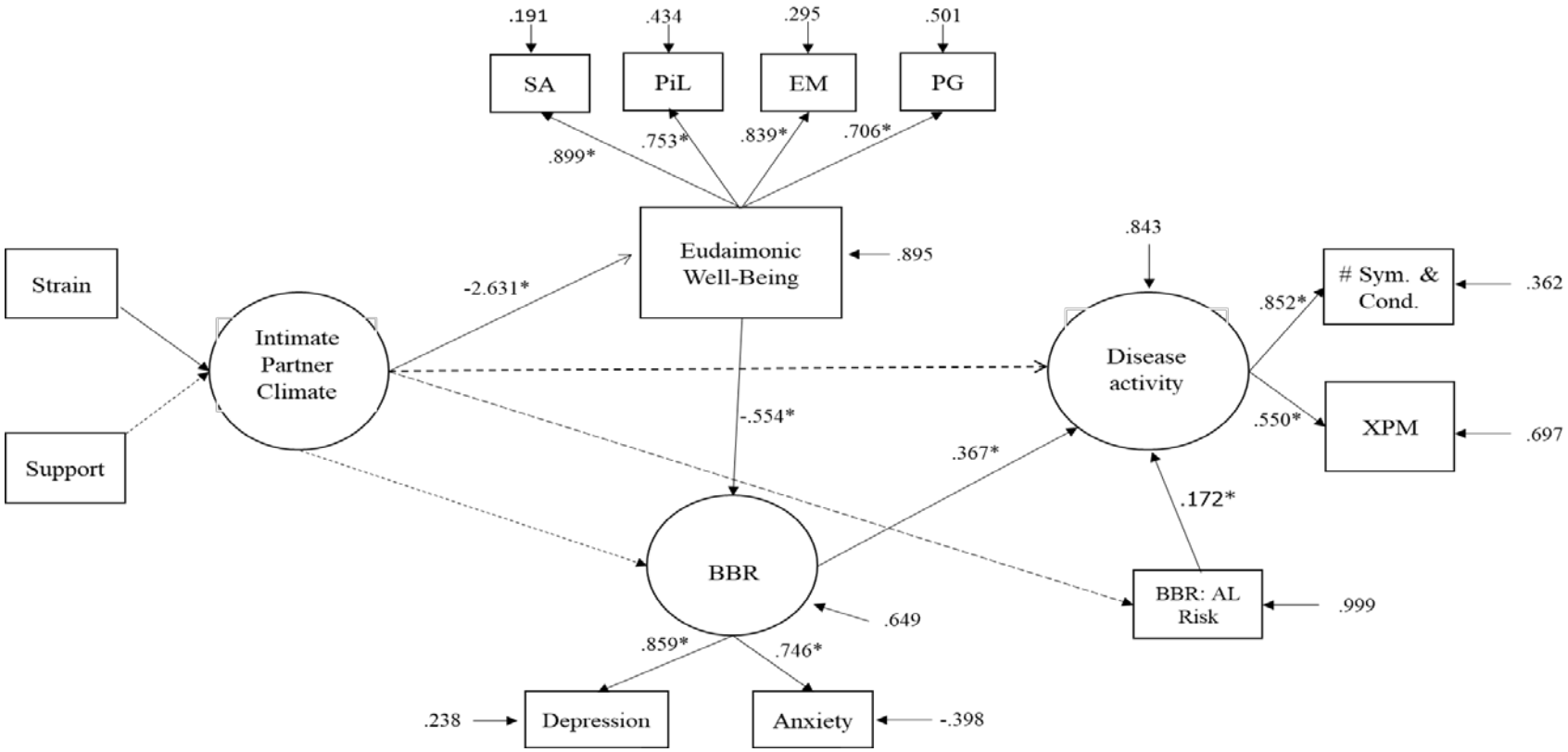


Figure 3. Hypothesized Model 2. SA = Self-acceptance, PiL = Purpose in life, EM = Environmental mastery, PG = Personal growth, #Sym. & Cond. = Number of symptoms and conditions, XPM = Total number of prescriptions, BBR = biobehavioral reactivity, AL Risk = Allostatic load risk score.



x^2 = 208.094, p = 0.000, RMSEA = 0.071, CFI = 0.950, SRMR = 0.035.

Figure 4. Family Model 1 Results, SA = Self-acceptance, PiL = Purpose in life, EM = Environmental mastery, PG = Personal growth, #Sym. & Cond. = Number of symptoms and conditions, XPM = Total number of prescriptions, BBR = biobehavioral reactivity, AL Risk = Allostatic load risk score. *p < .050.



x^2 = 213.762, p = 0.000, RMSEA = 0.081, CFI = 0.929, SRMR = 0.035.

Figure 5. Intimate Partner Model 2 Results, SA = Self-acceptance, PiL = Purpose in life, EM = Environmental mastery, PG = Personal growth, #Sym. & Cond. = Number of symptoms and conditions, XPM = Total number of prescriptions, BBR = biobehavioral reactivity, AL Risk = Allostatic load risk score. *p < .050.