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Intergenerational Transmission of Health-promoting Behaviors: Examining Participation in Physical Activity between Middle-aged Mothers and their Younger Adult Children

Sarah T. Stahl

Dissertation submitted to the
Eberly College of Arts and Sciences
at West Virginia University
in partial fulfillment of the requirements
for the degree of

Doctor of Philosophy
in
Psychology

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Morgantown, West Virginia
2011

ABSTRACT

Intergenerational Transmission of Health-promoting Behaviors: Examining Participation in Physical Activity between Middle-aged Mothers and their Younger Adult Children

Sarah T. Stahl

Research has provided considerable evidence that participation in regular physical activity is associated with numerous physical and mental health benefits (Penedo & Dahn, 2005). Despite public health efforts to increase the activity levels adults, only 25% of the U.S. adult population is regularly active and nearly 60% remains sedentary (US Department of Health and Human Services [USDHHS], 2008). A small, but growing, area of research has examined physical activity from an intergenerational or dyadic perspective that considers how involvements in close, personal relationships influence levels of physical activity. In a sample of middle-aged mothers and their younger adult children, the present study had three primary objectives: (a) to examine the relations among well-known predictors of physical activity in younger adulthood and midlife, (b) to examine the relations between individual characteristics and interpersonal variables on physical activity within mother-child dyads, and (c) to examine whether mothers influenced their daughters more strongly than their sons. Data from 48 mother-child dyads between the ages of 18 and 57 were collected via an online survey. Findings from the first research objective indicate an adequate fit of the model to the data for middle-aged mothers (χ^2 (df = 2; N = 48) = 2.938, p = .230) and younger adults (χ^2 (df = 3; N = 48) = .288, p = .962). With regard to the second research objective, results indicated an adequate fit of the model to the data χ^2 (df = 6; N = 48) = 5.057, p = .537. The hypothesized model explained 2.4% of variance in younger adults' physical activity and 17.5% of variance in middle-aged mothers' physical activity. In addition, standardized beta weights provided support for one actor effect, as mothers' internal health locus of control was positively associated with physical activity. (β = .42). Research objective three was not supported. Findings from this study may help inform the design of future health interventions. Specifically, the results suggest that personal relationships, such as the relationship one has with a family member, may play a role in understanding participation in physical activity.

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Statement of the Problem

Despite the known benefits of regular participation in physical activity, more than 60 percent of all Americans are not regularly active (Centers for Disease Control, 2008). Because sedentary behavior is associated with a host of negative outcomes (e.g., increased risk of chronic disease and cancer prevalence, increased mortality rate), understanding the determinants of participation in physical activity is imperative in terms of informing future health promotion interventions. As such, the need for theory- based interventions is critical in understanding how to promote an active lifestyle. A majority of theoretical health promotion models (e.g., social cognitive model, theory of reasoned action and planned behavior) typically focus on how individual characteristics (e.g., self-efficacy, intention to change) directly influence one's participation in physical activity. Models of health promotion that focus solely on individual characteristics are limited because they do not address how interactions with social partners influence participation in physical activity. Scholars suggest that explanatory models of health promotion must recognize how the influence from social relationships interacts with individual variables to explain physical activity (Lewis & Rook, 1999).

At present, health campaigns and weight management interventions (see O'Connor, Jago, & Baranowski, 2009) aimed at increasing physical activity behavior in children and adolescents are becoming more family-based. In other words, health promotion programs are moving towards targeting the entire family unit (Rimal, 2003), because scholars suggest the home environment is an important context in which health-promoting behaviors are shaped and developed (Golan, 2006). The primary purpose of the current study was to investigate how individual (e.g., own health beliefs) and interpersonal variables (e.g., family member's health beliefs) relate to physical activity within a sample of middle-aged mothers and their younger adult children.

Most studies within the intergenerational health literature focus on parents and younger children who live in the same household. However, the enduring family socialization model (Lau, Quadrel, & Hartman, 1990) asserts that preventative health behaviors are learned (e.g., through observational learning) within the family context and the influence from parents remains during younger adulthood. Even though younger adults may no longer be living with their parents, parental influence may still be important in predicting adults' participation in physical activity because of these enduring relationships (e.g., Raymore, Baber, & Eccles, 2000; Seiffge-Krenke, 2006). One dyad which has not been examined thoroughly is the middle-aged parent-younger adult child dyad. Although younger adults are becoming more autonomous as they leave home to live at college, most maintain the relationships they have with their parents (Arnett, 2002). Thus, the middle-aged parent-adult child relationship may be a significant dyad to consider when examining the role social relationships play in promoting health.

When focusing on the parent-child dyad, it is important to consider whether the sex of the parent differentially influences their children's health behavior. Bauer, Nelson, Boutelle, and Neumark-Sztainer (2008) assert that little work has examined parent-specific (e.g., maternal verses paternal) influences on sons' and daughters' physical activity. These researchers suggest that parents may yield gender-specific influences on their adolescent's behavior. However, a majority of research pools maternal and paternal data; thus rending the interpretation of such parental differences difficult. Gustafson and Rhodes' (2006) meta-analysis of 34 studies on the parental correlates of child physical activity reports inconsistent findings regarding this relation. Correlations between fathers' and children's physical activity are equivocal; however, most of the studies included in the meta-analysis report that mothers' physical activity level is strongly associated with the physical activity level of both their sons and daughters. In addition, other research has found that younger adult females often nominate their mothers as one of their most important agents of change, suggesting that mothers have a more prominent influence on their daughters' health behaviors when compared to their sons (Thorpe, Lewis, & Sterba, 2008). Furthermore, offspring typically report greater feelings of positive relationship quality and filial maturity (e.g., ability to relate to and support parents) with mothers when compared to fathers (Birditt, Fingerman, Lefkowitz, & Dush, 2008). As a result, investigating whether mothers and fathers behaviorally and cognitively influence their sons and daughters differently is essential in informing future family-based health interventions. Because studies show that young adults typically nominate their mothers as important influences in the health domain (Thorpe et al., 2008), the current study focused on the relationship between mothers and their younger adult children.

In sum, the literature on intergenerational influences on health behavior suffers from two major problems. First, most studies report that the main parental influence is *direct* modeling of behavior; thus rarely providing research on *indirect* modeling processes, such as how family members' psychological influences (e.g., health beliefs such as internal health locus of control) are transmitted between partners. Moreover, few intergenerational health models have explained *how* interpersonal influences are transmitted between partners. One such mechanism through which mothers and children may be able to influence each other is via social control (Lewis & Rook, 1999). Social control refers to social network member's attempts to influence another's health behaviors both directly (e.g., requests or persuasions to change behavior) and indirectly (e.g., observational learning and social inferences).

Secondly, notably absent in the literature is the investigation of whether children, specifically adult children, influence their parent's engagement in health-promoting behaviors. A majority of intergenerational models of health promotion have focused on the transmission from parent to child. Ward, Spitze, and Deane (2009) assert that little is known regarding whether adult children affect parental well-being and physical health. As middle-aged adults age and begin to notice physical age-related declines (Merrill & Verbrugge, 1999), it is unclear whether younger adult children influence middle-aged adults' decisions to combat these declines by participating in physical activity. To answer these questions, it is important to consider and examine bidirectional influences of intergenerational health behavior.

Summary

To better inform future family-based interventions aimed at increasing physical activity, research on intergenerational transmission of health behaviors should strive to identify important predictors of physical activity within the family context. The current study: (a) examined major predictors of physical activity across two age groups, (b) considered the *indirect* process of transmission, (e.g., family member's health beliefs) and concurrently examined if adult children influenced their parents' health beliefs, and (c) compared whether mothers influenced the health beliefs and physical activity of their daughters and sons differently. The current study drew from Lewis and Rook's (1999) social control theory (discussed in greater detail later), to examine individual and interpersonal correlates of physical activity in a sample of middle-aged mothers and their younger adult children.

Introduction

The following section presents an organizational framework for understanding the process of physical activity, beginning with a brief introduction of the health promotion domain of physical activity. Next, social control theory is highlighted as a way to understand the underlying mechanisms of how individuals in social relationships (e.g., mother-child dyad) influence each other's health behaviors. Finally, a review of the literature provides empirical research that supports the paths of the organizational framework that were tested in the current study.

Health Promotion and Physical Activity

Health-promoting behaviors are typically categorized as behaviors that move individuals toward optimal physical and mental health, in turn decreasing one's susceptibility to illness and disease (Becker & Arnold, 2004; Grywacz & Keyes, 2004). Participation in physical activity has been recognized as one of the most important health-promoting behaviors. Engagement in regular physical activity may prevent the onset and reduce the severity of many chronic diseases (e.g., cardiovascular disease, diabetes, and osteoporosis) (Schutzer & Graves, 2004), may improve mental and cognitive functioning (Kramer, Hahn, & McAuley, 2000), and is associated with increases in metabolic and cardiovascular functioning (Cress et al., 2005). Despite these benefits, more than half of Americans live a sedentary lifestyle (Centers for Disease Control, 2008), which places adults at a greater risk for developing an array of diseases, such as coronary heart disease, hypertension, diabetes, and certain cancers (USDHHS, 2001). Because physical inactivity is considered to be a major public health threat, there is an increasing need to understand the determinants of physical activity so that research can be translated into community-based programs (Prohaska et al., 2006). The current study addressed the role of individual and interpersonal influences, namely family member's health beliefs, to gain a more complete understanding of the determinants of physical activity within the mother – adult child dyad.

Models of Health Promotion

Psychosocial models of health promotion are grounded on the common metatheory that a combination of psychological, cognitive, and environmental factors are primary contributors to human health (Bandura, 2004). The five most commonly applied conceptual models of health behavior include: the social cognitive theory (Bandura, 1997), the health belief model (Rosenstock, 1974), the theory of reasoned action (Azjen & Fishnein, 1980), the theory of planned behavior (Azjen, 1985) and protection motivation theory (Roy, 1983). In general, these models address four main sociocognitive determinants to varying degrees: (a) perceived ability to successfully engage in a health behavior, (b) the expected outcomes (e.g., benefits, costs) of engaging in a health behavior, (c) the goals that provide self-incentives for a health behavior, and (d) the perceived obstacles that hinder one's ability to maintain a health behavior.

Studies that use these conceptual models as a framework for explaining health behaviors typically take an individual approach. In other words, these models generally examine how the relations among adults' *own* beliefs and characteristics explain variance in their *own* physical activity. Scholars suggest that these models ignore important social relationships and do not consider how interactions among social network members may impact health behaviors (Lewis & Rook, 1999).

Based on prior models of health promotion along with social control theory, Figure 1 illustrates a potential framework that was devised to conceptualize the way in which individual and interpersonal influences interact to influence physical activity. All paths have been empirically tested (although not simultaneously) in previous research. Scholars agree that health behaviors are influenced by a combination of demographic and health status characteristics (Zanjani, Schaie, & Willis, 2006), psychological variables such as self-efficacy and internal control (Skaff, 2007), cognitive variables (Fishbein et al., 2001), and interpersonal variables (Lewis & Rook, 1999). Because the individual is typically the unit of analysis in prior research, relatively few studies have addressed interpersonal influences. The few studies that have addressed the influence from partners have documented that perceived social support is a strong correlate of physical activity (Hancher-Rauch & Hyner, 2005). Finally, surrounding the model is the sociohistorical context, emphasizing that the health behavior process occurs within a proximal context (e.g., transition to college) and distal context (e.g., cultural and historical context) (Baltes, 1987). Although the full model was not tested in the current study due to power constraints, parts of the model were tested in Research Question 1 and Research Question 2. (See Figure 1 for an illustration of specific paths that were tested in the current study.)

Social Control and Personal Relationships

Because the current study focuses on the relationship between middle-aged mothers and their younger adult children, the next section discusses the importance of considering social relationships and the ways in which interactions with a close partner may promote health. Specifically, social control theory focuses on understanding the mechanisms by which social relationships are related to health behaviors.

Social control refers to the efforts by social network members to regulate the health behaviors of a close individual either by encouraging the development of a health-promoting behavior or discontinuing the development of a health compromising behavior (Lewis & Rook, 1999). Interest in the link between social networks and well-being is marked by the consistent evidence that social networks are related to better health outcomes (Lachman & Agrigoroaei, 2010), decreased morbidity (Tucker, Schwartz, Clark, & Friedman, 1999), and the adoption of health-promoting behaviors (Tucker, Klein, & Elliot, 2004).

Theorists have identified two basic mechanisms of social control: direct social control and indirect social control. *Direct* social control operates when a social network member requests or persuades an individual to engage in a health-promoting behavior. An example of direct social control would be when a young adult persuades his or her sedentary parent to join a fitness facility and praises them for working out. *Indirect* social control relies on inferences made from social comparisons. In other words, people learn from observing the behaviors of others and the consequences that follow. For example, children who see their mothers successfully perform an activity (e.g., physical activity) without adverse consequences will generate expectations that they too can perform that behavior if they persist in their efforts. Indirect social control assumes that individuals persuade themselves that if others in their social network can perform a behavior, they should also be able to achieve that behavior.

A majority of the social control research has focused on the interpersonal variable of social support, which Lewis and Rook (1999) suggest discourages future investigations of alternative interpersonal variables that may influence health. Thorpe, Lewis, and Sterba (2008) likewise highlight the narrow focus of most studies to examine the interpersonal influence of social support. They propose that social support (e.g., social network member's provision of resources in response to stress) may only be applicable in social relationships within the context of chronic disease because one person in the relationship is in noticeable need of assistance. As such, researchers propose the continued investigation of how other interpersonal variables (e.g., partner's health beliefs) may influence health behavior within a disease free context. Thorpe et al. (2008) suggest that understanding interpersonal determinants is important in understanding individual's self-management of health behaviors. Such knowledge may lend support to the development of future interventions.

Social control studies have typically focused on individuals whose exposure to social control was a function of their marital or parental status. When examining agents of social control (e.g., spouses, parents), Thorpe et al. (2008) found that over half of their younger adult sample reported that their mother was their agent of social control. Moreover, one third of younger adult married couples often reported their mothers, in addition to their spouses, as an important agent of social control. For reasons that are not well understood, the researchers suggest that mothers may be more involved in their adult child's health behaviors when compared to fathers.

Although social control can take different forms, the current study focused on indirect social control to explain how interpersonal variables (e.g., family member's health beliefs) influence mothers' and children's own beliefs. Figure 3 illustrates the actor-partner model that was tested in Research Question 2 that examined the influence of individual and interpersonal variables on middle-aged mothers' and their younger adult children's physical activity.

Review of Literature

The following review of the literature is divided into three sections. As a majority of conceptual health promotion models typically focus on the direct influence of individual characteristics, the first two sections consequently outline empirical research in support of individual influences on physical activity (i.e., lines a and b in Figure 1): (a) demographic correlates of physical activity (e.g., age, body mass index, and chronic health condition status) and (b) psychological influences of physical activity, specifically internal health locus of control and perceived family health support. The third section will focus on the relationship between middle-aged mothers and their younger adult children and address the interpersonal paths that were tested in the current study (e.g., line c in Figure 1). Each of these paths is highlighted in the organizational framework in Figure 1 and more specifically in Figure 2 (e.g., Research Question 1) and Figure 3 (e.g., Research Question 2). As such, empirical research will be presented that lends support to these highlighted paths.

Individual Influences on Physical Activity

Demographic Predictors

Major predictors for engagement in physical activity include age, body mass index (BMI), and chronic health condition status, among others. This relation is depicted as line “a” in Figure 1 and more specifically as solid lines in Figure 2.

Age. At present, research suggests that levels of physical activity decrease with age (USDHHS, 1996); currently, older adults are the most sedentary segment of the population (Nelson, Rejeski, Blair, Duncan, Judge, King, et al, 2007; Prohaska et al., 2006) and are less likely to meet current physical activity guidelines recommended from the American College of Sports Medicine (ACSM, Prohaska et al.). Additionally, within college student samples, research suggests that levels of physical activity decrease from freshman to senior year because as students progress through college, more time is spent studying and working (Buckworth & Nigg, 2004). Although the age range is small, the U.S. Department of Health and Human Services (2008) reports that physical activity starts to decline during adolescence and early adulthood, with the most rapid decline found in the 18- to 24-year old age group.

Body Mass Index. Participation in physical activity may depend on individuals’ BMI status. BMI is an estimate of body fat, and is a calculated as a function of the ratio of individuals’ weight to height. BMI scores can be categorized into four broad categories: (a) *underweight* (BMI < 18.5), (b) *normal weight* (BMI = 18.5 - 24.9), (c) *overweight* (BMI = 25.0 - 29.9), and (d) *obese* (BMI > 30.0). Obesity, or having excess body fat (e.g., 25% in women, 18% for men) is significantly related to physical inactivity and the development of chronic health conditions and functional disabilities (Kahng, Dunkle, & Jackson, 2004) and may be both a barrier to physical activity (Godin, Belanger-Gravel, & Nolin, 2008) as well as a consequence (Centers for Disease Control, 2009b). Research suggests individuals' BMI tends to increase across the life span until old age, when adults experience weight loss due to decreases in muscle mass and bone density (USDHHS, 2001). Nevertheless, an inverse association between BMI status and engagement in physical activity has been documented (Godin, et al., 2008; Hallal et al., 2008); such that adults with higher BMIs are less likely to participate in leisure-time physical activity. Although the underlying mechanisms are unclear, Godin and colleagues (2008) suggest that BMI influences physical activity through its association with individual's cognitions; adults with greater BMI's may be less likely to participate in physical activity because their weight status has decreased their feelings of confidence or self-efficacy. However, it is important to consider bidirectional influences when interpreting such results; perhaps those who are physically inactive have greater BMIs because they are not physical capable of performing regular exercise.

Chronic Health Conditions. The prevalence rates for many chronic health conditions continue to increase in the United States (Piazza, Charles, & Almeida, 2007); it is estimated that more than 54 million adults are living with some type of chronic condition (e.g., arthritis, heart disease) and 21 million experience daily limitations due to one or more conditions (US Census Bureau, 2008). Chronic health conditions are often associated with experiencing functional limitations or limited mobility, which are significant barriers towards participation in physical activity. For example, Rasinahdo and colleagues (2006) found that adults reported poor health as a major barrier towards exercise; those who experienced limited mobility were less likely to engage in physical activity. Traywick and Schoenberg (2008) likewise provide evidence that having a chronic health condition may decrease the likelihood that adults participate in physical activity. More specifically, they found that women who had coronary heart disease were less likely to engage in physical activity because their compromised health status significantly decreased their exercise self-efficacy. Researchers typically examine the outcomes of chronic illness (i.e., disability) as measured by activities of daily living (ADL). Perceived functional limitation (e.g., perceived limitation in completing a range of tasks) has received relatively less attention, but is an important construct to consider, as it is considered a pathway by which chronic illness leads to disability (Lee & Park, 2006).

The current study examined age, BMI, and chronic health condition status in an attempt to account for observed variance in physical activity across two age periods: younger adulthood and midlife (see Figure 2). In addition to demographic characteristics, the current study addressed the role of psychological variables, namely how internal health locus of control and perceived family health support, are related to physical activity. The next section discusses the importance of considering psychological influences when examining physical activity.

Psychological Variables

Internal Health Locus of Control. Internal health locus of control beliefs are defined as one's belief that outcomes (e.g., health status) are due to internal, dispositional forces (e.g., personal power) and less so due to external sources (e.g., chance, physicians) (Skaff, 2007; Wallston et al., 1978). In other words, individuals with a stronger sense of internal health locus of control believe their behaviors can bring about desired outcomes (e.g., "I am in control of my health") (Wallston, 2005). Research indicates that sense of control is critically important to well-being (Skaff, 2007) because of its relation to health and health behavior (Lachman, 2006; Schulz & Heckhausen 1999). For example, compared to those who feel powerless over their health, those with a stronger sense of internal control are more likely to engage in health-promoting behaviors including physical activity, information seeking from health professionals and seat belt usage because they feel that taking action will make a difference in their health (Ziff, Conrad, & Lachman, 1995). This relation is depicted as line b in Figure 1 and more specifically as solid lines in Figure 3.

Internal control is regarded as an important predictor within the health domain because of its relation to many health behaviors. For example, a greater sense of internal control is associated with better adjustment to chronic disease diagnosis, better self-rated health, less severe physical limitations (Lachman, 2004), fewer acute and chronic illnesses (Lachman & Weaver, 1998b), and important for successful aging because adults are better equipped to adjust to the aging process (Lachman & Firth, 2004). Additionally, those with a greater sense of internal control report better access to medical care and believe there are many things they can do to stay healthy (Lachman & Weaver, 1998a).

Although reported less frequently, some research highlights the negative outcomes associated with stronger internal control beliefs. For example, Heslin and Klehe (2006) suggest that greater self-efficacy beliefs are associated with a host of negative outcomes such as risk-taking, feelings that one is immune to injury, and feeling invulnerable to negative life events. Moreover, Njus and Brockway (1999) suggest that internal locus of control is associated with fewer symptoms of depression and better social adjustment, but only when the individual is trying to control a positive event and is thus not generalizable to negative events (e.g., onset of chronic disease, physical disability).

Longitudinal research on global control beliefs (e.g., control beliefs collapsed across multiple domains such as work, family, health) indicate that midlife is characterized by stronger feelings of internal control when compared to young and late life (Clarke-Plaskie & Lachman, 1999). Conversely, within life-span developmental theory (see Baltes, 1987), because of the gains and losses adults experience as they age, there are shifts in control beliefs within each domain throughout the life span. For example, middle-aged adults may experience increased confidence in the work domain (i.e., gain), but decreased physical ability in health domain due to a chronic illness (i.e., loss). Accordingly, middle-aged adults may have stronger control beliefs in the work domain than the health domain. Thus, researchers do not find global control measures to be particularly useful. As a result, many scholars conclude (Lachman & Firth, 2004; Skaff, 2006, 2007) that some domains, such as health, work, and family, are valued differently throughout the life span and consequently, adults' sense of internal control has been hypothesized to vary by age and across domain.

In regards to age differences, researchers agree that beliefs about personal control vary by age (Schulz & Heckhausen, 1999, 2010) and such changes are associated with concurrent age-related changes in health, cognition, and well-being (Lachman, 2006; Rodin, 1986). To explain age differences in control, the motivational theory of life-span development suggests our overall sense of control consists of primary control strategies (e.g., directly altering our environment to match our goals) and secondary control strategies (e.g., altering the self to match the environment) (Heckhausen, Wrosch, & Schulz, 2010). As an individual moves from younger adulthood into midlife, one's opportunities for control strategies change to match one's developmental tasks/goals. As adults age and face functional and biological declines, adults attempt to stabilize primary control strategies and increase secondary control strategies (see Heckhausen & Schulz, 1995).

Further, these scholars assert that individuals have to determine when the time is right is adopt specific developmental tasks/goals (e.g., adopting a physically active lifestyle, obtaining health screens). The ability to attain various developmental goals (e.g., manage one's health) changes throughout the adult life span; what may be favorable in younger adulthood becomes increasingly difficult in mid and late life as individuals become concerned with managing loss (Wrosch, Heckhausen, & Lachman, 2000). As a result, age differences in control strategies for managing health suggest younger adults may have a stronger sense of control when compared to middle-aged and older adults.

Specific to participation in physical activity, Lachman and Weaver (1998) assert that although previous research on control beliefs indicate that an adult's internal control beliefs within the health domain continuously decreased with age, their research found no age differences (middle-aged adults versus younger and older adults). This may be indicative of the widespread attention in the media and from health professionals to engage in health-promoting behaviors (e.g., CDC's Healthy People 2010, USDHHS My Food Pyramid) in order to decrease the likelihood of developing obesity and numerous pervasive chronic diseases.

In addition to internal health locus of control, perceived support is also related to health and should be considered when examining health behaviors among social partners (Lewis & Rook, 1999). Following is a brief discussion describing the relation between perceived family health support and (a) health behaviors and (b) its relation to internal health locus of control.

Perceived Family Health Support. Social support is defined as providing (or receiving) emotional, informational, or material aid through interactions with close friends and family members (Jung, 1987; Krause, 1995). Within intimate relationships, perceived support has been related to a number of positive health outcomes, including engagement in physical activity. This relation is depicted as line “b” in Figure 1 and more specifically as solid lines in Figure 3. Research demonstrates that perceived support is a much better predictor of well-being than actual received support (Krause, 1997). Specifically, those within an interpersonal relationship that report having better social resources and thus perceive more support from family members are more likely to engage in physical activity (Ayotte, Margrett, & Patrick, 2010; Azjen & Fishbein, 1980), are less likely to drop out of a fitness facility (Hancher-Rauch & Hyner, 2005), are more likely to adhere to an exercise regimen (Lewis et al., 2006) and typically have better health outcomes when recovering from major surgery (Robb, Small, & Haley, 2008). Moreover, within the middle-aged parent - younger adult child dyad, perceived family support is associated with less psychological strain and better physical health (e.g., ability to engage in moderate, vigorous activities) during periods of transition, such as the transition to and exit from college (Holahan, Valentiner, & Moos, 1994).

Additionally, perceived support has been shown to be related to one’s own control beliefs. Research by Vanderzee, Buunk, and Sanderman (1997) suggests that adults are likely to perceive more qualitative social support and many social resources when they have stronger internal control beliefs as compared to stronger external control beliefs (e.g., belief that one’s behaviors are controlled by external sources, such as doctors). Moreover, they found that the greater one’s internal control beliefs, the more social support he or she will perceive from those within his or her social network. Holahan and Holahan (1987) likewise suggest that control beliefs directly influence perceptions of support; their results demonstrated that initial feelings of control enabled adults to obtain sufficient levels of support, which in turn, influenced positive functioning during late-life. Such findings are in accord with Bandura’s (1997) conceptualization of self-efficacy. Although self-efficacy is the primary determinant in the social-cognitive model, it is also expected to influence one's social expectations, such that those with increased feelings of efficacy are more likely to believe their behavior will be approved in their interpersonal relationships.

The current study examined internal health locus of control and perceived family health support (e.g., expectation that one can depend on their family for health support and advice) in the same model (e.g., see Figure 3) in an attempt to account for variance in physical activity among middle-aged mothers and their younger adult children. In addition, the current study addressed the role that interpersonal influences, namely family member's internal health locus of control, in order to gain a more complete understanding of how family members' health beliefs influence behavior within the mother-child dyad. Thus, the next section discusses the importance of considering interpersonal influences when examining physical activity.

Interpersonal Influences within the Mother - Adult Child Dyad

As illustrated in the organizational framework in Figure 1, researchers agree that there are multiple sources of influence (e.g., demographic, psychological, social variables, etc.) that contribute to the adoption of physical activity (Kumanyika, Jeffery, Morabia, Ritenbaugh, & Antipatis, 2002). Figure 2 illustrates how psychological and interpersonal variables were hypothesized to influence physical activity. The next two sections outline important concepts when considering interpersonal influences on health behavior: (a) the interdependence of partners and (b) the importance of considering the middle-aged mother – younger adult child dyad. Lastly, empirical research in support of the specific interpersonal influence (i.e., partner effect) tested in the current study's model will be presented (dotted lines in Figure 3).

Interdependence of Partners

Conceptually, scholars suggest that individuals within a dyadic relationship exert mutual influences on one another's beliefs and behaviors (Bell, 1978; Kelley & Thibaut, 1978; Kenny, 1996) and as a result, individuals involved in close, personal relationships are interdependent. Dyadic models within the health literature have typically reported results related to marital status and longevity. For example, marital status is strongly correlated with morbidity and disability. Both married men and married women typically live longer and report being in better health than their same-aged single counterparts (Verbruggue, 1979) and have fewer medical problems because they are more likely to encourage and support each other's engagement in health promotion (Schone & Weinick, 1998; Waite & Lehrer, 2003). Additionally, research suggests the best predictor of physical activity in married couples is the level of physical activity of one spouse (Satariano, Haight, & Tager, 2002). In regards to marital status and disability, additional research suggests that functional disability (Robb et al., 2008) and the onset of other chronic diseases (Revenson, 2003) in one partner is linked to decreases in psychological well-being in both men and women; thus suggesting that the health status of one partner influences the well being of the other.

Operationally, Kenny, Kashy, and Cook (2006) identify four sources that constitute interdependence, or nonindependence, within a dyad. The first is a *compositional effect*, where members of the dyad are already similar on a number of characteristics (e.g., socioeconomic status) before they were paired for the study. The second is *a partner effect*, where the characteristics of one partner influence his or her partner's outcomes. For example, the amount of social support a child provides may influence the mother's commitment to an exercise regime. The third is *mutual influence,* where each partners' outcomes directly influence each other's outcomes. For example, a parent might criticize his or her child for not engaging in enough physical activity and, as a result, the child joins a soccer team. The child's effort may in turn increase the likelihood the parent also engages in more physical activity. The last source of nonindependence is *common fate*, where both members are exposed to the same causal influences due to situational factors. For example, if the neighborhood in which the parent raised the child was located adjacent to an outdoor trail, both would be more likely to engage in physical activity.

Mother –Adult Child Dyad

Although marriage is an important bond to consider in adulthood, a relationship that has not been examined thoroughly is parent-child relationship when children are young adults. Given that the parent-child dyad is one of the most central, long-lasting, and emotional bonds between two people (Bell, 1978; Bowlby, 1980); there is a surprising paucity of research on the reciprocal effects within the younger adult-parent relationship (Birditt et al., 2008; Masche, 2008). Moreover, relatively few studies have examined physical health outcomes from this dyadic perspective. However, as children move from adolescence into younger adulthood, research suggests the nature of the parent-child dynamic becomes an equally and mutually supportive relationship between two adults (Birditt et al., 2008; Tanner, 2006). Masche (2008) likewise supports the idea of reciprocal influences between parents and young adult children but cautions that the development of this relationship may be discontinuous. In other words, as adolescents experience new social roles that accompany young adulthood, they also experience periods of detachment and reconnections with their parents. Stein et al. (1998) suggests that younger adult children continue to maintain contact and participate in family rituals with their parents and endorse these behaviors because of strong societal expectations to satisfy the needs of one's parents and other family obligations.

Vassallo, Smart, and Price-Robertson (2009) examined parents' and young adult children's perspectives of the roles each partner plays during these two age periods. Their results suggest that both middle-aged parents and younger adult children continue to engage in mutually supportive relationships, even though (a) parents learn to accept their children as autonomous adults and (b) children learn to see their parents as individuals with their own needs and desires. More specifically, parents agreed they were still responsible for passing on their values and life advice to their adult children and believed their younger adult children relied upon them for emotional and social support (Vassallo et al., 2009). Results from this study are in accord with the enduring family socialization model (Lau et al., 1990), which asserts that behaviors (including preventative health behaviors, such as physical activity) are learned within the family context and the influence from parents remain stable from childhood into younger adulthood. In another study of middle-aged mothers and fathers and their college-aged offspring, Harvey, Curry, and Bray (2001) provide support for an intergenerational model of positive health-related behaviors between these two age periods; specifically, parents' and younger adults' perceptions of the quality of their nuclear family relationship influenced compliance with health-promoting behaviors. The researchers viewed this intergenerational transmission occurring through a process of indirect social control (i.e., observational learning); younger adults who perceived stronger ties with their family were more likely to model health promotive behaviors because of a sense of covert loyalty to their parents.

Exits from Parental Home. The relationship between parents and younger adults who are transitioning out of their parents' home is an understudied area (Seiffge-Krenke, 2006). However, even though younger adult children may be no longer living with their parents, Arnett (2002) suggests that younger adults are semi-autonomous and continue to interact with their parents because they leave some of their responsibilities (e.g., source of income) to their parents. Fingerman (2001) reports that the relationship between parents and adult children tend to improve as adult children tend to report experiencing strong ties or bonds with their parents as they move through adulthood because each party, regardless of living location, recognizes each other as an individual, which leads to greater self-disclosure and intimacy. Vassallo et al. (2009) likewise support the idea that parents' and children's relationship grows stronger regardless of younger adults' living context; their findings suggest that parents' level of emotional and social support did not differ depending on where their child lived. Moreover, Masche (2008) suggests that the new social roles that are associated with young adults leaving home (e.g., attending college, becoming a spouse or parent) promotes the development of young adult-parent relationships because of the increased frequency of discussions and feelings of connectedness.

Gender Differences. Differences between the relational patterns of health promoting behaviors between mothers and their children and fathers and their children have been reported in previous research (Harvey et al., 2001). Parent involvement has typically been examined in the mother-child relationship, as the father has been thought to primarily support the efforts of the mother (Quittner & DeGirolamo, 1998). Nevertheless, health behavior models that examine parental correlates of physical activity during childhood suggest mothers are better able to influence their daughters, such that mothers' levels of physical activity are more strongly correlated with their daughters when compared to their sons (Gustafson & Rhodes, 2000). Longitudinal research by Bauer et al. (2008) found that maternal support for and encouragement of physical activity during high school predicted their daughters' participation in moderate and vigorous activity 5 years later, whereas paternal support for and encouragement of physical activity during high school predicted sons' participation in moderate and vigorous activity 5 years later. Additionally, Bauer et al. suggest that parental encouragement and family support for fitness and exercise can play a strong long-term role in adolescent and younger adults' physical activity habits.

Relatedly, Birditt et al. (2008) found that adult children often report greater filial maturity, or the ability of adult children to relate to and support their parents' needs and goals, with their mothers when compared to fathers. Other research suggests younger adult women rely upon their parents for support to a greater extent when compared to younger adult males (Vassallo et al., 2009) and younger adult females tend to feel greater obligation to their parents when compared to younger adult males (Stein et al., 1998).

The literature on parental socialization of gender provides a detailed explanation for the gender differences reported in the aforementioned studies (see Leaper & Friedman, 2007). Briefly, parents are the first agents to influence their son's and daughter's play behaviors and preferences. Parents encourage gender-typed activities and discourage gender atypical activities, and consequently treat their daughters and sons differently. Children internalize these gender-specific rules and develop cognitive representations of gender (i.e., schemas), through which they view the world. Consequently, boys and girls tend to seek out gender appropriate activities and gender-specific environments that strengthen their gender schemas (Leaper & Friedman, 2007).

Interpersonal Paths in the Hypothesized Model

A small area of research has demonstrated that the control beliefs of *one* partner significantly influence the *other* partner's perceptions of support; such that one individual is likely to perceive more support if their partner has greater feelings of self-efficacy and confidence (Ayotte, 2007; Rohrbaugh et al., 2004). This relation is depicted as line "c" in Figure

1 and more specifically as dotted lines in Figure 3. Research suggests that individuals with greater control beliefs influence others in their social network, specifically eliciting more support from those in their social networks (Holahan & Holahan, 1987; Rohrbaugh et al., 2004). They suggest that those with greater feelings of control interpret their social partner's behavior as being more supportive. Taken together, these findings suggest that one's views of partner efficacy may represent another facet of relationship functioning, and that individual-interpersonal factors (e.g., one's perception of their partner's health beliefs) influence one's own health beliefs. Accordingly, the current study sought to examine how *family member's* health beliefs influenced one's *own* perception of support.

Using Social Control to Explain the Interpersonal Paths. As shown in Figure 3, it was hypothesized that there would be an interpersonal influence between family member's health beliefs (e.g., internal health locus of control) and one's own perceived family health support. Although previous research has supported this path, scholars seldom provide an explanation of any underlying mechanisms that clarify the relation. Social control theory would explain this link by highlighting that transmission between the mother-child dyad occurred through indirect social control. In other words, the underlying mechanism by which family members are able to influence each other is through observational learning and inferences made by social comparisons. Specifically, a mother who is wondering whether to look up to her family for health advice (e.g., perceived family health support), observes her child's confidence and ability to execute a health behavior (e.g., internal health locus of control) and because the mother notices the child's successful accomplishments, the mother believes she should rely upon her family for health advice. Although one cannot observe their family member's *beliefs* (e.g., internal health locus of control), one can observe the *behaviors* of those with stronger internal control beliefs. For example, individuals with stronger control beliefs are often able to successfully execute a health behavior and manage their health status. Thus, individuals' health behaviors may be a proxy for their health beliefs. Bandura's social cognitive theory provides an explanation of how one's efficacy beliefs can influence others' beliefs. Bandura notes that efficacy beliefs influence the kinds of social environments adults create for themselves. In other words, adults with strong efficacy beliefs promote environments where others' efficacy beliefs can thrive (Bandura, 2004).

Summary

Despite the widespread effort to increase the physical activity levels of all Americans, national data sets, such as the BRFSS (e.g., the CDC's Behavioral Risk Factor Surveillance System) suggest stable rates of sedentary behavior for both children and adults since 1990. In addition, rates of recommended physical activity have only slightly increased for Whites, men, and individuals with a college education (Brownson & Boehmer, 2007). The US Department of Health and Human Services (USDHHS, 2008) reports that approximately 60 percent of adults do not engage in enough exercise to meet the 2008 physical activity guidelines suggested by the Centers for Disease Control (e.g., 30 minutes of moderate aerobic activity most days of the week); approximately 25 percent of adults are not active at all. A majority of interventions aimed at increasing physical activity in adults typically are not able to maintain the activity levels at one year follow-up assessments (see Dubbert et al., 2006 for a meta-analysis of physical activity interventions). Many interventions utilize the same theoretical models (e.g., social-cognitive model, theory of reasoned action and planned behaviors), which primarily examine individual correlates of physical activity; consequently ignoring the influence from social partners. Proponents of social control theory suggest that explanatory models of physical activity must acknowledge how the influence from social relationships interact with individual variables to explain physical activity.

Lastly, the parent-child dynamic is a central, long-lasting relationship in adulthood (Bell, 1978; Bowlby, 1980). During this stage, each member of the dyad is thought to be mutually interdependent, and thus expected to influence each other's beliefs and behaviors. Within the health domain, a limited amount of research has explored physical activity from a dyadic approach that examines how the thoughts and behaviors of one partner influence the thoughts and behaviors of the other, particularly within the parent-adult child dyad.

Current Study

There were three primary objectives of the current study. The first objective examined the relations among well-known predictors of physical activity (e.g., age, body mass index, chronic health condition status) across two age groups. The second objective addressed the gap in the literature regarding interpersonal (i.e. family member) influences on participation in physical activity in younger adult and middle-aged mother dyads. More specifically, the study examined the relations among internal health locus of control, family members' internal health locus of control, perceived family health support, and self-reported physical activity behavior. A modeling approach to analyze dyadic data was utilized because it allowed for the examination of actor effects (e.g., individual influences) and partner effects (e.g., interpersonal influences) while maintaining the dyad as the unit of measurement and controlling for the potential nonindependence in the data (Arbuckle & Wothke, 1999). The third objective examined whether mothers more strongly influenced their daughters' internal health locus of control and physical activity when compared to their sons.

Research Questions and Hypotheses:

RQ1. How well did demographic variables influence physical activity for middle-aged mothers and younger adult children? (see Figure 2).

At present, research suggests that levels of physical activity decrease with age (Centers for Disease Control, 2008); currently, older adults are the most sedentary segment of the population (Nelson et al., 2007; Prohaska et al., 2006). In college populations, older students are more likely to report sedentary behaviors when compared to younger college students (Buckworth & Nigg, 2004). As a result,

H1a. Among mothers, older age was expected to be related to less physical activity.

H1b. Among children, older age was expected to be related to less physical activity.

Research has demonstrated that adults typically report poor health as a major barrier to exercise; those who have a chronic health condition and experience limited mobility are less likely to engage in physical activity (Rasinahdo et al., 2006; Traywick & Schoenberg, 2008). As a result,

H2a. Among mothers, perceiving more severe functional limitations was expected to be related to less physical activity.

H2b. Among children, perceiving more severe functional limitations was expected to be related to less physical activity.

An inverse association between BMI status and engagement in physical activity has been documented (Godin et al., 2008; Hallal et al., 2008); such that adults with higher BMIs are less likely to participate in leisure-time physical activity. As a result,

H3a. Among mothers, higher BMI was expected to be related to less physical activity.

H3b. Among children, higher BMI was expected to be related to less physical activity.

RQ2. How well did individual and interpersonal variables relate to participation in physical activity? (see Figure 3). (Note: actor effect = individual influence; partner effect = interpersonal influence).

Research suggests that younger and middle-aged adults with stronger internally controlled health beliefs have better health outcomes and are more likely to engage in a variety of health-promoting behaviors than those with fewer internally controlled health beliefs (Skaff, 2007; Wallston et al., 1978; Ziff et al., 1995). As a result,

H4a. Among mothers, stronger internal control beliefs were expected to be related to more physical activity (actor effect).

H4b. Among children, stronger internal control beliefs were expected to be related to more physical activity (actor effect).

Research suggests that individuals with stronger internally controlled health beliefs perceive more social resources than individuals with weaker internal locus of control beliefs (Vanderzee et al., 1997). In addition, perceived social support has consistently been found to be an important predictor of exercise adoption and maintenance (Lewis et al., 2006). Moreover, others suggest personal control is indirectly related to health outcomes and physical activity through its association with perceived support (Ayotte, 2007). As a result,

H5a. Among mothers, stronger internal control beliefs were expected to be related to more perceived family health resources (actor effect).

H5b. Among children, stronger internal control beliefs were expected to be related to more perceived family health resources (actor effect).

H6a. Among mothers, perceiving more family health resources was expected to be related to more physical activity (actor effect).

H6b. Among children, perceiving more family health resources was expected to be related to more physical activity (actor effect).

Research suggests individuals with greater control beliefs influence others in their social network, specifically eliciting more support from those in their social networks (Holahan & Holahan, 1987; Rohrbaugh et al., 2004). Additionally, research has demonstrated that the control beliefs of *one* partner significantly influence the *other* partner's perceptions of support (see Ayotte, 2007; Rohrbaugh et al., 2004); As a result,

H7a. Stronger internal control beliefs among mothers were expected to be related to perceiving more family health resources among children (partner effect).

H7b. Stronger internal control beliefs among children were expected to be related to perceiving more family health resources among mothers (partner effect).

RQ3. Did mothers influence daughters and sons differently?

Research suggests mothers may have a stronger influence on their daughters' participation in physical activity when compared to that of sons (Bauer et al., 2008; Gustafson & Rhodes, 2006; Rimal, 2003). Additionally, research indicates that daughters of active mothers are more likely to be active when compared to daughters of inactive mothers (Aarnio et al., 1997; Gustafson & Rhodes, 2006; Yang et al., 1996). As a result,

H8a. It was expected that mothers' internal control beliefs would be more strongly related to their daughters' internal control beliefs than sons' internal control beliefs.

H8b. It was expected that mothers' physical activity would be more strongly related to their daughters' physical activity than sons' physical activity.

Method

Larger Study: Master's Thesis Project

As part of a larger study examining health promotion in younger, middle-aged, and older adults (Stahl, 2009), data were collected during the Fall 2007 and Spring 2008 semesters at West Virginia University via an online data management system, Sona (e.g., http://wvu.sona-systems.com). More specifically, the larger project examined the relations among demographic and psychological variables and middle-aged adults' engagement in six domains of health promotion. The current study used these data, but focused on the dyad as the unit of measurement and extended findings from the thesis project, which suggested that internal health locus of control was positively associated with middle-aged adults' engagement in health promotion.

Procedure

Middle-aged adult participants were recruited by means of undergraduate referrals. Undergraduate students enrolled in psychology courses completed an online study (e.g., Health-promoting Behavior Study) and were asked if they thought their parents and/or grandparents would also be interested in participating in the study. Undergraduates then referred their interested parents and grandparents for the current study by providing the primary investigator (PI) with contact information (e.g., full name, mailing address, and email address) of their middle-aged and older adult family members. Depending on which psychology course they were enrolled, undergraduate students who referred their parents and grandparents for the study were offered either course credit (e.g., homework credit) or extra credit. A total of 692 students participated and made 842 referrals. Eight hundred forty-two middle-aged and older adult participants were then contacted to participate.

The referred middle-aged and older adults received postcards in the mail describing the purposes of the health promotion study and inviting them to participate in the online survey. The postcard also provided instructions for accessing the study online along with a username and password so they could log in to the Sona system and access the appropriate study (i.e., Health-promoting Behavior Study). Study participation was not timed and lab attendance was not required. Participation in the Health-promoting Behavior Study was contingent upon an online consent form. The online survey described the purposes of the study and allowed for participants to skip any question they did not want to answer. Additionally, participants were allowed to withdraw from the online study at any time. Participants who completed the online study were later mailed a postcard thanking them for their participation.

One hundred sixty-seven middle-aged adults and fifteen older adults responded to the recruitment ads that were mailed to them and completed the online study, a 21% return rate. The first part of the online study consisted of the consent form and the demographic questionnaire; part two of the online study consisted of questions that asked about the key study variables of interest (e.g., body mass index, chronic health condition status, internal health locus of control, perceived family health support, and physical activity). Of the 167 middle-aged adults, 58 completed only part one of the study. In sum, the final thesis sample consisted of 109 consenting middle-aged parents and grandparents. There were no significant demographic differences between the 109 participants and the 58 who did not complete part two (Stahl, 2009).

Participants

Family Units. Of the 109 middle-aged parent participants in the larger study, 70 middle-aged adults were considered for the current study because they had a younger adult child who completed both parts of the online survey. Because some younger adults had both parents participate, there were 58 family units. Within these family units were twelve triads (e.g., seven triads included both parents and a daughter; five triads included both parents and a son), 24 mother-daughter dyads, 12 mother-son dyads, nine father-daughter dyads, and one father-son dyad. Because a primary aim of the current study was to examine how mothers and children influence each others' health behaviors, the final sample consisted of 48 mother-child dyads (e.g., 31 mother-daughter dyads, 17 mother-son dyads).

Current Study Sample. The 96 adults (17 men and 79 women) ranged in age from 18-57 years (*M* = 34.13, *SD* = 14.81). They were primarily White (97.9%); the remaining were Hispanic American (2.1%). A majority of participants (98%) were residents of the Northeastern and Mid-Atlantic United States (e.g., West Virginia, Pennsylvania, Maryland, New Jersey, New York, and Delaware). About one-third (31.3%) of the participants reported a total annual family income of $100,000 or greater. An additional 30.2% reported an income of $75,000 - $99,999; the remaining reported an income of $50,000 - $74,999 (18.8%), $25,000 - $49,999 (8.3%) and less than $25,000 (6.3%).

Of the 48 middle-aged mothers (*M* age = 48.54, *SD* = 3.94), 83.3% were married, 8.3% were remarried after divorce, 6.3% were divorced, and 2.1% were living with a partner. The majority had earned a high school diploma (56.3%), followed by a college degree (30.2%) and a graduate degree (10.4%). Of the younger adult participants (*M* age = 19.71, *SD* = 1.74), 93.1% were single, 3.4% were married, 1.7% were living with a partner, and 1.7% were divorced. All had earned at a high school diploma (100%), 10.4% had earned a college degree (see Table 1).

Sample Size Considerations. Although there is disagreement in the literature pertaining to calculating power in actor-partner models (APIM), Olsen and Kenny (2006) suggest that the minimum sample requirement for APIM is that the number of dyads must be twice the number of variables. As a result, a sample of 48 dyads should provide power for an APIM with 6 variables. Moreover, Kline (2005) suggests a sample size less than 200 for small effects, a sample size between 100-200 for medium effects, and a sample size greater than 100 for large effects. Further, a χ^2 (df = 7) a priori power analysis test using *G Power* was conducted. Results indicated that a sample size of 48 would provide sufficient power (>.80) to detect large effect sizes (*r* = .50) in a path model with 15 distinct parameters (each causal path and construct is counted as a parameter in path analysis).

Measures

The online study included questionnaires that assessed demographics, general health functioning, chronic health conditions, future time perspective, health locus of control, disordered eating, and engagement in various health-promoting behaviors (Stahl, 2009). Only those measures relevant to the current analyses are discussed below. For a full review, see Stahl (2009).

Demographic Information. The demographic questionnaire (see Appendix A) consisted of items regarding participants' age, gender, marital status, education, and a variety of health information (e.g., height, weight, etc.). Body mass index (BMI) was calculated using participants' self reports of their current height and weight. Using the adult BMI formula (e.g., kg/m^2) and classifications (e.g., underweight, normal weight, overweight, and obese) recommended by Centers for Disease Control and Prevention (CDC, 2009a), a majority of middle-aged mothers were categorized as overweight (52.1%), with a mean BMI of 27.33 (*SD* = 4.45; range = 20.00 – 41.20) reported. The remainder of middle-aged mothers were normal weight (27.1%) and obese (20.8%). Of the younger adult participants, a majority were categorized as normal weight (56.3%), with a mean BMI of 24.11 (*SD* = 4.78; range = 18.30 –

47.40) reported. The remaining younger adults were overweight (33.3%), obese (8.3%) and underweight (2.1%) (see Table1).

Perceived Limitation due to Chronic Illness. The Health Condition Checklist from the National Long-Term Care Survey (NLTCS, 1992) assessed the number and severity of chronic health conditions that individuals reported (see Appendix B). Participants were asked to indicate whether they had been diagnosed with any of the 31 listed conditions and to rate the difficulty each condition causes them from "none" to "severe." Health conditions ranged from potentially fatal (e.g., cancer, heart trouble) to nonfatal (e.g., arthritis, back problems). The Charlson index (see Pompei, Ales & MacKenzie, 1987) is a valid index that assesses risk of death from comorbid disease by calculating the number and severity of comorbid health conditions. Using this index, responses were first coded for presence (1) or absence (0) of each chronic health condition. In order to calculate the severity of each 31 present chronic health conditions, responses were then coded as such: (1) "no difficulty," (2) "mild difficulty," (3) moderate difficulty," and (4) "severe difficulty." All 31 present chronic health conditions were summed to create an index of current health status, such that higher scores indicate greater difficulty in dealing with chronic health conditions. In other words, the severity index represented individuals' perceived sense of functional disability that was a result of being diagnosed with a chronic health condition. In the current sample, participants reported having an average of 3.14 chronic health conditions (SD = 2.31; range 0 - 10); and similarly reported experiencing back problems (31.3%), nervousness (38.5%), and sleeping problems (42.7%), (see Table 2). The possible severity composite range was from 0 (e.g., reporting no chronic health conditions and no difficulty) to 124 (e.g., reporting "yes" to all 31 chronic health conditions and "severe" difficulty (4)). The severity composite range for the current sample was from 0 – 15.

Participants' average severity composite was 5.14 (SD = 3.97), indicating that, on average, they experienced zero or mild difficulty for their reported chronic health conditions.

Internal Health Locus of Control. The 6-item Internality subscale of the Multidimensional Health Locus of Control Scale (MHLC, Wallston et al., 1978) addressed individuals' perceptions about how strongly they believed they were personally responsible for their health status (see Appendix C)[1]. All items are rated on a 6-point Likert scale ranging from (1) "strongly disagree" to (6) "strongly agree" and the scale is scored such that higher scores indicate a greater sense of internal control. Sample items include "If I get sick, it is my own behavior which determines how soon I get well again," "The main thing which affects my health is what I myself do," and "If I take care of myself, I can avoid illness." In the current sample, an average score of 4.36 (SD = 0.68), on a scale of 1 - 6, was obtained, indicating participants' slightly agreed they had control over their health (see Table 3).

The internality scale has been shown to be internally consistent in previous research (α = .77) (Wallston et al., 1978), in the larger study (α = .71) (n = 692) and in the current sample (α = .73). Although the MHLC consists of three similar Internality Forms, Wallston (2005) suggests only using one form (A, B, or C) of the MHLC unless the purpose of the study is to test the validity of the MHLC. In the current study, participants completed the three forms in order (e.g., Form A, Form B, and Form C), thus in order to reduce testing-instrumentation effects, Form A was chosen to be included in model testing.

Perceived Family Health Support. A 4-item Perceived Family Health Support scale was developed to assess participants' perceptions of how strongly their family influenced their health habits (see Appendix D). Participants were asked to indicate their level of agreement on a 6-point Likert type scale that ranged from (1) "strongly disagree" to (6) "strongly agree" and the scale is scored such that higher scores indicate stronger agreement that one's family influences their own health habits. Items include "My health habits are greatly influenced by my family's health habits," "I rely on my parents for advice on how to live a healthy lifestyle," "My family plays a big part in whether I stay healthy or not," and "I look up to and model my family when deciding whether or not to engage in healthy behaviors." In the present sample, an average score of 3.54 (*SD* = 1.17) on a scale of 4 - 24 was obtained, indicating neutral agreement that their family influenced their health habits (see Table 3). Although one item specifically asks about parents (the remaining items ask about *family* influences), all items remained as part of the scale because dropping it did not significantly influence the scales' internal consistency. (The coefficient alpha for the 3-item scale was .84 in the current sample.) In addition, the inter-item correlational coefficients for the scale ranged from .46 to .79. The overall scale was internally consistent (α = .79) in the larger study (n = 692) and in the current sample (α = .83).

Physical Activity. The 8-item Physical Activity subscale of the Health-promoting Lifestyle Profile II (HPLP II, Walker & Hill-Polerecky, 1996) was used to assess engagement in physical activity (see Appendix E)[2]. Participants were asked to indicate the frequency with which they engaged in each behavior ranging from (0) "never" to (3) "routinely" and the scale is scored such that higher scores indicate more engagement in physical activity, whereas lower scores indicate less engagement in physical activity. Sample items encompass participation in light, moderate, vigorous, and leisure time exercise and include statements such as, "Take part in light to moderate physical activity (such as sustained walking 30-45 minutes 5 or more times a week)," "Follow a regular exercise program," and "Check my pulse rate when exercising." In the present sample, an average score of 1.14 (*SD* = .68) was obtained, indicating participants engaged in little physical activity (see Table 3).

The Physical Activity scale has been shown to be internally consistent in previous research (α = .81) (Walker, Sechrist, & Pender), the larger study (α = .84; n = 692), and the current sample (α = .81). In past research, construct validity was supported through convergence with the Personal Lifestyle Questionnaire (*r* = .68), criterion-related validity was reported for concurrent measures of perceived health status and quality of life (*r* = .27 to .49), and the 3-week test-retest reliability coefficient for the overall scale was .89 (Becker & Arnold, 2004; Walker & Hill-Polerecky, 1996).

Analyses and Results

The reporting of results are divided into five sections: (a) data management, (b) preliminary analyses, (c) an outline of the analytical approached used to test research questions one and two, (c) results pertaining to research question one (i.e., demographic path model), (d) results pertaining to research question two (i.e., actor-partner model), and (e) results pertaining to research question three (i.e., Hotelling's *t*-test).

Data Management

Missing Data

Relatively few data points were missing in the total sample. However, missingness was examined within each of the variables of interest and appropriate solutions were used to impute data for missing values. More specifically, of the 96 participants, 5 participants (5.2%) were missing data on one item within the physical activity subscale of the Health-promoting Lifestyle Profile II (e.g., "Reach my target heart rate when exercising." Three participants (3.1%) were missing data on at least one item within the Perceived Family Health Support scale and one participant (1.1%) was missing data on one item within the Internality subscale of the

Multidimensional Health Locus of Control Scale. There were no missing data for the other variables of interest.

Participants elected not to answer these questions by checking a box during the online Sona survey that stated, “Check this box if you do not wish to provide an answer for this question.” Analyses examining potential group differences (i.e., missing data versus no missing data) revealed no significant group differences in age, number of chronic health conditions, number of doctor visits, average hours of sleep, BMI, or any key variables of interest (see Table 4). Individual mean substitution was used to impute data for participants who were missing data on a single item on a given scale. This procedure, in which the mean of completed values within that scale for that individual is substituted, results in little bias because information from that particular subject is still being utilized (Widamen, 2005).

Outliers

Prior to analyses, data were inspected for outliers. Outliers were defined as values that fell outside of the whisker of a box and whisker plot (Howell, 2002). By using the following formula for outlying high values: 75^{th} percentile + 1.5*(interquartile range); and 25^{th} percentile - 1.5*(interquartile range) for outlying low values, outliers were recoded so they were along the whiskers but still on the end of the distribution. By doing so, this brings the outlying values closer to the mean but maintains their position on the ends of the distribution. Overall, seven values representing seven participants were recoded: four high values for BMI, and 3 high values for perceived functional limitation.

Normality

The distributions of scale scores were examined for normality using skewness and kurtosis values. A distribution was considered significantly skewed if the skew or kurtosis z-score value (e.g., skew or kurtosis value divided by their standard error) was greater than 1.96 (Field, 2009). Using this criterion, and following the adjustment of the outliers, all scales were normally distributed; thus no additional data transformations were necessary.

However, for RQ3, to determine whether there was a significant difference between the correlation coefficients of interest, Fisher's *r* to z transformations and Hotelling's *t*-test statistics were calculated. In order to test this association, the data were restructured so the individual was the unit of measurement (i.e., each individual within the dyad occupied a separate line in the data file). Because the Pearson sampling distribution is not normally distributed, Fisher's r to z transformation was used to convert Pearson *r* values to a normally distributed z value (Field, 2009). Fisher's z was then used for computing confidence intervals on the difference between correlations.

Preliminary Analyses

Descriptive Information

Descriptive statistics (i.e., mean, standard deviation) for all key variables included in the study can be found in Table 3. All measures of interest (e.g., internal health locus of control, perceived family health support, and physical activity) used a Likert-type scale (e.g., unidimensional scaling), indicating interval level data. Middle-aged mothers had, on average, a chronic condition severity index of 5.00 (*SD* = 3.86) and an average of 3.17 (*SD* = 2.31) chronic health conditions, indicating they perceived none to mild functional impairment as a result of their reported chronic health conditions. They were most likely to report experiencing arthritis (41.7%), nervousness (33.3%), and sleeping problems (33.3%). Mothers perceived little health support from family (*M* = 3.17, *SD* = 1.17) and had a weak sense of internal control over their health, as a mean score of 4.42 (*SD* = 0.61) was obtained. Moreover, on average, a physical activity score of 1.25 (*SD* = 0.73) indicated that mothers engaged in none to some physical activity.

Younger adult children had, on average, a chronic condition severity index of 5.29 (*SD* = 4.11) and an average of 3.13 (*SD* = 2.32) chronic health conditions, indicating they perceived none to mild functional impairment as a result of their reported chronic health conditions. They were most likely to report headaches (66.7%), sleeping problems (52.1%), and nervousness (43.8%). Children perceived some health support from family (*M* = 3.91, *SD* = 1.10) and had a weak sense of internal control over their health, as indicated by a mean score of 4.31 (*SD* = 0.74). Moreover, on average, a physical activity score of 1.57 (*SD* = 0.60) indicated that younger adult children engaged in some physical activity.

Paired-sample t-tests

Paired-sample t-tests revealed a number of differences between middle-aged mothers and their younger adult children. (Paired-sample t-tests examine differences *within* each mother-child dyad, whereas the independent sample t-test examine differences between all mothers and all children) (see Table 3). Mothers reported, on average, a higher BMI (*M* = 27.07; *SD* = 3.87) than their children (*M* = 24.85; *SD* = 3.78), $t(47) = 2.73$, $p < .05$. Mothers also perceived less family health support (*M* = 12.68; *SD* = 4.66) than their children (*M* = 15.62; *SD* = 4.22), $t(47) = -3.35$, $p < .01$, and reported less physical activity (*M* = 10.00; *SD* = 5.81) than their children (*M* = 12.56; *SD* = 4.82), $t(47) = -2.49$, $p < .05$.

Additionally, paired-sample t-tests revealed a number of differences between middle-aged mothers' and younger adult children's types of self-reported physical activity (see Table 3). Because the Physical Activity subscale of the Health Promotion Lifestyle Profile encompassed participation in eight various types of activity (e.g., including light, moderate, vigorous, and leisure time exercise), t-tests were computed to examine mean group differences on each of these items. Children (M = 1.79; SD = .94) reported participating in more light to moderate exercise than their mothers (M = 1.27; SD = .96), $t(47) = -2.81$, $p < .05$, and reported more leisure time exercise (M = 1.58; SD = .82) than mothers (M = 1.17; SD = .88), $t(47) = -2.52$, $p < .05$. Moreover, children (M = 2.35; SD = .73) reported participating in more exercise through daily activities than their mothers (M = 1.89; SD = .93), $t(47) = -2.72$, $p < .05$, and reported reaching their target heart rate more often when exercising (M = 1.60; SD = 1.01) than mothers (M = 1.14; SD = .89), $t(47) = -2.57$, $p < .05$. No significant differences emerged for physical activity items related to stretching, vigorous activity, checking one's pulse, and following a planned exercise program.

Intraclass Correlation

To examine whether mothers' and children's responses on the three constructs examined in research question two (i.e., actor-partner model) were statistically dependent, an intraclass correlation coefficient was calculated to determine agreement between family members. Intraclass correlation coefficients are interpreted like Pearson coefficients. Howell (2002) suggests dependence exists if the coefficients are close to 1.00. For internal health locus of control and physical activity, the intraclass correlation coefficients were weak (e.g., 0.08 and 0.17 respectively) indicating those data could be considered independent. However, the intraclass coefficient for perceived family health support indicated the data were dependent (i.e., 0.40). To control for the dependency during model testing, a covariation was added between mothers' and children's perceived family health support in research question two (i.e., actor-partner model, see Figure 3).

Intercorrelations among Key Variables

To determine how the key variables were related, bivariate correlations were examined. Significant correlations between variables provided preliminary support for the hypothesized associations within the path models. Table 5 includes the correlation matrix for *middle-aged mothers*. As shown, greater BMI was associated with perceiving more severe functional limitations (r = .32) and perceiving more severe functional limitations was associated with perceiving less family health support(r = -.31). Lastly, stronger internal health locus of control was associated with participating in more physical activity (r = .42). Table 6 includes the correlation matrix for *younger adult children*. As shown, no significant correlations emerged.

Analytical Approach: Overview of Path Analysis

By utilizing path analysis, all paths (i.e., hypotheses) were tested simultaneously, and each path was examined for significance. To assess whether each path was significant, standardized maximum likelihood estimates (MLE) were inspected. The MLEs are similar to regression coefficients representing the linear influence of common factors on measured variables (Byrne, 2001; Kline, 2005). Statistical significance for each path was determined by examining the Critical Ratio (CR); CR values greater than 1.96 were interpreted as significant at the $p < .05$ level. Moreover, standardized Betas, β, provided information on the strength of the predictors in the model and indicated the number of standard deviation units the outcome variable would change if the predictor variable changed by one standard deviation (see Byrne, 2001; Kline, 2005).

However, path analysis is sensitive to model specification and the inclusion of extraneous variables or failure to include other relevant causal paths substantially affects the path coefficients (Byrne, 2001). Beta weights (e.g., slope of the regression line) show the direct influence of an independent variable on a dependent variable in a path model. When a model has two or more independent variables, the standardized Betas measure the direct influence of one variable on another while controlling for other variables in the model (Cohen, 2003). Moreover, R-squared (R^2) provides information on how well the regression line approximates the data. In other words, R-squared is the amount of variation in the dependent variable that is accounted for by the independent variables in the path model. R-squared ranges from 0 to 1 and becomes larger as more variance is explained and when more predictors are added to the model.

An advantage of using path analysis is that it allows for the decomposition of correlations into direct and indirect effects on the dependent variables (e.g., endogenous variables) in the model. The path coefficients (e.g., beta weights) show the direct effects of an independent variable on a dependent variable. A direct effect is the coefficient for an independent variable on a dependent variable controlling for all prior and intervening variables in the model. In addition, a variable may have an indirect effect on a dependent variable through its association with intermediating variables (e.g., mediated model). The indirect effect is the total causal effect minus the direct effect and measures the effect of intervening variables.

How well the hypothesized model fit the data was determined by inspecting a number of goodness-of-fit statistics. First, a chi-square statistic was used to determine the degree of discrepancy between the observed data and the hypothesized model's covariance matrices. A non-significant chi-square statistic at the 0.05 level (Barrett, 2007) indicates good model fit, such that the hypothesized model accurately reflects the underlying, inherent model in the data. Although model tests frequently report additional fit indices (e.g., the root mean square error of approximation, RMSEA) due to chi square's limitations (e.g., strongly influenced by sample size and degrees of freedom), these limits do not apply for studies with 100 or fewer participants (see Bryne 2001, Kline 2005). As a result, alternative model fit indices were not reported. Secondly, modification indices were inspected. Modification indices suggest specific paths that can be added to the model in order to improve model fit. However, modifications should be theoretically justifiable and not added to the model solely to improve model fit (Hayduk, 1990). Following each modification, a comparative chi-square test was performed to examine whether the modification significantly improved model fit.

Because path analysis is an extension of multiple regression, a possible alternative would be to run a hierarchical regression to test whether interpersonal variables predict physical activity above and beyond individual characteristics. For example, age, BMI, and internal health locus of control could be entered in step one as control variables (e.g., covariates) because they are considered known predictors of physical activity. In the second step, family member's health beliefs could be entered. Hierarchical regression models would allow one to determine the change in R-squared values between steps, which indicate whether the additional variance accounted for by the variables in each successive step is significantly different than zero. A significant model would indicate that when individual variables are held constant (e.g., similar age, BMI, and internal control), adults would be more likely to participate in physical activity if their family member had stronger health beliefs.

RQ1: Demographics Path Model

Past research suggests that demographic characteristics, such as age, BMI, and chronic health condition status, are strong correlates of physical activity. However, how these demographic characteristics influence participation in physical activity in different developmental age periods (i.e., younger adult children and middle-aged mothers) is somewhat unclear. In an attempt to clarify these association across two age periods, the following set of analyses included age, BMI, and chronic health condition status in a path model and was run *twice*: one predicting *mothers'* physical activity and one predicting *younger adult children's* physical activity. (Refer to line "a" in Figure 1, and Figure 2 for a more specific illustration). Although the age range is small in both models, age was included in model testing because previous research has shown a significant decline in physical activity during college (Buckworth & Nigg, 2004) and during midlife (Brim, Riff, 200X).

For *middle-aged mothers* (see Figure 4), results indicated a poor fit of the data to the model, χ^2 (df = 3; N = 48) = 8.149, p = .043. Due to the small *N*, additional fit indices were not interpreted. Further, the model explained a small amount of variance in physical activity (R^2 = .067). Inspection of the MLE and CR values did not provide support for any of the three hypothesized paths. More specifically, age (H1a; β = -.081), BMI (H2a; β = -.127) and chronic health condition status (H3a; β = -.211) were not significantly associated with physical activity. Although the paths did not emerge as significant, they were in the hypothesized direction, as age, BMI, and chronic health condition status were all expected to be negatively associated with physical activity (see Table 7 for a list of the CR values, SE estimates, and the unstandardized and standardized betas for the hypothesized models).

Modification indices suggested the addition of a covariance between middle-aged mothers' BMI and health condition status. The covariance was added to the model because modification indices suggested improvement in model fit (e.g., a chi-square change of 4.72 or greater) and the correlation between adults' BMI and health condition status was theoretically relevant. The addition of the covariance improved the fit index, and results indicated an adequate fit of the data to the model, χ^2 (df = 2; N = 48) = 2.938, p = .230. Moreover, there was a significant chi-square difference of 5.21; df = 1, p<.05, which exceeded the chi-square critical value of 3.84 (Fields, 2009). Although variance explained increased, the model still explained a small amount of variance in physical activity (R^2 = .083).

For *younger adult children* (see Figure 5), results indicated an adequate fit of the data to the model, χ^2 (df = 3; N = 48) = .288, *p* = .962. However, the model explained a small amount of variance in physical activity (R^2 = .049). Inspection of the MLE and CR values did not provide support for any of the three hypothesized paths. More specifically, age (H1b; β = -.175), BMI (H2b; β = .124) and chronic health condition status (H3b; β = .052) were not significantly associated with physical activity.

In sum, these results provide support for RQ1, such that the demographic path model (e.g., age, BMI, and health condition status) adequately fit the data in both younger adult children and middle-aged mothers. Refer to Figure 1 to see how demographic characteristics were hypothesized to influence the physical activity process. Due to power restraints, these variables were not included with individual and interpersonal variables (i.e., actor-partner model) to predict physical activity in RQ2.

RQ2: Actor-partner Model

Previous research suggests that both individual and interpersonal characteristics may be important predictors of physical activity. How partner variables may relate to participation in physical activity has not been examined within the middle-aged mother-younger adult child dyad. The following analyses tested the influence of one's and one's family member's internal health locus of control and perceived family health support on physical activity in middle-aged mothers and their younger adult children. (Refer to lines "b" and "c" in Figure 1; and Figure 3 for a more specific illustration).

Preliminary analyses indicated that mothers' and children's responses regarding perceived family health support were dependent. To control for the dependency, a covariation was added between these variables in the model. In order to test these associations, the data were restructured so that the dyad was the unit of measurement (i.e., each mother and child within the dyad occupy one line in the data file).

Overview of Actor-partner Analyses

Because of the potential dependence of the mother-child data, a dyadic approach to examining the data was taken (see Kenny et al., 2006). The presence of dependence in distinguishable dyads (e.g., mother-child) was measured by examining the intraclass correlation coefficient among the three variables of interest: internal health locus of control(r = .08), perceived family health support (r = .40), and physical activity(r = .17). Cook and Kenny (2005) suggest the dyad be treated as the unit of measurement (i.e., the sample size is the number of pairs of participants) whenever there are nonindependent observations because summed or average scores may produce a mis-measure of the dyad.

The actor-partner interdependence model (APIM) considers the dependent nature of the data by taking into account the shared variance by simultaneously estimating (a) Actor effects (e.g., the relation between one's own internal health locus of control and his or her own physical activity: Figure 3, lines H4a and H4b; the relation between one's own internal health locus of control and his or her own perceived family health support: Figure 3, lines H5a and H5b; and the relation between one's own perceived family health support and his or her own physical activity: Figure 3, lines H6a and H6b), (b) Partner Effects (e.g., the relation between one's internal health locus of control and his or her family member's perceived family health support; Figure 3, lines

H7a and H7b), and (c) the covariances between younger adults' and mothers' individual characteristics that are statistically dependent (Figure 3, line "a") (Arbuckle & Wothke, 1999).

Hypothesized Actor-partner Model

The hypothesized model examined how internal health locus of control, partners' internal health locus of control, perceived family health support, and partners' perceived family health support were related to physical activity. In addition to the overall fit of the data to the model, each path in Figure 6 represented a specific hypothesis.

Results indicated an adequate fit of the data to the model, χ^2 (df = 6; N = 48) = 5.057, p = .537. However, the hypothesized model accounted for only a small amount of variance in younger adults' physical activity (R^2 = .024) and mothers' physical activity (R^2 = .175). Standardized Beta weights provided support for one of the eight hypothesized paths. Hypothesis H4a (e.g., actor effect) was supported, as mothers' internal health locus of control was positively associated with physical activity (β = .42).

However, no other actor effects were supported. More specifically, for *middle-aged mothers*, internal health locus of control (H5a; β = .08) was not significantly associated with perceived family health support and perceived family health support (H6a; β = -.01) was not significantly associated with physical activity. For *younger adult children,* internal health locus of control (H4b; β = .07) and perceived family health support (H6b; β = .12) were not significantly associated with physical activity. In addition, internal health locus of control was not significantly associated with perceived family health support (H5b; β = .23).

Additionally, results did not provide support for partner effects, as mothers' internal health locus of control (H7a; β = .08) and younger adults' internal health locus of control (H7b; β = .12) were not significantly associated with their family member's perceived level of family health support (see Table 8 for a list of the CR values, SE estimates, and the unstandardized and standardized betas for the hypothesized model).

In sum, these results did provide support for the hypothesized model in RQ2, such that both individual (e.g., actor effects) and partner characteristics (e.g., partner effects) are important variables to consider when explaining physical activity within the parent-child dyad.

RQ3: Hotelling's t-test

Previous research suggests mothers are better able to influence their daughters when compared to sons and may have a stronger influence on their daughters' participation in physical activity. However, little research has examined whether mother's health beliefs are more strongly related to their daughters' health beliefs when compared to their sons. As a result, RQ3 examined (a) whether the correlation between mothers' and children's internal health locus of control was stronger for daughters when compared to sons; and (b) whether the correlation between mothers' and children's physical activity was stronger for daughters when compared to sons.

For hypothesis H8a, mother's internal health locus of control was not significantly correlated with daughters' internal health locus of control $r(29) = .08$, $p = .67$, nor was it significantly correlated with sons' internal health locus of control $r(15) = -.06$, $p = .06$. These correlations with mothers' internal health locus of control were not significantly different, Z = 0.42, $p = .66$. For hypothesis H8b, mother's physical activity was not significantly correlated with daughters' physical activity $r(29) = -.05$, p = ns, nor was it significantly correlated with sons' physical activity $r(15) = .41$, p = ns. These correlations with mothers' physical activity were not significantly different, Z = -1.59, $p = .06$ (see Table 9). Overall, these results do not provide support for RQ3, that mothers were better able to influence their daughters' internal locus of control and physical activity behavior when compared to sons. However, because power is low, the difference between correlations would need to be significantly large in order to be detected. With a larger sample, a more sophisticated approach to testing path models across groups (e.g., mother-son versus mother-daughter) would be to run a *multiple group path analysis,* and compare the goodness-of-fit statistics of a constrained model to an unconstrained model. If the constrained model has poorer fit indices when compared to the unconstrained model, then the effects significantly differ by group (Kline, 2005).

DISCUSSION

Review of Research Objectives

The current study drew from Lewis and Rook's (1999) social control theory to examine the role of individual and interpersonal characteristics on physical activity in a sample of community-dwelling mother-child dyads. Specifically, the study had three primary research objectives. The first objective was to examine the relations among well-known demographic predictors of physical activity across two age groups. The second objective examined the relations among internal health locus of control, family members' internal health locus of control, perceived family health support, and physical activity. A modeling approach to analyze dyadic data was utilized because it allowed for the examination of actor effects (e.g., individual influences) and partner effects (e.g., interpersonal influences) while maintaining the dyad as the unit of measurement (Arbuckle & Wothke, 1999). The third research objective examined whether mothers more strongly influenced their daughters' internal health locus of control and physical activity when compared to their sons.

Review of Study Findings

The following section provides a summary of the current study's major findings. Major findings related to the primary objectives of the study are highlighted: (a) the associations among demographic characteristics and physical activity (i.e., RQ1), (b) the associations among individual and interpersonal influences on physical activity (i.e., RQ2), and (c) comparing the strength of mothers' influence between daughters and sons (i.e., RQ3).

Role of Demographic Characteristics in Physical Activity

The first research objective was to examine the relations among well-known predictors of physical activity across two age groups. As hypothesized, the two demographic models adequately fit the data (i.e., younger adult model and middle-aged mother model). The models accounted for a small amount of variance in younger adults' (e.g., 5%) and middle-aged mothers' (e.g., 7%) physical activity. Despite the adequate fit, none of the six hypothesized paths emerged as significant. However, path analysis is sensitive to model specification and the inclusion of extraneous variables or failure to include other relevant causal paths substantially affects the path coefficients. Strong model fit (i.e., nonsignificant chi-square) indicates that the covariance matrix does not differ from the observed covariance matrix.

Age. Hypotheses H1a and H1b, that older age would be associated with less participation physical activity, were not supported. Research has consistently noted that participation in physical activity declines with age from adolescence to older adulthood (e.g., Prohaska, 2006; USDHHS, 2008). Additionally, studies with college student samples, note that participation in physical activity consistently declines across semesters from freshman to senior year (Buckworth and Nigg, 2004). Although the paths did not emerge as significant, their influence was in hypothesized direction. In both younger adulthood and midlife, older age was correlated with less participation in physical activity. One explanation for the nonsignificant finding, is that the limited age ranges for both younger and middle-aged adults (e.g., younger adults: 18.0 – 21.48 years; middle-aged 44.60 – 54.48 years) seriously limited the ability to examine age effects.

BMI. Hypotheses H2a and H2b, that greater BMI would be associated with less participation in physical activity, were not supported by the models. Such non-significant findings may be in accord with research that suggests that adults' BMI scores may not be a valid predictor of activity (e.g., adults who are fit and have more muscle mass tend to weight more, which increases their BMI score), thus suggesting other measures of body fat (e.g., waist circumference) are more reliable measures (CDC, 2009). Another possible explanation may be due to the small range in BMI scores; over half (56.3%) of the younger adults were of "normal" weight and consequently may not use their BMI status as a motive to engage in physical activity. Additionally, in midlife, where over half of adults were "overweight" (52.1%), perhaps BMI was a barrier towards physical activity for some adults but a motivator to action for others.

Interestingly, when comparing the path coefficients, (i.e., Beta weights) across age groups, the path from BMI to physical activity was in the hypothesized direction for mothers (e.g., negative relation, $\beta = -.13$) but in the opposite direction (e.g., positive relation $\beta = .12$) for younger adults. Perhaps younger adults see their increased BMI as a motivator to engage in more physical activity, whereas middle-aged mothers see their increased BMI as barrier towards physical activity.

Chronic Health Conditions. Hypotheses H3a and H3b, that perceptions of more severe functional limitations would be associated with less participation in physical activity were not supported by the models. Of interest, is the direction of influence from perceived limitations to physical activity. Like BMI, the path from perceived limitation to physical activity was in the hypothesized direction for mothers (e.g., negative relation, $\beta = -.21$) but in the opposite direction (e.g., positive relation $\beta = .05$) for younger adults. This may be of interest to future researchers interested in understanding how adults' health context, particularly adults' chronic health condition status, influences health behaviors across the lifespan (Rashinaldo, 2006; Traywick & Schoenberg). Perhaps the current cohort of younger adults view chronic disease as a societal norm (despite the trend that illness is not typically salient during this age period) and is thus not seen as a barrier towards exercise. In other words, whereas middle-aged adults may see functional limitations as a perceived physical barrier, younger adults may view their health status, including their functional limitations, as a motivator to change one's behavior and engage in more health promotion.

With regard to the middle-aged mother model (Figure 4), the standardized beta values for each of the three variables suggest that perceived limitation may be the most important demographic predictor in the model ($\beta = -.21$). The strength of this relation for middle-aged mothers is consistent with research that suggests midlife is a time when adults begin to notice the age-related changes and declines in their health status which consequently influence their engagement in health behaviors (Merrill & Verbrugge, 1999). Alternatively, with regard to the younger adult child model (Figure 5), the standardized beta values for age and body mass index are comparatively identical ($\beta = -.17$ and $.12$ respectively) indicating that both variables have a comparable degree of importance in the model.

Role of Individual and Interpersonal Variables in Physical Activity

The second research objective used an actor-partner interdependence model and examined the relations among individual and interpersonal variables on physical activity within mother-child dyads. The APIM is a model that is being used more frequently in the social sciences to examine interpersonal relationships; specifically, Cook and Kenny (2005) assert the APIM explores how one person's thoughts and behaviors affect the thoughts and behaviors of another person. The hypothesized set of relations can be seen in Figure 3. As hypothesized, the hypothesized model adequately fit the data and explained a small amount of variance in younger adult children's (i.e., 2.4%) and mothers' (i.e., 17.5%) physical activity. Of interest is how the model approached a moderate amount variance in mothers' physical activity but only a minute amount in children's physical activity.

Internal Health Locus of Control. One of the eight hypothesized paths emerged as significant. Hypothesis H4a, that mothers with a greater sense of internal control would be more likely to report physical activity when compared to mothers with a weaker sense of control, was supported by the model. This finding is in accord with previous research, that suggest that those who believe they control their health outcomes (e.g., "My behaviors influence whether I get diagnosed with a chronic disease") are more likely to report engaging in a variety of health preventative behaviors, including physical activity (Lachman, 2004; Wallston, 2001). Interestingly, when comparing the standardized beta values for mothers and children, the strength of the path from internal control to physical activity was vastly different between age groups. While mothers' internal health locus of control was an important predictor ($\beta = .42$) of physical activity in the model, younger adults' internal health locus of control ($\beta = .07$) was not. In other words, the model suggested that for middle-aged mothers, stronger internal control beliefs resulted in more physical activity but for younger adult children stronger internal control beliefs did not result in more physical activity.

This finding may lend support to the hypothesis that health is a domain that is highly valued during midlife. Perhaps, during midlife, feelings of control and power are operating within the health domain because middle-aged adults believe health to be an important developmental task/goal for them (e.g., will optimize the aging process). Interestingly, hypothesis H4b, that younger adults with a greater sense of internal control would be more likely to report physical activity when compared to younger adults with a weaker sense of control, was not supported by the model. Again, these findings may lend support to research by Heckhausen, Wrosch, and Schulz (2010) who suggests internal control varies by age and across domain; perhaps health is not an important developmental task for younger adults and thus internal control is not a strong predictor of behavior within this domain.

Another explanation for the significant difference in path coefficients may be that younger adults' beliefs *indirectly* influence physical activity, through its association with other psychosocial constructs. For example, some models of exercise behavior suggest that exercise is determined by a combination of individuals' health beliefs and a sense of subjective norm. Subjective norm is one's perception of the social pressure to perform the behavior (Lox et al., 2003). Perhaps, younger adults' exercise behaviors are more strongly influenced by the social pressure they receive from friends, romantic partners, and college fitness campaigns. Arnett (2000) suggests younger adults are forming identities during college, and because they are trying out various life possibilities, perhaps they may more susceptible to social pressure as they move towards making enduring behavioral decisions.

Perhaps, there other constructs that are more important to consider during younger adulthood. Research on age differences in physical activity has shown that the reasons for exercising differ between younger, middle-aged, and older adults. Younger adults are more likely to exercise if they believe it will enhance their physical appearance and interpersonal attraction, whereas middle-aged adults are more likely to exercise if they believe they can reap physical health benefits (Trujillo, Brougham, & Walsh, 2004). These results are consistent with developmental theorists (Erikson, 1982) who propose that intimacy and finding a romantic partner is an important developmental task during younger adulthood. Thus, adults' evaluation of the reasons for and consequences of a particular decision (e.g., engaging in physical activity) reflect the developmental tasks associated with their respective age group.

With regards to age differences in internal control, researchers also suggest that as we age, what may be favorable in younger adulthood becomes increasingly difficult in mid and late life as individuals become concerned with managing loss (Wrosch, Heckhausen, & Lachman, 2000). As a result, younger adults may have a stronger sense of control when compared to middle-aged and older adults. However, in the current sample of adults, no significant age differences in internal control emerged as a result of paired-sample t-tests. This inconsistency may be due to sample characteristics; the current sample of middle-aged adults are part of the Baby Boom cohort (b. 1946-1964), who are typically described as competent and knowledgeable, and researchers assume they aspire to optimize the aging process (Lachman 2004). As a consequence, one may expect to find stronger control beliefs when compared to previous cohorts of middle-aged adults. Secondly, recent work has begun to explore the short-term intra-individual variations in internal control (Wolinsky, Wyrwich, Kroenke, Babu, & Tierney, 2003). They suggest that negative, external events may pose immediate and long lasting decreases in personal control. Perhaps the current sample of younger adults was overwhelmed with the adoption of new social roles (e.g., college student, employee, romantic partner, etc.) and additional stress that accompany the transition to college, which consequently influenced their levels of internal control.

In the hypothesized model, no other paths emerged as significant. However, when comparing the standardized beta values for mothers' paths with children's paths (i.e., H4a with H4b; H5a with H5b, etc.), of interest is the difference in the strength of the beta values. For example, the standardized beta value for the path from internal health locus of control to perceived family health resources is stronger for younger adults (β = .23) than middle-aged mothers, (β = .08) possibly suggesting that this relation is stronger during younger adulthood. Younger adults were more likely to perceive health support from their family if they had stronger feelings of internal control. Perhaps during midlife and with more life experiences, mothers' sense of family health support is influenced by previous experiences with family members and less by their own health beliefs. Of further interest is that the model was able to explain a moderate amount of variance in mothers' physical activity (17.5%) but only a small amount of variance in younger adult children's physical activity (2.4%), suggesting that there are other psychosocial constructs during younger adulthood that more strongly influence physical activity.

Interpersonal Influences. With regard to interpersonal influences, it was hypothesized that one's *own* perceived family health support would be associated with their *partner's* level of internal control. Kenny and Cook (1999) assert that partner effects imply that one person's response is contingent upon some property of the partner. In addition, partner effects can validate the presence of a relationship and can identify underlying relational phenomenon within a dyad. In the current study, social control theory aided in the conceptualization of *how* interactions with social partners influence one's own health beliefs. However, these paths (e.g., dashed lines in Figure 6) were not supported by the model.

Perhaps, within the domain of physical activity, the mother-child dyad is less important when considering the significance of mothers' and younger adult children's ability to exert social control. Thorpe et al. (2008) suggest that the mother-child dyad may be more important in influencing health behaviors within the context of chronic disease management. Thus, the effects of social control may differ depending on the health context by which it occurs. Although young adults typically report parents, romantic partners, and friends as agents of social change, young adults who were diagnosed with diabetes nominated their parents as agents of social change, because they believed they needed support and guidance from a parent in managing their diabetes (Thorpe et al., 2008).

Influence of Child Sex

Previous research suggests mothers are better able to influence their daughters when compared to sons and may have a stronger influence on their daughters' participation in physical activity (Gustafson & Rhodes, 2006, Rimal, 2003). Hypothesis H8a, that mothers' internal health locus of control would be more strongly related to their daughters' internal health locus of control than sons' internal health locus of control, was not supported. It is possible that the current sample of younger adults is not representative of the general young adult population. Because they are enrolled in college, some researchers (Arnett, 2000) would suggest their experiences are characterized by identity exploration and semi-autonomy. Perhaps, during college, mothers may not be an important agent of change when compared to other social partners with whom younger adults are exposed (e.g., friends, romantic partners). Although previous research suggests that women are more likely to rely upon their parents when compared to sons (Vassallo et al., 2009) and are more likely report stronger feelings of relatedness with their mother (Birditt et al., 2008), perhaps mothers are no longer a role model in the domain of physical activity. Due to the recent increase in wellness programs on college campuses, college students may be adopting new role models due to their exposure to such programs.

Additionally, hypothesis H8b, that mothers' participation in physical activity would be more strongly related to their daughters' participation in physical activity than sons' participation in physical activity, was not supported. Interestingly, the strength of the correlation between mothers' physical activity and their children's was in the opposite direction than hypothesized. Although the difference was approaching significance (p = .06), mothers' physical activity was moderately correlated with son's physical activity (r=.41) but not with daughters' physical activity (r = -.05). Although the research on the relation between parent and child physical activity is mixed, (Gustafson & Rhodes, 2006) there is no empirical research that supports the positive relation between mothers' and sons' physical activity. However, the interpretation of these findings should be made with caution. Research that demonstrates a positive relation between parents' and children's physical activity typically examines independent, objective measures of physical activity (Ionnotti et al., 2005). The current study used self-report measures of physical activity, which are prone to response bias and social desirability. Further, there is some research to suggest that the association between parents' and children's physical activity is dependent on the intensity (e.g., vigorous, moderate, light activity) of physical activity (Ionnotti et al., 2005).

Summary

The current study suggests that the demographics models and actor-partner model adequately fit the observed data and additionally provided support for the relation between internal health locus of control and physical activity during midlife. The current study was among the first to investigate physical activity between middle-aged mothers and their younger adult children. In addition, the findings can potentially add to a framework that may guide future work aimed at understanding health behaviors in mother-child dyads. Although future research is needed to replicate these findings, a number of conclusions can be said about the data.

First, the results of the current study suggest that demographic characteristics (e.g., age, BMI, and chronic health condition status) were not directly associated with mothers' or younger adult children's participation in physical activity. One possibility is that demographic characteristics are only able to indirectly influence levels of physical activity, through their association with other psychosocial constructs. As illustrated in the organizational framework in Figure 1, perhaps age, BMI, and chronic health conditions are indirectly related to physical activity through their association with psychological constructs, such as internal health locus of control. Unfortunately, due to power constraints, the results of the present analyses cannot address the mechanisms by which demographic characteristics influence mothers' and children's physical activity.

Next, it is clear that for the current sample of mothers, internal health locus of control was an important factor influencing physical activity during midlife. Thus, an intervention designed to increase mothers' internal health locus of control (e.g., perhaps through positive reinforcement of mothers' physical activity or educating adults on the important role of midlife physical activity) might prove successful in increasing their own physical activity. Within a variety of health behavior domains, of interest is whether internal control beliefs can be enhanced with positive interventions. For example, emerging evidence suggests control beliefs about performance in specific health domains, such as balance ability (Lachman, 2006) and cognitive health (Wolinsky et al., 2010) can be modified. Alternatively, internal health locus of control was not an important contributor to young adults' physical activity. Consequently, future research should strive to identify important psychological predictors of physical activity in younger adulthood.

Interestingly, interpersonal characteristics were not significant in the actor-partner model. One possible reason for not finding a significant relation is that there was not enough power due to the small sample size. Previous research suggests that one individual is likely to perceive more support if their partner has greater feelings of control. However, some of this research was conducted with married couples. As such, perhaps these relations are not generalizable to other dyads and social relationships.

Finally, mothers' internal health locus of control and physical activity were not more strongly related to the internal control and physical activity of their daughters when compared to their sons. One possible explanation is that the younger adult females were separating from parental influence and with the increased social demands of young adulthood, mothers were less salient role models for physical activity. Future research is needed to clarify how mothers' and children's' sex influence physical activity within these dyads, as the results of the current study were not consistent with previous research.

Limitations and Future Directions

In general, findings from the current study add to the small, yet growing area of research that uses a modeling approach to examine partner level influences on the health behaviors of adults within dyadic relationships. However, a number of limitations must be considered when interpreting the results and planning for future directions.

Sampling

It is possible that the current study would not be replicable in a more diverse sample of adults. First, the participants were quite affluent and high functioning; approximately 70 % of mothers reported earning a college degree (20.8% of those earning graduate degree) and over 60% reported a total income of over $75,000 (31.3% reported an income greater than $100,000). Over 90% of participants reported having some form of health insurance. Because a majority of the participants were residents of Northeastern and Mid-Atlantic regions, the current findings may not generalize to other regions in the United States, where engagement in physical activity is typically greater than (e.g., Colorado) or less than (e.g., Kentucky) the national average (CDC, 2008). Moreover, all younger adult children in the present study were college students. Results may have differed if the sample have comprised of younger adults who were employed and did not experience the transition to college.

Out of 842 middle-aged adults who were contacted to participate in the larger study, only 167 participants responded to the recruitment postcards. Thus, data on non-responders were not available and the sample in the current study may have been biased such that those who were more educated and had more resources (i.e., a computer and internet access) were more likely to respond to the recruitment ads and participate in the study. Moreover, the title of the online SONA survey, "Health-promoting Behavior Study" may have increased selection bias. In other words, perhaps participants who engaged in healthy lifestyles were more likely to choose and participate in the Health-promoting Behavior Study because it was attractive and seemed relevant to them when compared to less healthy participants.

Future research should attempt to replicate the tested model in a more diverse sample of parent-child dyads. For example, the actor-partner model could be extended to include fathers (e.g., father-son and father-daughter), single-child versus multiple child families, intact-families versus divorced families, and include younger adult children who are not enrolled in college. According to a systematic review by the CDC of eleven family based interventions, the influence of family-based social support on levels of physical activity in inconsistent. Perhaps, the influence of family-based social support differs depending on the specific parent-child dyad under examination. There is evidence to suggest that the strength and quality of relationships within families is contingent upon one's family status (e.g., intact versus divorced) and ethnicity (e.g., White, African American, Hispanic American) (Nicholson, 2007). Some research suggests ethnic minorities adolescents endorse family obligations more strongly than their White peers (Fuglini & Flock, 2007). Relatedly, 97.9% of the sample was White, which limits the generalizability to other ethnic or racial groups. Additionally, Grundy (2005) found socioeconomic differences in the reciprocal nature of the parent-adult child relationship; children were less likely to provide assistance to parents who were financially secure. Future research should examine whether the relations found in the current study can be equally applied to different ethnic and socioeconomic groups.

Measurement

Self-Report. Another limitation of the current study was related to measurement issues. All of the measures were self-report measures and thereby prone to response bias and social desirability. Although all of the selected measures were carefully selected based on previous research; in general, a number of limitations are associated with self-report measures. For example, there is an over-reliance on episodic recall, closed-ended items often force people into choosing an alternative even if they feel the best answer is not included, and, lastly, participants are more likely to overly report social desirable behaviors (e.g., “I frequently engage in regular exercise”) when answering self-report items (Krosnick, 1999; Schwarz, 1999).

Because it is important to validate self-report data using objective measures of the same construct, future research should address these shortcomings by including multiple measurement techniques. Although used less often, objective measures are becoming more widely accepted in health promotion research. The most common, accelerometers (e.g., pedometers), record data on the intensity and duration of movement and typically report the number of steps taken and number of estimated expended calories based on one’s height and weight (Tudor-Locke & Chan, 2006; Calfas et al., 1996). Validity coefficients for accelerometer use are typically high (.81) and when used in conjunction with objective measures, the accuracy of self-report data is oftentimes more accurate for males than females, for younger adults than older adults, and those in better physical health (e.g., lower BMI scores) (Ferrari et al., 2007). Interestingly, the underlying mechanisms for these differences are unclear. Such a finding necessitates the need to perform validation studies so that physical activity levels can be estimated through a variety of assessment instruments (Ferrari, et al., 2007).

Operational Definition of Physical Activity. A major critique and research priority for health researchers is to diminish the inconsistencies in language when defining physical activity. Because of the inconsistencies in construct definition, researchers are able to freely choose a dependent outcome that may not be capturing the full concept of physical activity. Oftentimes, there are considerable variations in how physical activity is measured; which usually reflect different domains of behaviors. For example, some researchers define physical activity as simply adherence to exercise programs (e.g., Morey et al., 2003; Oman & King, 2000; Tudor-Locke & Chan, 2006), while others define physical activity as functional locomotion (e.g., walking, climbing stairs), participation in daily routines (e.g., housework, gardening), or scheduled exercise participation (e.g., endurance training, competitive sports) (Ziegelmann, Lippke, & Schwarzer, 2006).

One suggestion for operationalizing physical activity is to ensure that outcome measures are in accord with physical activity guidelines recommended by the Centers for Disease Control (CDC) (Nelson, et al., 2007). In order to help Americans incorporate physical activity into their lifestyle, the American College of Sports Medicine (ACSM) and the Center for Disease Control (CDC) issued a set of exercise recommendations (revised in 2008) that were intended to illustrate precise behaviors in which to achieve optimal physical and mental health. Many intervention programs integrate the ACSM-CDC guidelines into their outcome measure of physical activity because the ACSM-CDC recognizes physical activity as a multidimensional construct. For example, the ACSM-CDC published guidelines on the *frequency* (e.g., 3-5 days per week), *intensity* (e.g., 60-90% of maximum heart rate reserve), *duration* (e.g., 15-90 minutes) and *type* of exercise (large muscle group activities) that is required for cardiovascular fitness (Dubbert, 2002).

Although not always well known by the lay population, such recommendations do vary slightly depending on the population of interest (e.g., healthy adults, older adults, adolescents). For example, adults included in current study (ages 18-65) would need 150 minutes of moderate-intensity aerobic activity (i.e., brisk walking) *or* 75 minutes of vigorous-intensity aerobic activity (i.e., jogging or running) every week *and* muscle strengthening exercises on 2 or more days a week that work all major muscle groups (legs, hips, back, abdomen, chest, shoulders, and arms). Some researchers agree that measurement instruments should be modified in order to accommodate the ACSM-CDC recommendations (Pinto, Lynn, Marcus, DePue, & Goldstein, 2001).

The 8-item physical activity subscale used in the current study did not include an item related to muscle strengthening exercises. In addition, the frequency and duration assessed for item 10 (e.g., 60 minutes of vigorous-intensity activity) and item 16 (e.g., 150 -200 minutes of moderate-intensity activity) were not in accord with current 2008 ACSM guidelines. Thus, the index of physical activity used in this study could be considered a limitation. Because of the discrepancy in physical activity domains examined, comparison across measures is difficult and should be interpreted cautiously. Consequently, future studies must be explicit in how the construct of physical activity is defined so that the relation between those dimensions of activity and desired health benefits can be elucidated.

Study Design

Given the cross-sectional nature of the data in the current study (i.e., data were collected at one time point), the typical caveat must be acknowledged. Cross-sectional data are limited to group averages and do not allow for the examination of intraindividual changes and preclude any causal interpretation of the data. Thus, within the current study's path analysis framework, causal links could not be determined, and only estimated conclusions regarding development could be made (Baltes, Reese, & Nessleroade, 1988).

Moreover, health behavior change can be conceptualized as a process (Prohaska & DiClimente, 1983); thus in order to fully understand how middle-aged adults and their younger adult children influence each other's health behaviors, future research must utilize longitudinal methods. This is especially important as adults experience the transitions associated with the entrance into and the exits from emerging adulthood and midlife. For example, longitudinal data could help explain how transitions in emerging adulthood (e.g., going to college, getting married; Arnett, 2000) and midlife (e.g., experiencing physical changes in health; Merrill & Verbrugge, 1999) influences variability in physical activity.

Life Span Integration. Researchers agree that theory driven physical activity interventions are essential for understanding *why* an intervention is successful (Ramey & Ramey, 1998). Currently, only one study known to the author (Ziegelmann et al., 2006) developed an intervention with a life-span conceptualization. Further, no intervention mentions an interest in assessing cohort differences or whether an intervention may be cohort specific. Unless sequential methods are introduced, one can not tease apart age differences from cohort effects. For example, with the current obesity epidemic, today's younger adults are projected to be in worse physical health when they approach old age when compared to today's older adults. Therefore, today's older adult interventions may not be applicable to future cohorts. The use of a sequential method may help elucidate this public health dilemma.

Alternative Constructs to Consider. To increase variance explained in physical activity, future work could extend the current study's findings by including additional constructs listed in the organizational framework in Figure 1. For example, at an individual level, constructs derived from social cognitive theory (Bandura, 1997), the health belief model (Rosenstock, 1974), the theory of reasoned action (Azjen & Fishnein, 1980), the theory of planned behavior (Azjen, 1985) and protection motivation theory (Roy, 1983) could be included in model testing to assess how various psychological variables influence physical activity. In general, model testing would include sociocognitive determinants such as: (a) perceived ability to successfully engage in a physical activity, (b) the expected outcomes (e.g., benefits, costs) of engaging in physical activity, (c) the goals that provide self-incentives for a physical activity, and (d) the perceived obstacles that hinder one's ability to maintain a physically active lifestyle.

At an interpersonal level, constructs derived from social control theory (Lewis & Rook, 1999) could be included in model testing to assess how one's social relationships and interactions with social partners influence physical activity. Future research could examine who middle-aged adults and younger adults nominate as agents of social change and whether these agents exert social control (and whether it is direct control, indirect control, or both) on their partners. Further, some research examines physical activity from a community approach which examines environmental factors that may influence health behaviors. With the persistent rise in the number of obese and overweight adults, there is a marked increase in the number of worksite wellness and campus wellness programs that are available to adults. Such programs may have the potential to directly and indirectly influence adults' physical activity behaviors. Such community programs may indirectly influence physical activity because adults who have such opportunities may subsequently perceive fewer obstacles and have stronger efficacy beliefs which, in turn, influence their physical activity.

Conclusion

Physical inactivity is considered a major public health threat (Prohaska et al., 2006). Because of the increasing burden of chronic health problems (e.g., coronary heart disease, obesity, etc.) and health care costs associated with a sedentary lifestyle, more preventative approaches are required (Stewart et al., 2001). As a result, researchers are attempting to understand and identify individual, social, and environment predictors of health-promoting behaviors; particularly physical activity because regardless of age, adults can derive health benefits from regular exercise (e.g., improvements in quality of life, decreases in risk factors for chronic diseases, etc.). Many scholars note that there is a marked gap examining how interactions with social partners interacts with psychological variables to influence physical activity.

The current study addressed the importance of considering individual and interpersonal influences in the study of physical activity in middle-aged mothers and their younger adult children. Two primary research objectives were met. The first objective examined the role of demographic variables on physical activity across two age groups. Results indicated that hypothesized models adequately fit the data. Interestingly, the direction of the relation from chronic health conditions and BMI to physical activity varied by age group. The second research objective examined the role of individual (e.g., own health beliefs) and interpersonal (e.g., family member influences) influences on physical activity using an actor-partner interaction model (APIM, Cook & Kenny, 2005). Results indicated the APIM adequately fit the data. Further, standardized beta weights indicated that mothers with stronger internal health locus of control beliefs were more likely to report participating in physical activity. The third research objective investigated whether mothers were able to more strongly influence their daughters' health locus of control and physical activity when compared to their sons. No significant differences emerged between daughters and sons; as a result, research question three was not supported.

The current study provides a basis for further investigation of the demographic, psychological, and interpersonal influences that are related to physical activity within parent-child dyads. The results suggest that, in additional to spousal relationships, interpersonal influences may also be important in the study of physical activity between adults involved in other close dyadic relationships (e.g., parent-child relationship). However, because physical activity seems to be influenced by a system of both personal and social factors, additional research is needed to clarify the pathways (in diverse dyads) by which parents and children influence each others' physical activity behavior. Such knowledge may potentially maximize programs aimed at facilitating family members' health promotion practices by adding to a dyadic framework for family-based interventions.

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Footnotes

[1] The MHLC scale consists of two additional dimensions: powerful others and chances externality.

[2] The HPLP has five additional health promotion domains: nutrition, stress management, interpersonal relations, spirituality, and health responsibilities.

Table 1

Sample Characteristics for Total Sample and Mothers and Children

Variable	Total (n=96)		Mothers (n=48)		Children (n=48)		Difference Test		
	M	*SD*	*M*	*SD*	*M*	*SD*	*t*	df	*p*
Age (years)	34.13	14.81	48.54	3.94	19.71	1.74	-46.44	94	0.00
# of Health Conditions	3.14	2.31	3.17	2.32	3.12	2.32	-0.10	94	0.92
Height (inches)	66.04	3.63	64.96	2.69	67.08	4.1	2.96	92	0.00
Weight (pounds)	162.71	34.79	162.91	29.83	162.54	39.01	-0.05	89	0.96
Body Mass Index (BMI)	25.97	3.97	27.08	3.87	24.85	3.78	-2.27	94	0.03
Average Sleep (per night)	6.83	1.03	6.75	1.00	6.92	1.07	0.79	94	0.43
# of Doctor Visits (in past year)	3.24	2.79	3.81	3.43	2.67	1.83	-2.05	94	0.04
	N	%	N	%	N	%	χ^2	df	*p*
Insurance							0.45	2	0.80
Private	66	68.8	35	72.9	31	64.6			
Public	21	21.9	11	22.9	10	20.8			
None	3	3.1	1	2.1	2	4.2			
Ethnicity									
White	94	97.9	47	97.9	47	97.9			
Hispanic / Latino	2	2.1	1	2.1	1	2.1			
Education							42.39	3	0.00
Less than 9th grade	1	1.0	1	2.1	0	0.0			
9th to 11th grade	54	56.3	11	22.9	43	89.6			
College - Degree	29	30.2	24	50.0	5	10.4			
Graduate - Degree	10	10.4	10	20.8	0	0.0			

(table continues)

Table 1 *(continued)*

	N	%	N	%	N	%	χ^2	df	*p*
Income							10.30	4	0.04
Less than $25,000	6	6.3	0	0.0	6	12.5			
$25,000 - $49,000	8	8.3	6	12.5	2	4.2			
$50,000 - $74,999	18	18.8	8	16.7	10	20.8			
$75,000 - $99,999	29	30.2	14	29.2	15	31.3			
$100,000 +	30	31.3	19	39.6	11	22.9			
Marital Status							83.38	4	0.00
Cohabitating / Living w partner	2	2.1	1	2.1	1	2.1			
Married	42	43.8	40	83.3	2	4.2			
Divorced	4	4.2	3	6.3	1	2.1			
Remarred after divorce	4	4.2	4	8.3	0	0.0			
Single / Never married	44	45.8	0	0.0	44	91.7			
Smoke Cigarettes							0.13	1	0.72
Yes	11	11.5	6	12.5	5	10.4			
No	84	87.5	41	85.4	43	89.6			
Wear Seat Belt							6.01	1	0.01
Yes	87	90.6	47	97.9	40	83.3			
No	9	9.4	1	2.1	8	16.7			

Table 2

Frequency of Health Conditions for Total Sample and Mothers and Children

	Total (n=96)		Mothers (n=48)		Children (n=48)	
Chronic Health Condition	*N*	%	*N*	%	*N*	%
Arthritis	21	21.9	20	41.7	1	2.1
Heart Trouble	8	8.3	7	14.6	1	2.1
Back Problems	30	31.3	14	29.2	16	33.3
Breathing Problems	12	12.5	5	10.4	7	14.6
Diabetes	5	5.2	4	8.3	1	2.1
High Blood Pressure	13	13.5	10	20.8	3	6.3
Cancer	2	2.1	1	2.1	1	2.1
Glaucoma	1	1.0	1	2.1	0	0.0
Cataracts	3	3.1	3	6.3	0	0.0
Nervousness	37	38.5	16	33.3	21	43.8
Sleeping Problems	41	42.7	16	33.3	25	52.1
Headaches	52	54.2	20	41.7	32	66.7
Parkinson's disease	1	1.0	1	2.1	0	0.0
Hardening of Arteries	1	1.0	1	2.1	0	0.0
Stomach Ulcers	1	1.0	1	2.1	1	2.1
Stoke/Effects of Stoke	1	1.0	1	2.1	0	0.0
Paralysis	2	2.1	1	2.1	1	2.1
Circulation Trouble	9	9.4	4	8.3	5	10.4
Asthma	16	16.7	6	12.5	10	20.8
Broken hip	2	2.1	1	2.1	2	4.2
Other broken bones	6	6.3	1	2.1	6	12.5
Bladder Problems	8	8.3	7	14.6	1	2.1

(table continues)

Table 2 *(continued)*

Chronic Health Condition	Total *N*	Total %	Mothers *N*	Mothers %	Children *N*	Children %
Gall Bladder Trouble	4	4.2	2	4.2	2	4.2
Kidney Trouble	1	1.0	1	2.1	0	0.0
Anemia	7	7.3	3	6.3	4	8.3
Emphysema	1	1.0	1	2.1	0	0.0
Epileptic Seizures	1	1.0	1	2.1	0	0.0
Pneumonia	1	1.0	1	2.1	0	0.00
Vision Problems	13	13.5	6	12.5	7	14.6
Hearing Problems	4	4.2	2	4.2	2	4.2

Table 3

Means and Standard Deviations of Key Study Variables

Variable	Total (n=96)		Mothers (n=48)		Children (n=48)		Paired-Sample t-test	
	M	*SD*	*M*	*SD*	*M*	*SD*	*t*(df)	*p*
Age	34.13	14.81	48.54	3.94	19.71	1.74	53.38 (47)	0.00
Chronic Health: Perceived Limitation	5.14	3.97	5.00	3.86	5.29	4.11	-0.93 (47)	0.34
Body Mass Index	25.97	3.96	27.08	3.87	24.85	3.78	-2.27 (47)	0.09
Internal Health Locus of Control	4.36	0.68	4.42	0.61	4.31	0.74	1.21 (47)	0.23
Perceived Family Health Support	3.54	1.17	3.17	1.17	3.91	1.10	-3.35 (47)	0.00
Physical Activity (sum)	1.14	0.68	1.25	0.73	1.57	0.60	-2.49 (47)	0.02
Follow planned exercise program	1.41	1.01	1.25	0.98	1.54	1.01	0.13 (47)	0.17
Vigorous activity	1.51	1.06	1.35	1.10	1.63	1.02	0.15 (47)	0.20
Light to moderate activity	1.53	0.98	1.27	0.96	1.79	0.94	-0.15(47)	0.01
Leisure time activity	1.36	0.86	1.17	0.89	1.58	0.82	-0.08 (47)	0.02
Stretching exercises	1.20	1.03	1.10	1.05	1.27	1.01	0.24 (47)	0.42
Exercise through daily activities	2.12	0.86	1.89	0.92	2.35	0.72	-0.12(47)	0.01
Check pulse rate while exercising	0.80	0.91	0.72	0.86	0.83	0.95	0.18 (47)	0.47
Reach target heart rate while exercising	1.38	0.98	1.15	0.90	1.61	1.00	-0.09 (47)	0.01

Table 4

Comparison of Participants with Missing Data and Participants without Missing Data

Variable	No Missing Data		Missing Data		Difference Test		
	M	*SD*	*M*	*SD*	*t*	df	*p*
Age (years)	33.68	14.96	37.25	13.84	0.78	94	0.44
# of Health Conditions	3.07	2.32	3.66	2.29	0.82	94	0.41
Average Sleep (per night)	6.79	1.03	7.17	1.03	1.21	94	0.23
# of Doctor Visits (in past year)	3.37	2.92	2.33	1.3	1.19	94	0.24
Body Mass Index (BMI)	26.12	4.81	26.16	4.74	0.06	94	0.95
Perceived Family Health Support	3.60	1.10	3.52	1.15	0.44	94	0.66
Internal Health Locus of Control	4.40	0.65	4.36	0.68	0.34	94	0.73
Physical Activity	1.46	0.67	1.12	0.69	0.47	94	0.64

Table 5

Intercorrelations among Variables: Middle-aged Mothers (n=48)

Variable	1	2	3	4	5	6
1. Age						
2. Body Mass Index	0.24					
3. Chronic Health: Perceived Limitation	0.10	0.32*				
4. Internal Health Locus of Control	0.01	0.09	-0.06			
5. Perceived Family Health Support	0.10	0.04	-0.31*	0.18		
6. Physical Activity	-0.13	-0.21	-0.26	0.42**	0.06	

*$p < .05$; **$p < .01$.

Table 6

Intercorrelations among Variables: Younger Adult Children (n=48)

Variable	1	2	3	4	5	6
1. Age						
2. Body Mass Index	-0.02					
3. Chronic Health: Perceived Limitation	-0.04	0.03				
4. Internal Health Locus of Control	0.14	0.06	-0.06			
5. Perceived Family Health Support	-0.07	0.01	-0.13	0.24		
6. Physical Activity	-0.20	0.13	0.07	0.10	0.14	

Table 7

Standardized and Unstandardized Estimates for Preliminary Demographics Model

Regression Coefficients	Younger Adult Child Model (n=48)				Middle-aged Mother Model (n=48)			
	β	*b*	SE(*b*)	CR	β	*b*	SE(*b*)	CR
Age → Physical Activity	-0.175	-0.485	0.394	-1.229	-0.080	-0.117	0.204	-0.572
BMI → Physical Activity	0.124	0.158	0.181	0.871	-0.126	-0.186	0.219	-0.852
Chronic Health Condition Status → Physical Activity	0.052	0.060	0.167	0.363	-0.209	-0.312	0.221	-1.415

Table 8

Standardized and Unstandardized Estimates for Hypothesized Actor-Partner Model

Regression Coefficients	Hypothesized Model (n=48)			
	β	*b*	SE(*b*)	CR
Actor Effects				
M int. locus of control → M family health support	0.085	0.222	0.177	1.253
M int. locus of control → M physical activity	0.421	0.65	0.208	3.124
M family health support → M physical activity	-0.014	-0.018	0.167	-0.106
C int. locus of control → C family health support	0.232	0.222	0.135	1.641
C int. locus of control → C physical activity	0.068	0.075	0.162	0.461
C family health support → C physical activity	0.124	0.141	0.169	0.836
Partner Effects				
M int. locus of control → C family health support	0.085	0.096	0.160	0.600
C int. locus of control → M family health support	0.118	0.124	0.150	0.826

Table 9

Comparison of Dependent Correlational Coefficients

Correlation	Pearson *r*	z (SE)	95% CI lower	95% CI upper	z- test	*p*
1. M internal locus of control - C internal locus of control (n=31)						
Daughters	0.08	.0802 (.19)	-0.463	0.654	0.428	0.67
Sons	-0.06	.0601 (.27)				
2. M physical activity - C physical activity (n=17)						
Daughters	-0.05	.0471 (.19)	-0.822	0.121	-1.59	0.06
Sons	0.41	.4404 (.27)				

Figure 1. Illustration of health behavior process highlighting how individual (a,b) and interpersonal (c) variables may interact to influence health outcomes. The process is embedded within a proximal and distal context. Dashed arrows were tested in RQ1 (see Figure 2); dotted arrows were tested in RQ2 (See Figure 3). *Note:* Indirect social control explained the way in which interpersonal variables influenced one's own psychological variables.

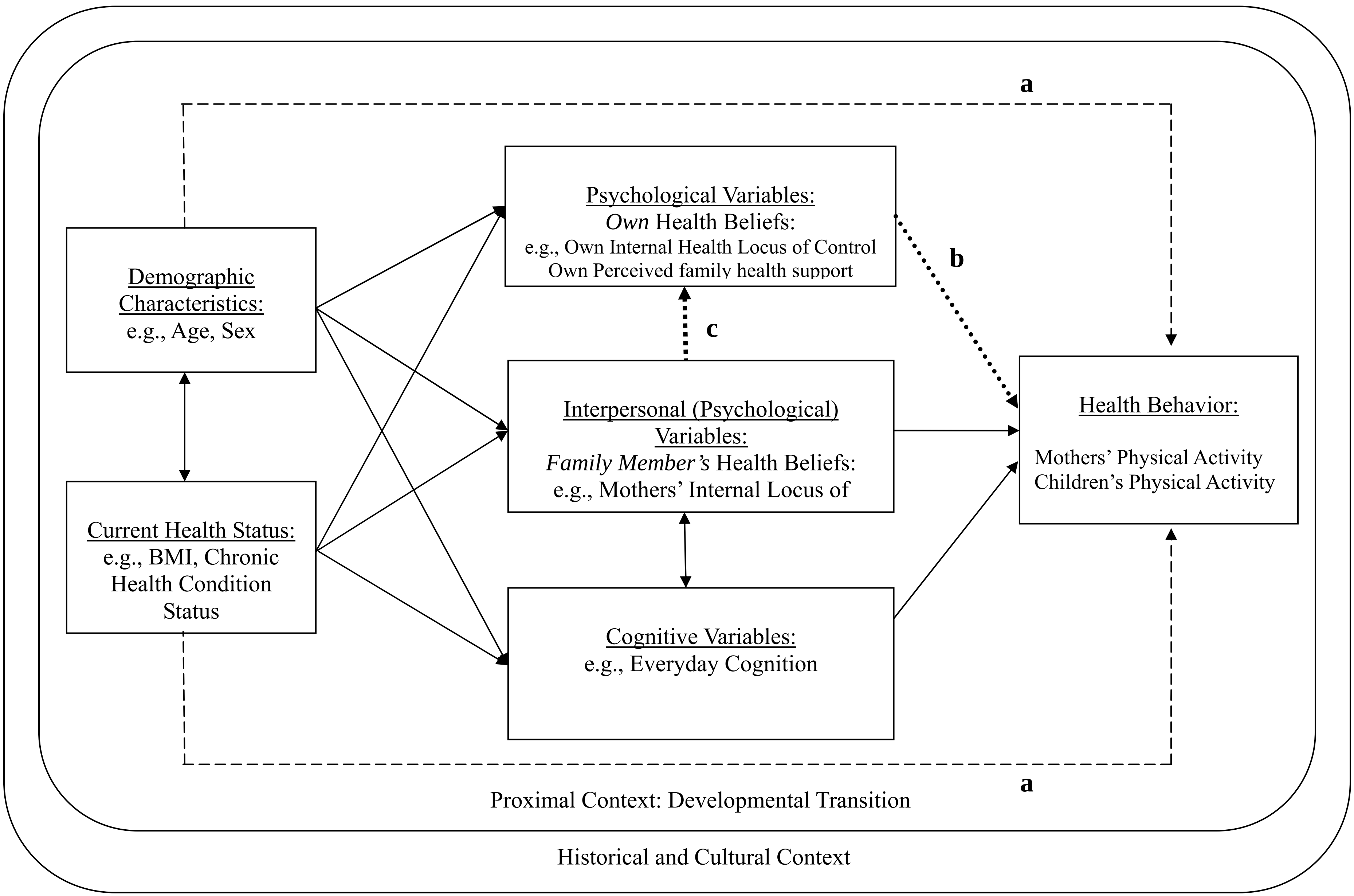


Figure 2. Hypothesized demographic model predicting physical activity in middle-aged mothers and young adult children.

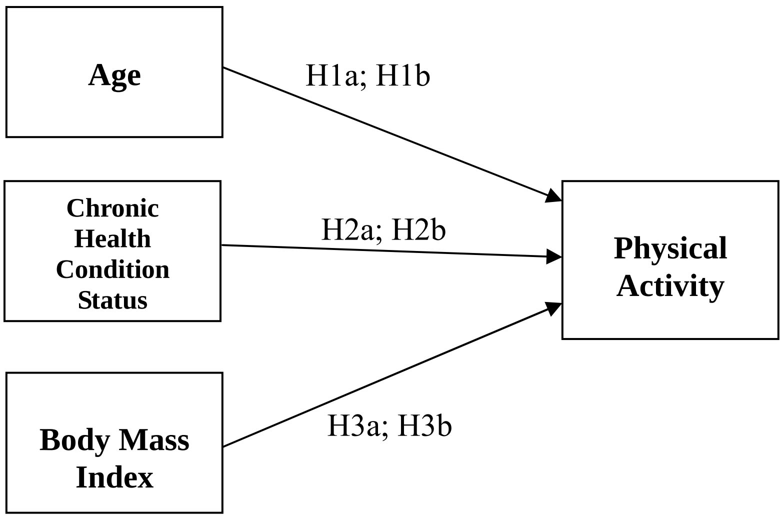


Figure 3. Hypothesized actor-partner interdependence model; solid lines indicate actor effects, dashed lines indicate partner effects.

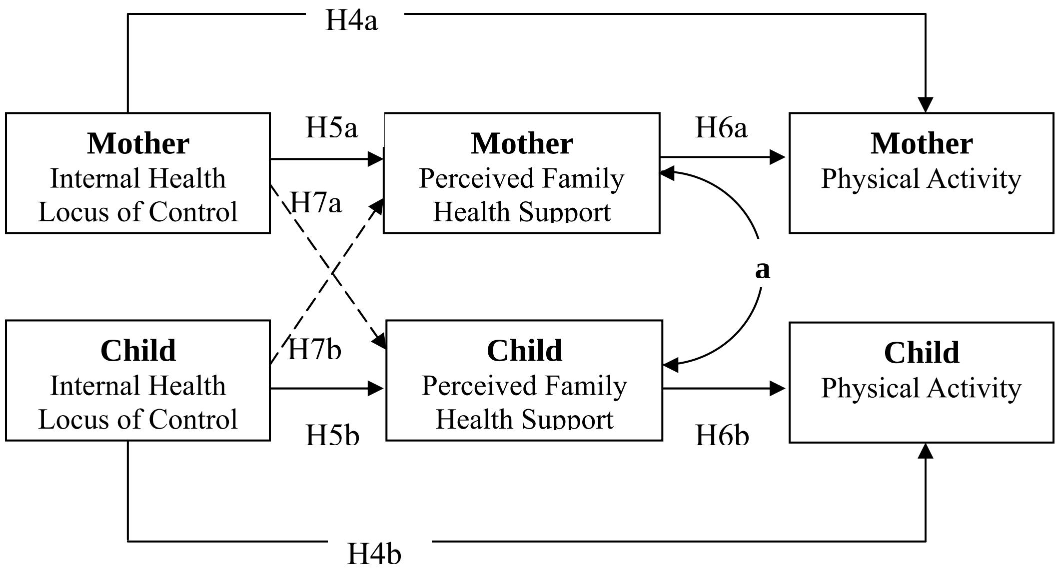


Figure 4. Demographic model predicting physical activity in *middle-aged mothers*. All path estimates are standardized. Results indicated an acceptable fit of the model to the data, χ^2 (df =2; N=48) = 2.938, p = .230 and explained a small amount a variance in physical activity (R^2 = .083).

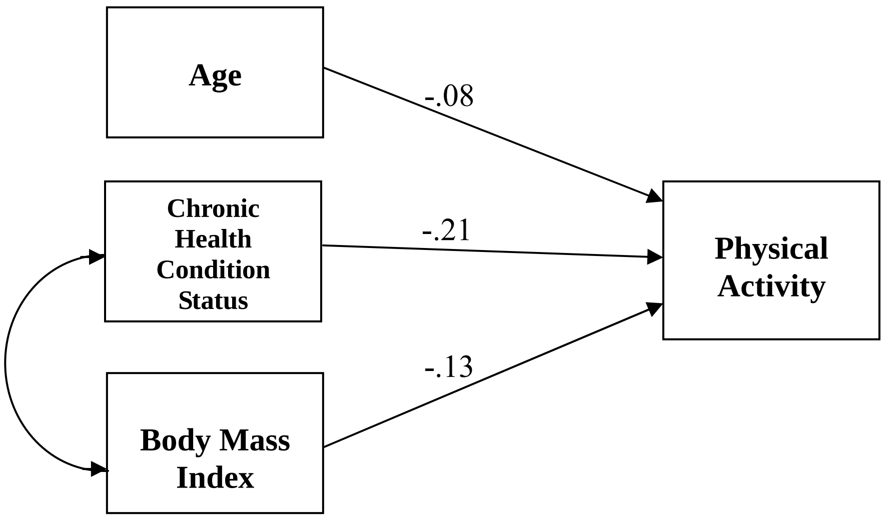


Figure 5. Demographic model predicting physical activity in *younger adult children*. All path estimates are standardized. Results indicated an acceptable fit of the model to the data, χ^2 (df =3; N=48) = .388, p = .962 and explained a small amount a variance in physical activity (R^2 = .049).

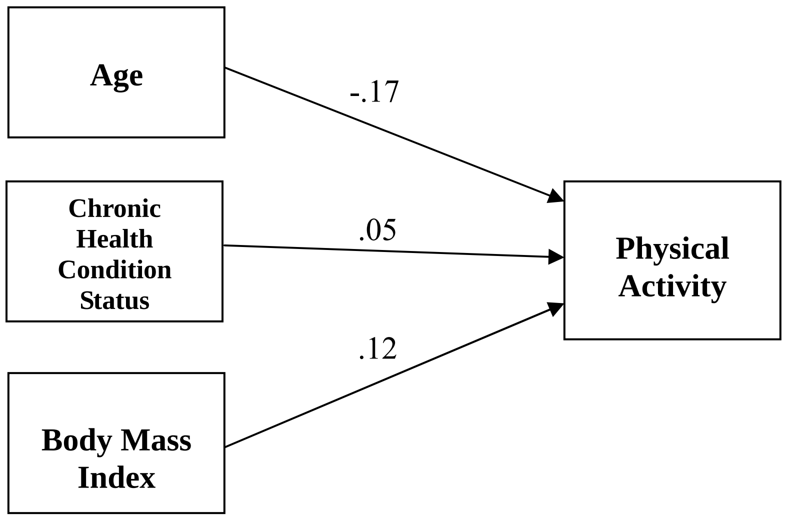
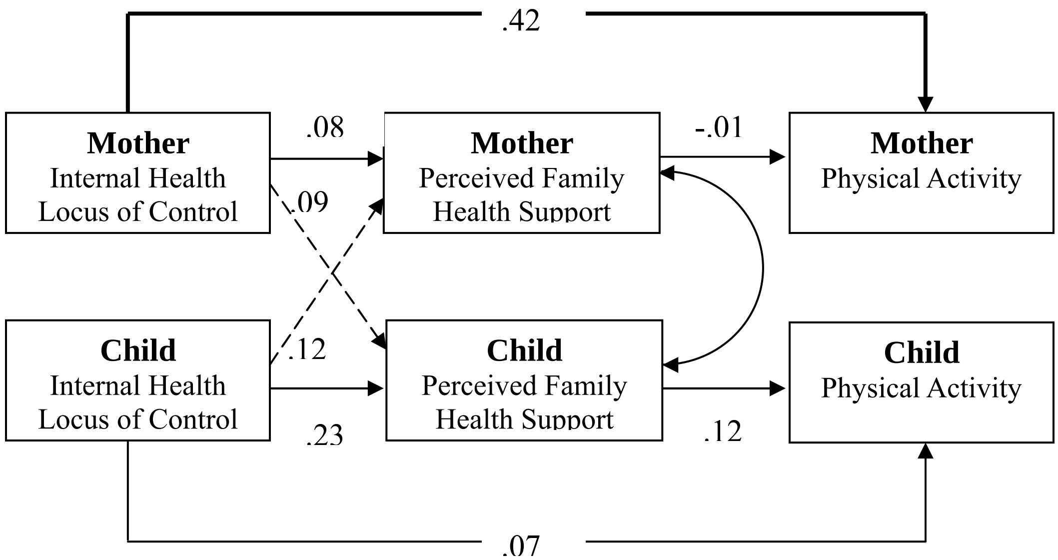


Figure 6. Hypothesized actor-partner interdependence model. Bold lines indicate significant paths at the $p < .05$ level. Results indicated an acceptable fit of the model to the data, χ^2 (df =6; N=48) = 5.057, $p = .537$ and explained a small amount a variance in mothers' physical activity ($R^2 = .024$) and children's physical activity ($R^2 = .175$). All path estimates are standardized.



Appendix A: Personal Data Form

Please answer the following questions as honestly and accurately as possible:

1) Current Age: _____

2) Sex: ___Male ___Female

3) For descriptive purposes, could you please select the ethnicity category to which you most belong:
___African American/ Black
___Caucasian/ White
___American Indian/ Alaskan Native
___Asian/ Pacific Islander
___Latino/ Hispanic
___Other
___I do not wish to provide an answer for this question

4) What is your current marital status:
___Cohabiting/ Living with Partner (not married)
___Married
___Widowed
___Divorced
___Remarried after widowed
___Remarried after divorce
___Single/ Never married
___I do not wish to provide an answer for this question

5) In what state do you currently reside: ________________

6) How many people, including yourself, live in your home: ________

7) Select the **highest** level of education you have completed:
___Less than 9th grade
___9th to 11th grade
___High school diploma
___College –Degree
___Graduate Degree
___I do not wish to provide an answer for this question

8) Total yearly family income:
___Less than $25,000
___$25,000- $49,999
___$50,000- $74,999
___$75,000- $99,999
___$100,000 +

___I do not wish to provide an answer for this question

9) How many hours in a typical week do you spend in paid work: _________

10) How many hours in a typical week do you spend in unpaid volunteer work: __________

11) Do you currently smoke or use tobacco:
___Yes
___No
___I do not wish to provide an answer for this question

12) Do you wear seat belts regularly:
___Yes
___No
___I do not wish to provide an answer for this question

13) Do you take vitamin supplements:
___Yes
___No
___I do not wish to provide an answer for this question

14) If you take vitamin supplements, which types do you take:
____

15) How much sleep on average do you get: _____________

16) What is your height (e.g., "5 ft 10 in"): ____________

17) What is your weight (in pounds): ____________

18) How many times have you visited the doctor in the last year: _______________

19) I believe my life to be:
___Extremely Happy
___Very Happy
___Somewhat Happy
___Average
___Somewhat Unhappy
___Very Unhappy
___Extremely Unhappy
___I do not wish to provide an answer to this question

20) What type of health insurance do you currently have:
___Private

___Public
___None
___I do not wish to provide an answer to this question

21) How much do you <u>trust</u> your health care providers:
___Not at all
___A little
___A great deal
___I do not wish to provide an answer to this question

22) How easily can you physically access your health care system:
___Very easily
___Moderately easy
___Easy
___Moderately hard
___Hard
___Very hard
___I do not wish to provide an answer to this question

23) What types of over the counter medicine do you take (Check all that apply):
___Flu medications
___Joint supplements
___Antacids
___Allergy medications
___Pain relievers including aspirin
___Cold medicine
___Anti-diarrhea medicine & laxatives
___Menstrual cycle products for pain and cramp relief
___Cough syrup, drops, and throat lozenges
___Sinus medications & nasal sinus sprays
___Nicotine gum or patches for smoking cessation
___Special ointment or cream for sunburn
___BenGay, Tiger Balm, and similar products for muscle or joint pain
___First aid cream, calamine lotion, bug bite medication, wart remover treatments
___Visine and other such eye products
___Suppositories and creams for hemorrhoids
___Sleeping aids
___Motion sickness pills
___I do not wish to provide an answer for this question

24) The following screens are recommended by the U.S. Department of Health and Human Services. Please indicate which of the following screens you have had:

___Obesity: Body Mass Index
___Cholestrol Screening

___High Blood Pressure
___Diabetes Screen
___HIV Screen
___Other Sexually Transmitted Diseases Screens
___Skin Cancer Screen
___Dental Screens
___Hearing Screen
___Vision Screen/ Eye Exam
___Glaucoma Screen

25) Have you ever had any of the following screens:

___Tobacco Cessation Screens
___Breast Cancer Screen
___Cervical Cancer Screen
___Prostate Cancer Screen
___Abdominal Aortic Aneurism Screen
___Colorectal Cancer Screen (colonoscopy)
___Osteoporosis Screen (bone density tests)
___Other screens not listed previously

APPENDIX B: Perceived Limitation due to Chronic Illness

Please indicate which conditions you currently have & how much difficulty each condition causes you.

DO YOU HAVE:			**In terms of the difficulty it causes you, is it:**			
1. Arthritis	No	Yes	None	Mild	Moderate	Severe
2. Heart Trouble	No	Yes	None	Mild	Moderate	Severe
3. Back Problems	No	Yes	None	Mild	Moderate	Severe
4. Breathing Problems	No	Yes	None	Mild	Moderate	Severe
5. Diabetes	No	Yes	None	Mild	Moderate	Severe
6. High Blood Pressure	No	Yes	None	Mild	Moderate	Severe
7. Cancer	No	Yes	None	Mild	Moderate	Severe
8. Glaucoma	No	Yes	None	Mild	Moderate	Severe
9. Cataracts	No	Yes	None	Mild	Moderate	Severe
10. Nervousness/ tension	No	Yes	None	Mild	Moderate	Severe
11. Trouble getting or staying asleep	No	Yes	None	Mild	Moderate	Severe
12. Headaches	No	Yes	None	Mild	Moderate	Severe
13. Parkinson's Disease	No	Yes	None	Mild	Moderate	Severe
14. Hardening of the arteries	No	Yes	None	Mild	Moderate	Severe
15. Stomach ulcer	No	Yes	None	Mild	Moderate	Severe
16. Stroke or effects of Stroke	No	Yes	None	Mild	Moderate	Severe
17. Paralysis from any condition other than stroke	No	Yes	None	Mild	Moderate	Severe
18. Circulation trouble in arms or legs	No	Yes	None	Mild	Moderate	Severe
19. Asthma	No	Yes	None	Mild	Moderate	Severe
20. Broken Hip	No	Yes	None	Mild	Moderate	Severe
21. Other broken bones	No	Yes	None	Mild	Moderate	Severe
22. Bladder problems	No	Yes	None	Mild	Moderate	Severe
23. Gall Bladder trouble	No	Yes	None	Mild	Moderate	Severe
24. Kidney trouble	No	Yes	None	Mild	Moderate	Severe
25. Anemia	No	Yes	None	Mild	Moderate	Severe
26. Emphysema	No	Yes	None	Mild	Moderate	Severe
27. Epileptic seizures	No	Yes	None	Mild	Moderate	Severe
28. Pnemonia	No	Yes	None	Mild	Moderate	Severe
29. Serious hearing problems	No	Yes	None	Mild	Moderate	Severe
30. Serious vision problems	No	Yes	None	Mild	Moderate	Severe
31. Other______________	No	Yes	None	Mild	Moderate	Severe

Appendix C: Multidimensional Health Locus of Control Scale

Instructions: Each item below is a belief statement about your medical condition with which you may agree or disagree. Beside each statement is a scale which ranges from strongly disagree (1) to strongly agree (6). For each item we would like you to circle the number that represents the extent to which you agree or disagree with that statement. The more you agree with a statement, the higher will be the number you circle. The more you disagree with a statement, the lower will be the number you circle. Please make sure that you answer **EVERY ITEM** and that you circle **ONLY ONE** number per item. This is a measure of your personal beliefs; obviously, there are no right or wrong answers.

1=STRONGLY DISAGREE **(SD)** 2=MODERATELY DISAGREE **(MD)** 3=SLIGHTLY DISAGREE **(D)**	4=SLIGHTLY AGREE **(A)** 5=MODERATELY AGREE **(MA)** 6=STRONGLY AGREE **(SA)**

		SD	MD	D	A	MA	SA
1	**If my condition worsens, it is my own behavior which determines how soon I will feel better again.**	**1**	**2**	**3**	**4**	**5**	**6**
2	As to my condition, what will be will be.	1	2	3	4	5	6
3	If I see my doctor regularly, I am less likely to have problems with my condition.	1	2	3	4	5	6
4	Most things that affect my condition happen to me by chance.	1	2	3	4	5	6
5	Whenever my condition worsens, I should consult a medically trained professional.	1	2	3	4	5	6
6	**I am directly responsible for my condition getting better or worse.**	**1**	**2**	**3**	**4**	**5**	**6**
7	Other people play a big role in whether my condition improves, stays the same, or gets worse.	1	2	3	4	5	6
8	**Whatever goes wrong with my condition is my own fault.**	**1**	**2**	**3**	**4**	**5**	**6**
9	Luck plays a big part in determining how my condition improves.	1	2	3	4	5	6
10	In order for my condition to improve, it is up to other people to see that the right things happen.	1	2	3	4	5	6
11	Whatever improvement occurs with my condition is largely a matter of good fortune.	1	2	3	4	5	6
12	**The main thing which affects my condition is what I myself do.**	**1**	**2**	**3**	**4**	**5**	**6**
13	**I deserve the credit when my condition improves and the blame when it gets worse.**	**1**	**2**	**3**	**4**	**5**	**6**
14	Following doctor's orders to the letter is the best way to keep my condition from getting any worse.	1	2	3	4	5	6
15	If my condition worsens, it's a matter of fate.	1	2	3	4	5	6
16	If I am lucky, my condition will get better.	1	2	3	4	5	6
17	**If my condition takes a turn for the worse, it is because I have not been taking proper care of myself.**	**1**	**2**	**3**	**4**	**5**	**6**
18	The type of help I receive from other people determines how soon my condition improves.	1	2	3	4	5	6

APPENDIX D: Perceived Family Health Resources

Please answer the following questions as honestly and accurately as possible:

1) I rely on my **parents** for advice on how to live a healthy lifestyle.
___Strongly Agree
___Moderately Agree
___Slightly Agree
___Slightly Disagree
___Moderately Disagree
___Strongly Disagree

2) My **family** plays a big part in whether I stay healthy or not.
___Strongly Agree
___Moderately Agree
___Slightly Agree
___Slightly Disagree
___Moderately Disagree
___ Strongly Disagree

3) My health habits are greatly influenced by my **family's** health habits.
___Strongly Agree
___Moderately Agree
___Slightly Agree
___Slightly Disagree
___Moderately Disagree
___ Strongly Disagree

4) I look up to and model my **family** when deciding whether or not to engage in healthy behaviors.
___Strongly Agree
___Moderately Agree
___Slightly Agree
___Slightly Disagree
___Moderately Disagree
___ Strongly Disagree

Appendix D: Health Promotion Lifestyle Profile II

This questionnaire contains statements about your **PRESENT** way of life or personal habits. Please respond to each item as accurately as possible, and try not to skip any item. Indicate the frequency with which you engage in each behavior by circling:

0	1	2	3
Never	**Sometimes**	**Often**	**Routinely**

1. Discuss my problems and concerns with people close to me.
2. Choose a diet low in fat, saturated fat, and cholesterol.
3. Report any unusual signs or symptoms to a physician or other health professional.
4. **Follow a planned exercise program.**
5. Get enough sleep.
6. Feel I am growing and changing in positive ways.
7. Praise other people easily for their achievements.
8. Limit use of sugars and food containing sugar (sweets).
9. Read or watch TV programs about improving health.
10. **Exercise vigorously for 20 or more minutes at least three times a week (such as brisk walking, bicycling, aerobic dancing, using a stair climber).**
11. Take some time for relaxation each day.
12. Believe that my life has purpose.
13. Maintain meaningful and fulfilling relationships with others.
14. Eat 6-11 servings of bread, cereal, rice, and pasta each day.
15. Question health professionals in order to understand their instructions.
16. **Take part in light to moderate physical activity (such as sustained walking 30-40 minutes 5 or more times a week).**
17. Accept those things in my life that I can not change.
18. Look forward to the future.
19. Spend time with close friends.
20. Eat 2-4 servings of fruit each day.
21. Get a second opinion when I question my health care provider's advice.
22. **Take part in leisure-time (recreational) physical activities (such as swimming, dancing, bicycling).**
23. Concentrate on pleasant thoughts at bedtime.
24. Feel content and at peace with myself.
25. Find it easy to show concern, love, and warmth to others.
26. Eat 3-5 servings of vegetables each day.
27. Discuss my health concerns with health professionals.
28. **Do stretching exercises at least 3 times per week.**
29. Use specific methods to control my stress.
30. Work toward long-term goals in my life.
31. Touch and am touched by people I care about.
32. Eat 2-3 servings of milk, yogurt, or cheese each day.
33. Inspect my body at least monthly for physical changes/danger signs.
34. **Get exercise during usual daily activities (such as walking during lunch, using stairs**

instead of elevators, parking car away from destination and walking).
35. Balance time between work and play.
36. Find each day interesting and challenging.
37. Find ways to meet my needs for intimacy.
38. Eat only 2-3 servings from the meat, poultry, fish, dried beans, eggs, and nuts group each day.
39. Ask for information from health professionals about how to take good care of myself.
40. Check my pulse rate when exercising.
41. Practice relaxation or meditation for 15-20 minutes daily.
42. I am aware of what is important to me in life.
43. Get support from a network of caring people.
44. Read labels to identify nutrients, fats, and sodium content in packaged food.
45. Attend educational programs on personal health care.
46. Reach my target heart rate when exercising.
47. Pace myself to prevent tiredness.
48. Feel connected with some force greater than myself.
49. Settle conflicts with others through discussion and compromise.
50. Eat breakfast.
51. Seek guidance or counseling when necessary.
52. Expose myself to new experiences and challenges.

John H. Hagen
Digitally signed by John H. Hagen
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