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Health-Related Behaviors In Low-Income, Minority Youth: The Role Of Motivation, Basic Needs, Mental Health, And Environmental Barriers

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HEALTH-RELATED BEHAVIORS IN LOW-INCOME, MINORITY YOUTH: THE ROLE OF MOTIVATION, BASIC NEEDS, MENTAL HEALTH, AND ENVIRONMENTAL BARRIERS

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CHAPTER 1 INTRODUCTION

Engaging in health-related behaviors, such as exercise, healthy eating, and sleep hygiene, appears to strengthen mental well-being. These behaviors are associated with fewer externalizing and internalizing behavior problems and higher self-esteem, suggesting that there may be large benefits to engaging in health-related behaviors during the transitional developmental phase of adolescence (Ong, Wickramaratne, Tang, & Weissmann, 2006; Stathopoulou, Power, Berry, Smits, & Otto, 2006). Consequently, society may have much to gain by encouraging youth to engage in more of these behaviors in order to help them develop healthy behavior patterns.

The current study examines the associations between adolescents' motivation and their engagement in healthy activities. Self-Determination Theory (SDT) posits that engagement in activities is optimally motivated when the activity is linked to fulfillment of the humanistic intrinsic need for autonomy, competency, and relatedness (Deci & Ryan, 2000). The current study seeks to be one of the few studies that examine associations between need satisfaction, motivation, and health-related behaviors. The current study also seeks to extend research on the reciprocal relations between psychological symptoms and health behaviors. By focusing on low-income, minority youth, the current study examines the role of environmental barriers in these associations.

The current study examines a multivariate model in an effort to identify key psychological processes that may boost or impede youths' motivation and engagement in health-related behaviors. In this model, psychological symptoms and environmental barriers are conceptualized as risk factors that reduce motivation for and actual engagement in health-related behaviors. Accordingly, as depicted in Figure 1, the main goals of the study are to examine (1) direct associations of psychological symptoms, environmental barriers, and motivation with

exercise, healthy eating, and sleep hygiene and (2) perceived needs fulfillment as a potential moderator of the proposed association between risk factors and motivation. More specifically, youth's psychological symptoms and/or environmental barriers will negatively impact both their motivation to engage in health behaviors as well as their engagement in health behaviors, which will be positively related. It is expected that when psychological symptoms or environmental barriers are present, and youth's basic needs are not being met, they will be more at risk for less motivation to engage in health behaviors. When needs are being met, the negative impact of psychological symptoms or environmental barriers on motivation will not be as strong.

Health- Related Behaviors

Establishing and maintaining healthy behaviors enhances physical and mental health across the lifespan. Engaging in behaviors, such as exercise, nutritious eating, and sleep hygiene, promotes health and may be indicative of healthy choices for your body and mind or become internalized so that youth make healthy choices when presented with options. Walsh describes these behaviors as therapeutic lifestyle changes because of their significant therapeutic advantages for both physical and mental health (Walsh, 2011). For example, increased physical activity is associated with reduced symptoms of medical diseases, such as heart disease, as well as with psychological well-being and quality of life (Schmitz, Kruse, & Kugler, 2004).

It is important to establish healthy patterns as early as possible. Adolescence may be an especially crucial time because many essential behaviors are transitioning from parent-managed to autonomous regulation. Consequently, youths' behavior patterns may establish long-term health behavior and life-long health (Hoelscher, Evans, Parcel, & Kelder, 2002). Health behaviors are likely to be more malleable during earlier development stages, before patterns become habits (Lohaus, Klein-Hessling, Ball, & Wild, 2004). Although risk behaviors tend to

generate more focus in the literature than positive adolescent behaviors, girls and boys report engagement in both health-promoting and health-risk behaviors, indicating a need to further examine healthy behaviors among adolescents (Adelmann, 2005; Neumark-Sztainer et al., 1997). The current study examines adolescent engagement in exercise, healthy eating, and sleep hygiene; three behaviors that have been linked to positive outcomes for adolescents.

Generally, increasing exercise and physical activity are associated with reductions in psychological symptoms. For example, increasing adults' physical activity is related to improvements in symptoms of mood disorders, such as depression (Atlantis, Chow, Kirby, & Singh, 2004) and anxiety (Stathopoulou et al., 2006), as well as symptoms of alcohol abuse, eating disorders (Stathopoulou et al., 2006), and stress (Penedo & Dahn, 2005). Research examining the benefits of physical activity for adolescents has established similar relations between increased physical activity and reductions in depression, anxiety (Taylor, Gillies, & Ashman, 2009), post-traumatic stress disorder (Diaz & Motta, 2008), and substance use (Field, Diego, & Sanders, 2001).

Decisions regarding food are also particularly important during adolescence because they determine current as well as future health status (Contento, Williams, Michela, & Franklin, 2006). When unhealthy eating develops, adolescents are also likely to report dangerous weight control behaviors, body dissatisfaction, and depression (Crow, Eisenberg, Story, & Neumark-Sztainer, 2006).

Although less is known about sleep hygiene compared to exercise and healthy eating, links have been found between sleep disturbances and psychological symptoms in adolescent populations. Onset of sleep disturbances and poor mental health status are likely reciprocally linked (Kaneita et al., 2009). Sleep disturbances are associated with greater symptoms of

depression and anxiety and increasing sleep hygiene has been found to improve mood and related symptoms (Ong, et al., 2006; Pabst, Negriff, Dorn, Susman, & Huang, 2009). Other psychological symptoms related to sleep disturbances include aggression, increased appetite and weight gain, negative affect, and emotional problems (Dahl & Harvey, 2009; Moore, Slane, Mindell, Burt, & Klump, 2010). Sleep disturbances are also associated with academic difficulties, such as increased cognitive errors (Alfano, Zakem, Costa, Taylor, & Weems, 2009), decreased attentional functioning (Dahl & Harvey, 2009), and greater school absences due to illness (Roberts, Roberts, & Chen, 2001).

Despite the well-documented benefits of health-related behaviors, there is wide variability in adolescents' engagement in these behaviors. Longitudinal studies demonstrate significant historical trends over the last two decades of greater obesity and less exercise and healthy eating among American teenagers (Delva, O'Malley, & Johnston, 2006; Eaton et al., 2012). Recent estimates suggest that fewer than 50% of high school students ages 14 to 17 were engaging in moderate physical activity for the recommended 60 minutes per day for most days of the week (Eaton et al., 2012). Additionally, adolescents' preference for later bedtimes coupled with earlier school start times are also thought to result in a decreased amount of sleep compared to childhood (for reviews, see Gradisar, Gardner, & Dohnt, 2011 and Kirby, Maggi, & D'Angiulli, 2011). Although sleep duration has declined for all youth ages 5 to 18 over the last century, the decline for older adolescents is significantly worse than the other age groups (Matricciani, Olds, & Petkov, 2012). For example, approximately 67% of high school students reported getting an inadequate amount of sleep on an average school night (McKnight-Eily et al., 2011).

Health-related Behaviors in Low-income, Minority Youth

Sociocultural factors, such as SES and ethnicity, may also play a role in youths' engagement in health behaviors. The sample for the current study includes youth from low-income and minority populations. In order to understand the constructs of interest in this population, it is important to look at cultural or racial/ethnic differences in health behaviors. A larger proportion of White high school students (52.7%) are meeting the recommended physical activity guidelines than Black or Hispanic high school students (44.4% and 45.4%, respectively; Eaton et al., 2012). In addition, Black and Hispanic teens spend more time in sedentary activities, including watching television and videos or playing video and computer games (Gordon-Larsen, McMurray, & Popkin, 1999). Minority and lower SES youth are consistently found to be more overweight and less physically active than White youth (Delva et al., 2006; Hodge, Jackson, & Vaughn, 2010). When examining sleep patterns of adolescents, minority youth and youth living in distressed neighborhoods report less sleep on average than non-minority youth and youth living in non-distressed neighborhoods (Moore et al., 2011). Similarly, lower SES is associated with more variability in sleep onset, total sleep period, and number of minutes asleep (Marco, Wolfson, Sparling, & Azuaje, 2012).

The evidence suggests that low-income and minority adolescents engage less frequently in exercise, healthy eating, and sleep hygiene than others their age. It is important to encourage all youth, especially low-income and minority adolescents, to engage in health-related behaviors that have been linked to mental and physical well-being. In order to understand why youth do or do not engage in health-related behavior, it is important to understand their motivation, which often underlies why individuals engage in any behavior or activity. The current study explores how motivation for exercise, healthy eating, and sleep hygiene is associated with actual engagement in these behaviors among youth.

Motivation and Health-Related Behaviors

Motivation has been defined as the force that directs, selects, energizes, and organizes behavior (McClelland, 1985). Motivation also influences level of performance, effort, and long-term accomplishment for specific behaviors. A leading theory in the area of motivation, Self-Determination Theory (SDT), operationalizes motivation on a continuum from amotivation to autonomous motivation depending on the reasons behind why individuals engage in certain activities (Deci & Ryan, 2000). Autonomously motivated behaviors stem from internal factors or external factors that take into account the behavior's value (Deci & Ryan, 2008). Because of its intrinsic quality, autonomous motivation is characterized as a healthier stance that tends to lead to more effective performance. For instance, empirical studies have linked autonomous motivation with greater long-term persistence, such as maintained change toward healthier behaviors (Deci & Ryan, 2008). Adolescent athletes are more likely to put forth effort and cope effectively during training if they are autonomously motivated (Mouratidis & Michou, 2011). Lower on the continuum is controlled motivation, which is characterized by an extrinsic orientation toward external factors or internal factors that rely on other people (e.g. guilt after failing to meet an external demand). Controlled motivation is associated with more rigid functioning and diminished well-being (Deci & Ryan, 2008). Amotivation reflects the lack of intention to act (Deci & Ryan, 2008).

SDT has been used in previous research to understand the motives behind adolescents' engagement in identity formation and development (Smits, Soenens, Vansteenkiste, Luyckx, & Goossens, 2010), academics (Kenny, Walsh-Blair, Blustein, Bempechat, & Seltzer, 2010), after-school activities (Beiswenger & Grolnick, 2010), and pro-environmental behaviors (Renaud-Dube, Taylor, Lekes, Koestner, & Guay, 2010). It also has been used to explain adolescents'

engagement in some health-related behaviors, such as exercise and sports (Mouratidis & Michou, 2011). One facet of SDT that is pertinent to understanding adolescent motivation is Basic Psychological Needs Theory (BPNT).

BPNT posits that individuals experience health and well-being when basic needs of autonomy, competency, and relatedness are met and pathology and distress when these needs go unmet (Deci & Ryan, 2000). In short, the optimal development and functioning of all individuals, regardless of their demographic characteristics, rests on the fulfillment of these three basic needs (Deci & Ryan, 2011). Further, autonomy, competency, and relatedness needs determine one's position on the continuum of amotivation to autonomous motivation. For example, the development of autonomous motivation requires that all three basic needs are consistently satisfied. The development of controlled motivation arises from some satisfaction of competency and relatedness and a thwarting of autonomy. Lastly, amotivation develops when all three basic needs are thwarted (Deci & Ryan, 2008). Previous research examining the three psychological needs and their link to motivation has primarily been conducted on adult populations. Less is known about how fulfillment of these basic psychological needs, which become especially salient during adolescent development, is associated with motivation in adolescents.

Autonomy, Competence, and Relatedness in Adolescence

Autonomy. Autonomy needs include needs for personal agency and perceiving oneself as the origin of one's actions (Gillison, Standage, & Skevington, 2011). Autonomy is particularly important during adolescence when key developmental tasks include identity formation and self-exploration (Koepke & Denissen, 2012). One facet of adolescent autonomy is behavioral autonomy, which consists of independent decision-making and self-governance (Collins &

Steinberg, 2008). Autonomy in decision-making increases from middle childhood through adolescence, with a steep increase after age 15 (Wray-Lake, Crouter, & McHale, 2010). Thus, satisfaction of the basic need of autonomy is important as adolescents engage in decision-making regarding specific behaviors and activities.

Autonomy and adult support of adolescents' autonomy strivings have been linked to motivation and health-related behaviors among adolescents. For example, autonomy is positively associated with physical activity among British teen girls and boys (Markland & Ingledew, 2007). Parental autonomy support is related to more intrinsic life goals and greater general well-being as well as lower levels of sexual risk behavior (Beiswenger & Grolnick, 2010; Lekes, Gingras, Philippe, Koestner, & Fang, 2010; Turner, Irwin, Tschann, & Millstein, 1993). Autonomy support from parents and teachers is associated with greater life and school satisfaction (Ferguson, Kasser, & Jahng, 2010). Beyond these data, little is known about how adolescent autonomy or autonomy support is related to youths' motivation for health-related behavior.

Competency. The need for competency pertains to feeling effective in one's environment and having opportunities to show one's efficacy. Autonomous motivation for an activity requires a basic sense of competency in which individuals perceive themselves as able to succeed in that activity (Beiswenger & Grolnick, 2010). During adolescence, it becomes more difficult to maintain a strong sense of competency, because youth receive more feedback, both negative and positive, on their performance than they did in childhood and begin to better understand this feedback (Wigfield & Wagner, 2005). The emergence of meta-cognitive skills that accompanies adolescent development allows youth to monitor and reflect on their performance, which, in the case of negative feedback, might diminish youths' perceived competence (Ryan & Shin, 2011).

Although most adolescents experience these challenges as part of typical development, some appear resilient to the negative impact while others are heavily influenced by it (Wigfield & Wagner, 2005).

Various studies have demonstrated links from perceived competence to adolescents' motivation and health behavior. For instance, adolescents who report greater perceived competence for positive after-school activities are more likely to be motivated to engage in these activities (Beiswenger & Grolnick, 2010). Perceptions of competence and values about exercise and healthy eating as well as strong self-efficacy, control, and goal ownership in the health domain are each associated with healthier food and dieting choices (Kalavana, Maes, & De Gucht., 2010; Sabiston & Crocker, 2008; Stevenson, Doherty, Barnett, Muldoon, & Trew, 2007). A Belgian study on disordered eating found lower perceived self-competence was associated with drive for thinness, bulimia, and body dissatisfaction (Kerremans, Claes, & Bijttebier, 2010). Although some preliminary evidence connects perceived competence with exercise and healthy eating, no studies have explored its relation to sleep hygiene in adolescents.

Relatedness. The basic need for relatedness pertains to establishing and maintaining interpersonal relationships. Although self-reliance is at the core of autonomous behavior, research also notes the important role of parents in building adolescents' autonomy (Collins & Steinberg, 2008; Darling & Steinberg, 1993). For example, parenting style has been associated with adjustment factors important in adolescence, such as responsibility, self-assurance, social competence, leadership, and maturity (Collins & Steinberg, 2008; Steinberg, 2001). Additionally, peer relationships and resistance to peer pressure are influential factors in the achievement of behavioral autonomy (Collins & Steinberg, 2008). Adolescents tend to report their friends as being the most influential outside of family members (Collins & Laursen, 2004),

and tend to increase the amount of time spent with their peers while also decreasing the amount of time spent with their parents (Larson & Richards, 1991).

The ways family members, peers, and the school environment relate to adolescents around food also influence the eating habits of adolescents. Unhealthy foods are often given as treats by teachers and parents (Stevenson et al., 2007). However, perceiving more friends who care about healthy diet and having peer approval of new eating habits were both related to healthy dieting and food choices (Kalavana et al., 2010; Luszczynska, Gibbons, Piko, & Tekozel, 2004). Also, family cohesion predicts healthy eating (Kalavana et al., 2010). Similarly, relatedness to one's peers affects sleep hygiene. Needs for peer relatedness may motivate youth tendencies to stay awake later into the night to text message with friends or use the internet freely without parental supervision (Dahl & Harvey, 2009; Moore et al., 2010).

In addition to examining the three basic needs separately, research has explored the importance of satisfaction of one's basic needs on motivation for healthy behaviors. In adolescent populations, this work has primarily examined basic need satisfaction and motivation in physical education classes (Perlman, 2010; Taylor & Lonsdale, 2010). For example, greater needs satisfaction in the area of physical education is linked to greater self-determined motivation in physical education classes among adolescent students (Ntoumanis, 2005). Less is known about how basic needs satisfaction is associated with engagement in healthy eating and sleep hygiene although competency and relatedness have been linked to these behaviors.

Research suggests that motivation is critical to behavioral engagement, including health-related behavior. SDT provides a framework for understanding individual variability in motivational orientations and their potential links to health behavior. BPNT is a mini-theory within SDT that offers insights into the ways basic needs fulfillment may shape motivational

orientation. These needs are especially salient to key developmental tasks during adolescence and may thus be useful for understanding adolescents' motivational orientations and engagement in health behavior. The current study uses key insights from SDT and BPNT to examine adolescent risk factors that might reduce engagement in health related behavior. BPNT theory is used to examine whether needs fulfillment might mitigate or potentiate risk for diminished motivation to engage in health behavior. Risk factors of interest in the current study include mental health problems and environmental barriers.

Mental Health in Adolescence

Psychological symptoms (e.g, depression, anxiety, hostility) are viewed as both a sign of and influence on getting basic needs met. With an array of changes in biological, cognitive, and social development (e.g., puberty and identify formation; Meschke, Peter, & Bartholomae, 2012), adolescence is often seen as an age of vulnerability, with engagement in unhealthy behaviors such as unsafe sexual activity or school underachievement being commonplace (Kenny, 1996). Although most adolescents are able to transition into adulthood without severe impairments in the social, emotional, and behavioral domains, a subset of adolescents display mental health difficulties and symptoms. Lifetime prevalence rates of mental health disorders among adolescents are comparable to that of adults, suggesting that mental disorders reported by adults may begin prior to entering adulthood (Merikangas et al, 2010). According to the National Comorbidity Survey Replication-Adolescent Supplement (NCS-A; Merikangas et al, 2010), about 50% of adolescents reported at least one class of mental disorders. In fact, these data demonstrate early onset and stability of anxiety, behavior, mood, and substance use disorders throughout adolescence.

For over half a century, researchers have been examining the development and mental health of adolescents growing up in poverty (Jessor, 1993). The Research Network on Successful Adolescent Development Among Youth in High-Risk Settings proposed a model of development that views adolescents at the center of their three primary settings; family, school, and neighborhood (Jessor, 1993). In this model, the neighborhood is given equal importance to that of family and school, suggesting the need to explore the effects of neighborhood as youth transition to young adulthood. Stressors that exist in high-risk environments, such as low-income urban cities, tend to be significantly associated with mental health problems among adolescents. A review on challenges to adolescent development explains that poverty and other associated factors exacerbate risk behaviors in adolescents (Lerner & Galambos, 1998) For example, poverty is linked to urban violence and being directly victimized by violence predicted internalizing and externalizing problems among African American youth (McGee, 2003).

Despite consistent findings that adolescence and high-risk environments are linked to difficulties in mental health, there is a lack of utilization of mental health professionals and treatments among low-income and minority families. Although there are low rates of initiation and stabilization of mental health treatment among all adolescents, minority adolescents are less likely than White adolescents to receive services (Cuffe et al., 2001; Cummings & Druss, 2011). Even when accounting for need for care and ability to secure services, White adolescents report more service use than Black or Hispanic adolescents (Freedenthal, 2007). Besides increasing utilization among urban families, other methods are needed to maintain or increase positive mental health among low-income, minority youth struggling with normative adolescent difficulties and high-risk environmental stressors. It is important to promote health-related

behaviors, which are linked with decreases in psychological symptoms, in a clinical population struggling with psychological symptoms.

Although research has established links between health-related behaviors and later mental health, the associations are likely bidirectional. That is, current psychological symptoms may impede engagement in health behavior which, in turn, may maintain or increase symptoms. Although the current cross-sectional study could not examine temporal sequence of events, it focuses on the less examined direction – associations from psychological symptoms to motivation and health-related behaviors. Oftentimes, professionals working with youth (e.g. teachers, counselors) interact with them after mental health concerns have already been established. Professionals need to better understand how youths' symptoms may be influencing their sedentary or unhealthy behaviors or vice versa. Better mental health, or relative lack of psychological symptoms, is associated with participation in health-related behaviors among adolescents. For example, greater self-esteem and interpersonal relationships and less depressive symptoms are associated with greater exercise participation, while the presence of depressive symptoms is related to greater sedentary activity (Ammouri, Kaur, Newberger, Gajewski, & Choi, 2007; Field et al., 2001; Rees & Sabia, 2010; Schmitz et al., 2002). Several mental health disorders (e.g. Major Depressive Disorder, Bulimia nervosa, Anorexia nervosa) are marked by unhealthy eating habits (DSM-IV-TR, 2000). Similarly, symptoms of mood, anxiety, and eating disorders are associated with sleep disturbances in adolescents (Dahl & Harvey, 2007).

The current study examines the extent to which health-related behaviors are linked to both psychological symptoms and youths' motivational orientation for these behaviors. Previous research has found associations between psychological symptoms and motivation for healthy behavior; however, there are few focusing on adolescent populations. In one study of older

adolescence and young adults, symptoms of hopelessness and depression were negatively associated with academic motivation (Miller & Markman, 2007). While psychological symptoms may contribute to decreased motivation for healthy behavior, they may also contribute to increased motivation for unhealthy behavior among adolescents. Trait anxiety and anxiety sensitivity are associated with motivation for alcohol, cigarette, and marijuana use (Comeau, Stewart, & Loba, 2001). Mood and anxiety disorders are also associated with greater coping motives for alcohol use (Windle & Windle, 2012). Studies using adult populations have found links between psychological symptoms and motivation. For example, both positive and negative symptoms of schizophrenia are negatively related to intrinsic motivation among racially diverse patients (Yamada, Lee, Dinh, Barrio, & Brekke, 2010). Similarly, previously depressed individuals report more avoidance goals than individual who have never been depressed (Vergara & Roberts, 2011). Evidence shows that mental health affects general motivation and motivation for health-related behaviors; however, more research is needed to understand these relations among adolescents. The current study explores the degree to which psychological symptoms are associated with both motivation to engage in health behaviors and engagement in health behaviors.

Barriers to Health-Related Behaviors

There are barriers and motivators to any self-care behaviors (Tucker et al., 2011). Of primary concern in the current study are the environmental barriers in low-income environments that might decrease motivation and engagement in health-related behaviors. Safety concerns and crime as well as traffic and the absence of parks and sidewalks diminish the engagement in physical activity (Heesch, Brown, & Blanton, 2000; Zlot, Librett, Buchner, & Schmid, 2006). Additionally, lack of affordable and accessible exercise or recreational facilities in a

neighborhood inhibit ability to engage in physical activity close to home (Krans & Chang, 2011). Inadequate quality or quantity of physical education decreases exercise at school (Goh et al., 2009). An exploration of city structures in locations known for high rates of obesity found that there are less park access and areas for walking in locations with the largest populations of youth, suggesting a lack of resources contributes to the rise of child obesity (Cutts, Darby, Boone, & Brewis, 2009). In fact, environmental opportunities for exercise predict exercise participation in adolescents (Ammouri et al., 2007).

Similar barriers are thought to impede families' engagement in healthy eating habits. For example, grocery store and food availability, variety, and quality, high costs of healthy food, and safety concerns are obstacles to acquiring food in low-income neighborhoods (Zenk et al., 2011). Youth report that an unavailability of healthy meals at school and home accompanied by low cost and proximity of fast food increases accessibility to unhealthy food choices (Kaye, Tucker, Bragg, & Estampador, 2011; Shepherd et al., 2006). Less is known about environmental barriers to sleep hygiene; however, poor neighborhood conditions have been found to be associated with later sleep onset in adolescents on the weekends (Marco et al., 2012). The current study assesses environmental barriers and examines the extent to which these barriers are associated with youths' reports of motivation and engagement in health-related behaviors.

Taking into account both psychological symptoms and environmental barriers, it is easier to understand the difficulties low-income and minority youth might face when engaging in health promoting and rewarding behaviors. However, there are youth who are able to overcome these difficulties to exercise, eat healthy, and sleep well. The current study explores how the risk factors of psychological symptoms and environmental barriers interact with basic need fulfillment to predict motivation for and engagement in health behaviors.

Aims and Hypotheses:

The first aim of the current project is to explore the relations among *psychological symptoms*, motivation, and engagement in health-related behaviors while also taking into account fulfillment of the basic needs of autonomy, competency, and relatedness (see Figure 1). I expect higher levels of psychological symptoms will be significantly, negatively associated with motivation for health-related behaviors. However, I also expect that fulfillment of basic needs will serve as a protective factor against the negative effects of psychological symptoms on motivation, whereby, youth who report greater basic needs satisfaction will also report greater motivation to engage in healthy behaviors regardless of psychological symptoms. Therefore, I expect that fulfillment of basic needs will moderate the relation between psychological symptoms and motivation to engage in healthy behaviors. Additionally, I expect that motivation will be significantly, positively associated with engagement in health-related behaviors. Accordingly, I hypothesize:

H1: When autonomy, competency, and relatedness are not satisfied, greater psychological symptoms will be negatively associated with motivation to engage in exercise, healthy eating, and sleep hygiene

H2: When autonomy, competency, and relatedness are satisfied, psychological symptoms will not be significantly related to motivation to engage in exercise, healthy eating, and sleep hygiene.

H3: Motivation to engage in health behaviors will be positively associated with reported engagement in these behaviors.

The second aim is to explore the relations among *environmental barriers*, motivation, and engagement in health-related behaviors while also taking into account the basic needs of

autonomy, competency, and relatedness. I expect greater environmental barriers will be significantly, negatively associated with motivation for health-related behaviors. However, I also expect that fulfillment of basic needs will serve as a protective factor against the negative effects of environmental barriers on motivation, whereby, youth who report greater basic needs satisfaction will also report greater motivation to engage in healthy behaviors regardless of environmental barriers. Therefore, I expect that fulfillment of basic needs will moderate the relation between environmental barriers and motivation to engage in healthy behaviors. Additionally, as predicted above, I expect motivation will be significantly, positively associated with engagement in health-related behaviors. Accordingly, I hypothesize:

H4: When autonomy, competency, and relatedness are not satisfied, environmental barriers will be negatively associated with motivation to engage in exercise, healthy eating, and sleep hygiene.

H5: When autonomy, competency, and relatedness are satisfied, environmental barriers will not be related significantly to motivation to engage in exercise, healthy eating, and sleep hygiene.

CHAPTER 2 METHODS

Participants

Study recruitment took place at two different locations in Detroit, Michigan. Initially, youth were recruited from an integrative adolescent primary health clinic. In order to increase sample size, a second recruitment site was added after 12 months for the last 2 months of data collection. The bulk of the sample of youth and their primary caregivers were recruited from the integrative adolescent primary health care clinic and are referred to as the Primary Care Sample. This sample includes 64 youth, aged 13 to 18 years, and their primary caregivers, aged 30 to 64 years. The Primary Care Sample of 64 youth includes 66% girls. This youth sample consists of 89% African American, 3% Caucasian, and 8% Other, specifically multi-racial. The Primary Care Sample of 52 unique caregivers includes 79% biological mothers, 4% biological fathers, and 17% other. Fifty-one percent were single, 33% were married or living with their partner, and 16% were divorced, separated, or widowed. The median income was between $10,000 and $19,000 (range = Less than $9,999 to Greater than $100,000).

The secondary portion of the sample of participants were recruited from two churches located in the city of Detroit and are referred to as the Church sample. The Church Sample consists of 15 youth, aged 13 to 18 years, and their primary caregivers, aged 29 to 53 years. The Church Sample of 15 youth includes 47% girls. This youth sample consists of 67% African American, 7% Caucasian, and 26% Other, specifically multi-racial. The Church Sample of 9 unique caregivers includes 78% biological mothers, of which 33% are another relation to one of their children (e.g., aunt), and 22% biological fathers. Twenty-two percent were single, 67% were married or living with their partner, and 11% were separated. The median income was between $40,000 and $49,000 (range = $20,000 – Greater than $100,000).

The two samples were comparable on all demographic information and study variables except for family income, with the family income of the Church Sample being significantly greater than the family income of the Primary Care Sample. The samples were combined for all further analyses. The final combined sample included 79 youth, aged 13 to 18 years, and their primary caregivers, aged 29 to 64 years. The youth sample includes 62% girls. This youth sample consists of 85% African American, 4% Caucasian, and 11% Other, specifically multi-racial. The unique caregiver sample includes 79% biological mothers, 6% biological fathers, and 15% Other. Seven percent are also another relation to one of their children (e.g., aunt). Forty-seven percent were single, 38% were married or living with their partner, and 15% were divorced, separated, or widowed. The median income was between $20,000 and $29,000 (range = Less than $9,999 to Greater than $100,000). Fifty-eight percent of the families consisted of 1 caregiver and 1 youth while 42% of the families consisted of 1 caregiver with either 2 or 3 youth.

Unique and non-unique families were comparable on all demographic information and study variables except for controlled motivation for exercise and healthy eating, with youth from non-unique families reporting significantly greater controlled motivation for exercise ($t = 1.98$, $p < 0.05$) and healthy eating ($t = 1.99$, $p < 0.05$) than youth from unique families. Due to the inclusion of siblings in the final sample of 79 families, the dataset included non-independent data. Analyses were re-run with 62 unique families. Effect sizes and magnitude of results did not change; therefore, the 79 families were retained in the current study.

Procedure

Youth and primary caregivers were recruited at their primary health care clinic or church either by a member of the research team or using our recruitment flyer (see Appendix B). Families heard about the study and discussed eligibility criteria with a member of the research

team either in person or over the telephone. Youth and caregivers who met eligibility criteria were scheduled for a lab or home visit. Initially, all visits were completed either in the lab or hospital clinic. At the time we added a new recruitment site, we also added the option of completing visits at participants' homes. 18% of the youth participants completed the study during a home visit; 5% of youth from unique families and 65% of youth from non-unique families. At this scheduled appointment, potential participants were given the opportunity to indicate consent and then separated to complete the study. Youth participants completed a semi-structured interview including demographic information, questionnaires, two story-telling tasks, and a receptive vocabulary task. Caregiver participants completed a semi-structured interview and questionnaires. The majority of participants had the questionnaires read aloud to them and completed by the research team. However, due to time constraints present during home visits, 16% of the participants read along with the research team and filled in their own responses. After completing the questionnaires and additional tasks, participants and caregivers were awarded $20 each in the form of cash or a gift card for participation. Initially, all families were awarded $20 gift cards to either Target or CVS. At the time we added a new recruitment site and the option of home visits, we also added the incentive of $20 cash.

Measures (see Appendix C)

Demographics. Youth participants completed a demographic questionnaire that included items on age, gender, ethnicity, and grade level. Caregiver participants completed a demographic questionnaire that included items on age, ethnicity, family income, gender, and relationship to child participant. For ethnicity, participants chose from the following categories: African-American/Black, Caucasian/White, Latino-American, Indian/Alaska Native, Asian/Pacific Islander, and Other. The following categories were used to assess family income: $9,999 or Less,

10,000-20,000, 20,000-30,000, 30,000-40,000, 40,000-50,000, 50,000-60,000, 60,000-70,000, 70,000-80,000, 80,000-90,000, 90,000-100,000, and Over 100,000. The following categories were used to assess the caregivers' relationship with youth participants: Biological Mother, Biological Father, Grandmother, Grandfather, Aunt, Uncle, Foster Mother, Foster Father, and Other.

Self-reported Psychological Symptoms. Caregiver and youth participants completed the 35-item Pediatric Symptom Checklist and the Pediatric Symptom Checklist-Youth Version (Murphy & Jellinek, 1988), respectively, to assess youth's current psychosocial dysfunction. Using a 3-point scale, participants were asked to indicate how well each symptom fits them or their child (0 = never, 1 = sometimes, 2 = often). Item scores were added to create a total symptom severity score. Higher scores indicate more psychological symptoms. Sample items include: *Less interested in school*, *Feel that you are bad*, and *Do not listen to rules.* The PSC has demonstrated adequate reliability over time in a sample of lower-middle class children (r = 0.87) and minority children (r = 0.91; Murphy & Jellinek, 1988). Adequate internal consistency was found in the current youth sample (α = 0.87) and caregiver sample (α = 0.90). Youth's and caregivers' reports of youth's psychological symptoms were significantly concordant (r = 0.58). Due to the reasonable agreement between youth and caregivers on this variable, their scores were standardized and summed to create one psychological symptom composite scores. The psychological symptom composite score was used in subsequent regression and path analyses. Adequate internal consistency was found for the combined measure in the current sample (α = 0.93).

Environmental Barriers. Environmental barriers to exercise, healthy eating, and sleep hygiene were assessed using a 15-item checklist and 3 open-ended questions developed for the

current study. Using a 3-point scale, youth and caregiver participants were asked to indicate how much each environmental barrier makes it difficult for them and/or their family to engage in health behaviors (0 = not at all; 2 = a lot). A sample exercise barrier is *lack of physical education classes at my school*. A sample healthy eating barrier is *healthy food is too expensive*. A sample sleep hygiene barrier is *outside noise from my neighborhood or street.* Item scores assessing barriers for each health behavior were averaged to create a total environmental barriers score for exercise, healthy eating, and sleep hygiene separately. Acceptable internal consistency was found in the current youth sample for each health behavior barrier score (Exercise barriers: $\alpha = 0.73$; Healthy Eating barriers: $\alpha = 0.70$; Sleep barriers: $\alpha = 0.69$). Acceptable internal consistency was found in the current caregiver sample for the exercise barriers subscale ($\alpha = 0.75$); however, the healthy eating barriers subscale ($\alpha = 0.42$) and sleep hygiene barriers subscale ($\alpha = 0.53$) were less than adequate. Additionally, youth's report and caregivers' report of environmental barriers for exercise ($r = 0.15$), healthy eating ($r = 0.13$), and sleep hygiene ($r = -0.08$) were not significantly concordant. Youth's reports of environmental barriers for each health behavior were used in subsequent regression and path analyses.

Motivation for Health Behaviors. The 15-item Treatment Self-Regulation Questionnaire (TSRQ; Ryan & Connell, 1989) was adapted for the current study to assess reasons for engaging in each of the 3 specific health behaviors. The original measure was used to assess why people "behave in a healthy way" (Williams, Grow, Freedman, Ryan, & Deci, 1996). In the current study, the adapted TSRQ contains the same 15 items to assess why youth in our sample choose to exercise, eat healthy, and engage in healthy sleep habits. Youth participants used a 7-point scale to rate the reasons they engage in the described self-care behavior (1 = not at all true, 7 = very true). Sample items include: *The reason I would exercise regularly is because others would*

be upset with me if I did not exercise regularly, *The reason I would eat a healthy diet is because it is consistent with my life goals*, and *The reason I would get an adequate amount of hours of sleep a night is because I personally believe it is the best thing for my health*. Youth participants' responses were averaged to calculate three subscale scores: *Autonomous Motivation* (6 items), *Controlled Motivation* (6 items), and *Amotivation* (3 items). Higher scores indicate higher autonomous, controlled, or amotivation motivation toward the health-related behavior. The TSRQ for exercise, diet, and sleep all demonstrated acceptable internal consistency in the current sample on the autonomous motivation subscale (α = 0.74-0.85) and controlled motivation subscale (α = 0.72-0.84). The Amotivation subscales did not demonstrate acceptable internal consistency across the three measures (α = 0.25-0.44) and were not used in further analyses.

Health-related behaviors. Frequency of youth's current physical activity and exercise, eating behaviors, and sleep hygiene were assessed using 12 items developed for the current study. Youth and caregiver participants used a 7-point scale to indicate how many days out of a typical week youth engage in the health-related behavior described (0 = 0 days, 6 = 6+ days). Four items were used to assess frequency of physical activity or exercise. A sample item includes: *How many days did you exercise or participate in physical activity for at least 20 minutes that made you sweat and breathe hard (basketball, soccer, running, swimming, fast bike-riding, fast dancing, or other aerobic activities)?* Four items were used to assess current eating behaviors. A sample item includes: *How many days did you eat "junk food" such as pop, chips, or fried food?* Four items were used to assess sleep habits. A sample item includes: *How many days did you wake up in the morning feeling rested for the day?* Item scores were averaged to create a total engagement score for each health behavior. Higher scores mean greater frequency of engagement in health-related behaviors. Youth's and caregivers' reports of youth's

engagement in exercise (r = 0.53), healthy eating (r = 0.60), and sleep hygiene (r = 0.34) were significantly concordant. Due to the reasonable agreement between youth and caregivers on these variables, their scores were standardized and summed to create one engagement composite score for each health behavior. The engagement composite scores were used in subsequent regression and path analyses. Acceptable internal consistency was found for the combined measures for exercise engagement (α = 0.73) and healthy eating engagement (α = 0.74) in the current sample. The internal consistency for the combined measure for sleep hygiene engagement was less than adequate (α=0.55); however, there was not a smaller subset of items that increased the reliability.

Basic Need Satisfaction. Youth participants completed the 20-item Basic Need Satisfaction in Life Scale from the larger Basic Psychological Needs Scales (BCSC; Deci, Ryan, Gagnè, Leone, Usunov, & Kornazheva, 2001) to assess satisfaction of their autonomy, competence, and relatedness needs. Item response choices ranged from 1 (not at all true) to7 (very true), and item scores were averaged to create an overall summary score. Higher scores indicate higher levels of need satisfaction. Sample items include: *I feel like I am free to decide for myself how to live my life (*autonomy); *Often, I do not feel very competent* (competence); and *I really like the people I interact with* (relatedness). Internal consistency for the overall composite score (α = 0.80) was adequate for the current sample.

Receptive Vocabulary. The Peabody Picture Vocabulary Test, Fourth Edition (PPVT-4; Dunn & Dunn, 2007) was used to assess youth participants' receptive vocabulary and estimate intellectual functioning. Youth participants viewed four pictures and selected the picture that best illustrates the meaning of a stimulus word spoken by a researcher. From participants' responses, a standard score (M = 100; SD = 15) was calculated. Administration of the PPVT-4 typically

takes less than 20 minutes. Significant correlations between the standard score on previous editions of the PPVT and WISC-III full scale score have been found ($r = 0.85$, Hodapp & Gerken, 1999; $r = 0.60$; Carvajal, Hayes, Miller, Wiebe, & Weaver, 1993). The PPVT-4 demonstrates acceptable validity and internal consistency when normed on adolescent populations ($\alpha = 0.96$-0.98; Dunn & Dunn, 2007).

CHAPTER 3 RESULTS

Preliminary Analyses

Prior to analyses, I screened the variables for accuracy of data, missing data, skewness, kurtosis, and the presence of univariate and multivariate outliers. No out of range values were detected and the means and standard deviations of each variable were plausible. The Autonomous Motivation for Healthy Eating total score and Caregivers' Environmental Barriers to Sleep Hygiene total score each contained one outlier. These values were changed to the next highest values that were not an outlier for subsequent analyses. There were four multivariate outliers; 1 youth and 3 caregivers; and they were retained in the analyses. Due to the interview structure of the study, there was little missing data. Missing data were handled by the full information maximum likelihood (FIML; Schafer & Graham, 2002) method in Mplus (Muthén & Muthén, 1998-2010), which is more powerful and less biased than ad hoc methods of handling missingness (e.g., listwise deletion). This method, also known as direct ML (Allison, 2002), works by finding model parameters which maximize the likelihood of each case's observed data (Wothke, 2000). This approach to handling missing data assumes data are missing at random (MAR), that is, missing at random conditional on values observed.

The following youth variables were significantly skewed: Barriers for Exercise ($z = 1.99$) Barriers for Sleep Hygiene ($z = 2.38$), Autonomous Motivation for Exercise ($z = -2.42$), Controlled Motivation for Exercise ($z = 2.34$), Autonomous Motivation for Healthy Eating ($z = -4.19$), Controlled Motivation for Healthy Eating ($z = 2.34$), Autonomous Motivation for Sleep Hygiene ($z = -3.06$), and Controlled Motivation for Sleep Hygiene ($z = 3.04$). The following caregiver variable was significantly skewed: Pediatric Symptom Checklist ($z = 1.99$). Scales with significant skew were transformed using a square-root transformation with the exception of youth's report of autonomous motivation for healthy eating. This variable had substantial skew and was transformed using a log transformation. Raw scores were used to calculate all

descriptive statistics. Transformed scores were used to compute all regression and path analyses,

Descriptive Analyses

Means and standard deviations of all independent, dependent, and potential covariate variables (e.g. age) for youth are presented in Table 1 and for caregivers are presented in Table 2. All values have plausible means and show good variability. For youth-reported psychological symptoms, slightly more than half fell above the mean (54%); however, 75% of youth participants (n=59) scored below the clinical cut-off of 30. For caregiver report of youth symptoms, slightly more than half fell below the mean (57%), and 65% of scores (n=51) were below the clinical cut-off of 28. The mean scores for environmental barriers indicate that on average, youth and caregivers in our current sample report that most items were "not at all" or "somewhat" barriers for them. For youth, the mean scores were accurate measures of central tendency, with half of participants' scores falling above and below the mean. Slightly more than half of the caregivers' scores fell below the mean for exercise barriers (54%) and sleep hygiene barriers (56%) whereas slightly more than half fell above the mean for healthy eating barriers (52%).

Youth's autonomous and controlled motivation for health behaviors were examined. On average, youth reported greater autonomous motivation than controlled motivation for exercise ($t = 17.35$, $p < 0.01$), healthy eating ($t = 14.53$, $p < 0.01$), and sleep hygiene ($t = 12.67$, $p < 0.01$). Both youth and caregivers reported that youth engage in exercise behaviors, on average, 2-3 days per week and engage in healthy eating and sleep hygiene behaviors 3-4 days a week. In the current sample, 41.7%, 44.9%, 40.6% of youth reported engaging in exercise, healthy eating, and sleep hygiene behaviors, respectively, for at least 4 days in a typical week. When examining engagement in health behaviors for at least 3 days in a typical week, 65.8%, 69.8%, and 77.4%

of youth in the current study reported engagement in exercise, healthy eating, and sleep hygiene behaviors, respectively.

The patterns of correlation coefficients among the independent and dependent variables for youth (see Table 3) and caregivers (see Table 5) were examined. Several significant associations were found suggesting that youth's report of psychological symptoms was negatively associated with engagement in exercise, healthy eating, and sleep hygiene. Similarly, for youth, there was a negative relation between environmental barriers for exercise and healthy eating and engagement in these health behaviors. Psychological symptoms were positively associated with controlled motivation for exercise and healthy eating and negatively associated with autonomous motivation for sleep hygiene and basic needs satisfaction. Similarly, a positive relation was found between environmental barriers for healthy eating and sleep hygiene and controlled motivation for these health behaviors. Environmental barriers for each health behavior were also negatively associated with basic needs satisfaction. Additionally, being more autonomously motivated for sleep was positively associated with engagement in sleep hygiene while basic need satisfaction was positively associated with engagement in exercise and healthy eating. Lastly, greater basic need satisfaction in all areas was negatively associated with controlled motivation for all health behaviors examined. Based on their caregivers report, youth's psychological symptoms were negatively associated with engagement in exercise and sleep hygiene. There was also a negative relation between caregivers' report of environmental barriers for healthy eating and youth's engagement in this behavior.

Also of importance are the associations among the potential covariates and independent and dependent variables (see Tables 4 and 5). For youth, age was associated with environmental barriers and engagement in health behaviors. Older youth reported greater environmental barriers

for exercise and healthy eating and less engagement in exercise, healthy eating, and sleep hygiene. PPVT score and family income were associated with motivation for healthy behaviors. Unexpectedly, PPVT score was negatively associated with autonomous motivation for exercise and autonomous and controlled motivation for sleep hygiene. Family income was negatively associated with autonomous motivation for sleep hygiene. Therefore, youth's age, PPVT score, caregiver's age, and family income were included as covariates in subsequent path analyses. Several significant associations were found between youth and caregiver summary scores and study variables (see Table 6). Youth's and caregivers' age were included as covariates in subsequent path analyses containing summary scores for youth's engagement in health behaviors.

Patterns of associations between study variables and mean-level comparisons were examined for possible gender differences. Independent-samples t-tests indicated that girls reported greater environmental barriers for each health behavior (exercise: $t = -2.37$, $p < 0.05$; healthy eating: $t = -3.11$, $p < 0.01$; sleep hygiene: $t = -2.56$, $p < 0.01$) while boys reported greater engagement in exercise ($t = 2.85$, $p < 0.01$). As a result, gender was added a potential covariate in subsequent model analyses. Fisher's r-to-z transformations indicated that with the current sample size, the correlations for males and females would have to differ by a magnitude of at least 0.360 to be considered significant. Examining the key variables in subsequent models, 18% (n = 6) of 33 correlations were significantly different by this criteria, suggesting a pattern of differences in the associations among study variables for boys and girls. As a result, post hoc models were developed to examine gender as a potential moderator.

Moderation Analyses

Multiple linear regression analyses were conducted to determine if basic needs satisfaction

moderated the relations between risk factors (i.e. psychological symptoms, environmental barriers) and motivation for health behaviors. Results were examined to determine the role of basic needs satisfaction in subsequent path models. Basic needs satisfaction was not a significant moderator of the relations between independent variables and motivation for exercise, healthy eating, or sleep hygiene regardless of informant. However, results indicated that basic needs satisfaction was a significant predictor of motivation for health behaviors; therefore, it was included in subsequent path models as an independent variable.

Model Analyses

Data Analytic Strategy. Mplus version 5.2 (Muthèn & Muthèn, 2007) was used to estimate path models developed for the current study. Separate models were run for each of the independent variables (i.e., psychological symptoms and environmental barriers) with each of the dependent variables (i.e., engagement in exercise, healthy eating, and sleep hygiene). Figure 2 presents the tested model of the associations based on the preliminary and regression analyses. Paths A and B estimate the effects of psychological symptoms or environmental barriers on autonomous motivation and controlled motivation for health behaviors. Paths C and D estimate the effects of perceived need satisfaction on autonomous motivation and controlled motivation. Paths E and F estimate the effects of psychological symptoms or environmental barriers and perceived basic needs satisfaction on engagement in health behavior. Lastly, paths G and H estimate the effects of autonomous motivation and controlled motivation on engagement in health behavior. All models include youth age, youth gender, youth PPVT score, and caregiver age as covariates. Results are presented below and organized by the findings for each health behavior.

Because the magnitude of relations among key study variables differed for boys and girls, I

examined whether youth gender moderated each of the tested path models. Unconstrained models for each health behavior where path coefficients were allowed to vary across gender were compared to models where all path coefficients were constrained to be equal. The chi-square difference test was used to compare chi-square and degrees of freedom for the two models to determine whether constraining the path coefficients worsened the model fit. The results of these comparisons are presented below for each health behavior. Where tests of moderation were significant, reported results focus on significant paths by gender. Where tests of moderation were not significant, reported results focus on significant paths for the entire sample, with gender as a covariate.

Exercise and Psychological Symptoms. Results for the path models predicting engagement in youth exercise from psychological symptoms, needs satisfaction, and motivation are presented in Tables 7 and 8. Fit indices indicate an adequate fit for the data for the overall model ($\chi^2 = 8.49$, $p = 0.39$; CFI = 0.99; RMSEA = 0.03). The constrained and unconstrained models differed significantly ($\Delta\chi^2 = 47.55$, $\Delta df = 19$, $p<0.01$); therefore, key pathways in the overall model was examined separately for boys and girls. Significant pathways are presented in Figure 3. For both boys and girls autonomous and controlled motivations were positively related. For boys only, more psychological symptoms were related to less autonomous motivation for exercise and lower perceived needs satisfaction. For girls only, more psychological symptoms and having older caregivers were associated with less engagement in exercise.

Exercise and Environmental Barriers. Results for the path model predicting engagement in youth exercise from barriers, needs satisfaction, and motivation are presented in Table 9. The constrained and unconstrained models did not differ significantly ($\Delta\chi^2 = 26.83$, $\Delta df = 20$, $p > 0.05$), indicating that gender did not moderate the overall path model. Fit indices for the overall

model indicate an adequate fit for the data (χ^2 = 10.95, p = 0.36; CFI = 0.98; RMSEA = 0.04). Youth who reported greater basic need satisfaction reported less controlled motivation for exercise, fewer barriers to exercise, and greater engagement in exercise. Autonomous and controlled motivations were positively related. Youth with older caregivers reported less engagement in exercise.

Healthy Eating and Psychological Symptoms. Results for the path models predicting engagement in youth healthy eating from psychological symptoms, needs satisfaction, and motivation are presented in Table 10 and 11. Fit indices indicate an adequate fit for the data (χ^2 = 0.65, p = 0.72; CFI = 1.00; RMSEA = 0.00). The constrained and unconstrained models differed significantly ($\Delta\chi^2$ = 32.27, Δdf = 16, p < 0.01); therefore, key pathways in the overall model was examined separately for boys and girls. Significant pathways are presented in Figure 4. For both boys and girls, psychological symptoms and perceived needs satisfaction were negatively related while autonomous and controlled motivations were positively related. For boys only, more controlled motivation to engage in healthy eating was related to less engagement in healthy eating. For girls only, being younger was associated with associated with more engagement in healthy eating.

Healthy Eating and Environmental Barriers. Results for the path models predicting engagement in youth healthy eating from barriers, needs satisfaction, and motivation are presented in Table 12 and 13. Fit indices indicate an adequate fit for the data (χ^2 = 2.86 p = 0.72; CFI = 1.00; RMSEA = 0.00). The constrained and unconstrained models differed significantly ($\Delta\chi^2$ = 33.42, Δdf = 17, p < 0.01); therefore, key pathways in the overall model was examined separately for boys and girls. Significant pathways are presented in Figure 5. For both boys and girls, autonomous and controlled motivations were positively related. For boys only, more

controlled motivation to engage in healthy eating was related to less engagement in healthy eating. For girls, being younger was associated with less environment barriers and more engagement in healthy eating.

Sleep Hygiene and Psychological Symptoms. Results for the path models predicting engagement in youth sleep hygiene from psychological symptoms, needs satisfaction, and motivation are presented in Tables 14 and 15. Fit indices indicate an acceptable fit for the data ($\chi^2 = 3.17$, $p = 0.20$; CFI = 0.00; RMSEA = 0.09). The constrained and unconstrained models differed significantly ($\Delta\chi^2 = 73.33$, $\Delta df = 28$, $p < 0.01$); therefore, key pathways in the overall model was examined separately for boys and girls. Significant pathways are presented in Figure 6. For both boys and girls, psychological symptoms and perceived needs satisfaction are negatively related. For boys only, greater perceived needs satisfaction was associated with less controlled motivation to engage in sleep hygiene. For girls only, more psychological symptoms were related to less engagement in sleep hygiene. Autonomous and controlled motivations were positively related. Girls from families with greater income reported less autonomous motivation to engage in sleep hygiene.

Sleep Hygiene and Environmental Barriers. Results for the path models predicting engagement in youth sleep hygiene from barriers, needs satisfaction, and motivation are presented in Tables 16 and 17. Fit indices indicate an adequate fit for the data ($\chi^2 = 3.66$, $p = 0.96$; CFI = 1.00; RMSEA = 0.00). The constrained and unconstrained models differed significantly ($\Delta\chi^2 = 50.86$, $\Delta df = 24$, $p < 0.01$); therefore, key pathways in the overall model was examined separately for boys and girls. Significant pathways are presented in Figure 7. For boys only, greater perceived needs satisfaction was related to more autonomous motivation to engage in sleep hygiene. Additionally, for boys, more controlled motivation to engage in sleep hygiene

was related to less engagement in sleep hygiene. For girls only, autonomous and controlled motivations were positively related.

CHAPTER 4 DISCUSSION

The current study examined reported engagement in health behaviors among low-income, minority youth and their associations with reported psychological symptoms, environmental barriers, and basic social needs satisfaction. Although health behaviors have been examined in adolescent populations, less is known about what explains the wide variability of engagement in these behaviors. Previous research has found that during adolescence, compared to childhood, youth exercise less, eat unhealthy, and receive an inadequate amount of sleep each night (Eaton et al., 2012, McKnight-Eily et al., 2011). Furthermore, poor exercise, eating, and sleep habits are more prevalent among low-income, minority youth populations (Delva et al., 2006; Hodge et al., 2010; Marco et al., 2012). The current study used Self-Determination Theory as a framework for examining basic needs and motivational factors that may be related to health-related behavior among a subset of adolescents more at-risk for unhealthy habits. The specific aims of the study were to (1) explore the relations among *psychological symptoms*, motivation, and engagement in health-related behaviors while also taking into account fulfillment of the basic needs of autonomy, competency, and relatedness and (2) explore the relations among *environmental barriers*, motivation, and engagement in health-related behaviors while also taking into account the basic needs of autonomy, competency, and relatedness. Overall, in the current study, reported psychological symptoms and environment barriers were negatively associated with engagement in health behaviors. Additionally, the results indicated that perceived needs satisfaction among low-income minority youth was associated with motivation and engagement in health-related behaviors.

In the current sample, 41.7%, 44.9%, 40.6% of youth reported engaging in exercise, healthy eating, and sleep hygiene behaviors, respectively, for at least 4 days in a typical week.

The percentage of youth in our sample engaging in exercise (41.7%) is consistent with previous findings that approximately 44.4% of Black and 45.4% of Hispanic high school students meet the recommended physical activity guidelines, compared to 52.7% of White students (Eaton et al., 2012). Similarly, consistent with previous findings, the majority of youth in our sample are not consistently physically active, eating healthy, or engaging in healthy sleep habits (Delva et al., 2006; Hodge et al., 2010; Marco et al., 2012). When examining engagement in health behaviors for at least 3 days in a typical week, 65.8%, 69.8%, and 77.4% of youth in the current study reported engagement in exercise, healthy eating, and sleep hygiene behaviors, respectively. Given the significance of psychological symptoms and environmental barriers, it is important to note that a majority of the youth in our current sample reported engagement in health behaviors some days out of the week and slightly less than half reported engagement in health behaviors most days out the week despite significant obstacles. Results indicated that psychological symptoms were negatively associated with exercise and sleep hygiene, while environmental barriers were negatively associated with healthy eating and sleep hygiene. The current study examined motivation and perceived needs satisfaction to better understand what factors protect youth from their present risk factors.

It was expected that motivation for health-related behaviors would be positively related to engagement in exercise, healthy eating, and sleep hygiene. Contrary to expectations, motivation was most often unrelated to reported engagement in health behaviors. Although youth may report high motivation for behaviors, these reports were not significantly associated with their reports of actual engagement in those behaviors. Measuring both autonomous motivation and controlled motivation may be contributing to this finding. The current study examined autonomous and controlled motivation separately to explore all the reasons why adolescents make healthy

decisions. Some youth reported both autonomous and controlled motivation for exercise, healthy eating, and sleep hygiene. The lack of association between motivation and engagement may be capturing youth's confusion about their reasons for engaging in healthy behaviors. Alternatively, youth may be dually motivated. Although autonomous and controlled motivations are positively related in the current study, previous research has found different associations between autonomous and controlled motivations and outcomes. While autonomous motivation has been found to be associated with more persistence and effort towards a goal, controlled motivation is associated with more rigid functioning and diminished well-being (Deci & Ryan, 2008; Mouratidis & Michou, 2011). This finding may also be capturing a struggle between making decisions based on one's own values and being consistent with one's external world (e.g., family, friends). Further research should explore the engagement of youth's caregivers and friends in order to fully understand the external factors that may be influencing their own motivational processes.

It is also possible that youth in the current study may have wanted to report higher motivation for health behaviors in order to give a more positive impression during the interview. This finding may be capturing a desire to engage in healthy behaviors rather than the reasons why youth do or do not engage in those behaviors. Additionally, adolescents may be poor reporters of their own motivational processes. McClelland and colleagues (1989) suggest that motive dispositions, of all individuals, vary depending on the methods used to obtain the information. For example, story-telling tasks and self-report measures elicited different information about motives, even when these measures were titled the same (McClelland, Koestner, & Weinberger, 1989). This finding may be capturing the difficulties of measuring motivation in human beings, further evidenced by the difficulty in reliably measuring

amotivation in the current sample. Perhaps for adolescents, other methodological approaches in addition to self-report may help us to better understand the underlying motivational processes present.

It was also expected that perceived fulfillment of basic needs would moderate the relations between risk factors and motivation. Contrary to expectations, the relation between risk factors and youth motivation did not vary depending on perceived fulfillment of basic needs. However, regression analyses indicated that youth's perceived need satisfaction does predict motivation for and engagement in health behaviors. For exercise, perceived need satisfaction was negatively related to controlled motivation and positively related to exercise engagement. Needs satisfaction was also positively associated with autonomous motivation for sleep hygiene. Although it did not serve as a moderator, fulfillment of basic needs satisfaction may play an important role in understanding motivation for health behaviors. Youth who perceive themselves as more autonomous, competent, and related to others in their life reported health-related motivation that is based more on their own intrinsic values. On the other hand, youth who do not perceive themselves as having autonomy, competency, and relatedness reported health-related motivation based on what others in their life would want or do.

Basic need satisfaction, or the satisfaction of our need for autonomy, competency, and relatedness, promotes both general well-being and motivation for specific health-related behaviors. According to Deci and Ryan (2011), individuals' optimal development and functioning is reliant on fulfillment of these basic needs, regardless of demographic characteristics. These authors further posit that the fulfillment or thwarting of these three basic needs will determine how autonomously motivated individuals' are for specific behaviors. While perceived needs satisfaction and motivation have been linked in adult populations, the current

study is one of few that replicate this link among adolescents. In order to promote adolescent motivation and subsequent health-related decision-making, it is important that we further understand the role of perceived need satisfaction on both general functioning and specific health behaviors. Adolescence is the developmental phase during which autonomy, competency, and relatedness are malleable and most influenced by others. Our findings capture the importance of fulfilling these needs during adolescence in order to influence decisions regarding health-related behaviors that will likely transition into adulthood.

Perceived needs satisfaction and its association with motivation for health behaviors has clinical implications for treatment approaches with youth. Working with youth in any setting often involves working with the youth's family. Therapeutic interventions consisting of family therapy are often a large component of treatment with youth and have been found to be effective when working with youth with various problems, such as externalizing problems (Sexton & Turner, 2010), Attention Deficit/Hyperactivity Disorder (ADHD; Robin, 2014), borderline and antisocial personality traits (Uliaszek, Wilson, Mayberry, Cox, & Maslar, 2014), eating disorders (Girz, Robinson, Foroughe, Jasper, & Boachie, 2013), mood disorders (Miklowitz et al., 2013), and suicide ideation (Diamond, Creed, Gillham, Gallop, & Hamilton, 2012). Our finding suggests that helping the family build autonomy, competency, and relatedness in general might facilitate motivation for and engagement in healthy exercise, eating, and sleep. In other words, if we want to encourage youth to make healthy decisions, we have to help them feel connected, competent, and autonomous to make those decisions. Approaching family therapy from this perspective can improve family dynamics while also influencing specific goals or behaviors. Future research could further explore the importance of perceived need fulfillment in other important areas in adolescence, such as academic success or romantic relationship

involvement. Additionally, further understanding how to increase adolescents' feelings of autonomy, competency, and relatedness in specific areas could potentially direct therapeutic interventions targeting specific health-behaviors.

Correlational and mean-level analyses demonstrated significant differences between boys and girls on engagement in health behaviors. Results indicated that boys reported greater engagement in exercise. Previous research has also found that adolescent boys tend to engage in more physical activity than adolescent girls. For example, boys participated in more moderate to vigorous physical activity than girls as measured by both objective and self-report measures of physical activity (Klinker et al., 2014; Ramos et al., 2013). Exploring our finding further, boys reported significantly greater engagement than girls on two of the four items on the Child Health Behavior Questionnaire: (1) How many days did you exercise or participate in physical activity for at least 20 minutes that made you sweat and breathe hard (basketball, soccer, running, swimming, fast bike-riding, fast dancing, or other aerobic activities)?, and (2) How many days did you attend a class or group outside of school that involves physical activity (dance class; sports team)? Consequently, boys' greater engagement in exercise behaviors may be driven by a tendency to participate in sport activities more often than girls in our sample. This finding is consistent with previous research that found that boys are more likely to participate in organized sport activities than girls (Findlay & Bowker, 2009; Slater & Tiggemann, 2011). A closer look at these gender differences revealed that girls reported more environmental barriers for each health behavior than boys. External factors, such as environmental barriers, may hold more significance for girls and play a larger role in preventing engagement in exercise and other health-related behaviors. Future research could further explore how the risk and protective factors that are important in determining engagement in health behaviors may differ between girls and boys.

Significant pathways and correlations differed depending on which health behavior was being examined. In the current study, exercise and healthy eating were associated with different risk factors. Whereas psychological symptoms were associated with less exercise engagement, environmental barriers were associated with less healthy eating. Healthy eating seems to be more affected by external factors than exercise behaviors. Perhaps youth have less independence in making healthy eating choices throughout their day versus deciding when and how to exercise. It may be easier for youth to eat what is readily available to them at home or at school. One study examining food choices of African American teenagers found that while at school, teenagers were more likely to make unhealthy food choices or chose to eat off-campus for lunch rather than select nutrient-rich food options (George, 2009). Exercise, on the other hand, seems be less constrained by environmental barriers. Free school classes and groups may help youth achieve the recommended amount of exercise during the day. To better understand youth's healthy habits, future research could take into account which health behaviors are more likely affected by external versus internal factors.

Although research has emphasized the importance of exercise and healthy eating, less research exists that examines what impedes healthy sleep habits. In the current study, the pattern of findings for sleep hygiene differed for those regarding exercise and eating. For example, the risk factors of psychological symptoms and environmental barriers were each associated with poorer sleep hygiene. Additionally, perceived needs satisfaction was associated with greater autonomous motivation for sleep hygiene while greater controlled motivation was associated with less sleep hygiene. Contrary to exercise and healthy eating, motivation for sleep hygiene does seem to play a role in reported engagement. More research is needed to further understand what motivates youth to engage in healthier sleep habits.

The current study is important because it adds to the literature on health-related behaviors among low-income, minority youth population. Findings highlight the relevance of psychological health, perceived basic need satisfaction, and motivational stance to youths' health behavior and suggest these factors may be important targets of intervention. Nonetheless, the findings should be interpreted in light of the study limitations. Although the cross-sectional findings are discussed in terms of the effects of psychological symptoms, environmental barriers, and basic needs satisfaction on engagement in health behaviors, the effects could be in the opposite direction, bi-directional, or attributable to a third unmeasured variable. Additionally, the cross-sectional nature of the study and inclusion of only low-income, minority youth prevented comparison across SES or between minority and non-minority youth. Studies with more diverse samples that examine relations over time and intervene at multiple time points are needed to test the directionality of the relations among variables at different developmental phases. Also, difficulties with recruitment resulted in a small sample size of only 79 youth-caregiver dyads being used to analyze the conceptual models, which may have limited the power of the statistical analyses to detect additional effects. Lastly, methodological issues with newly-developed self-report measures may have slightly restricted the findings due to their modest reliability. Future research should examine how to best conceptualize and accurately measure engagement in specific health behaviors. Nonetheless, the current study explored health behaviors in a low-income, minority population and examined a potential protective factor to offset the influence of risk factors. Understanding engagement in health behaviors despite barriers helps to expand the literature on low-income minority youth as well as provides implications for clinical work with this population.

APPENDIX A

Table 1

Descriptive Statistics for Youth-Reported Study Variables (n = 79)

	Mean	Standard Deviation	Observed Range	Possible Range
Psychological Symptoms	22.53	10.01	4-52	0-70
Exercise				
Environmental Barriers	0.65	0.50	0.00-1.80	0.00-2.00
Autonomous Motivation	5.71	1.04	2.83-7.00	1.00-7.00
Controlled Motivation	2.96	1.26	1.00-7.00	1.00-7.00
Engagement	2.85	1.46	0.00-5.50	0.00-6.00
Healthy Eating				
Environmental Barriers	0.90	0.53	0.00-2.00	0.00-2.00
Autonomous Motivation	5.62	1.34	1.00-7.00	1.00-7.00
Controlled Motivation	2.94	1.54	1.00-7.00	1.00-7.00
Engagement	3.20	1.33	0.75-6.00	0.00-6.00
Sleep Hygiene				
Environmental Barriers	0.59	0.50	0.00-2.00	0.00-2.00
Autonomous Motivation	5.21	1.38	1.00-7.00	1.00-7.00
Controlled Motivation	2.75	1.52	1.00-7.00	1.00-7.00
Engagement	3.10	1.29	0.00-5.75	0.00-6.00
Basic Needs Satisfaction	5.19	0.79	3.19-6.86	1.00-7.00
Youth Age	14.89	1.48	13-18	13-18
PPVT (n = 78)	89.05	12.91	51-123	20-160

Note. PPVT-4 = Peabody Picture Vocabulary Test, Fourth Edition.

Table 2

Descriptive Statistics for Caregiver-Reported Study Variables

	n	Mean	Standard Deviation	Observed Range	Possible Range
Youth's Psychological Symptoms	79	23.15	12.43	1.00-57.00	0.00-70.00
Exercise					
Family Environmental Barriers	62	0.88	0.56	0.00-2.00	0.00-2.00
Youth's Engagement	79	2.58	1.47	0.00-5.50	0.00-6.00
Healthy Eating					
Family Environmental Barriers	62	0.81	0.41	0.00-1.60	0.00-2.00
Youth's Engagement	79	3.34	1.20	0.67-6.00	0.00-6.00
Sleep Hygiene					
Family Environmental Barriers	62	0.46	0.39	0.00-2.00	0.00-2.00
Youth's Engagement	79	3.19	1.38	0.00-6.00	0.00-6.00
Caregiver Age	61	42.68	9.08	29-64	--

Note. Variables affected by non-unique family data were reported for 62 unique caregivers only.

Table 3

Correlations between Youth-Reported Independent and Dependent Variables (n=79)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Psych. Sx	1.00	.207+	.390**	.445**	-.059	.239*	-.044	.312**	-.219*	.174	-.339**	-.192+	-.180	-.643**
2. Exercise Barriers		1.00	.390**	.292**	.030	.040	.019	.085	-.045	.093	-.394**	-.234**	-.192+	-.312**
3. Eating Barriers			1.00	.340**	-.052	.133	-.073	.219*	-.302**	.043	-.373**	.410**	-.412**	-.238*
4. Sleep Barriers				1.00	.085	.269*	.061	.298**	.080	.254*	-.040	-.214+	-.153	-.329**
5. Exercise Autonomous					1.00	.254*	.696**	.271*	.609**	.243*	.110	-.031	.123	.179
6. Exercise Controlled						1.00	.271*	.832**	.115	.720**	-.034	-.089	-.254*	-.320**
7. Eating Autonomous							1.00	.340**	.609**	.282*	.030	.131	.127	.105
8. Eating Controlled								1.00	.105	.786**	-.069	-.071	-.218*	-.315**
9. Sleep Autonomous									1.00	.294**	.179	.247*	.228*	.225*
10. Sleep Controlled										1.00	-.011	-.023	-.166	-.256*
11. Exercise											1.00	.253*	.249*	.315**
12. Healthy Eating												1.00	.414**	.225*
13. Sleep Hygiene													1.00	.143
14. Basic Needs Sat.														1.00

Note. Psych. Sx = Psychological symptoms; Exercise Autonomous = Autonomous motivation for exercise; Exercise Controlled = Controlled motivation for exercise; Eating Autonomous = Autonomous motivation for healthy eating; Eating Controlled = Controlled motivation for healthy eating; Sleep Autonomous = Autonomous Motivation for sleep hygiene; Sleep Controlled = Controlled motivation for sleep hygiene; Basic Needs Sat. = Satisfaction of basic needs.

$^{+}p < .10$. $*p < .05$. $**p < .01$.

Table 4

Correlations between Youth-Reported Potential Covariates and Independent and Dependent Variables

	Youth Age (n=79)	Caregiver Age (n=78)	PPVT-4 Score (n=78)	Family Income (n=74)
1. Psych. Sx	.046	-.069	-.033	-.007
2. Exercise Barriers	.275*	.215+	-.066	-.094
3. Eating Barriers	.375**	.081	.027	.002
4. Sleep Barriers	.064	.077	-.086	-.119
5. Exercise Autonomous	.112	.068	-.222*	.032
6. Exercise Controlled	-.020	-.153	-.165	.087
7. Eating Autonomous	-.002	.156	-.160	.091
8. Eating Controlled	-.100	.045	-.166	.142
9. Sleep Autonomous	-.108	.001	-.298**	-.250*
10. Sleep Controlled	-.122	-.065	-.380**	-.128
11. Exercise	-.241*	-.199+	-.092	-.041
12. Healthy Eating	-.280*	-.037	-.071	-.101
13. Sleep	-.254*	.102	-.094	-.003
14. Basic Needs Sat.	.059	-.057	.099	.051

Note. Psych. Sx = Psychological symptoms; Exercise Autonomous = Autonomous motivation for exercise; Exercise Controlled = Controlled motivation for exercise; Eating Autonomous = Autonomous motivation for healthy eating; Eating Controlled = Controlled motivation for healthy eating; Sleep Autonomous = Autonomous Motivation for sleep hygiene; Sleep Controlled = Controlled motivation for sleep hygiene; Basic Needs Sat. = Satisfaction of basic needs;PPVT-4 Score = Peabody Picture Vocabulary Test, Fourth Edition Standard Score.

$^{+}p < .10$. $*p < .05$. $**p < .01$.

Table 5

Correlations between Caregiver-Reported Independent and Dependent Variables and Potential Covariates

	n	1	2	3	4	5	6	7	8	9	10	11
1. Youth's Psych. Sx	79	1.00	.134	-.048	.201+	-.346**	-.117	-.415**	-.049	-.016	-.177	-.139
2. Exercise Barriers	79		1.00	.010	.419**	-.067	-.087	-.031	-.163	-.036	.089	-.209+
3. Eating Barriers	79			1.00	.154	.118	-.370**	-.160	.098	-.112	.012	-.093
4. Sleep Barriers	79				1.00	.115	-.002	-.197+	-.083	-.249*	-.009	-.308**
5. Youth's Exercise	79					1.00	.182	.215+	-.143	-.348**	-.045	.053
6. Youth's Healthy Eating	79						1.00	.156	-.417**	-.035	.009	-.222+
7. Youth's Sleep Hygiene	79							1.00	-.111	-.094	-.041	.056
8. Youth Age	79								1.00	.131	-.135	.026
9. Caregiver Age	78									1.00	-.022	.056
10. Youth's PPVT-4 Score	78										1.00	.350**
11. Family Income	74											1.00

Note. Youth's Psych. Sx = Youth's Psychological symptoms; Youth's PPVT-4 Score = Peabody Picture Vocabulary Test, Fourth Edition Standard Score. $^{+}p < .10$. $*p < .05$. $**p < .01$.

Table 6

Correlations between Youth and Caregiver Summary Scores and Study Variables

	n	Youth's Psychological Symptoms	Youth's Engagement in Exercise	Youth's Engagement in Healthy Eating	Youth's Engagement in Sleep Hygiene
1. Youth-Exercise Barriers	79	.116	-.361**	-.154	-.260*
2. Youth-Eating Barriers	79	.360**	-.369**	-.389**	-.467**
3. Youth-Sleep Barriers	79	.450**	-.077	-.173	-.311**
4. Caregiver-Exercise Barriers	79	.147	-.106	-.187	-.006
5. Caregiver-Eating Barriers	79	.031	-.089	-.429**	-.238*
6. Caregiver-Sleep Barriers	79	.157	.059	-.080	-.129
7. Exercise Autonomous	79	-.135	.201+	-.040	.066
8. Exercise Controlled	79	.300**	-.020	-.136	-.285*
9. Eating Autonomous	79	-.066	.004	.070	.073
10. Eating Controlled	79	.333**	-.095	-.095	-.095
11. Sleep Autonomous	79	-.210+	.157	.209+	.209+
12. Sleep Controlled	79	.219*	-.008	-.020	-.020
13. Basic Needs Sat.	79	-.577**	.383**	.149	.161
14. Youth Age	79	-.002	-.219*	-.389**	-.223*
15. Caregiver Age	78	-.048	-.311**	-.040	.006
16. Youth PPVT-4 Score	78	-.118	-.079	-.034	-.083
17. Family Income	74	-.081	.007	-.182	.030

Note. Exercise Autonomous = Autonomous motivation for exercise; Exercise Controlled = Controlled motivation for exercise; Eating Autonomous = Autonomous motivation for healthy eating; Eating Controlled = Controlled motivation for healthy eating; Sleep Autonomous = Autonomous Motivation for sleep hygiene; Sleep Controlled = Controlled motivation for sleep hygiene; Basic Needs Sat. = Satisfaction of basic needs; Youth PPVT-4 Score = Youth's Peabody Picture Vocabulary Test, Fourth Edition Standard Score.
$^{+}p < .10$. $*p < .05$. $**p < .01$.

Table 7

Path Model Results for Pathways between Psychological Symptoms, Basic Needs Satisfaction, Motivation, and Exercise for Whole Sample (n=79)

	Estimate	S.E.	Est./S.E.	β	95% CIL	95% CIU
Psych. Sx ON						
Auto. Motivation	0.005	0.029	0.156	0.024	-0.054	0.061
Con. Motivation	0.025	0.035	0.726	0.122	-0.042	0.094
Exercise Engagement	-0.229*	0.104	-2.196	-0.23	-0.440	-0.030
BNS ON						
Auto. Motivation	-0.069	0.068	-1.012	-0.160	-0.200	0.063
Con. Motivation	-0.121*	0.059	-2.047	-0.260	-0.231	-0.001
Exercise Engagement	0.496	0.272	1.827	0.224	-0.032	1.035
Auto. Motivation ON						
Exercise Engagement	-0.581	0.573	-1.015	-0.113	-1.652	0.601
Con. Motivation ON						
Exercise Engagement	0.368	0.536	0.687	0.078	-0.753	1.371
Youth Gender ON						
Exercise Engagement	-0.649	0.381	-1.704	-0.374	-1.382	0.113
Youth Age ON						
Exercise Engagement	-0.185	0.128	-1.453	-0.157	-0.434	0.072
Caregiver Age ON						
Exercise Engagement	-0.055**	0.016	-3.362	-0.286	-0.086	-0.022
Youth PPVT-4 ON						
Auto. Motivation	0.000	0.001	-0.283	0.069	-0.001	0.002
Psych. Sx WITH BNS	-0.800**	0.304	-2.627	-0.577	-1.552	-0.458
Auto. Motivation WITH Con. Motivation	0.040**	0.012	-3.402	0.352	-0.066	-0.020

Note: Psych. Sx=Psychological Symptoms; Auto. Motivation=Autonomous Motivation to Engage in Exercise; Con. Motivation=Controlled Motivation to Engage in Exercise; BNS=Basic Needs Satisfaction; Youth PPVT-4= Youth's Peabody Picture Vocabulary Test, Fourth Edition Standard Score. Because autonomous motivation was reflected and transformed due to negative skew, higher values represent less autonomous motivation. * $p < .05$. ** $p < .01$.

Table 8

Path Model Results for Pathways between Psychological Symptoms, Basic Needs Satisfaction, Motivation, and Exercise for Boys (n=30) and Girls (n=49) Separately

	Estimate		**S.E.**		**Est./S.E.**		**β**		**95% CIL**		**95% CIU**	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Psych. Sx ON												
Auto. Motivation	0.087*	-0.022	0.035	0.038	2.455	-0.583	0.472	-0.115	0.021	-0.093	0.160	0.055
Con. Motivation	0.028	0.025	0.070	0.043	0.406	0.584	0.116	0.128	-0.095	-0.060	0.179	0.104
Exercise Engagement	0.130	-0.344**	0.308	0.130	0.421	-2.652	0.117	-0.386	-0.446	-0.597	0.751	-0.103
BNS ON												
Auto. Motivation	0.007	-0.083	0.086	0.090	0.087	-0.925	0.020	-0.185	-0.182	-0.258	0.163	0.093
Con. Motivation	-0.153	-0.104	0.112	0.075	-1.359	-1.390	-0.305	-0.229	-0.392	-0.234	0.052	0.056
Exercise Engagement	0.558	0.418	0.648	0.317	0.861	1.320	0.247	0.201	-1.009	-0.138	1.601	1.131
Auto. Motivation ON												
Exercise Engagement	-1.330	-0.702	1.845	0.640	-0.721	-1.097	-0.222	-0.151	-5.032	-1.842	2.194	0.638
Con. Motivation ON												
Exercise Engagement	0.385	0.168	1.189	0.621	0.324	0.271	0.085	0.037	-2.153	-1.171	2.530	1.255
Youth Age ON												
Exercise Engagement	-0.081	-0.268	0.292	0.146	-0.277	-1.833	-0.066	-0.230	-0.655	-0.560	0.477	0.022
Caregiver Age ON												
Exercise Engagement	-0.037	-0.061**	0.037	0.023	-0.997	-2.620	-0.212	-0.317	-0.116	-0.108	0.029	-0.015
Youth PPVT-4 ON												
Auto. Motivation	0.007	0.000	0.006	0.001	1.275	0.285	0.314	0.080	-0.005	-0.001	0.018	0.001
Psych. Sx WITH BNS	-0.572**	-0.895	0.179	0.492	-3.188	-1.820	-0.540	-0.581	-0.957	-2.021	-0.274	-0.444
Auto. Motivation WITH Con. Motivation	-0.035*	-0.039*	0.016	0.017	-2.246	-2.620	-0.454	-0.308	-0.069	-0.080	-0.008	-0.012

Note: Psych. Sx=Psychological Symptoms; Auto. Motivation=Autonomous Motivation to Engage in Exercise; Con. Motivation=Controlled Motivation to Engage in Exercise; Exercise Engage. = Engagement in Exercise; BNS=Basic Needs Satisfaction; Youth PPVT-4= Youth's Peabody Picture Vocabulary Test, Fourth Edition Standard Score. Because autonomous motivation was reflected and transformed due to negative skew, higher values represent less autonomous motivation.
* $p < .05$. ** $p < .01$.

Table 9

Path Model Results for Pathways between Environmental Barriers, Basic Needs Satisfaction, Motivation, and Exercise (n=79)

	Estimate	S.E.	Est./S.E.	β	95% CIL	95% CIU
Environ. Barriers ON						
Auto. Motivation	-0.085	0.124	-0.683	-0.094	-0.316	0.168
Con. Motivation	-0.122	0.127	-0.961	-0.125	-0.379	0.127
Exercise Engagement	-0.755	0.468	-1.615	-0.164	-1.718	0.158
BNS ON						
Auto. Motivation	-0.087	0.062	-1.392	-0.202	-0.216	0.029
Con. Motivation	-0.173**	0.057	-3.007	-0.370	-0.281	-0.056
Exercise Engagement	0.640*	0.262	2.442	0.292	0.152	1.203
Auto. Motivation ON						
Exercise Engagement	-0.739	0.574	-1.287	-0.145	-1.760	0.509
Con. Motivation ON						
Exercise Engagement	0.154	0.576	0.268	0.033	-1.022	1.275
Youth Gender ON						
Environ. Barriers	0.160	0.086	1.862	0.429	-0.007	0.330
Exercise Engagement	-0.592	0.375	-1.579	-0.344	-1.308	0.159
Youth Age ON						
Environ. Barriers	0.042	0.029	1.434	0.164	-0.017	0.096
Exercise Engagement	-0.161	0.132	-1.225	-0.138	-0.411	0.105
Caregiver Age ON						
Exercise Engagement	-0.048**	0.017	-2.804	-0.253	-0.079	-0.013
Youth PPVT-4 ON						
Auto. Motivation	0.000	0.001	0.248	0.061	-0.001	0.001
Environ. Barriers WITH BNS	-0.087**	0.026	-3.328	-0.313	-0.147	-0.043
Auto. Motivation WITH Con. Motivation	-0.041**	0.012	-3.492	-0.363	-0.066	-0.020

Note: Environ. Barriers=Environmental Barriers for Exercise; Auto. Motivation=Autonomous Motivation to Engage in Exercise; Con. Motivation=Controlled Motivation to Engage in Exercise; BNS=Basic Needs Satisfaction; Youth PPVT-4= Youth's Peabody Picture Vocabulary Test, Fourth Edition Standard Score. Because autonomous motivation was reflected and transformed due to negative skew, higher values represent less autonomous motivation. * $p < .05$. ** $p < .01$.

Table 10

Path Model Results for Pathways between Psychological Symptoms, Basic Needs Satisfaction, Motivation, and Healthy Eating for Whole Sample (n=79)

	Estimate	S.E.	Est./S.E.	β	95% CIL	95% CIU
Psych. Sx ON						
Auto. Motivation	-0.001	0.042	-0.019	-0.003	-0.084	0.080
Con. Motivation	0.047	0.038	1.230	0.187	-0.029	0.121
Healthy Eating Engagement	0.008	0.119	0.071	0.008	-0.277	0.238
BNS ON						
Auto. Motivation	-0.050	0.100	-0.499	-0.074	-0.253	0.140
Con. Motivation	-0.118	0.071	-1.655	-0.207	-0.252	0.140
Healthy Eating Engagement	0.255	0.298	0.855	0.112	-0.329	0.846
Auto. Motivation ON						
Healthy Eating Engagement	-0.445	0.361	-1.230	-0.132	-1.121	0.292
Con. Motivation ON						
Healthy Eating Engagement	-0.717	0.434	-1.654	-0.180	-1.651	0.047
Youth Age ON						
Health Eating Engagement	-0.501**	0.137	-3.671	-0.411	-0.775	-0.228
Psych. Sx WITH BNS	-0.800**	0.148	-5.390	-0.577	-1.120	-0.533
Auto. Motivation WITH Con. Motivation	-0.086**	0.025	-3.461	-0.388	-0.140	-0.043

Note: Psych. Sx=Psychological Symptoms; Auto. Motivation=Autonomous Motivation to Engage in Healthy Eating; Con. Motivation=Controlled Motivation to Engage in Healthy Eating; BNS=Basic Needs Satisfaction. Because autonomous motivation was reflected and transformed due to negative skew, higher values represent less autonomous motivation. * $p < .05$. ** $p < .01$.

Table 11

Path Model Results for Pathways between Psychological Symptoms, Basic Needs Satisfaction, Motivation, and Healthy Eating for Boys (n=30) and Girls (n=49) Separately

	Estimate		**S.E.**		**Est./S.E.**		**β**		**95% CIL**		**95% CIU**	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Psych. Sx ON												
Auto. Motivation	0.068	-0.025	0.072	0.057	0.949	-0.435	0.195	-0.087	-0.075	-0.136	0.215	0.087
Con. Motivation	0.071	0.042	0.084	0.046	1.060	0.910	0.209	0.192	-0.094	-0.049	0.236	0.128
Healthy Eating Engagement	-0.098	0.037	0.299	0.143	-0.328	0.258	-0.081	0.040	-0.557	-0.255	0.659	0.321
BNS ON												
Auto. Motivation	-0.121	-0.005	0.168	0.129	-0.721	-0.039	-0.171	-0.008	-0.512	-0.253	0.153	0.244
Con. Motivation	-0.184	-0.084	0.144	0.089	-1.282	-0.935	-0.264	-0.165	-0.476	-0.242	0.093	0.111
Healthy Eating Engagement	-0.347	0.437	0.751	0.348	-0.463	1.256	-0.141	0.203	-2.150	-0.193	0.744	1.196
Auto. Motivation ON												
Healthy Eating Engagement	-0.748	-0.264	0.782	0.483	-0.956	-0.547	-0.216	-0.082	-2.069	-1.170	0.931	0.709
Con. Motivation ON												
Healthy Eating Engagement	-1.680*	0.029	0.776	0.579	-2.164	0.051	-0.475	0.007	-3.404	-1.131	-0.339	1.204
Youth Age ON												
Healthy Eating Engagement	-0.134	-0.626**	0.248	0.183	-0.541	-3.424	-0.100	-0.518	-0.732	-0.961	0.284	-0.249
Psych. Sx WITH BNS	-0.573**	-0.895**	0.154	0.196	-3.713	-4.560	-0.542	-0.581	-0.911	-1.336	-0.298	-0.559
Auto. Motivation WITH Con. Motivation	-0.088*	-0.093**	0.039	0.030	-2.245	-3.037	-0.399	-0.442	-0.176	-0.168	-0.022	-0.044

Note: Psych. Sx=Psychological Symptoms; Auto. Motivation=Autonomous Motivation to Engage in Healthy Eating; Con. Motivation=Controlled Motivation to Engage in Healthy Eating; BNS=Basic Needs Satisfaction. Because autonomous motivation was reflected and transformed due to negative skew, higher values represent less autonomous motivation. * $p < .05$. ** $p < .01$.

Table 12

Path Model Results for Pathways between Environmental Barriers, Basic Needs Satisfaction, Motivation, and Healthy Eating for Whole Sample (n=79)

	Estimate	S.E.	Est./S.E.	β	95% CIL	95% CIU
Environ. Barriers ON						
Auto. Motivation	0.025	0.121	0.207	0.025	-0.218	0.251
Con. Motivation	0.144	0.094	1.533	0.168	-0.033	0.338
Healthy Eating Engagement	-0.737	0.445	-1.658	-0.216	-1.643	0.105
BNS ON						
Auto. Motivation	-0.045	0.087	-0.514	-0.066	-0.218	0.121
Con. Motivation	-0.157*	0.063	-2.505	-0.275	-0.275	-0.032
Healthy Eating Engagement	0.159	0.241	0.662	0.070	-0.314	0.634
Auto. Motivation ON						
Healthy Eating Engagement	-0.356	0.374	-0.952	-0.105	-1.046	0.420
Con. Motivation ON						
Healthy Eating Engagement	-0.491	0.438	-1.121	-0.123	-1.430	0.308
Youth Age ON						
Environ. Barriers	0.108**	0.040	2.684	0.302	0.032	0.190
Health Eating Engagement	-0.393*	0.163	-2.414	-0.322	-0.705	-0.081
Youth Gender ON						
Environ. Barriers	0.265*	0.118	2.244	0.505	0.029	0.497
Environ. Barriers WITH BNS	-0.092*	0.040	-2.287	-0.249	-0.181	-0.021
Auto. Motivation WITH Con. Motivation	-0.087**	0.024	-3.606	-0.393	-0.139	-0.044

Note: Barriers=Environmental Barriers to Healthy Eating; Auto. Motivation=Autonomous Motivation to Engage in Healthy Eating; Con. Motivation=Controlled Motivation to Engage in Healthy Eating; BNS=Basic Needs Satisfaction. Because autonomous motivation was reflected and transformed due to negative skew, higher values represent less autonomous motivation.
* $p < .05$. ** $p < .01$.

Table 13

Path Model Results for Pathways between Environmental Barriers, Basic Needs Satisfaction, Motivation, and Healthy Eating for Boys (n=30) and Girls (n=49) Separately

	Estimate		**S.E.**		**Est./S.E.**		**B**		**95% CIL**		**95% CIU**	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Environ. Barriers ON												
Auto. Motivation	-0.035	0.041	0.167	0.176	-0.209	0.232	-0.034	0.037	-0.398	-0.325	0.270	0.354
Con. Motivation	0.303	0.072	0.182	0.112	1.666	0.644	0.299	0.087	-0.051	-0.144	0.671	0.298
Healthy Eating Engagement	-0.037	-1.080	0.815	0.567	-0.045	-1.904	-0.010	-0.307	-1.627	-2.171	1.579	0.049
BNS ON												
Auto. Motivation	-0.201	0.034	0.139	0.113	-1.449	0.300	-0.283	-0.051	-0.469	-0.200	0.067	0.241
Con. Motivation	-0.223	-0.131	0.118	0.078	-1.891	-1.682	-0.320	-0.258	-0.466	-0.266	0.002	0.042
Healthy Eating Engagement	-0.269	0.262	0.638	0.266	-0.422	0.986	-0.109	0.123	-1.725	-0.227	0.696	0.826
Auto. Motivation ON												
Healthy Eating Engagement	-0.810	-0.099	0.746	0.496	-1.085	-0.199	-0.234	-0.031	-2.308	-1.063	0.641	0.918
Con. Motivation ON												
Healthy Eating Engagement	-1.740*	0.354	0.835	0.596	-2.082	0.594	-0.492	0.084	-3.913	-0.706	-0.494	1.668
Youth Age ON												
Environ. Barriers	0.065	0.130**	0.076	0.048	0.854	2.693	0.173	0.382	-0.085	0.037	0.210	0.229
Healthy Eating Engagement.	-0.141	-0.463*	0.285	0.192	-0.494	-2.407	-0.105	-0.386	-0.828	-0.822	0.347	-0.061
Environ. Barriers WITH BNS	-0.078	-0.098	0.061	0.051	-1.280	-1.915	-0.222	-0.266	-0.201	-0.214	0.039	-0.008
Auto. Motivation WITH Con. Motivation	-0.078*	- 0.096**	0.036	0.030	-2.201	-3.225	-0.361	-0.452	-0.154	-0.166	-0.015	-0.047

Note: Environ. Barriers=Environmental Barriers to Healthy Eating; Auto. Motivation=Autonomous Motivation to Engage in Healthy Eating; Con. Motivation=Controlled Motivation to Engage in Healthy Eating; BNS=Basic Needs Satisfaction. Because autonomous motivation was reflected and transformed due to negative skew, higher values represent less autonomous motivation.
* $p < .05$. ** $p < .01$.

Table 14

Path Model Results for Pathways between Psychological Symptoms, Basic Needs Satisfaction, Motivation, and Sleep Hygiene for Whole Sample (n=79)

	Estimate	S.E.	Est./S.E.	β	95% CIL	95% CIU
Psych. Sx ON						
Auto. Motivation	0.039	0.033	1.167	0.170	-0.028	0.104
Con. Motivation	0.026	0.039	0.663	0.102	-0.040	0.112
Sleep Hygiene Engagement	-0.401**	0.132	-3.040	-0.435	-0.688	-0.173
BNS ON						
Auto. Motivation	-0.045	0.087	-0.515	-0.087	-0.218	0.125
Con. Motivation	-0.123	0.073	-1.685	-0.215	-0.241	0.050
Sleep Hygiene Engagement	-0.340	0.257	-1.323	-0.164	-0.787	0.235
Auto. Motivation ON						
Sleep Hygiene Engagement	-0.140	0.568	-0.247	-0.035	-1.320	0.942
Con. Motivation ON						
Sleep Hygiene Engagement	-0.712	0.539	-1.319	-0.195	-1.560	0.519
Youth Age ON						
Sleep Hygiene Engagement	-0.242	0.133	-1.825	-0.218	-0.494	0.009
Youth PPVT-4 ON						
Auto. Motivation	-0.002	0.006	-0.276	-0.648	-0.014	0.001
Con. Motivation	0.000	0.011	0.028	0.098	-0.023	0.002
Sleep Hygiene Engagement	0.004	0.035	0.109	0.338	-0.054	0.019
Family Income ON						
Auto. Motivation	0.070*	0.030	2.375	0.688	0.021	0.130
Con. Motivation	-0.010	0.028	-0.362	-0.090	-0.054	0.069
Sleep Hygiene Engagement	-0.101	0.112	-0.896	-0.244	-0.377	0.069
Psych. Sx WITH BNS	-0.800**	0.148	-5.396	-0.577	-1.119	-0.534
Auto. Motivation WITH Con. Motivation	-0.058**	0.018	-3.115	-0.367	-0.112	-0.032

Note: Psych. Sx =Psychological Symptoms; Auto. Motivation=Autonomous Motivation to Engage in Sleep Hygiene; Con. Motivation=Controlled Motivation to Engage in Sleep Hygiene; BNS=Basic Needs Satisfaction; Youth PPVT-4= Youth's Peabody Picture Vocabulary Test, Fourth Edition Standard Score. Because autonomous motivation was reflected and transformed due to negative skew, higher values represent less autonomous motivation. * $p < .05$. ** $p < .01$.

Table 15

Path Model Results for Pathways between Psychological Symptoms, Basic Needs Satisfaction, Motivation, and Sleep Hygiene for Boys (n=30) and Girls (n=49) Separately

	Estimate		**S.E.**		**Est./S.E.**		**β**		**95% CIL**		**95% CIU**	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Psych. Sx ON												
Auto. Motivation	0.077	0.072	0.050	0.053	1.532	1.366	0.346	0.311	-0.017	-0.023	0.183	0.182
Con. Motivation	-0.043	0.024	0.107	0.051	-0.402	0.460	-0.127	0.109	-0.237	-0.068	0.171	0.132
Sleep Hygiene Engagement	-0.132	-0.432*	0.424	0.202	-0.312	-2.135	-0.120	-0.513	-1.041	-0.816	0.606	-0.020
BNS ON												
Auto. Motivation	-0.146	0.079	0.109	0.125	-1.345	0.631	-0.321	0.144	-0.364	-0.160	0.085	0.335
Con. Motivation	-0.419*	-0.055	0.183	0.097	-2.286	-0.564	-0.603	-0.108	-0.778	-0.223	-0.067	0.158
Sleep Hygiene Engagement	-1.203	-0.233	1.047	0.367	-1.149	-0.636	-0.535	-0.118	-4.066	-0.856	0.323	0.625
Auto. Motivation ON												
Sleep Hygiene Engagement	-1.611	-0.319	1.687	0.771	-0.955	-0.413	-0.326	-0.088	-4.542	-2.043	2.128	1.084
Con. Motivation ON												
Sleep Hygiene Engagement	-2.090	-0.615	1.233	0.674	-1.695	-0.912	-0.646	-0.158	-5.283	-1.630	-0.149	1.079
Youth Age ON												
Sleep Hygiene Engagement	-0.170	-0.259	0.384	0.167	-0.442	-1.553	-0.139	-0.234	-1.143	-0.572	0.420	0.048
Youth PPVT-4 ON												
Auto. Motivation	0.003	-0.002	0.008	0.014	0.309	-0.116	0.087	-0.701	-0.014	-0.054	0.015	0.000
Con. Motivation	-0.022	0.000	0.013	0.014	-1.752	0.028	-0.512	0.184	-0.038	-0.027	0.004	0.007
Sleep Hygiene Engagement	-0.048	0.001	0.063	0.053	-0.753	0.025	-0.336	0.159	-0.129	-0.126	0.139	0.103
Family Income ON												
Auto. Motivation	-0.002	0.113**	0.029	0.038	-0.079	2.943	-0.021	0.824	-0.054	0.053	0.064	0.209
Con. Motivation	0.007	-0.019	0.046	0.040	0.152	-0.465	0.042	-0.143	-0.074	-0.083	0.109	0.084
Sleep Hygiene Engagement	-0.125	0.028	0.231	0.161	-0.542	0.172	-0.230	0.056	-0.505	-0.305	0.364	0.330
Psych. Sx WITH BNS	-0.573**	-0.895**	0.154	0.196	-3.721	-4.554	-0.542	-0.581	-0.911	-1.330	-0.299	-0.555
Auto. Motivation WITH Con. Motivation	-0.029	-0.078**	0.019	0.025	-1.514	-3.163	-0.285	-0.509	-0.070	-0.148	0.004	-0.050

Note: Psych. Sx=Psychological Symptoms; Auto. Motivation=Autonomous Motivation to Engage in Sleep Hygiene; Con. Motivation=Controlled Motivation to Engage in Sleep Hygiene; BNS=Basic Needs Satisfaction. Youth PPVT-4= Youth's Peabody Picture Vocabulary Test, Fourth Edition Standard Score. Because autonomous motivation was reflected and transformed due to negative skew, higher values represent less autonomous motivation. * $p < .05$. ** $p < .01$.

Table 16

Path Model Results for Pathways between Environmental Barriers, Basic Needs Satisfaction, Motivation, and Sleep Hygiene for Whole Sample (n=79)

	Estimate	S.E.	Est./S.E.	β	95% CIL	95% CIU
Environ. Barriers ON						
Auto. Motivation	-0.140	0.117	-1.195	-0.136	-0.358	0.109
Con. Motivation	0.221	0.126	1.754	0.194	-0.035	0.463
Sleep Hygiene Engagement	-0.985*	0.498	-1.978	-0.283	-1.976	-0.045
BNS ON						
Auto. Motivation	-0.132	0.079	-1.674	-0.257	-0.308	0.009
Con. Motivation	-0.114*	0.056	-2.048	-0.202	-0.219	0.001
Sleep Hygiene Engagement	-0.015	0.223	-0.065	-0.007	-0.448	0.454
Auto. Motivation ON						
Sleep Hygiene Engagement	-0.661	0.536	-1.233	-0.164	-1.696	0.401
Con. Motivation ON						
Sleep Hygiene Engagement	-0.793	0.433	-1.832	-0.218	-1.629	0.069
Youth Gender ON						
Environ. Barriers	0.195*	0.089	2.195	0.499	0.019	0.366
Youth Age ON						
Sleep Hygiene Engagement	-0.231	0.132	-1.744	-0.209	-0.516	0.004
Youth PPVT-4 ON						
Auto. Motivation	0.001	0.001	1.140	0.489	-0.002	0.003
Con. Motivation	0.000	0.001	-0.096	-0.028	-0.002	0.002
Family Income ON						
Auto. Motivation	0.063*	0.031	2.027	0.620	-0.011	0.113
Con. Motivation	-0.018	0.030	-0.600	-0.158	-0.069	0.045
Environ. Barriers WITH BNS	-0.105**	0.033	-3.156	-0.350	-0.176	-0.046
Auto. Motivation WITH Con. Motivation	-0.049**	0.017	-2.916	-0.314	-0.093	0.366

Note: Environ. Barriers =Environmental Barriers to Sleep Hygiene; Auto. Motivation=Autonomous Motivation to Engage in Sleep Hygiene; Con. Motivation=Controlled Motivation to Engage in Sleep Hygiene; BNS=Basic Needs Satisfaction; Youth PPVT-4= Youth's Peabody Picture Vocabulary Test, Fourth Edition Standard Score. Because autonomous motivation was reflected and transformed due to negative skew, higher values represent less autonomous motivation. * $p < .05$. ** $p < .01$.

Table 17

Path Model Results for Pathways between Environmental Barriers, Basic Needs Satisfaction, Motivation, and Sleep Hygiene for Boys (n=30) and Girls (n=49) Separately

	Estimate		**S.E.**		**Est./S.E.**		**β**		**95% CIL**		**95% CIU**	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Environ. Barriers ON												
Auto. Motivation	0.064	-0.258	0.185	0.166	0.347	-1.556	0.072	-0.227	-0.320	-0.543	0.413	0.110
Con. Motivation	0.394	0.226	0.385	0.178	1.024	1.271	0.290	0.213	-0.289	-0.157	1.214	0.540
Sleep Hygiene Engagement	-0.611	-1.172	0.992	0.678	-0.616	-1.728	-0.327	-0.195	-2.506	-2.543	1.431	0.145
BNS ON												
Auto. Motivation	-0.229*	-0.077	0.101	0.103	-2.272	-0.744	-0.504	-0.141	-0.466	-0.332	-0.056	0.088
Con. Motivation	-0.215	-0.047	0.148	0.070	-1.452	-0.680	-0.309	-0.094	-0.501	-0.156	0.090	0.149
Sleep Hygiene Engagement	-0.901	0.205	0.641	0.262	-1.407	0.782	-0.423	-0.185	-2.283	-0.248	0.253	0.791
Auto. Motivation ON												
Sleep Hygiene Engagement	-1.613	-0.706	1.279	0.667	-1.261	-1.059	-0.327	-0.195	-3.960	-1.964	1.066	0.625
Con. Motivation ON												
Sleep Hygiene Engagement	-1.368*	-0.719	0.686	0.625	-1.993	-1.149	-0.423	-0.185	-2.725	-1.938	0.009	0.510
Youth Age ON												
Sleep Hygiene Engagement	-0.114	-0.225	0.306	0.171	-0.371	-1.314	-0.093	-0.204	-0.875	-0.594	0.371	0.056
Youth PPVT-4 ON												
Auto. Motivation	0.000	0.001	0.008	0.001	0.015	0.377	0.004	0.231	-0.016	-0.003	0.013	0.003
Con. Motivation	-0.018	0.000	0.012	0.001	-1.432	0.044	-0.393	0.019	-0.035	-0.002	0.019	0.002
Family Income ON												
Auto. Motivation	0.008	0.066	0.026	0.049	0.330	1.349	0.077	0.454	-0.036	-0.051	0.069	0.136
Con. Motivation	-0.016	-0.017	0.030	0.039	-0.553	-0.434	-0.097	-0.128	-0.074	-0.077	0.041	0.074
Environ. Barriers WITH BNS	-0.109	-0.098	0.060	0.077	-1.801	-1.271	-0.411	-0.311	-0.224	-0.233	0.007	0.002
Auto. Motivation WITH Con. Motivation	-0.032	-0.066**	0.019	0.024	-1.712	-2.706	-0.290	-0.427	-0.082	-0.137	-0.002	-0.034

Note: Psych. Sx=Psychological Symptoms; Auto. Motivation=Autonomous Motivation to Engage in Sleep Hygiene; Con. Motivation=Controlled Motivation to Engage in Sleep Hygiene; BNS=Basic Needs Satisfaction. Youth PPVT-4= Youth's Peabody Picture Vocabulary Test, Fourth Edition Standard Score. Because autonomous motivation was reflected and transformed due to negative skew, higher values represent less autonomous motivation. * $p < .05$. ** $p < .01$.

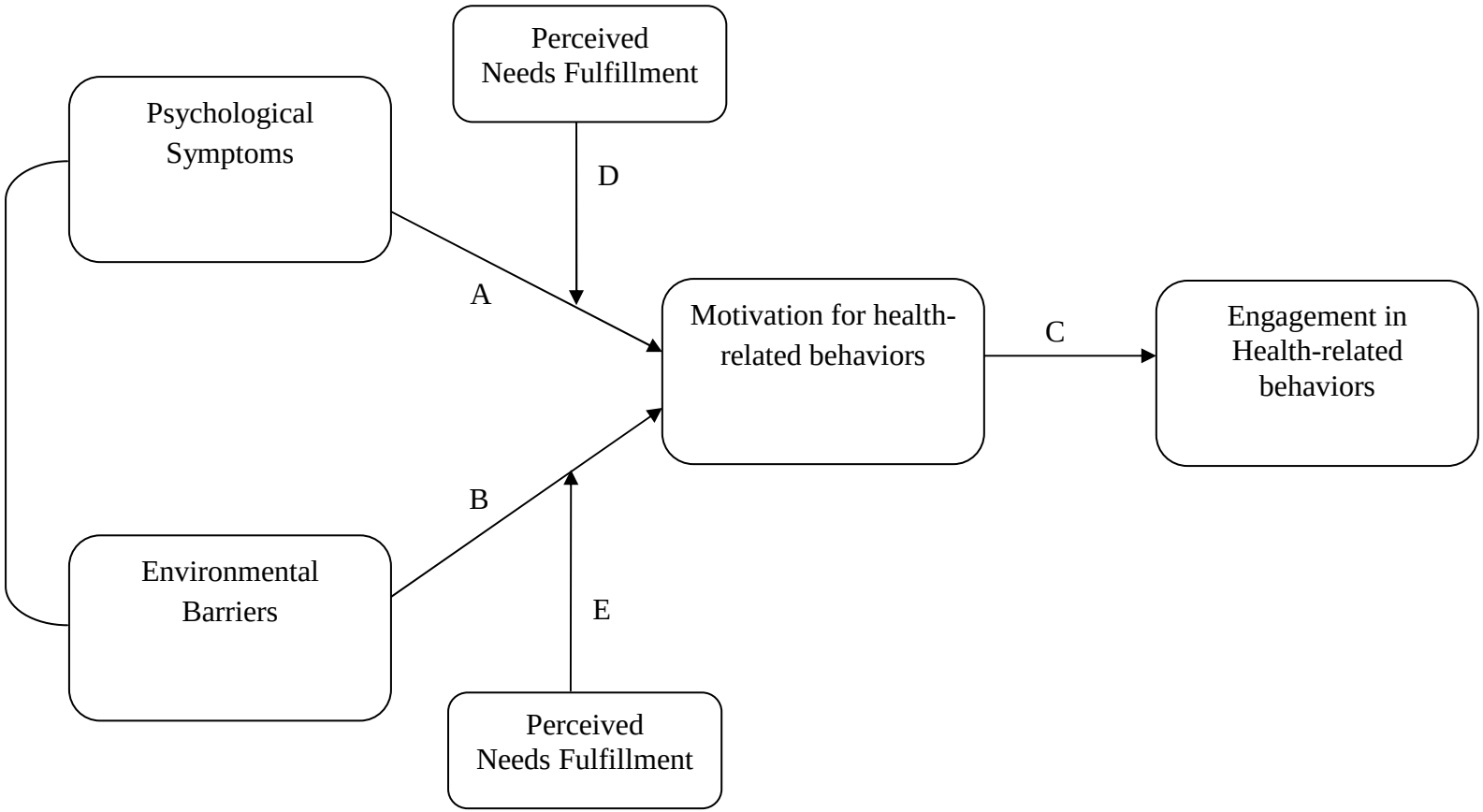

Figure 1. Conceptual Model of Psychological Symptoms, Environmental Barriers, Perceived Needs Satisfaction, Motivation, and Health-related Behaviors

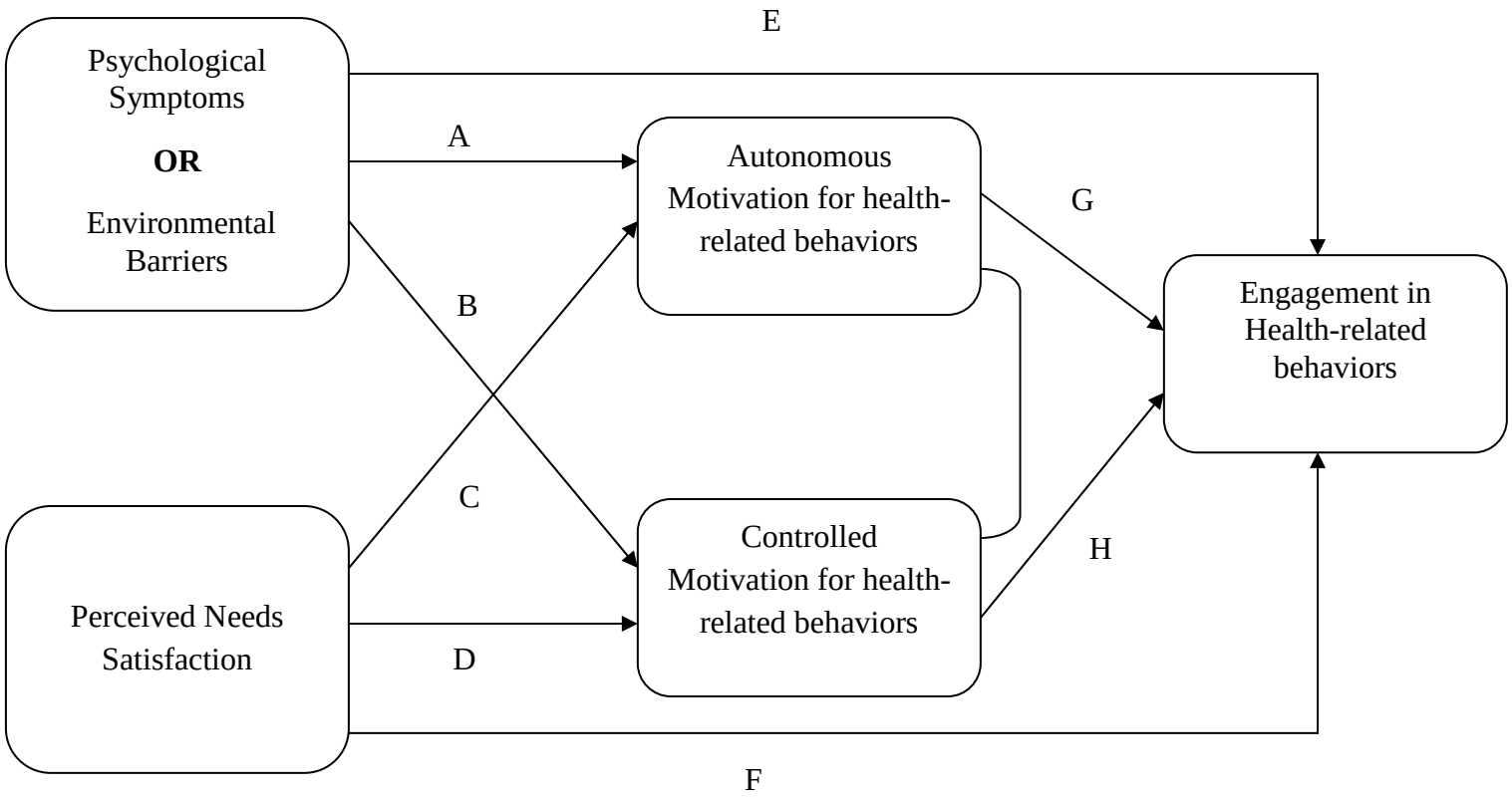

Figure 2. Tested Model of Psychological Symptoms, Environmental Barriers, Perceived Needs Satisfaction, Motivation, and Health-related Behaviors

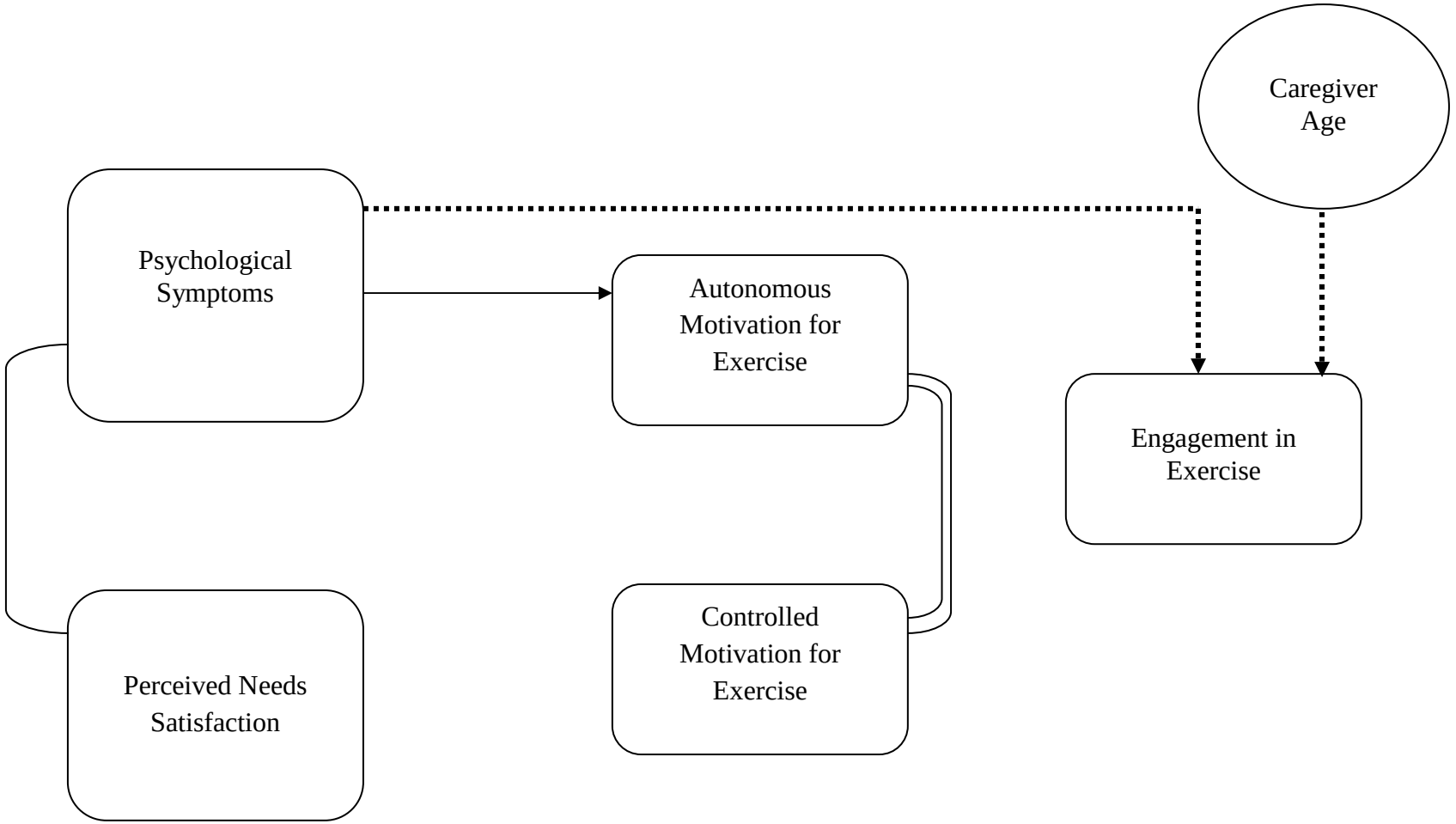

Figure 3. Model of Psychological Symptoms, Perceived Needs Satisfaction, Motivation, and Exercise. Significant pathways for boys and girls are presented as a double line. Significant pathways for boys only are presented as a single line. Significant pathways for girls are presented as a dashed line.

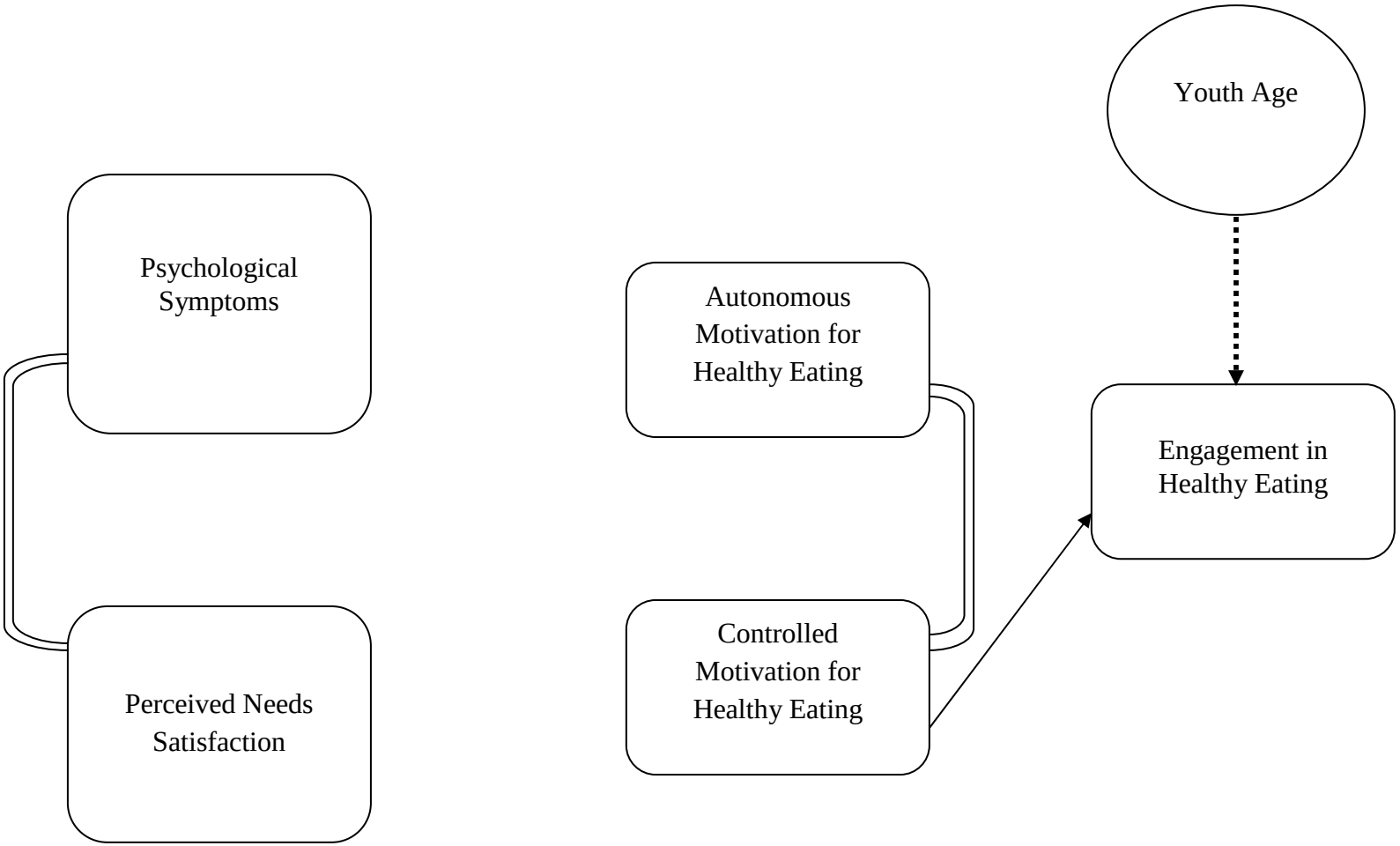

Figure 4. Model of Psychological Symptoms, Perceived Needs Satisfaction, Motivation, and Healthy Eating. Significant pathways for boys and girls are presented as a double line. Significant pathways for boys only are presented as a single line. Significant pathways for girls are presented as a dashed line.

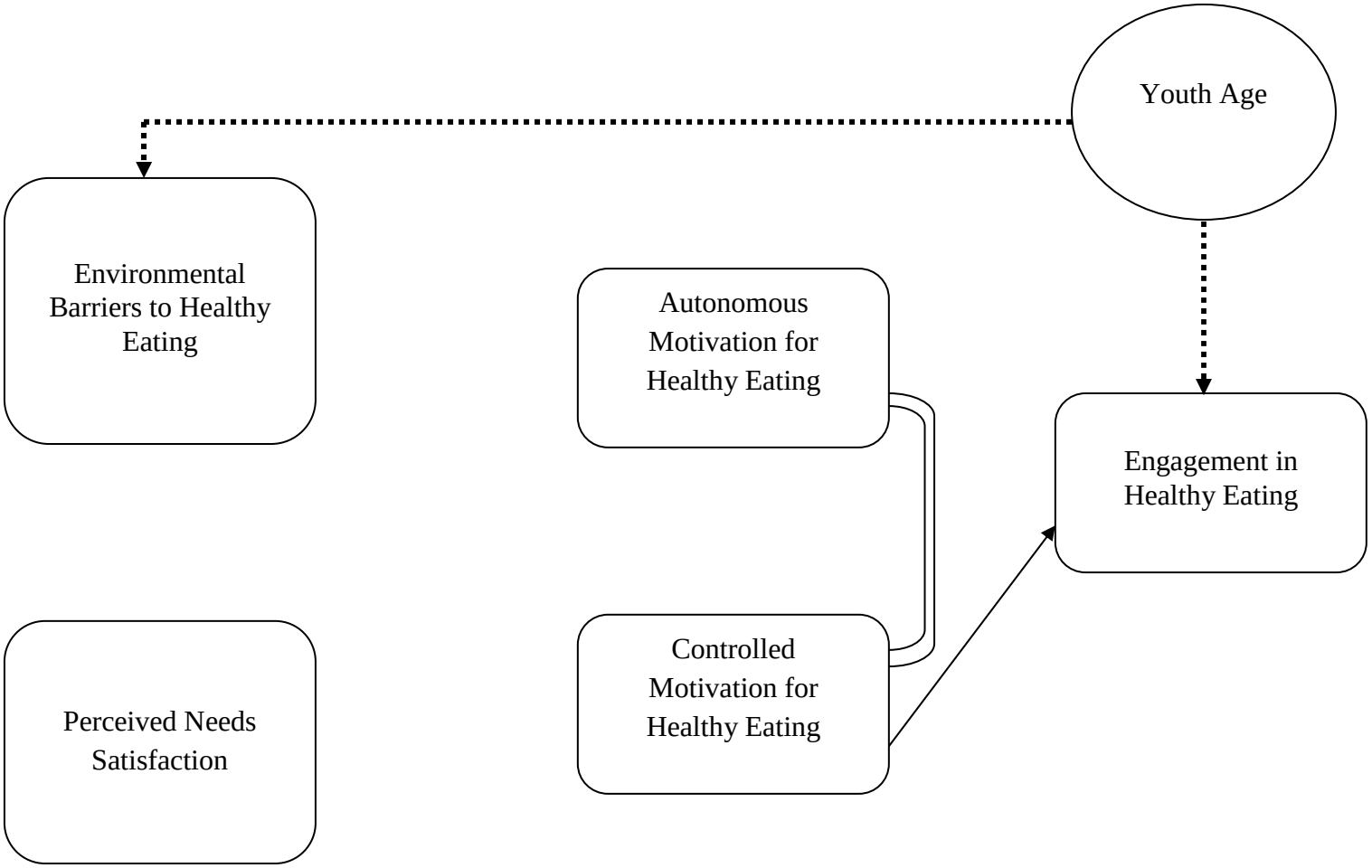

Figure 5. Model of Environmental Barriers, Perceived Needs Satisfaction, Motivation, and Healthy Eating. Significant pathways for boys and girls are presented as a double line. Significant pathways for boys only are presented as a single line. Significant pathways for girls are presented as a dashed line.

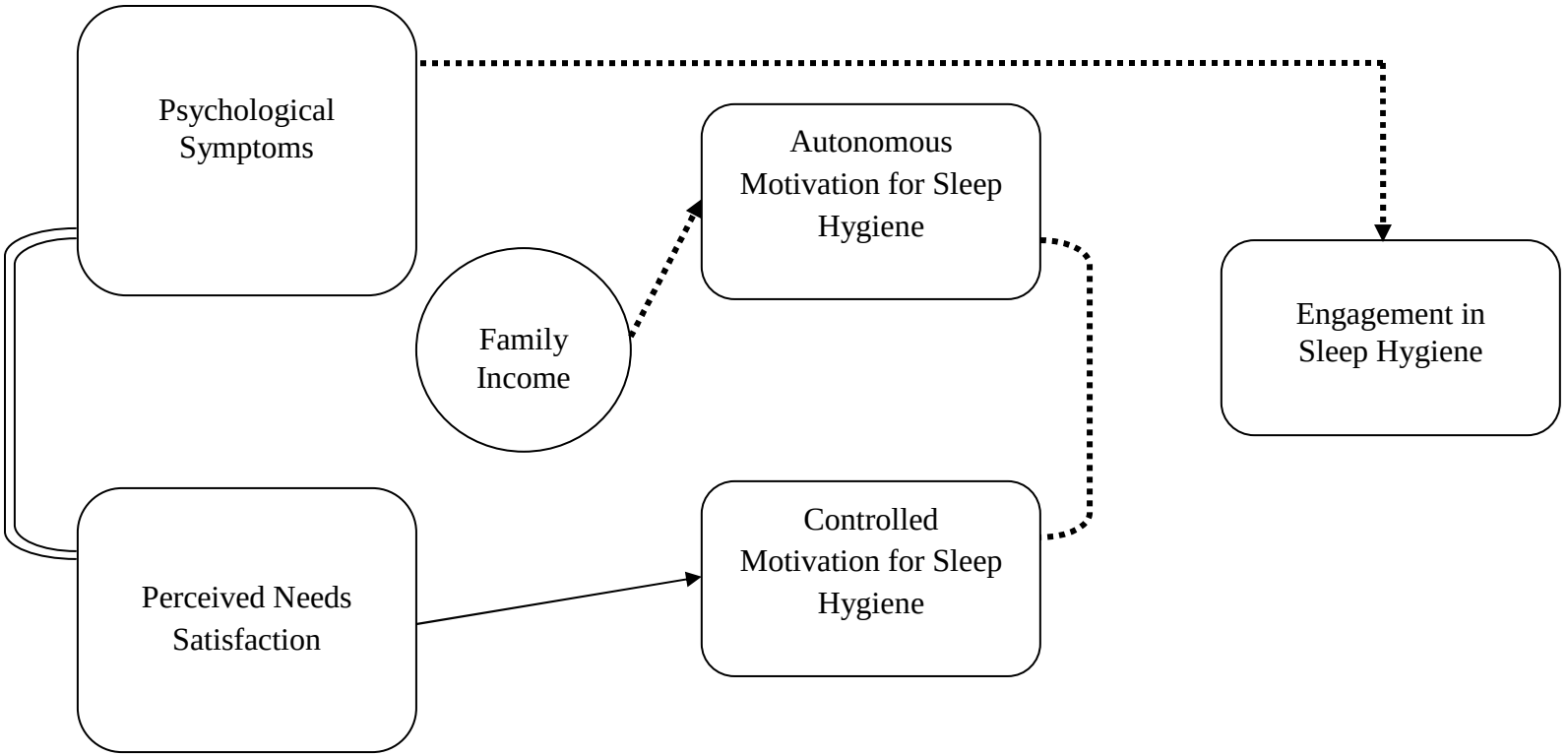

Figure 6. Model of Psychological Symptoms, Perceived Needs Satisfaction, Motivation, and Sleep Hygiene. Significant pathways for boys and girls are presented as a double line. Significant pathways for boys only are presented as a single line. Significant pathways for girls are presented as a dashed line.

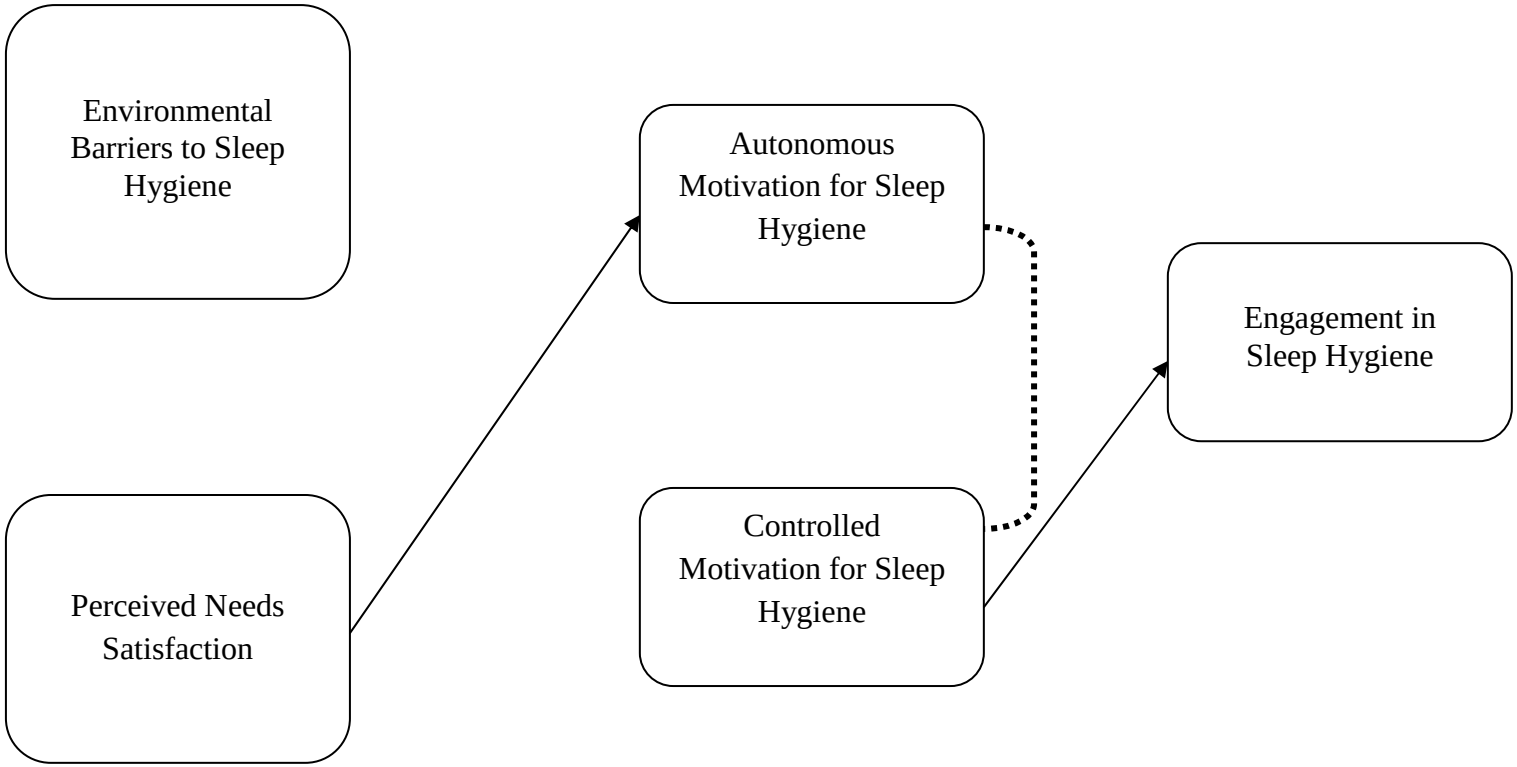

Figure 7. Model of Environmental Barriers, Perceived Needs Satisfaction, Motivation, and Sleep Hygiene. Significant pathways for boys and girls are presented as a double line. Significant pathways for boys only are presented as a single line. Significant pathways for girls are presented as a dashed line.

APPENDIX B

We need teens like you!

& Parents

* **Would you like your opinions heard?**
* **Are you a teen between 13 and 18 years old?**
* **Would one $20 gift card each interest you and your parent/guardian?**

If you answered YES to all of these questions, then this study is for **YOU**!!!

We are doing research at the Adolescent Medicine Clinic in order to better understand what Detroit area teenagers and parents think about mental and physical health care behaviors.

Your participation will help us better understand the decisions that teenagers make about mental health treatment and the physical health behaviors of eating, sleeping, and exercise.

In order to participate, teenagers must have a parent/guardian who is also willing to participate. The study will only take 2 hours of your time and can be scheduled at your convenience.

You and your parent/guardian will each receive one $20 gift card for your time.

If you have any questions about the study, you can contact the study coordinators, Brittany Kohlberger or Marilyn Franklin, at 313-577-8688.

APPENDIX C

Youth Demographic Questions

1. What is your relationship to the adult that is participating in this project?
   Biological Mother Biological Father Grandmother Grandfather
   Aunt Uncle Foster Mother Foster Father
   Other _____

2. Is this person your primary caregiver? **YES** **NO**

   2a. Who do you consider to be your primary female caregiver? _____

   2b. Who you do consider to be your primary male caregiver _____

3. How old are you? _____

4. What is your gender? **BOY** **GIRL**

5. What grade are you in? _____

6. Please tell me which of the following best describes your ethnic background:
   African-American/Black Caucasian/White Latino-American
   Indian/Alaska Native Asian/Pacific Islander
   Other _____

Caregiver Demographic Questions

1. What is your relationship to the child that is participating in this project? (***Circle response*****)**

   Biological Mother Biological Father Grandmother Grandfather
   Aunt Uncle Foster Mother Foster Father
   Other _____

2. Are you this child's primary caregiver? **YES** **NO**

   2a. Who do you consider to be this child's primary female caregiver? _____

   2b. Who you do consider to be this child's primary male caregiver? _____

3. How old are you? _____

4. Please tell me which of the following best describes your ethnic background:
   African-American/Black Caucasian/White Latino-American
   Indian/Alaska Native Asian/Pacific Islander
   Other _____

5. What is your highest grade completed in school? _____

   5a. ***If less than college:*** Did you receive: **High School Diploma** **GED**

6. Are you currently working? **YES** **NO**

   6a. ***If YES,*** what is your current occupation? _____

7. What is your current marital status?
   Single Married Divorced Separated Living with Partner Widowed

8. What was your family's approximate income last year?
   Less than 9,999 10,000-19,999 20,000-29,999 30,000-39,999
   40,000-49,999 50,000-59,999 60,000-69,999 70,000-79,999
   80,000-89,999 90,000-99,999 over 100,000

Pediatric Symptom Checklist—Youth Report (Y-PSC)

For the following items, please mark under the heading that best fits you:

	Never	Sometimes	Often
1. Complain of aches and pains	_____	_____	_____
2. Spend more time alone	_____	_____	_____
3. Tire easily, little energy	_____	_____	_____
4. Fidgety, unable to sit still	_____	_____	_____
5. Have trouble with teacher	_____	_____	_____
6. Less interested in school	_____	_____	_____
7. Acts as if driven by a motor	_____	_____	_____
8. Daydream too much	_____	_____	_____
9. Distract easily	_____	_____	_____
10. Are afraid of new situations	_____	_____	_____
11. Feel sad, unhappy	_____	_____	_____
12. Are irritable, angry	_____	_____	_____
13. Feel hopeless	_____	_____	_____
14. Have trouble concentrating	_____	_____	_____
15. Less interested in friends	_____	_____	_____
16. Fight with other children	_____	_____	_____
17. Absent from school	_____	_____	_____
18. School grades dropping	_____	_____	_____
19. Down on yourself	_____	_____	_____
20. Visit doctor with doctor finding nothing wrong	_____	_____	_____
21. Have trouble sleeping	_____	_____	_____
22. Worry a lot	_____	_____	_____
23. Want to be with parent more than before	_____	_____	_____
24. Feel that you are bad	_____	_____	_____
25. Take unnecessary risks	_____	_____	_____
26. Get hurt frequently	_____	_____	_____
27. Seem to be having less fun	_____	_____	_____
28. Act younger than children your age	_____	_____	_____
29. Do not listen to rules	_____	_____	_____
30. Do not show feelings	_____	_____	_____
31. Do not understand other people’s feelings	_____	_____	_____
32. Tease others	_____	_____	_____
33. Blame others for your troubles	_____	_____	_____
34. Take things that do not belong to you	_____	_____	_____
35. Refuse to share	_____	_____	_____

Pediatric Symptom Checklist (PSC)

Please mark under the heading that best describes your child:

	Never	Sometimes	Often
1. Complains of aches and pains	_____	_____	_____
2. Spends more time alone	_____	_____	_____
3. Tires easily, has little energy	_____	_____	_____
4. Fidgety, unable to sit still	_____	_____	_____
5. Has trouble with teacher	_____	_____	_____
6. Less interested in school	_____	_____	_____
7. Acts as if driven by a motor	_____	_____	_____
8. Daydreams too much	_____	_____	_____
9. Distracted easily	_____	_____	_____
10. Is afraid of new situations	_____	_____	_____
11. Feels sad, unhappy	_____	_____	_____
12. Is irritable, angry	_____	_____	_____
13. Feels hopeless	_____	_____	_____
14. Has trouble concentrating	_____	_____	_____
15. Less interested in friends	_____	_____	_____
16. Fights with other children	_____	_____	_____
17. Absent from school	_____	_____	_____
18. School grades dropping	_____	_____	_____
19. Is down on him or herself	_____	_____	_____
20. Visits the doctor with doctor finding nothing wrong	_____	_____	_____
21. Has trouble sleeping	_____	_____	_____
22. Worries a lot	_____	_____	_____
23. Wants to be with you more than before	_____	_____	_____
24. Feels he or she is bad	_____	_____	_____
25. Takes unnecessary risks	_____	_____	_____
26. Gets hurt frequently	_____	_____	_____
27. Seems to be having less fun	_____	_____	_____
28. Acts younger than children his or her age	_____	_____	_____
29. Does not listen to rules	_____	_____	_____
30. Does not show feelings	_____	_____	_____
31. Does not understand other people’s feelings	_____	_____	_____
32. Teases others	_____	_____	_____
33. Blames others for his or her troubles	_____	_____	_____
34. Takes things that do not belong to him or her	_____	_____	_____
35. Refuses to share	_____	_____	_____

Environmental Barriers Questions

Please read each of the following items carefully, thinking about how much each barrier impedes your exercise, healthy eating, or sleep hygiene, and then indicate how true it is for you. Use the following scale to respond:

0	1	2
Not at all	Somewhat	A lot

How much does each of the following get in your way when trying to exercise?

1. Lack of exercise facilities in my neighborhood
2. Lack of park access in my neighborhood
3. Safety concerns in my neighborhood
4. Lack of physical education classes at my school
5. Expense of exercise equipment or classes

6. What other things in your home, school, or neighborhood get in the way of you exercising?

How much does each of the following get in your way when trying to eat healthy?

7. Easy access to fast food in my neighborhood
8. Easy access to fast food at home
9. Selection of food offered at school
10. Fast food is not expensive to buy
11. Healthy food is too expensive

12. What other things in your home, school, or neighborhood get in the way of you eating healthy?

How much does each of the following get in your way when trying to sleep?

13. Noise made by other people in my home
14. Sharing a bedroom with other people
15. Outside noise from my neighborhood/street
16. Safety concerns in my neighborhood
17. My sleep arrangements are uncomfortable

18. What other things in your home, school, or neighborhood get in the way of you sleeping?

Treatment Self-Regulation Questionnaire (Exercise)

The following question relates to the reasons why you would either start to exercise regularly or continue to do so. Different people have different reasons for doing that, and we want to know how true each of the following reasons is for you. All 15 responses are to the one question which asks, "The reason I would exercise regularly is…" Please indicate the extent to which each reason is true for you.

1	2	3	4	5	6	7
Not at all true			Somewhat true			Very true

The reason I would <u>exercise regularly</u> is:

1. Because I feel that I want to take responsibility for my own health.
2. Because I would feel guilty or ashamed of myself if I did not exercise regularly.
3. Because I personally believe it is the best thing for my health.
4. Because others would be upset with me if I did not exercise regularly.
5. I really don't think about it.
6. Because I have carefully thought about it and believe it is very important for many aspects of my life.
7. Because I would feel bad about myself if I did not exercise regularly.
8. Because it is an important choice I really want to make.
9. Because I feel pressure from others to exercise regularly.
10. Because it is easier to do what I am told than think about it.
11. Because it is consistent with my life goals.
12. Because I want others to approve of me.
13. Because it is very important for being as healthy as possible.
14. Because I want others to see I can do it.
15. I don't really know why.

Treatment Self-Regulation Questionnaire (Diet)

The following question relates to the reasons why you would either start eating a healthier diet or continue to do so. Different people have different reasons for doing that, and we want to know how true each of the following reasons is for you. All 15 responses are to the same question which asks, "The reason I would eat a healthy diet is…" Please indicate the extent to which each reason is true for you.

1	2	3	4	5	6	7
Not at all true			Somewhat true			Very true

The reason I would <u>eat a healthy diet</u> is:

1. Because I feel that I want to take responsibility for my own health.
2. Because I would feel guilty or ashamed of myself if I did not eat a healthy diet.
3. Because I personally believe it is the best thing for my health.
4. Because others would be upset with me if I did not eat a healthy diet.
5. I really don't think about it.
6. Because I have carefully thought about it and believe it is very important for many aspects of my life.
7. Because I would feel bad about myself if I did not eat a healthy diet.
8. Because it is an important choice I really want to make.
9. Because I feel pressure from others to eat a healthy diet.
10. Because it is easier to do what I am told than think about it.
11. Because it is consistent with my life goals.
12. Because I want others to approve of me.
13. Because it is very important for being as healthy as possible.
14. Because I want others to see I can do it.
15. I don't really know why.

Treatment Self-Regulation Questionnaire (Sleep)

The following question relates to the reasons why you would develop healthy sleeping habits or continue to do so. Different people have different reasons for doing that, and we want to know how true each of the following reasons is for you. All 15 responses are to the same question which asks, "The reason I would develop healthy sleeping habits…" Please indicate the extent to which each reason is true for you.

1	2	3	4	5	6	7
Not at all true			Somewhat true			Very true

The reason I would <u>develop healthy sleep habits</u> is:

1. Because I feel that I want to take responsibility for my own health.
2. Because I would feel guilty or ashamed of myself if I did not develop healthy sleep habits.
3. Because I personally believe it is the best thing for my health.
4. Because others would be upset with me if I did not develop healthy sleep habits.
5. I really don't think about it.
6. Because I have carefully thought about it and believe it is very important for many aspects of my life.
7. Because I would feel bad about myself if I did not develop healthy sleep habits.
8. Because it is an important choice I really want to make.
9. Because I feel pressure from others to develop healthy sleep habits.
10. Because it is easier to do what I am told than think about it.
11. Because it is consistent with my life goals.
12. Because I want others to approve of me.
13. Because it is very important for being as healthy as possible.
14. Because I want others to see I can do it.
15. I don't really know why

Basic Need Satisfaction in Life

Please read each of the following items carefully, thinking about how it relates to your life, and then indicate how true it is for you. Use the following scale to respond:

1	2	3	4	5	6	7
Not at all true			Somewhat true			Very true

1. I feel like I am free to decide for myself how to live my life.
2. I really like the people I interact with
3. Often, I do not feel very competent.
4. I feel pressured in my life.
5. People I know tell me I am good at what I do.
6. I get along with people I come into contact with.
7. I pretty much keep to myself and don't have a lot of social contacts.
8. I generally feel free to express my ideas and opinions.
9. I consider the people I regularly interact with to be my friends.
10. I have been able to learn interesting new skills recently.
11. In my daily life, I frequently have to do what I am told.
12. People in my life care about me.
13. Most days I feel a sense of accomplishment from what I do.
14. People I interact with on a daily basis tend to take my feelings into consideration.
15. In my life I do not get much of a chance to show how capable I am.
16. There are not many people that I am close to.
17. I feel like I can pretty much be myself in my daily situation.
18. The people I interact with regularly do not seem to like me much.
19. I often do not feel very capable.
20. There is not much opportunity for me to decide for myself how to do things in my daily life.
21. People are generally pretty friendly towards me.

Current Health Behaviors- Youth Version

Questions used and adapted from Youth Health Behavior Survey.

For each of the following items, please indicate how many days in a typical week you engage in the behavior described.

0	1	2	3	4	5	6
0 days	1 day	2 days	3 days	4 days	5 days	6+ days

1. How many days did you exercise or participate in physical activity for at least 20 minutes that made you sweat and breathe hard (basketball, soccer, running, swimming, fast bike-riding, fast dancing, or other aerobic activities)?
2. How many days did you exercise or participate in physical activity for at least 30 minutes that did not make you sweat or breathe hard (fast walking, slow bicycling, skating, pushing a lawn mower)?
3. How many days did you attend a physical education class in school?
4. How many days did you attend a class or group outside of school that involves physical activity (dance class; sports team)?
5. How many days did you eat “junk food” such as pop, chips, or fried food?
6. How many days did you eat from a fast food restaurant?
7. How many days did you eat 5 servings of fruits and vegetables (one serving is equal to one piece of fruit or ½ cup of fruit/vegetable)?
8. How many days did you eat a healthy breakfast?
9. How many days did you wake up in the morning feeling rested for the day?
10. How many days did you wake up in the morning without the aid of an alarm clock or other person?
11. How many days did you take a nap prior to going to sleep in the evening?

For each of the following items, please indicate how many nights out of a typical week you engage in the behavior described.

0	1	2	3	4	5	6
0 nights	1 night	2 nights	3 nights	4 nights	5 nights	6+ nights

12. How many nights was your sleep interrupted by other people (in your home or calling/texting your phone)?

Current Health Behaviors- Caregiver Version

For each of the following items, please indicate how many days in a typical week did your child engage in the behavior described.

0	1	2	3	4	5	6
0 days	1 day	2 days	3 days	4 days	5 days	6+ days

1. How many days did your child exercise or participate in physical activity for at least 20 minutes that made him/her sweat and breathe hard (basketball, soccer, running, swimming, fast bike-riding, fast dancing, or other aerobic activities)?
2. How many days did your child exercise or participate in physical activity for at least 30 minutes that did not make him/her sweat or breathe hard (fast walking, slow bicycling, skating, pushing a lawn mower)?
3. How many days did your child attend a physical education class in school?
4. How many days did your child attend a class or group outside of school that involves physical activity (dance class; sports team)?
5. How many days did your child eat “junk food” such as pop, chips, or fried food?
6. How many days did your child eat from a fast food restaurant?
7. How many days did your child eat 5 servings of fruits and vegetables (one serving is equal to one piece of fruit or ½ cup of fruit/vegetable)?
8. How many days did your child eat a healthy breakfast?
9. How many days did your child wake up in the morning feeling rested for the day?
10. How many days did your child wake up in the morning without the aid of an alarm clock or other person?
11. How many days did your child take a nap prior to going to sleep in the evening?

For each of the following items, please indicate how many nights out of a typical week did your child engage in the behavior described.

0	1	2	3	4	5	6
0 nights	1 night	2 nights	3 nights	4 nights	5 nights	6+ nights

12. How many nights did your child’s sleep get interrupted by other people (in your home or calling/texting his/her phone)?

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ABSTRACT

HEALTH-RELATED BEHAVIORS IN LOW-INCOME, MINORITY YOUTH: THE ROLE OF MOTIVATION, BASIC NEEDS, MENTAL HEALTH, AND ENVIRONMENTAL BARRIERS

by

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Engaging in health-related behaviors, such as exercise, healthy eating, and sleep hygiene, are associated with fewer externalizing and internalizing behavior problems and higher self-esteem, suggesting that there may be large benefits to engaging in health-related behaviors during the transitional developmental phase of adolescence (Ong, Wickramaratne, Tang, & Weissmann, 2006; Stathopoulou, Power, Berry, Smits, & Otto, 2006). The purpose of the current study was to identify key psychological processes and external factors that may boost or impede youths' motivation and engagement in health-related behaviors. Specifically, we expected that higher levels of psychological symptoms and environmental barriers will be significantly, negatively associated with motivation for and engagement in health-related behaviors, which will be positively related. We also expected that needs satisfaction will moderate the relation between risk factors and motivation to engage in healthy behaviors.

Participants were recruited at an integrative adolescent primary health clinic and two churches located in Detroit, Michigan. Data was collected at our research lab or at participants' homes. Participants consisted of 79 youth volunteers, aged 13 to 18 years, and their primary

caregivers. Youth participants completed multiple questionnaires assessing their psychological symptoms, environmental barriers to healthy barriers, motivation for and engagement in healthy behaviors, and perceived needs satisfaction. Caregiver participants completed multiple questionnaires about their child's psychological symptoms, family environmental barriers to healthy behaviors, and their child's engagement in healthy behaviors.

Direct effects were found from psychological symptoms, environmental barriers, and perceived needs satisfaction to motivation and engagement in exercise, healthy eating, and sleep hygiene. These associations varied depending on which health behavior was being examined. Additionally, examinations of correlations and mean-level differences between boys and girls indicated that youth gender was a potential moderator. Significant pathways were found in the tested models for each health b, but they differentiated by gender.

AUTOBIOGRAPHICAL STATEMENT

The author was born in Englewood, New Jersey, July 13, 1985. She graduated from Dumont High School, Dumont, New Jersey in June 2003. She graduated with her Bachelor of Arts in Psychology from The College of New Jersey, Ewing, New Jersey in May 2007. She graduated with her Master of Arts in Clinical Psychology from Wayne State University, Detroit, Michigan, in August 2011. She will graduate with her Doctorate in Philosophy in Clinical Psychology from Wayne State University, Detroit, Michigan, in December 2014.