



The Biobehavioral Family Model: Close relationships and allostatic load



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ARTICLE INFO

Article history:

Received 13 March 2015

Received in revised form

4 August 2015

Accepted 14 August 2015

Available online 17 August 2015

Keywords:

Biopsychosocial

Family

Couple relationships

Depression

Physical health

Anxiety

ABSTRACT

Rationale: This study tested the inclusion of allostatic load as an expansion of the biobehavioral reactivity measurement in the Biobehavioral Family Model (BBFM). The BBFM is a biopsychosocial approach to health which proposes biobehavioral reactivity (anxiety and depression) mediates the relationship between family emotional climate and disease activity.

Methods: Data for this study included a subsample of $n = 1255$ single and married, English-speaking adult participants (57% female, M age = 56 years) from the National Survey of Midlife Development in the United States (MIDUS II), a nationally representative epidemiological study of health and aging in the United States. Participants completed self-reported measures of family and marital functioning, anxiety and depression (biobehavioral reactivity), number of chronic health conditions, number of prescribed medications, and a biological protocol in which the following indices were obtained: cardiovascular functioning, sympathetic and parasympathetic nervous system activity, hypothalamic pituitary adrenal axis activity, inflammation, lipid/fat metabolism, and glucose metabolism.

Results: Structural equation modeling indicated good fit of the data to the hypothesized family model ($\chi^2 = 125.13$, $p = .00$, SRMR = .03, CFI = .96, TLI = .94, RMSEA = .04) and hypothesized couple model ($\chi^2 = 132.67$, $p = .00$, SRMR = .04, CFI = .95, TLI = .93, RMSEA = .04). Negative family interactions predicted biobehavioral reactivity for anxiety and depression and allostatic load; however couple interactions predicted only depression and anxiety measures of biobehavioral reactivity.

Conclusion: Findings suggest the importance of incorporating physiological data in measuring biobehavioral reactivity as a predicting factor in the overall BBFM model.

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Links between adult intimate partner and family relationships and physical health are well documented in the literature (Carr and Springer, 2010; Cohen, 2004; Woods et al., 2014). Higher reports of negative intimate partner and family functioning are linked to increased anxiety and depression symptoms (Priest, 2013; Whisman, 2007), and higher reports of anxiety and depression symptoms are associated with chronic diseases (Woods et al., 2014). Additionally, there is an increased focus in research on testing pathways tying relational variables to health outcomes (e.g., Kiecolt-Glaser et al., 2010; Kiecolt-Glaser and Newton, 2001; Kouvonen et al., 2011). This study attempted to ameliorate gaps in

the literature, including a need for an increased focus on precise pathways by which negative family and intimate partner functioning stresses biological systems, and the need for specific physiological risk factors and outcomes using population-level data and biomarker studies (Carr and Springer, 2010; Wood and Miller, 2005). Specifically, we investigated and expanded the applicability of the Biobehavioral Family Model (BBFM; Wood, 1993), a multilevel biopsychosocial theoretical model explaining the effects of close relationships on health. Close relationships, in particular, are important to investigate as they can both buffer and potentiate risk factors related to health (Wood and Miller, 2002), in part due to the higher level of emotional intensity that these relationships tend to have compared to other social relationships, as well as their continued duration over the lifespan (Weihs et al., 2002).

The BBFM has been substantiated with lab-based family interaction studies (e.g., Wood et al., 2008) and findings suggest that the

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model is useful in highlighting family–psycho–biological pathways by which relational stress affects health outcomes (Wood et al., 2015). However, research evaluating the BBFM with adult family members has yet to incorporate objective physiological data (e.g., Woods and Denton, 2014; Woods et al., 2014; Priest and Woods, 2015), thereby limiting the measurement of the biobehavioral reactivity construct and the applicability of the model to guide clinical intervention. Specifically, subjective measures of depression and anxiety are often used to measure the biobehavioral reactivity construct. In this study, we included measures of allostatic load (McEwen, 1998) to expand the biobehavioral reactivity construct. We first tested whether allostatic load and self-reported measures of depression and anxiety provided better measurement as a single construct or as two separate but related constructs. We then used the best fitting measurement to reexamine the hypothesized pathways of the BBFM.

1. The Biobehavioral Family Model

The Biobehavioral Family Model (BBFM) is a biopsychosocial approach (Engel, 1977) to health that has integrated family functioning, psychological health, and physical health outcomes into a comprehensive model (Wood, 1993). The goal of this model was to connect principles of general systems theory (von Bertalanffy, 1969) with Minuchin's psychosomatic family model (Minuchin et al., 1978) to account for the impact of psychosocial factors on biological processes and disease activity (Wood and Miller, 2002). In the BBFM, family relationships serve as integral aspects of individual family member functioning that can serve to improve or aggravate health outcomes (Wood and Miller, 2002). The model theorizes the reciprocal nature of social, emotional, and physical influence on the experience of illness. In other words, the BBFM posits that there is responsivity at both the interpersonal (family) and individual levels and that individual responsivity/reactivity is “a pivotal factor and bidirectional pathway by which family patterns and disease processes influence one another” (Wood, 1993, p. 266). Wood (1993) suggests that individual and interpersonal responsivity interact, accounting for the risk of disease activity in individual family members (e.g., greater reactivity in individual family members may incur greater interpersonal, relational responsivity and higher levels of negative affect may be detrimental to family members' health). Although the BBFM was developed to explain global connections between family processes, individual family member reactions to relational stress, and disease activity across the lifespan and for all health conditions and outcomes, its emphasis on stress-related health outcomes meant that it was initially tested for children experiencing pediatric asthma and their families (e.g., Wood et al., 2008). Only recently has the BBFM been expanded and adapted to explain the connections between close relationships and health for adults (e.g., Woods and Denton, 2014).

The BBFM incorporates three variables: family emotional climate, biobehavioral reactivity, and disease activity (Wood, 1993). The model anticipates a mediation effect of biobehavioral reactivity on the association between family emotional climate and physical health. The construct of family emotional climate includes: relationship quality, interpersonal responsivity and reactivity, the positive and negative emotional processes within the family, as well as the intensity of those processes (Wood et al., 2008). Biobehavioral reactivity is proposed as the emotional and physiological ways in which an individual family member reacts to the family emotional climate (Wood et al., 2008). Biobehavioral reactivity is the construct of the BBFM that ties family process to health outcomes (Wood, 1993) and, as detailed in Wood et al. (2008), biobehavioral reactivity “is best understood ... as reflecting the degree of emotion/physiological regulation or dysregulation” (p. 23).

Disease activity is often operationalized as self-reported health and the presence of illness. The BBFM predicts that, in families where the emotional climate is marked by negativity and conflict, individuals will exhibit more biobehavioral reactivity (psychophysiological responsiveness to stress), which will lead to increased disease activity, or, worsened physical health (Wood, 1993; Wood and Miller, 2002; Wood et al., 2008).

Though the applicability of the BBFM's constructs and pathways are demonstrated in the literature, the measurement of the biobehavioral reactivity construct has been a consistent limitation. Specifically, prior tests of the model using adult samples use subjective, self-report measures of depression and/or anxiety to operationalize the biobehavioral reactivity construct (e.g., Priest and Woods, 2015; Woods et al., 2014). Though depression and anxiety were hypothesized as manifestations of high levels of biobehavioral reactivity, the original intent of this construct was to examine physiological reactivity in biological systems (e.g., the autonomic nervous system, the hypothalamic–pituitary–adrenal axis, etc.) and in emotional systems (e.g., depression and anxiety). The biobehavioral reactivity construct was viewed as the psychophysiological link between family emotional climate and disease activity. In other words, for the family emotional climate to affect disease activity, biological and emotional systems would need to be stressed. As the family emotional climate stressed the systems of a family member, this family member would be more susceptible to disease (Wood, 1993).

2. Allostatic load

Measuring and testing the applicability of the BBFM without physiological data does not encapsulate the original intent of the biobehavioral reactivity construct and therefore limits the applicability of the model. One way to improve the measurement of the biobehavioral reactivity construct would be to include the objective physiological measure of allostatic load. Allostatic load has been defined as “wear and tear that results from chronic over activity or under activity of allostatic systems” (McEwen, 1998, p. 171). The physiological or allostatic systems activated by stress are somewhat contradictory processes: when activated by stress, these systems can both protect and damage the body. If these systems repetitively respond to stress, their continual activation can damage the body and result in poor health (Seeman et al., 2002).

Research has identified seven physiological systems pertinent to the body's stress response. These physiological processes, also referred to as allostatic process, includes: cardiovascular functioning, the sympathetic and parasympathetic nervous systems, the hypothalamic pituitary adrenal axis, inflammation, lipid/fat metabolism, and glucose metabolism (Brooks et al., 2014; Buckwalter et al., 2011). This multi-system measure of allostatic load has been shown to predict more variance in health (e.g., depression, anxiety, and medical outcomes) compared to single weighted measures of allostatic load (Buckwalter et al., 2011).

3. BBFM and allostatic load

There are several areas of research that indicate the potential inclusion of allostatic load in the BBFM as a factor mediating the connection between family emotional climate and disease activity. Specifically, research suggests that problematic family functioning is linked to mental and physical health, which in turn has been linked to mental illness (Afifi et al., 2009; Priest, 2013; Whisman, 2007) and chronic diseases (Friedmann et al., 2006; Uchino, 2006; Zhang et al., 2007). Aspects of social relationships such as social support, social negativity, and contact frequency are shown to be associated with allostatic load, in that higher levels of spousal

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