Physical Activity and Community: A Longitudinal Study on the Influence of Neighborhood, Social Integration, and Social Participation on Physical Activity

by

Deepu Varughese George

(Under the direction of Jay A. Mancini)

Abstract

Researchers in the field have called for "choice-enabling" perspectives than traditional "choice-persuasive" perspectives to understand physical activity (PA). Choice-enabling perspectives help to uncover macro environmental and social processes that influence PA. The present study explored longitudinal influence of neighborhood, social integration, and social participation on PA, using the social organizational theory of community action and change. Using multi-level data from the National Longitudinal Study of Adolescent Health, I proposed that community characteristics like neighborhood stability (Wave I) would influence individual levels of PA (Wave IV). Then, neighborhood stability can also influence individual levels of social participation and higher levels of social participation will be associated with higher levels of PA. Findings suggested the importance of early neighborhood stability and the important role of individual social participation for increased PA. Overall, the findings underscore the importance of understanding how community and social integration influence levels of PA.

Index words: physical activity, social organizational theory

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Dedication

This dissertation is dedicated to my **family** (Acha, Amma, Pramod, and Shalin), my community of heroes at **The University of Georgia**, **Virginia Polytechnic Institute & State University**, and **Duke University/SR-AHEC Family Medicine Residency**. I am who I am because of my family and I am only as good as the people I surround myself with. Thank you for a meaningful, shared journey with each of you.

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Chapter 1

Introduction

Community contexts in which people live can directly affect an individuals behavior, relationships, and health outcomes. This notion of contextual influences on individual outcomes is a dominant theme in the socio-behavioral sciences. Despite universal agreement to this theme for more than a century, socio-behavioral scientists from broad disciplines (i.e., social epidemiology) to more specific fields of inquiry (i.e., child and adolescent development) continue to test various assumptions about the specific effects of community on health. For example, researchers have explored the association between social interactions and mortality Berkman & Syme (1979) to more complex issues such as gene by environment interactions relation to human aggression Simons et al. (2011).

This dissertation is informed by the perspective that communities can have direct effects on health and health behavior. Specifically, I examine structural and social mechanisms that influence physical activity across time. A theoretical model is presented based on the social organizational theory of community action and change. The assumptions are tested using the national longitudinal study on adolescent health.

1.1 Physical Activity and Health

Physical activity is a transformative behavior that can directly influence mortality, physical health, complex issues of biological influences and several health outcomes. Of the seven leading indicators measuring health in the United States as part of the Healthy People 2020, physical activity is the number one indicator of better health outcomes U.S. Department of Health and Human Services (2008). There is substantial evidence for the positive effect of regular physical activity for cardiovascular disease, stroke, Type-2 diabetes, colon cancer, hypertension, obesity, depression, osteoporosis, and premature death U.S. Department of Health and Human Services (2008); Warburton et al. (2006). Regular physical activity not only leads to better health, but also increases ones quality of life. Warburton et al. (2006) label physical activity as the "modifiable risk factor" (p. 801) that can aid in recovery, strengthen prevention efforts and create overall well-being. Although there is overwhelming evidence to the benefits of physical activity for general health and well-being, physicians rarely advise or counsel patients to add physical activity to a regular routine Eden et al. (2002); U.S. Department of Health and Human Services (2008). Despite evidence indicating the importance of physical activity and health, there remains a growing concern about the cost of physical inactivity (Powell et al., 2002) on health and society.

Calling for a better way to treat inactivity, Powell et al. (2002) note that the chronic epidemic of little to no physical activity not only influences negative health outcomes and increase in disability, but also has detrimental economic and social costs. Lack of physical activity - what Eden et al. (2002) label "sedentary behavior" (little or no recreational, household, or occupational physical activity) - affects 75% of Americans. Warburton et al. (2006) comment that physical inactivity is one of the highest "modifiable risk factors" among 51% of Canadians. Despite persistent recommendations for the power of physical activity to modify health risks and improve quality of life, a majority of individuals, in the United States

and other parts of the world continue to remain sedentary or physically inactive. Because of increased demands on production in the industrial sector and higher competitiveness in educational settings, the historical agrarian lifestyle requiring regular physical activity no longer exists. The technological revolution and advent of digital solutions that drive businesses today allow most workers to sit down and work several hours of the day (Powell et al., 2002). An increased division of labor in specialized fields, and the independent nature of work and education today create a less-connected, inter-dependent world. Increased use of automobiles, fewer social obligations, fewer opportunities for physically demanding occupations and hiring outside help for the traditional household jobs of lawn mowing and cleaning; surround us with options to lead sedentary life more than ever (Buchner & Miles, 2002). Additionally, with instant gratification of most of our needs through internet connectivity and greater access to entertainment, it is fair to assert that neighborhood activities, clubs, and meeting groups have dwarfed over the past few decades.

The reduction in overall physical activity has had effects on our society, economy, and culture as a whole. First Lady Michelle Obama in her "Lets Move" initiative targets childhood obesity. She comments that "the physical and emotional health of an entire generation and the economic health and security of our nation is at stake". One of every three children is either obese or overweight (U.S. Department of Health and Human Services, 2008). The "Lets Move" initiative is comprehensive and multi-disciplinary. It aims to provide a healthy pathway out of obesity within a generation. Among the five recommendations to control and manage obesity is physical activity, helping families, schools, and communities challenge physical inactivity through programs, incentives, and resources.

Physical activity, therefore, has a pivotal role in prevention and intervention science. It is vital to understand the dimensions that influence physical activity. Physical activity is a human behavior that can be changed, shaped, and molded to provide specific and incremental benefits to the human body as well as contribute to productive, engaged citizens. From being

a mere modifiable risk factor, physical activity can become a primary protective factor in driving positive health results for individuals, families, and communities.

1.2 Focus of the Study

The present study takes into account the need for theory integration (see Chapter 2) by employing the social organizational theory of community action and change (Mancini & Bowen, 2013). Mancini et al. (2005) argue that community contexts have a decisive influence on individual and family developmental out comes and therefore I have concluded that such contextual issues must be included to understand the physical activity outcome. The social organizational theory of action and change has evolved into a framework that captures multi-level social processes that are related to individuals, families, and community resilience. Centered on the idea that social connections have an impact on adoption of positive health behavior in later life, the theory serves as an anchor and use the National Longitudinal Study on Adolescent Health to understand how social structure (macro) and social organizational processes (meso) can best explain physical activity over time. Consistent with literature on understanding community influences on health and recommendations from physical activity research, my goal is to explore the three influences on physical activity: *neighborhood stability* (social structure), *early family social integration*, and *social participation* (social organizational processes).

1.3 Purpose of the Study

The purpose of this study is to examine to what extent environmental, social, and individual factors influence health behaviors. More specifically, to what extent do objectively measured environmental factors (concentrated affluence and residential stability), social factors

(collective socialization and formal network involvement) and individual factors (civic engagement and citizenship) affect levels of physical activity. The leading questions that guide this inquiry are:

1. Is there a significant relationship between neighborhood stability during adolescence and levels of physical activity later as adults

2. What role do social organizational processes play on the relationship between community context and physical activity? Specifically:

   (a) How does early family socialization (social integration) influence later social participation in adult roles?

   (b) What is the relationship between early family social integration (during adolescence) and later levels of physical activity (in adulthood)?

   (c) What is the relationship between social participation as young adults and levels of physical activity in later adulthood?

1.4 Assumptions of the Study

The current study considers the following assumptions:

1. Contextual assumption: Individual and family health outcomes are influenced by their surroundings

2. Emergence assumption: Social structures and processes collectively can better account for explanations about human behavior than either one by itself

3. Benevolence assumption: Community is a protective factor

4. Neighborhood assumption: "Place" is important in the discussion of community

The contextual assumption: Individual and family health outcomes are influenced by their surroundings. While biological determinism and individual will have been heralded as explanatory factors for human behavior in psychology and related disciplines, social science has long reasoned the notion of "context" as important in explaining variations in human behavior. Individuals and families are embedded in communities (Mancini & Bowen, 2013). Individuals and families live in communities that are hosts to various geo-political, economic, and social forces. The distribution of these forces gives way to social ordering and stratification, in turn giving rise to an enveloping "social structure" that shapes the lives of individuals and families. These structures enable, enhance, or prevent how individual will and biological influences unfold (Simons et al., 2011). As we grapple with various ways that structures explain human well-being, empirical and theoretical advances from the past few decades gives voice to the role of "social processes" in understanding human behavior and human outcomes.

The emergence assumption: Structure and process collectively can better account for explanations about human behavior than either one by itself. This assumption advances the Descartian notion "I think therefore I am" to a more contextual premise of "we belong (to social structures) and we relate (through social processes), therefore, we are." According to Gieryn (2000), "social processes (difference, power, inequality, and collective action) happen through the material forms that we design, build, use and protest," emphasizing a 'both - and' perspective rather than an 'either - or' approach. Therefore, the study assumes that there are processes at the macro structural level that guide, constrict, and shape individual behavior. Examples are civic involvement and physical activity. This 'both - and' perspective also highlights the relational insight in sociology which according to Sampson (2001), asserts that "social life is both interdependent and emergent." In other words, actions and directions that individuals take are invariably connected to influences in the environment that are above and beyond personal control.

The benevolence assumption: Community is a protective factor. This study departs from understanding communities from a risk and problem lens and to understanding communities as a protective factor. Mancini et al. (2003), posit that more is transpiring in communities apart from risk factors and risk behaviors (p. 320). Thus the community warrants further research to examine positive roles it plays in the daily lives of people. Much research on communities is based on the level of neighborhood poverty and economic disadvantage to understand behaviors. However, it can be assumed equally that communities are places where positive behaviors are learned and transpire in social relationships. Community as a protective factor centers on the question How must we organize to improve health? (Oakes & Kaufman, 2006). Research has shown that despite individual characteristics and economic positions, the community context (measured by the indicators of concentration of poverty, residential stability or instability, and ethnic composition) has an influence on individual outcome (Sampson, 2011; Wickrama & Bryant, 2003). The protective nature of a community comes from a combination of both structural and process elements. Understanding the protective nature of the community helps us move away from a conversation of risk to a framework of understanding resilience and how both influences co-exist.

The neighborhood assumption: Place is important in the discussion of community. Communities are undergirded by their physical location. The physical location is a central concept in working with and understanding communities (Sampson, 2012). The notion of place speaks to geographical and physical boundaries which are hosts to various resources, opportunities, and influences (Gieryn, 2000; Mancini & Bowen, 2009). Individuals relate to and are shaped by their physical environments. Sampson (2001) argues that "differential land use" of neighborhoods is important to understand possible opportunities that space affords human development. For example, locations where there is minimal adult supervision and close proximity to negative attractions (liquor store, drug availability) adversely influence adolescent development. The notions of place in terms of neighborhood and

community structures traditionally have been characterized through economic disadvantage, ethnic heterogeneity, and residential stability. The reverse, having well-supervised places with opportunities for structured play and interaction, can lead to positive differences.

Chapter 2

Literature Review

2.1 Understanding Influences on Physical Activity

Traditional research on physical activity has used personal-level theories (King et al., 2002) i.e., health belief model, theory of planned behavior and social cognitive theory (Bauman et al., 2002). These behavioral theorists explore various ways in which personal and psychological mechanisms (attitudes, behavior, beliefs and affect) influence and mediate physical activity. While such theories have contributed to understanding mediating mechanisms of physical activity, King et al. (2002) argue that such individually focused theories explain very little variance in physical activity. The authors call for additional dimensions to be part of theorizing and researching on physical activity. For example, decisions to engage in the health-related behaviors of physical activity can involve more than personal and psychological mechanisms. Of importance in the context of this study is the call for emphasis on micro-environmental factors. This includes physical and social conditions together with their combined capacity to explain physical activity as a function of economic condition, population characteristic, and how environmental conditions (Wall et al., 2012) influence the adoption and maintenance of physical activity. There is a growing emphasis on public

health studies to focus on contextual and environmental dimensions that influence physical activity.

King et al. (2002) recommend for a broad discussion on the influences of physical activity and invite inter-disciplinary theoretical approaches to understand physical activity. As mentioned earlier, traditional theories on physical activity have focused on motivational, psychological, and individual decision making mechanisms, primarily informed by psychology. The inclusion of non-traditional disciplines (frameworks that takes into account the notion of context and social relationships) to the discussion of physical activity affords a broad world view. This broad view provides a context to merge personal level theories, (such as individual choice and behavioral) that expound "choice-persuasive" mechanisms to physical activity with a "choice-enabling" lens that speak to environmental perspectives that focus on broad contextual issues, macro level explanations.

King and colleagues (2002) in their efforts to conceptualize choice-enabling theories note the following points:

1. The factors of physical environment, inter-personal, intra-personal, social and culture influence each other through interaction that can either encourage or obstruct physical activity.

2. Human behavior and environment interact with and influence each other reciprocally, and is therefore systemic and holistic.

3. All levels should be explored to understand physical activity in context - micro (personal), meso (family & community) and macro (socio-cultural, environmental, and economic) levels.

The authors further clarify their classification of approaches to physical activity that falls on a choice-driven versus choice-enabling continuum. They describe sub-categories;

interpersonal as health locus control and planned behavior/reasoned action; behavior-micro environmental as social learning and social cognitive; meso-environmental as environmental stress, restorative environments and macro-environmental as land use and transportation planning. Interpersonal falls to the left of the continuum and it explains choice-driven, individual level theories. Macro-environmental falls to the right of the continuum. The continuum makes clear contextual factors such as neighborhood disorder and urban planning.

The prescriptions by King and colleagues direct researchers to use trans-disciplinary theories to understand physical activity. The present study uses a longitudinal, national data set to explore various contextual and personal influences on physical activity. The study is based on the literature and theory of social organization, which provide an appropriate lens to link macro processes (neighborhood characteristics) to meso processes (family and community social integration) to micro processes (individual civic involvement and social participation). The social organizational theory of action and change, a choice-enabling theoretical framework, is used to understand physical activity.

2.2 The Social Organizational Theory of Action and Change

The social organizational theory of action and change provides a road map that asks key questions about the relationship among individuals, families, and their environment. Mancini et al. (2003) define social organization describes "the collection of values, norms, processes, and behavior patterns within a community that organize, facilitate, and constrain the interactions among community members" (p. 319). Social organization, therefore, emphasizes integration and cohesion, which Durkheim linked to mortality in his classic work on suicide (Berkman & Glass, 2000). According to Mancini & Bowen (2013), social organization brings together resources and needed supports for individuals and families, including health-related

concerns. Communities are therefore presented as a structure of belonging in which beliefs, norms, and values regulate human behavior and provide a means to access meaningful relationships. The social organizational theory advances this notion by asserting that individuals and families are embedded in communities (Mancini & Bowen, 2013) and that larger social and environmental factors influence individual outcomes over and above individual capacities and built environments (Sampson, 2012). This inclusive approach to human behavior answers the call for a choice-enabled framework to understand physical activity and advances the argument that social organizational processes have important consequences for the health and well-being of individuals and families (Mancini et al., 2003).

The current study embodies the benevolence assumption or a strength based approach as proposed by the social organizational theory of action and change (Mancini & Bowen, 2009,0). Therefore communities are conceptualized and presented as a protective factor. While this approach greatly complements many approaches to understanding communities (Chaskin et al., 2001; Sampson, 2012; Small & Supple, 2001), the social organization framework focuses on possibilities in communities rather than on social problems, such as crime and delinquency, as championed by social disorganization theories. By maintaining a positive approach, the focus is intentionally on building community capacity and resilience (Kretzmann & McKnight, 1993; Mancini & Bowen, 2009,0). Additionally, Mancini and colleagues proposed that focusing on social organization helps researchers focus on degrees of "preparedness for addressing adversity and challenge" rather than focusing on good and bad notions of a community.

The theory stresses that community structures or antecedents influence individuals, families, and community results. Mancini and colleagues advance that the social organizational processes of networks, social capital, and community capacity mediate the relationship between community antecedents and individual results. The present study investigates physical activity and the various structural, social, and individual influences on physical activity. In

the following sections, any reference to the theory of community action and change have been taken from the following references: Bowen, Martin, Mancini, & Nelson, 2000; Bowen, Martin, Mancini, & Nelson, 2001; Bowen, Mancini, Martin, Ware, & Nelson, 2003; Bowen, Mancini, & Martin, 2013; Mancini et al., 2003; Mancini et al., 2005; Mancini, Nelson, Bowen, & Martin, 2006; Mancini & Bowen, 2009; Mancini & Bowen, 2013.

Community Antecedents: Social and Physical Infrastructures. In health promotion and prevention efforts it is crucial to understand what ultimately defines a community. Communities are hosts to people and enable a sense of safety, belonging, and are considered social units with geographical boundaries and physical infrastructures. The prevailing conditions within a community - that broadly cover physical and social infrastructures - are referred to as community antecedents in the social organizational theory of action and change. Community antecedents are similar to other concepts in the literature such as community social structure (Wickrama & Bryant, 2003) and neighborhood social structure (Sampson et al., 2002). These constructs connote the notion of place and presence of various community-built environments, which are man-made designs of spaces that serve as hosts to human behavior. Such environmental factors have important connections to physical activity (Boone-Heinonen et al., 2010; Dannenberg et al., 2003).

The word *neighborhood* is often used interchangeably with community. Sampson et al. (1997) define it as "a collection of people and institutions occupying a subsection of a larger community" (p. 919). Despite transitions of neighborhood demographics, introduction of newer policies, neighborhoods continue to be a persistent influence on various outcomes (Sampson, 2012). In the context of our current study, we operationalize community antecedents as neighborhood stability based on two characteristics: concentrated neighborhood affluence and aspects of residential stability (length of stay and home ownership). Affluence and stability speak to both physical and social aspects of community life. Concentrated affluence refers to clusters of middle and upper middle class families living in a particu-

lar geographical area. Such residents are likely to invest in community organizations and contribute to economic stability. Such investment has direct consequences in maintaining a healthy and productive social, physical environment (Browning & Cagney, 2003). Defining neighborhood parameters using plus points of neighborhood life gets at a resource oriented view as justified and recommended by Mancini and colleagues. However, the same measures used for affluence in the present study can also be reversed to compute adversity or community breakdown. While I recognize that the reverse of affluence can be used as markers of adversity, the present study will focus on the positive contributions of affluence to individual behavior. Residential stability further ensures constancy and familiarity in the social environment. The predictability of a social environment helps people develop trust, collectively realize goals, and rely on each other for support, information, and growth. We propose that early concentrated affluence and residential stability of a community has some impact on levels of physical activity in the future.

For the purposes of the present study, we argue that neighborhood characteristics and community experiences of young adults have a persistent influence in their adult outcomes (Wickrama et al., 2011). In other words, community experiences early in life can influence health behaviors based on opportunity and resources, which will affect later life outcomes (Keating & Hertzman, 1999; Wickrama et al., 2011). In this study, the amount of physical activity in later adulthood is the outcome. In summary, early environmental influences (concentrated affluence and residential stability (length of stay and homeownership) can have a longitudinal influence on a physically active or sedentary lifestyle.

Figure 2.1: Community antecedent and individual outcome

Social Organizational Processes. Social organizational processes are protective mechanisms in communities that increase the odds for positive outcomes and reduce the chances for negative consequences. According to Mancini et al. (2005), "social organization includes networks of people, exchanges of reciprocity that transpire in relationships, accepted standards and norms of social support, and social controls that regulate behavior and interaction" (p. 572). Social integration and cohesion play a central role in understanding collective influences on health outcomes, especially through understanding how people integrate with each other, find meaning and attachment to one another, and how much the degree of closeness in their social networks increases their odds for positive health outcomes (Berkman & Glass, 2000).

Mancini and his colleagues have long searched to understand the "black box" that operates between community antecedents and results, later described as social organizational processes. Theoretically, the authors make a distinction between social organizational structure, referring to "interconnecting parts, a framework, organization, configuration, and composition" (p. 573) and process, referring to "a course of action, functions, operations, and methods of working" (p. 573) (Mancini et al., 2005). They identified three processes that mediate the relationship between community antecedents and results: networks, social capital, and community capacity. These processes are reciprocally and dynamically interrelated.

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Networks. Networks are a central concept in social organization and they are considered primary mechanisms through which a community comes alive. Broadly referred to in the literature as social networks, they play an important role in influencing the physical, psychological, social, and spiritual well-being of individuals. The social organizational framework explains two types of networks: informal networks and formal systems within the community.

Informal networks. Informal networks consists of relationships with colleagues, friends, and neighbors that are mainly voluntary in nature and characterized by mutual exchange and reciprocal responsibility. Informal networks provide an organic structure for people to belong, support, and learn from one another. Mancini and his colleagues outline the following functions of informal networks: emotional, instrumental, informational, companionate, and validation. Emotional support speaks to assistance individuals and families provide each other during times of trial as well as to share joys of positive achievements. Instrumental function refers to assistance in accomplishing practical tasks. For example, groups of parents who take responsibility to drive a group of their children to school each week is an instance of instrumental function. Informational function helps individuals make informed decisions

through their contact with others in the community. Adoption of positive health behaviors, information about new resources etc., are often learned through informal social connections in the community. Companionate function refers to the notion of spending time together or what most literature refers to as social support. Finally, the validation function refers to mechanisms through which individuals and families feel confident and competent about themselves through their interactions with others. In other words, social interactions instill in people a sense of self-worth that validates their contributions to the larger well-being of communities. The theory and the current study argue that informal social relationships not only provide social support, but also have a host of benefits that aid in social integration, better community life, and learning opportunities.

Formal systems. Formal systems, formerly referred to as formal networks, consist of organizations and agencies in the community that have an element of obligation and contracted duties within and with the larger community. The local government, social service agencies, churches, libraries, and schools are examples of formal systems. According to the social organizational theory, a primary responsibility of formal systems is to support informal networks and mobilize their energy to achieve community results. When formal systems enhance their potential by harnessing energies within informal networks, leverage points for change open wider in communities. Formal systems gauge their success by the ability to support informal networks as they establish meaningful support within the community.

From a more theoretical and explanatory perspective, formal systems and informal networks aid individuals and families integrate into the larger social fabric. Mancini & Bowen (2013), contend that most individuals are embedded in multiple networks; very few are completely isolated from social contact. Belonging and social connection have important benefits; social disconnection and isolation have detrimental and persistent negative outcomes (Berkman & Syme, 1979; Bruhn, 2011; Kawachi & Berkman, 2001).

In the present study, early family social integration (collective socialization and formal network involvement) and social participation (civic engagement and citizenship) operationalizes dimensions of family and individual involvement in the community through informal networks and formal systems. Within the conceptual parameters of the present study, the greater the integration to the various networks in the community, the higher the levels of physical activity.

Social capital. Putnam (2000) defines social capital as "the aggregate resources (information, opportunities, and instrumental support) that arise from reciprocal social networks and relationships and that result from participation in formal and informal settings". Mancini and colleagues work on social capital is informed by Coleman (1988) and Putnam (2000). According to Helliwell & Putnam (2004) "social capital can be embodied in bonds among family, friends and neighbors, in the workplace, at church, in civic associations" (p. 1436). Social capital, therefore, is the product that emerges from the interactions within and between formal systems and informal networks. Social capital is also the mechanism through which accrued benefits from interactions foster positive outcomes i.e., better health and a physically active lifestyle. According to Sampson (1992), social capital is an essential element in mobilizing action within networks. Although it is not a tangible and visible aspect of communities, social capital is the mechanism through which positive results of social interaction accrue. For the social organizational model of community and change, social capital drives community capacity (explained later).

Social capital has a long history in social sciences (for further reading, see Portes (1998)) and has been identified as a central concept in explaining various outcomes such as physical activity (Kawachi & Berkman, 2001), educational achievement (Beaualieu et al., 2001), academic performance (Sun, 1999), health (Kawachi et al., 2008), health related behaviors (Lindstrom, 2008), mental health (Kawachi & Berkman, 2001) and lower crime rates (Sampson, 2012). Helliwell & Putnam (2004) found that family, neighborhood, and religious ties

directly and indirectly influenced well-being and overall health. Additionally, they found that social ties led to higher levels of civic engagement (both collective and individual social participation). Consequently, communities that exhibit strong levels of social capital have individuals who are civically engaged, participate regularly in community activities, and individuals who share a high level of trust and trustworthiness among themselves. As mentioned before, social capital is the mechanism which accrues positive benefits; it influences better health and healthy behaviors. In the present study, higher levels of early family social integration and social participation lead to strong funds of social capital at the collective and individual levels; this in turn, will influence physical activity. In other words, early family social integration correspond to family social capital and social participations correspond to individual social capital.

Community capacity. Community capacity is the "extent to which community members (a) demonstrate a sense of shared responsibility for the general welfare of the community and its members, and (b) demonstrate collective competence in taking advantage of opportunities for addressing community needs and confronting situations that threaten the safety and well-being of community members" (p.7) (Bowen et al., 2001). This action component of the theory emphasizes collective action inspired by shared responsibility.

In the context of the present study, which uses an extant data set to explore social and structural influences on physical activity, community capacity is not operationalized or considered in the theoretical model presented next.

2.3 Theoretical Model: Present Study

The present study adapts the social organizational theory of action and change to explain a choice-enabling model of physical activity. The various aspects of the theory are operationalized via the National Longitudinal Study on Adolescent Health and, therefore, makes

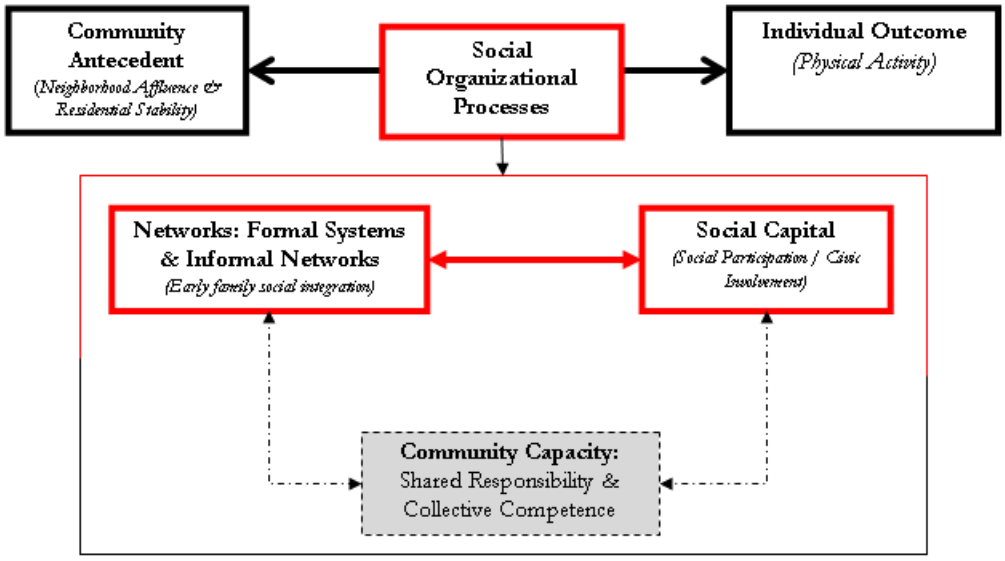

Figure 2.2: The social organizational theory of community action and change

use of three waves of data: Wave 1, Wave 3, and Wave 4, to examine longitudinal effects of community and social particpation on physical activity. The theoretical model presented below is also the first longitudinal, partial test of social organizational theory of action and change (excluding community capacity element). Neighborhood Stability (Box 1) represents community antecedents while Early Family Social Integration (Box 2) and Social Participation (Box 3) represent various aspects of social organizational processes. The theoretical model is presented in 2.3:

I propose that neighborhood stability characteristics (Box 1) exert a direct influence on early family social integration processes (Path 1a) i.e., collective socialization and parental participation in formal systems in the community. Collective socialization refers to informal parenting at the community level where parents look out for other children. Formal system integration refers to parental involvement in organizations in the community, such as the parent-teachers-association. The model also proposes that neighborhood level characteris-

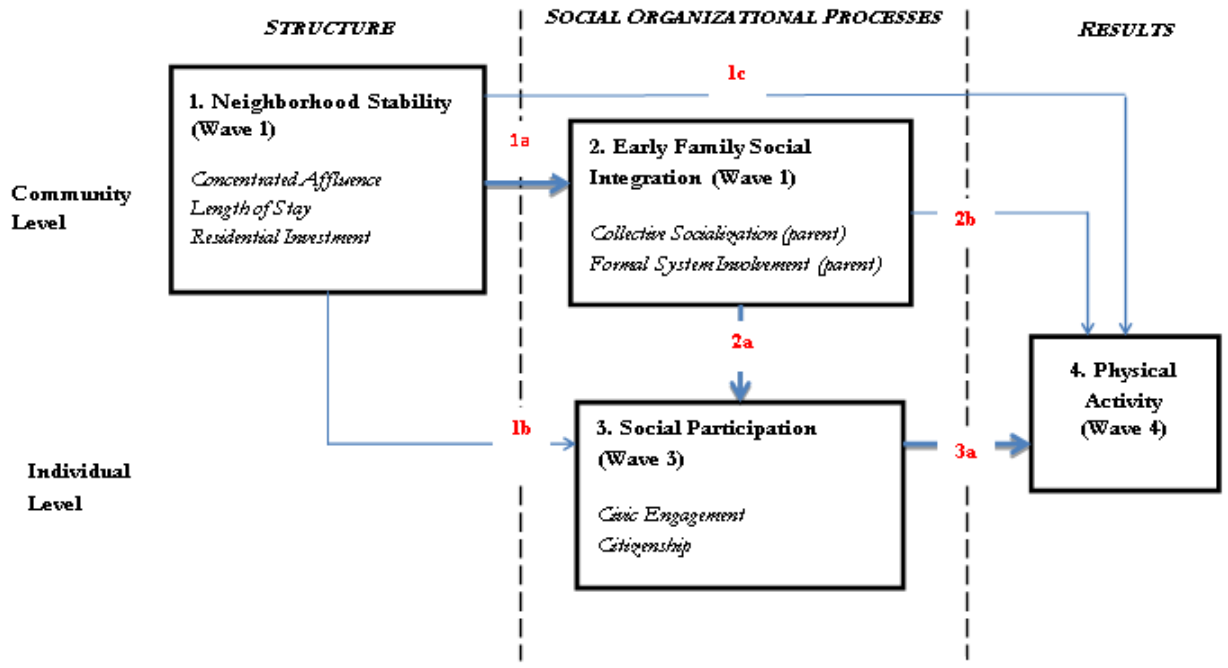

Figure 2.3: Social organizational theory of community action and change as applied to physical activity

tics at Wave1 can influence individual social participation at Wave 3, (Path 1b), such as civic engagement and citizenship. Civic engagement primarily involves voluntary participation in various social and civil organizations in the community, whereas, citizenship refers to fulfilling the civic duty of staying politically informed and participating politically. I predict that early family social integration (Box 2) would positively influence social participation (Box 3) at Wave 3, (Path 2a) even after controlling for the type of neighborhood as urban vs. rural. Finally, I propose that early family social integration (Wave 1) and social participation (Wave 3) contribute to levels physical activity involvement (Wave 4) by way of Paths 2b and 3a. Neighborhood level characteristics at Wave 1 are also hypothesized to have a distinctive influence on physical activity at Wave 4 (Path 1c). Specifically, early life contexts of neighborhood stability (Wave 1) can program an active or sedentary life style (physical activity)

in adulthood (Wave 4). Early life circumstances, such as neighborhood economic conditions, sense of safety, etc., can have decisive effects in developmental and biological outcomes in the future. Individual variables of race and gender and the type of community are included in the models. The goals of including individual demographics and community types are to explore whether the proposed model has differential influence on physical activity based on race, gender (male or female), and ones place of residence is designated as a rural or an urban community.

2.4 Neighborhood Stability, Early Family Social Integration and Physical Activity

The early twentieth century marked the marriage between sociological theories and issues in public health. Sociological theories explained how social structure and processes influence individual health conditions and health behavior. In particular, such theories focused on various attributes of neighborhoods and how their structural elements influenced individual outcomes above and beyond the status of the individuals who reside there (Sampson, 2003). The present study estimates the influence of neighborhood stability on health behavior. Neighborhood stability explains health outcomes and behavior in a context that accounts for access to resources, such as sidewalks, issues of safety, and social support. Research has traditionally focused on understanding the structural effects of poverty, spurred primarily by the social disorganizational theory of (Shaw & McKay, 1942). The social disorganizational theory explains behavioral, health and social outcomes through neighborhood instability, ethnic heterogeneity, and concentration of poverty. However, research that focused beyond poverty made it clear that neighborhood disadvantage does not paint the whole picture of neighborhood effects. Therefore, informed via a social organizational lens, in the present

study, I assess neighborhood stability by measuring *concentrated affluence* and residential stability through *length of stay* and *residential investment.*

Neighborhood stability. As described in the theoretical model, (Path 1c) I expect neighborhood stability (Wave 1) to influence levels of physical activity (Wave 4) directly, independent of either early family social integration or social participation. Community members, both adults and children are exposed to the various elements in the environment, similar opportunities, resources, and challenges. Thus, both parents and children living in a particular environment with concentrated affluence and stable neighborhood have the opportunity and resources to generate similar habits and patterns of social connectedness and health behavior.

Concentrated affluence. Elements of neighborhood stability, such as concentrated affluence, strengthen community relationships and broaden social resources through social organization. Residents who live in resourceful environments and perceive their neighborhoods as stable are more likely to form relationships with others. Stable neighborhoods encourage residents to actively invest in community well-being by participating in various formal and informal social organizations, such as the PTA, neighborhood association, or come together for projects like a community garden or a book club. Therefore, residents who live in a neighborhood that is resourceful and stable are encouraged through various opportunities to form supportive relationships via shared norms, and values. This increases the overall sense of trust, reciprocity, and exchanges leading to well-connected, formal and informal social networks within the community. Neighborhood stability also reflects core aspects of social organization (Mancini et al., 2003).

Length of stay and Residential Investment. Length of stay and residential investment highlight an important aspect of neighborhood stability: stable residents who live in particular areas consistently and homeowners who invest in their house financially. Economically stable communities attract individuals and families who are likely to own homes and seek

to create a safe and stable neighborhood. Individuals and families that reside in neighborhoods that have a high degree of residential stability are likely to be invested and concerned about the various conditions of the neighborhood, issues of safety, and are likely to invest in resources, such as public parks, sidewalks, and common playgrounds. Therefore, residential stability through people staying longer in a neighborhood and owning a home can promote and encourage collective efforts in formation of social relationships within the community and achieve consensus regarding common goals, values, and norms. These collective efforts increase various aspects of social organization (Mancini et al., 2003). Consequently, the level of residential stability is a key element in accounting for opportunities, information and resources for physical activity. For example, previous research has shown that high levels of residential stability is conducive not only to positive health outcomes but is also advantageous to strong ties among residents (Schulz et al., 2008). Conversely, levels of high residential instability have been shown to hinder formation of effective social networks, less consensus among neighbors regarding common goals, values, and norms, and increased vulnerability of neighborhoods towards negative effects. While there is considerable debate about the direct effects of residential stability on health outcomes per se, there is consensus that residential stability is a pivotal protective factor in securing effective mental and physical health (Larson et al., 2004; Silver et al., 2002). The possible explanation for the relationship between residential stability and social connections and positive behaviors is this: in neighborhoods that experience highly stable neighborhood - where people either own their homes or are committed to living in a home for a number of years (measured in the present study), community participation is an added economic incentive (DiPasquale & Glaeser, 1999; Rotolo et al., 2010). In other words, residential investment in terms of homeownership is a motivator for higher community involvement. This is sometimes referred to as the "stakes" theory or incentives-driven theory according to Aaronson (2000). Home owners who have a stake in their home invest more in their community. Additionally, people who own homes have more

to lose by not getting involved in their surroundings (Rotolo et al., 2010). Such stakes, tied with the incentive for common goals, values, and norms, are likely to be backed by social, economical, and voluntary commitments to ensure neighborhoods are well equipped, clean, resourceful and safe. Consequently, people living in and near such neighborhoods have better access to public parks, playgrounds, sidewalks, and safer environments that positively support adoption of a physically active lifestyle than a sedentary lifestyle.

Early family social integration. Early family social integration refers to the degree of community participation by the family of origin for each adolescent in the present study. Family is an important social group through which younger individuals are socialized into the community fabric. In other words, when an individual is young, how involved are their parents in their community and how do they contribute to the well-being of the larger neighborhood? These issues have implications for adolescents' future social involvement which in turn influences their health behavior. Collective socialization and formal system involvement are the two ways we measure early family social integration. Presence of formal social organizations such as a neighborhood association, which is powered primarily by informal and voluntary participation of adults in the community, provides adolescents with positive role models. Such involvement by parents and elders in a community provides influences to the adolescents in their own family as well as the adolescents in the larger community. In the present study, parental involvement in the community represents familys level of integration into the community. Therefore, early family social integration describes how the family is tied to the community and does not capture the influence of community on the family.

Greater community participation contributes to increased social ties among residents in the community, and consequently among adults and adolescents in the community. An active presence of informal parental involvement and parental participation in different aspects of community life indicates a presence of effective social ties among adults in the community. Environments that foster poor social connections and consensus of common values and

goals increase social isolation. Isolation can lead to weak social relations, desolation, and vulnerability (Wickrama & Bryant, 2003). Two mechanisms are at work. First, adolescents who grow up in a family that is socially involved and active internalize a model of social engagement and social participation. They are more likely to commit to social involvement in their future. Second, individuals and families experiencing social isolation are not in the path of information exchange and collective efforts. They are less likely to adopt new and updated information regarding resources in the community or be part of exchanges that may introduce them to new opportunities and means for physical activity.

Collective socialization speaks to "parental monitoring processes" at the neighborhood level (Patterson et al., 1989). Both formal system involvement and collective socialization reflect aspects of the social organization theory (informal networks and formal systems). Strong ties developed by adults in the community through collective socialization and active participation in the formal aspects of community influence the fund of social capital (Hovart et al., 2003) available in that community. The present study frames social capital as resources that are accessible to individuals in a community through their social connections (Greiner et al., 2004; Putnam, 2000). In other words, when adults in a neighborhood know each other and take the responsibility for supervision of all children, the neighborhood is likely to produce favorable behavioral and developmental outcomes for the children who live there as well as have positive effects for the community (Carlson, 2012). Early family social integration, therefore, helps in the development of social capital available to the members of that community, both adults and adolescents. Additionally, collective socialization is a mechanism through which social capital is linked to health outcomes (Kawachi & Berkman, 2000).

The fund of social capital is generated by actions that promote a sense of connectedness, reciprocity, information exchange, and mutual obligation among residents (collective socialization and formal system involvement in the present study). This process of connecting

and exchanging not only strengthens ties among adults but also adult connections with the adolescents in the community. This network of connections helps parents to become parents at the "neighborhood level" providing an opportunity to form supportive and caring relationships with the youth in the community (Wickrama & Bryant, 2003). Absence of early family social integration mechanisms like collective socialization and formal system involvement by parents leads to a perception in the adolescent of a less connected community. This, in turn, reduces the adolescents likelihood of being involved in the community as a youth as well as an adult later on (Duke et al., 2009). Additionally, the lack of early family social integration within communities prevents one from effective access to community resources and exchanges thereby encouraging adoption of risky health behavior, such as a sedentary lifestyle (Path 2b, 2.3). Therefore, we hypothesize that both experience of collective socialization and formal network involvement of family of origin can positively impact levels of physical activity at Wave 4.

2.5 Neighborhood Stability, Social Participation and Physical Activity

Social participation in the present study refers to individual levels of social engagement at Wave 3. In other words, social participation looks at a young adults efforts at social integration through civic engagement and exercising citizenship. According to the Human Resources and Skills Development Canada (2013), social participation is "people's social involvement and interaction with others". Social participation can range from acts of volunteerism and making donations to participation in sports activities and supporting common causes in the community. According to the Human Resources and Skills Development Canada (2013), popular measures of social participation include participation in political activities and in social activities.

In this study, civic engagement refers to social activities which primarily involve voluntary time invested in various civic associations and organizations within a community. Citizenship refers to political activities which look primarily at individual ties to political parties and their level of participation in local, state, and national elections after eighteen years of age. Scholars of political science early on believed in the primacy principle which refers to the fact that early life lessons of childhood will shape social behavior of the individuals as they age (2.3, Path 2a) (Searing et al., 1973). Research has provided evidence that civic training in adolescents is influential in their civic behavior as adults. For example, Andolina et al. (2003) found that salient lessons on civic engagement start at home. Their research shows that family is a key socialization context for young people and their connection to civic engagement in the future. According to Andolina et al. (2003) "engaged parents tend to raise engaged children" (p. 279). Furthermore, several scholars have emphasized recently the role of the family and community (Doherty & Carroll, 2002; Duke et al., 2009; Erickson & Louv, 2002; Wilkin et al., 2009) in producing socially conscious and civically engaged citizens for the larger community. Therefore, individual social participation later in life is influenced by early family social integration. Specifically, research has shown that collective socialization especially plays an important role in influencing later social participation (Greiner et al., 2004). Families, therefore, are the primary contexts of socialization for cultivating active citizens in the community. Early family social integration provides adolescents with positive examples for adult civic behavior. Youth who grow up in homes and neighborhoods that exhibit social participation are likely to internalize such civic behaviors and promulgate them as adults.

Social participation is the mechanism through which a young adult becomes integrated into a community. Studies have shown that higher levels of social participation and social integration leads to better health outcomes, longevity of life, and positive behavior (Berkman & Syme, 1979; Gottlieb & Gillespie, 2008; Kawachi et al., 2008; Lindstrom, 2008; Poortinga,

2006; Thomas, 2011). Successful integration into the community fabric (or the converse, social isolation) has direct implications for a person's level of physical activity. As mentioned previously, higher levels of social integration means greater access to resources and social capital in the community. Legh-Jones & Moore (2012) extensively looked at social participation and levels of physical activity in an urban adult population. They categorized social participation as no involvement, low involvement, and high involvement. These measures looked at whether or not the individuals were active members in a neighborhood association or a local group. Results revealed that people who were high in social engagement were more physically active. The respondents who indicated low or no social engagement had a higher chance of being physically inactive. Other scholars have argued along similar lines. In general, high levels of social capital (in this case high levels of social integration through social participation) have been associated with high levels of physical activity. Lindstrom et al. (2001), partly investigated the connection between psychosocial resources and levels of leisure-time physical activity. They found that low social participation "was associated with an increased risk of low leisure-time physical activity" for both men and women. In other words, less social engagement led to lower levels of being physically active. (Greiner et al., 2004) found that level of physical activity remained highly associated with community involvement. In short, studies have consistently linked high levels of reported physical activity with high levels of community involvement or social participation.

In the present study, social participation leads to increased levels of physical activity because people who interact more with others have better access to information, updates on new resources, and are likely have opportunities to adopt positive health behaviors. I posit that the access to resources and information is best seen as operating through social capital (Greiner et al., 2004; Putnam, 2000). Poortinga (2006) made a curious argument for individual level and collective levels of social capital and their relationship to health. He demonstrated that individual levels of social trust and civic participation were linked to

self-reported health as compared to aggregate levels of social trust and civic participation. He found that individuals who reported medium to high levels of civic participation were more likely to walk, play sports, and commit to regular physical as well as overall activity. Similarly, respondents who reported high levels of trust in his study also had higher scores for walking and other sports-related activities. Therefore, social participation through civic engagement and citizenship activities (both social and political activities) provide individuals with resources like social support, information channels, and access to different facilities. These social and environmental supports can trigger a "choice-enabling" (2.3, Path 3a) pathway to physical activity. Poortinga's conceptual pivots of individual and collective social capital supports my earlier comments about family social capital and individual social capital.

My theoretical model predicts that neighborhood stability can directly influence social participation (2.3, Path 1b). In other words, the socio-economic characteristics of ones neighborhood and the overall residential stability reflected through longevity of stay and home ownership, have direct implications for social participation elements, such as civic engagement and citizenship. Research has shown that various elements of social engagement, forming friendship and social ties, commitment, and interest in participating in a local community are influenced by length of residence (Fischer, 1982; Oropesa, 1992; Sampson, 1991). Other researchers have shown that beyond length of residence and other demographic factors, such as race and social class (affluence versus poverty), home ownership was a significant predictor in people's tendency to socially participate in community life (McCabe, 2013; Rotolo et al., 2010). In the present study, both longevity and ownership are both mechanisms that influence social integration and participation for the family as well as the individual. More explicitly, the longer one resides in a community and the deeper one's economic commitment to their residence, the higher the investment one will have to ensure

the neighborhood is a good, safe, and productive place for residents. Viswanath et al. (2000) emphasized this mechanism as "investment in the community".

According to McCabe (2013), higher residential stability and local fiscal investments in their neighborhoods of living lead to higher social participation in community affairs. Homeownership is, therefore, closely tied to neighborhood stability. In turn, stability is influential in social integration, social participation, and physical activity. Research has shown considerable evidence that increased homeownership in an area is linked to better property maintenance, longer lengths of tenure, social ties, and physical and social conditions (Rohe & Stewart, 1996).

In the present study, neighborhood stability is also tied to concentrated affluence. In other words, the socio-economic status of the environment in which one lives can influence social participation. Concentrated affluence describes the relative affluence of a neighborhood and has been a strong predictor of a number of the issues of health, child outcomes (Browning & Cagney, 2003; Wen et al., 2003), as well as community involvement in children's outcomes (Brody et al., 2001; Sampson et al., 1999). In an international study on youth civic engagement behaviors, family affluence had a positive overall effect on civic engagement (Lenzi et al., 2012). Similar to homeownership, mechanisms of increased social and economic investment in areas of living, we posit that affluence influences social participation (civic engagement and citizenship). Research has shown that voluntary commitments of citizens have a strong connection to the economic prosperity of communities, and vice versa. A study by Williams et al. (2008) in Canada found that close to 70% of residents from high and middle socio-economic groups were volunteers for various opportunities in their community while only 56% of the low SES reported volunteering. They found a significant difference between volunteer rates of high, middle socio-economic status (SES) neighborhoods versus low SES neighborhoods. While the notion of affluence has similar mechanisms as in residential stability (economic and social investment) contributing to better outcomes and social

participation, the affluence hypothesis draw from few other theoretical notions. First, concentrated affluence in the present study draws from the economic theory that focuses on the role of middle and upper middle class neighborhoods' role in securing socio-economic resources, community organizations, and institutional advantages to build healthy living environments (Browning & Cagney, 2003; Wen et al., 2003). Second, the notions of affluence and deprivation have been historically tied to place, or in other words, affluence and poverty tend to be 'place-based' (Sampson, 2012; Wen et al., 2003; Williams et al., 2008). Massey, as early as 1996, presented a compelling thesis on rising income inequality and the geographic concentration of poverty and affluence in the United States (Massey, 1996). Sampson (2012) makes a compelling argument for the persistent effects of place on human health and social outcomes. Place-based resources, therefore, vary depending on socio-economic status of the local community. With the presence of stable, social connections and stable institutions in the community, people who live in affluent neighborhoods are more likely to socially integrate and participate in social activities of the community. Third, higher socio-economic conditions are likely to support better social participation because of the common interest of everyone to maintain the stable conditions of the neighborhood. This is similar to the investment principle described by Viswanath et al. (2000) in relation to residential stability and homeownership. While many studies have commented on place-based affluence and civic engagement and other dimensions of social participation, no study has assessed the longitudinal effects of social participation trends based on early neighborhood structure (2.3, Path1b). Place-based effects on health have been long documented in sociological and public health research (Jones & Moon, 1993; Kawachi & Berkman, 2000; Macintyre et al., 2002).

2.6 Summary

The present study proposes a theoretical model to understand longitudinal influence of community, social integration, social participation, and individual differences on physical activity. The proposed model emphasizes macro/environmental influences on physical activity- a "choice enabling" perspective than the traditional choice persuasive approach to understanding physical activity. I hypothesize that neighborhood stability (concentrated affluence, length of stay, and residential investment) for participants at Wave 1 will directly influence individual physical activity levels at Wave 4. Neighborhood stability is also predicted to influence early family social integration (collective socialization and family social integration) and social participation (civic engagement and citizenship) at Wave 3. Both collective socialization and formal social integration speaks to family integration at the community level. Civic engagement and citizenship speaks to the individual integration into the community via social participation. I also predict that individual levels of social integration via social participation will emerge as a strong influence on physical activity and that early family social integration will positively influence social participation. The models include race, gender, and type of community to explore how such individual and community differences influence physical activity.

Chapter 3

Methods

3.1 Sample and Procedures

Analyses in this study are based on data from the National Longitudinal Study on Adolescent Health (Add Health). The Add Health study is a nationally representative, longitudinal study on adolescents from grades seven to twelve on through their transition to early adulthood. The study started in 1994-1995 and has completed four waves of data collection, at the end of which participants ranged from age 28 to 32 years of age. The scientific purpose of the Add Health research program is to explore and examine the contextual effects on adolescent health and health behavior and continuous influence of social context to their health progress. Using a school-based complex cluster sample, in which the primary sampling frame included all high schools in United States with eleventh grade and at least thirty students enrolled in school, the baseline data was collected in 1995 from 134 schools with a total of 20,745 respondents ($M = 15.2$ years, $SD = 1.28$ years, Age Range = 12 to 19 years). The sample was stratified by region, urbanicity, school type (public versus private), ethnic mix, and size. A sample (N = 20,745) of adolescents completed a ninety-minute in-home interview.

The present study uses in-home interviews with adolescents and parent response from Wave 1, responses from adolescent participants in Wave 3, and Wave 4 along with Wave 1 1990 census data (contextual data set). Wave 3 focuses on young adult life, well-being, and transition to adulthood to longitudinally explore how adolescent experiences link to future adult roles, at which point the age ranged between 18 and 26. At the time of interview at Wave 4, participants were roughly between 24 and 32 years and the study continued to explore various ways previous life experiences and social context influence health, health behaviors, and overall wellbeing. Of the total population sampled, the present analysis included 12,384 adolescents who participated in Waves 1, 3, and 4.

The community level variable is defined as neighborhood stability as supported by the Add Health contextual data set. Neighborhood is generally defined as "persons immediate residential environment which has been hypothesized to have both material and social characteristics related to health" (Diez-Roux, 2001). The present study's operationalization of neighborhood focuses on census data aggregations of neighborhoods, which are defined based on as administrative boundaries and are emphasized by geographic units. We use census tracts which are "small, relatively permanent statistical subdivisions of counties containing 4,000 residents on average" (Messer & Kaufman, 2006). For the community level, the present analysis included 1,594 tracts.

3.2 Measures

Concentrated Affluence. A Concentrated affluence (presence of an economic middle class) score for the community was measured by summing three indicators from the 1990 United States census tract information (Add Health contextual data set). These indicators include (a) household income above $50,000, (b) proportion of adults with an education with a college degree or more, and (c) the proportion of employment rate within their census

Table 3.1: Reliability of Study Variables

Variable	Cronbach's Alpha
Concentrated Affluence	0.72
Length of Stay	NA
Residential Investment	0.74
Collective Socialization	0.66
Formal System Involvement	0.70
Civic Engagement	0.80
Citizenship	0.64
Physical Activity	0.68

tract (Wen et al., 2003). Sum scores were computed for each census level tract to represent concentrated affluence. The index had an internal consistency of .72.

Length of stay. Length of stay measured the proportion of respondents who aged 5+ in the same house as in 1985 (length of residence).

Residential investment. Residential investment looked at proportion of housing units occupied by homeowners (home ownership) and proportion of family households that were married in the same tract. Both these percentages were added to get a total score of residential investment. The index had an internal consistency of 0.74.

Both Length of stay and Residential investment represent aspects of Residential stability as discussed in Chapter 2.

Collective socialization. Collective socialization was measured at a community by using three items. The first item asked parents, "If a neighbor saw your child getting into trouble, would your neighbor tell you about it", with a rating scale of 1 (definitely would) to 5 (definitely would not). The second item asked "People in this neighborhood look out for each other" with a 1 (true) or 2 (false) response set. The third item asked "How much do you feel that adults cared about you", which was rated on a scale of 1 (not at all) to 5

(very much). The first two items were reverse coded to ensure consistent directionality of scores (i.e., higher scores indicate stronger relationship and vice versa). The last two items were asked to adolescent participants. Due to differences in scoring, all three items were standardized. After standardization, a community level collective socialization score was computed by averaging the summed scores across census tracts. Because this is a community level measure, reliability was calculated by computing proportion of true score variance to observed scored variance of each community (Wickrama & Bryant, 2003; Raudenbush et al., 2011; Snijders & Bosker, 1999). The average reliability (inclusive of all communities) for collective socialization is 0.66.

Formal system involvement. Formal system involvement (Wickrama & Bryant, 2003) score for each community was developed from summing scores from five items that asked about parents involvement in community life. Parents had to answer yes (1) or no (0) to a question asked if they were a member of a parent teacher organization, military veterans organization, labor union, hobby groups, civic or other social organizations. The sums from the items were averaged to create a community score to indicate collective formal system participation, in which higher scores indicated higher involvement in formal systems in the community. The aggregated formal system involvement score for all communities is 0.70.

Civic engagement. Civic involvement was measured by summing the total number of volunteer activities the individual performed within a twelve-month period. The main question asked the participant "During the past 12 months did you perform any unpaid volunteer or community service work" which had a dichotomous response (1 = Yes; 2 = No). There was a total of nine follow-up questions that explored the various volunteering opportunities. These included service or volunteer time given to youth organizations, service organizations, political clubs, solidarity or ethnic-support groups, church or church-related groups, community centers, volunteer groups in hospitals or nursing homes, educational organizations, or conservation/environmental groups. If the respondent answered "No" to

the first question, then each of the following nine items were recoded as no. If the respondent answered "Yes", then each respondent received a total score out of nine. The combined score across the ten items indicated participants' level of civic engagement. A higher score indicated more frequent participation in the community and therefore reflected high civic involvement. This index has an internal consistency of 0.80.

Citizenship. Citizenship was measured using threeitems. All three items had a dichotomous response set (1= Yes; 2=No) to the questions "Are you registered to vote" and "Did you vote in the most recent presidential election". The third item asked "Do you identify with a specific political party?" All items were reverse coded and summed to give each individual a social participation score, in which higher scores reflected greater social participation. This index has an internal consistency of 0.64.

Levels of physical activity. Physical activity is measured by a standard seven day physical activity recall scale (Baranowski et al., 1998; Guo et al., 2007; Ornelas et al., 2007; Sallis et al., 1993). Each participant was asked how many times they engaged in a particular activity. Each participant answered seven recall questions regarding physical activity. The first item asked about bicycle skateboard, dance, hike, hunt, or do yard work. The second item asked about roller blade or skate, ski, snow board, play racquet sports or aerobics. The third item covered strenuous team sports like football, soccer, basketball, lacrosse, rugby, filed hockey, or ice hockey. The fourth item asked about participation in individual sports like running, wrestling, swimming, cross-country skiing, cycle racing or martial arts. The fifth question asked about participation in gymnastics, weight lifting, or strength training. The sixth question inquired about playing golf, fishing, bowling, or play softball or baseball. The final question asked, "In the past seven days, how many times did you walk for exercise?" Each item response ranged from zero to seven, in which a score of zero indicated "not at all" and a score of seven indicated "7 or more times". All seven items were summed, and then standardized to provide individual score for each participant. All the activities covered

in this index had an estimated energy cost of five to eight metabolic equivalents (MET). The MET is the energy expenditure associated with quiet sitting (Guo et al., 2007). The physical activity index has an internal consistency of 0.68.

3.3 Analytic Strategy

The present study explores the role of macro and micro environmental and social contexts on health behavior. Essentially, my theoretical model explores multi-level influences on physical activity and the various elements that operate at individual and contextual levels (Subramanian et al., 2003a). This exploratory mission requires understanding of individual and community level influences on physical activity and therefore used multilevel regression models. Multilevel regression models will be used to explore the association between neighborhood stability, early family social integration, social participation on physical activity. With a hierarchically arranged data where individuals were nested within communities (census tracts), hierarchical linear modeling (HLM) was employed to test for the various associations. HLM was employed to avoid both ecological fallacy and individual fallacy. According to Subramanian et al. (2003b), ecological fallacy refers to "invalid transfer of results obtained at the ecological level to the individual level" (p. 66) and individual fallacy happens when one fails to take into account the contextual aspects within which individual relationships take place. HLM therefore has the capacity to account for the nested nature of individuals in communities.

For the nested nature of the data and the dependency among individuals within communities, the multilevel models will be estimated using HLM 7 Software (Raudenbush et al., 2011). The present study used census tract data as proxies to estimate neighborhood stability (concentrated affluence and residential stability). To explore the differential influence of race and gender and type of community on physical activity each model will also

include estimates for males, females, different racial groups, and urban communities. Based on the race file provided for Add Health, Hispanics are denoted as the modal race. Therefore differential scores will be presented for white, African-American, and Asian racial groups. In the National Longitudinal Study on Adolescent Health (Add Health) dataset, population numbers per tract was used to demarcate tract area. Per census tract area consisted of ten block groups and a total of 1,594 census tracts will be included in the analysis.

Chapter 4

Data Analysis and Findings

4.1 Chapter Overview

This chapter introduces statistical analysis and results for the theoretical model explained in Figure 2.3. In this study, I examined multilevel processes to understand community and individual level influences on physical activity. Specifically, I used multilevel regression to examine individual/community level effects, cross-level mediations, and cross-level moderations on physical activity. In individual/community level effects, I first explored the influence of neighborhood stability (concentrated affluence, length of stay, and residential investment) on social participation (civic engagement and citizenship) and physical activity. Then, I examined the influence of early family social integration (collective socialization and formal system involvement) on social participation and physical activity. In cross-level mediations, I first explored the influence of neighborhood stability and social participation on physical activity, followed by the influence of early family social integration and social participation on physical activity. In the following pages, I present each of the models tested along with their significant and non-significant results. Table 4.1 contains the descriptive statistics for study variables. Table 4.2 contains the model estimates and the Akaike Information Cri-

Table 4.1: Descriptive Statistics of Study Variables

Variable	M	SD	Range	Skewness
Physical Activity (Standardized)	-	1.000	(-1.242 , 8.167)	
Concentrated Affluence	1.369	0.318	(0.400 , 2.530)	0.651
Residential Investment	1.301	0.369	(0.060 , 1.950)	-0.665
Length of Stay	0.539	0.135	(0.030 , 0.869)	-0.531
Early Family Social Integration	0.792	0.570	(0.000 , 4.000)	1.591
Collective Socialization	-0.021	1.220	(-8.110 , 7.620)	-0.288
Civic Engagement	0.491	0.979	(0.000 , 9.000)	2.867
Citizenship (Standardized)	-	1.000	(-1.420 , 1.341)	1.695

terion (AIC) from all five models. For more information about the AIC, refer to (Akaike, 1974). The left-hand column of the table identifies the independent variables used both at the community and individual levels. Table 4.3 contains the variance and percentage of explained variance for both community (Level-2) and individual (Level-1) levels. Following the presentation of each model, I provide a brief explanation of the results. A comprehensive discussion of the broader implications of the theoretical model will be discussed in Chapter 5.

4.2 Results

As a first step, zero-order correlations were calculated for all study variables. The dependent variable, physical activity, was not correlated either at the .05 or the .01 level with concentrated affluence, length of stay, and residential investment. Following this, null model or Model 0 was calculated using Formula 4.1. Here, Y_{ij} represented individual physical activity score, $Y_{ij} = \hat{\beta}_{0j} + r_{ij}$ was the Level-1 model which currently contains no variables at the individual level, and $\hat{\beta}_{0j} = \hat{\gamma}_{00} + \hat{\mu}_0$ was the Level-2 model containing no variables at

community or neighborhood level. The results from this intercept only model were used to measure the intraclass correlation which represented the amount of variation explained at the community level.

$$Y_{ij} = \hat{\beta}_{0j} + r_{ij} \text{ where } \hat{\beta}_{0j} = \hat{\gamma}_{00} + \hat{\mu}_0 \tag{4.1}$$

Formula 4.2 represented the expansion of Formula 4.1 where the Level-2 model was substituted into the Level-1 model.

$$Y_{ij} = \hat{\gamma}_{00} + \hat{\mu}_0 + r_{ij} \tag{4.2}$$

The intraclass correlation (ICC), for this intercept only model was calculated as:

$$Y_{ij} = \hat{\gamma}_{00} + \hat{\mu}_0 + r_{ij}.$$

The ICC explains the proportion of variance between communities or the percentage of variance explained at the community level. ICC for the 'intercept-only model was 0.01919/(0.01918+ 1.2814) = 0.0147. This reveals that 1.47% of the variance in physical activity scores was explained at the community level (Level-2) and its complement (98.53%) explained the remaining variation of physical activity score at the individual level (Level-1). Subsequent models were tested to understand the varying contributions of community and individual level factors that influence physical activity. Level-1 and Level-2 models are presented below, followed by the mixed formula with predictors and interaction effects.

This combined formula incorporated both Level 1 and Level 2 variables and the results are presented in Table 4.2. Table 4.3 shows community and individual level variances along with percentage of explained variance at both levels. The percentage of explained variance was derived by calculating the ICC explained earlier. A total of six models are presented.

Level-1 Model

$$Y_{ij} = \hat{\beta}_{0j} + \hat{\beta}_{1j} \times (Sex_{ij}) + \hat{\beta}_{2j} \times (White_{ij}) + \hat{\beta}_{3j} \times (Black_{ij}) + \hat{\beta}_{4j} \times (Asian_{ij}) + \hat{\beta}_{5j} \times (CivicEng_{ij}) + \hat{\beta}_{6j} \times (Citizen_{ij}) + r_{ij}$$

Level-2 Model

$$\hat{\beta}_{0j} = \hat{\gamma}_{00} + \hat{\gamma}_{01} \times (Urban_j) + \hat{\gamma}_{02} \times (ConcAff_j) + \hat{\gamma}_{03} \times (LengthSt_j) + \hat{\gamma}_{04} \times (ResidInv_j) + \hat{\gamma}_{05} \times (CollSoc_j) + \hat{\gamma}_{06} \times (FSI_j) + \hat{\mu}_{0j}$$

$$\hat{\beta}_{1j} = \hat{\gamma}_{10} + \hat{\mu}_{1j}$$

$$\hat{\beta}_{2j} = \hat{\gamma}_{20} + \hat{\mu}_{2j}$$

$$\hat{\beta}_{3j} = \hat{\gamma}_{30} + \hat{\mu}_{3j}$$

$$\hat{\beta}_{4j} = \hat{\gamma}_{40} + \hat{\mu}_{4j}$$

$$\hat{\beta}_{5j} = \hat{\gamma}_{50} + \hat{\mu}_{5j}$$

$$\hat{\beta}_{6j} = \hat{\gamma}_{60} + \hat{\mu}_{6j}$$

Model 1 tested the influence of neighborhood stability (concentrated affluence, length of stay residential investment) on physical activity. As you can see, Model 2 added individual level attributes of gender and race. Model 3 introduced early family social integration along with neighborhood stability and individual characteristics. Subsequently, Model 4 includes social participation and Model 5 includes type of community.

Model 1: Neighborhood stability and physical activity. The purpose of Model 1 was to analyze the significance of neighborhood stability (Wave 1) in predicting physical activity scores (Wave 4). Model 1 therefore examined the effects of neighborhood stability-concentrated affluence, length of stay, and residential investment- on physical activity. Concentrated affluence had a positive linear effect on physical activity ($\hat{\beta} = 0.22$, $p_v < .001$). Both length of stay ($\hat{\beta} = -0.15$) and residential investment ($\hat{\beta} = 0.04$) had a non-significant influence on physical activity. In other words, the longer an individual lived in a neighborhood, the less likely he or she is to be active in the future. Concentrated affluence therefore emerged as a significant, positive influence on physical activity.

Mixed Model

$Y_{ij} = \hat{\gamma}_{00} + \hat{\gamma}_{01} \times (Urban_j) + \hat{\gamma}_{02} \times (ConcAff_j) + \hat{\gamma}_{03} \times (LengthSt_j) +$
$+\hat{\gamma}_{04} \times (ResidInv_j) + \hat{\gamma}_{05} \times (CollSoc_j) + \hat{\gamma}_{06} \times (FSI_j) + \hat{\mu}_{0j} + \hat{\gamma}_{10} \times (Sex_{ij}) +$
$\hat{\gamma}_{20} \times (White_{ij}) + \hat{\gamma}_{30} \times (Black_{ij}) + \hat{\gamma}_{40} \times (Asian_{ij}) + \hat{\gamma}_{50} \times (CivicEng_{ij}) +$
$\hat{\gamma}_{60} \times (Citizen_{ij}) + \hat{\mu}_{0j} + \hat{\mu}_{1j} \times (Sex_{ij}) + \hat{\mu}_{2j} \times (White_{ij}) + \hat{\mu}_{3j} \times (Black_{ij}) +$
$\hat{\mu}_{4j} \times (Asian_{ij}) + \hat{\mu}_{5j} \times (CivicEng_{ij}) + \hat{\mu}_{6j} \times (Citizen_{ij}) + r_{ij}$

where:
$\hat{\gamma}_{00}$ = average intercept for the Level-2 intercepts when Level-2 equal zero
$\hat{\gamma}_{01}$ = change in intercepts with one unit change in urban versus rural community type
$\hat{\gamma}_{02}$ = change in intercepts with one unit change in concentrated affluence (NS)
$\hat{\gamma}_{03}$ = change in intercepts with one unit change in length of stay (NS)
$\hat{\gamma}_{04}$ = change in intercepts with one unit change in residential investment (NS)
$\hat{\gamma}_{05}$ = change in intercepts with one unit change in collective socialization (EFSI)
$\hat{\gamma}_{06}$ = change in intercepts with one unit change in formal system involvement (EFSI)
$\hat{\gamma}_{10}$ = change in slopes with one unit change in sex
$\hat{\gamma}_{20}$ = change in slopes with one unit change in White
$\hat{\gamma}_{30}$ = change in slopes with one unit change in Black
$\hat{\gamma}_{40}$ = change in slopes with one unit change in Asian
$\hat{\gamma}_{50}$ = change in slopes with one unit change in Civic Engagement (SP)
$\hat{\gamma}_{60}$ = change in slopes with one unit change in Citizenship (SP)
$\hat{\mu}_{0j}$ = residual effects of the community
$\hat{\mu}_{1j}$ = residual effects of the community
$\hat{\mu}_{2j}$ = residual effects of the community
$\hat{\mu}_{3j}$ = residual effects of the community
$\hat{\mu}_{4j}$ = residual effects of the community
$\hat{\mu}_{5j}$ = residual effects of the community
$\hat{\mu}_{6j}$ = residual effects of the community
r_{ij} = random effect

Level-2: Neighborhood Stability (NS), Early Family Social Integration (EFSI), and Urban versus Rural
Level-1: Social Participation (SP), Race, Gender
***ij*:** Neighborhood Stability (NS), Early Family Social Integration (EFSI), and Urban versus Rural

Model 2: Gender, race, neighborhood stability and physical activity. Model 2 added individual level variables- race and gender- to examine whether previously observed

neighborhood stability and physical activity relationship were different for males, as compared to females, and between different racial groups. Race was categorized into four groups. In the present study, 17.3% of the participants identified themselves as Black/African American, 50.5% as White/Caucasian, 5% as Asian, and 27.2% as Hispanic or other. Gender in the present study was operationalized by participants' self-identification as either male or female. There were 46.8% males and 53.2% females. In Model 2, being female ($\hat{\beta} = -0.30$, $p_v < .001$) and Black ($\hat{\beta} = -0.22$, $p_v < .001$) has a significant negative relationship with physical activity as compared to males and other races. Similarly, a negative but non-significant relationship was observed between different racial groups and physical activity. Although there were different scores for White ($\hat{\beta} = -0.10$) and Asian ($\hat{\beta} = -0.14$) racial groups, these differences were not statistically significant. In Model 2, adding gender and race explained 3.13% of variance at the community level and 6.58% at the individual level.

Therefore, while being White or Asian does not increase the likelihood of being physically active, being Black can significantly influence levels of physical activity. While effects of concentrated affluence reduced from 0.22 to 0.21 ($p_v < .001$) and remained a significant influence, both length of stay ($\hat{\beta} = -0.06$) and residential investment ($\hat{\beta} = -0.03$) had a non-significant negative effect on physical activity. In other words, staying longer in a neighborhood and owning a home as a family has no direct effect on levels of physical activity. These findings suggest that individual characteristics like race and gender can have an influence on physical activity, sometimes more than the environment. In this study, being female and being Black significantly influences ones level of physical activity. However, this does not decrease the overall influence of concentrated affluence on physical activity, implying the important influence of structural aspects of community on human behavior.

Model 3: Early family social integration, neighborhood stability, gender, race, and physical activity. Model 3 introduced early family social integration variables at the community level, mainly collective socialization and parental formal system involvement.

Table 4.2: Multilevel Model Effects of Individual and Community Characteristics on Physical Activity

Independent Variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**
Community/Second Level					
Neighborhood Stability					
Concentrated Affluence (CA)	0.22**	0.21***	0.19***	0.15***	0.11*
Length of Stay	-0.15	-0.06	-0.06	-0.10	-0.10
Residential Investment	0.04	-0.03	-0.03	-0.02	0.03
Early Family Social Integration					
Collective Socialization			0.02	0.02	0.02
Formal System Involvement			0.06	0.03	0.03
Community Characteristics					
Urban vs. Rural					0.05
Person/First Level					
Social Participation					
Citizenship				0.02*	0.04*
Civic Engagement				0.12***	0.12***
Individual Characteristics					
White		-0.10	-0.10	-0.11	-0.11
Black		-0.22**	-0.22**	-0.24**	-0.24**
Asian		-0.14	-0.14	-0.16	-0.16
Female		-0.30***	-0.30***	-0.30***	-0.30***
Constant	-0.32	0.03	0.02	0.05	-0.01
AIC	38,350.11	38071.71	38,078.65	37,943.96	37,944.27

Data: Waves 1, 3, and 4 of the National Longitudinal Study of Adolescent Health
N = 15,701; *$p < .05$,**$p < .01$, ***$p < .001$

Collective socialization has a positive linear relationship with physical activity ($\hat{\beta} = 0.02$) but was not statistically significant. Formal social involvement had a positive relationship with physical activity ($\hat{\beta} = 0.06$) and was not statistically significant. The results imply that

while early family social integration processes like parental involvement at the community level (collective socialization) and participation in formal systems in the community (formal system involvement) can positively influence physical activity, they are not a significant influence on the outcome overall. In Model 3, concentrated affluence ($\hat{\beta} = 0.19$, $p_v < .001$) remained a significant influence on physical activity. Both length of stay and residential investment continued to have a negative relationship to physical activity as explained in Model 2. In terms of individual level influences, a similar pattern from Model 2 was repeated in Model 3. Specifically, being Black ($\hat{\beta} = -0.22$, $p_v < .01$) and being Female ($\hat{\beta} = -0.30$, $p_v < .001$) were both significant influences on physical activity. As discovered in Model 2, both White and Asian racial groups continued to have similar, negative coefficients indicating no advantage of one racial group over the other in terms of being more physically active. Early family integration variables did not shrink the influence of neighborhood stability scores, indicating the persistent influence of structural influences on human behavior and social processes. In detail, stable neighborhood characteristics like concentrated affluence can promote healthy parental involvement at the community level, though not a statistically significant influence. Overall, in Model 3, 3.17% of variance is explained at the community level and 6.62% is explained at the individual level.

Model 4: Social participation, neighborhood stability, early family social integration, race, gender, and physical activity. In Model 4, I examine whether individual level social participation (civic engagement and citizenship) mediate the relationship between physical activity and neighborhood stability (concentrated affluence, length of stay, residential investment), and early family social integration (collective socialization and formal system involvement). Both civic engagement ($\hat{\beta} = 0.12$, $p_v < .001$) and citizenship ($\hat{\beta} = 0.02$, $p_v < .05$) emerged as significant, positive linear influences on physical activity. In the current model, introduction of social participation reduced concentrated affluence from 0.19 ($p_v < .001$) in Model 3 to 0.15 (p¡.001) in Model 4. This shift in the coefficient

Table 4.3: Variance and Percentage of Explained Variance for Level-2 and Level-1

Variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**
Level-2 (Community)					
Intercept1 - μ_0	0.01253	0.04292	0.04353	0.04321	0.04180
Level-1 (Individual)					
Sex - μ_1		0.07002	0.07070	0.07104	0.07096
White - μ_2		0.00724	0.00708	0.00616	0.00577
Black - μ_3		0.00440	0.00478	0.00504	0.00453
Asian - μ_4		0.00857	0.00835	0.01694	0.01794
Civic Engagement - μ_5				0.00777	0.00784
Citizenship - μ_6				0.00094	0.00110
Individual - r	1.28322	1.23872	1.23832	1.21540	1.21590
Perc. of Explained Variance					
Community	0.97%	3.13%	3.17%	3.16%	3.06%
Individual	NA	6.58%	6.62%	7.90%	7.92%

across models suggest the important influence of social participation- citizenship and civic engagement- on physical activity longitudinally. However, social participation did not significantly reduce the influence of race and gender on physical activity. Female and Black participants in the study continued to have similar coefficients and a statistically significant negative influence on physical activity. This persistent pattern of racial and gender influence on the outcome will be explored in Chapter 5.

Model 5: Urban vs. rural community type, social participation, neighborhood stability, early family social integration, race, gender, and physical activity. In Model 5, I examined the influence of the type of community- whether being a rural or an urban community- had any influence on physical activity. With a coefficient of 0.05, including community type into Model 5 did not significantly change the regression estimates of other predictors. Although residential investment coefficient turned positive, it still remains

nonsignificant. This suggests that the significant associations observed in the predictors in Model 4 existed across all community types. Also, looking at a rural versus urban comparison did not add to the understanding of physical activity.

4.3 Model Fit

Table 4.2 includes the values of the AIC which functions as a fit index. The AIC is a general rule for acceptable fit for continuous data and is recommended as a useful index to compare across models (Schreiber et al., 2006). As a rule of thumb, the smaller the AIC across the model, the better the fit of the model (Maydeu-Olivares & Garcia-Forero, 2010).

The AIC score varied from model to model, with Model 4 having the lowest AIC (37943.96). Model 4 introduced social participation (Wave 3), which included individual levels of civic engagement and citizenship. The introduction of social participation also demonstrates cross-level mediation via reduction in concentrated affluence coefficient. Cross-level mediations in multi-level models occur when a previously significant predictor either becomes non-significant or reduces as a result of adding another variable to the model. Concentrated affluence reduces from 0.22 (p_v ¡ .001) in Model 1 to 0.15 (p_v ¡ .001) in Model 4 when social participation (Level-1, Wave 3) was introduced. The results from Model 4 show the significant influence of social participation on physical activity.

4.4 Summary

First, as expected neighborhood stability at Wave I, mainly through concentrated affluence was directly connected physical activity at Wave 4. This relationship remained positive and significant with addition of other individual and community variables. Second, as expected, social participation emerged as a significant influence on physical activity. Third, individual

race and gender emerged as significant for females and African-Americans, implying higher risk for physical inactivity. Contrary to theoretical assumptions about the role family of origin involvement, early family social integration did not emerge at as significant influence on physical activity. In the present study, concentrated affluence, citizenship, civic engagement, being black, and female consistently influenced the level of physical activity. They were persistent across all models, especially affluence and individual demographics. Overall, a great amount of variability remains yet to be captured. There are other or perhaps better variables at the community level that can better explain individual levels of physical activity overtime. Finally, there was an absence of interaction between community level and individual level variables. The lack of interaction implies that while structural level and individual level factors are influences on physical activity, there are no additive or multiplicative effects of community and individual level variables on physical activity.

Chapter 5

Discussion

5.1 Chapter Overview

The purpose of the study was to understand longitudinal influence of neighborhood, social integration, and social participation on physical activity. The recommendations from (King et al., 2002; King, Bauman, & Abrams, 2002) the field placed emphasis on developing a '"choice-enabled" framework to understand physical activity. Historically, physically activity has been mainly described and theorized from "choice-persuasive" (personal, cognitive, and motivational) perspectives. A choice enabling framework highlights influences outside of the individual that can equally explain peoples' tendencies to behave in a particular way above and beyond individual make-up. Therefore, King and colleagues highlighted personal, family, community, and environmental aspects when outlining a "choice-enabling" framework. The social organizational theory of community action and change provided the appropriate handles to translate personal, family, environmental, and community levels to investigate physical activity. Using the Longitudinal National Study on Adolescent Health Data, I operationalized various community, family, environmental, and personal correlates of physical activity. The present study not only responds to the need for a choice-enabling model of

physical activity, but also partially tests the basic assumptions of the social organizational theory of community action and change. The findings of the study partially supported the hypothesized model of physical activity and various aspects of the theory. The six models tested in this study highlighted the various ways in which community and individual levels influenced physical activity. The results were also concordant with the assumptions stated in Chapter 1 (contextual, benevolence, neighborhood, and emergent).

In the following pages, I discuss the results of the study in relation to theory and similar studies in the literature. As a scientist-practitioner in the field of family therapy, I also discuss clinical and therapeutic implications of physical and social organizational theory. Following the therapeutic implications, I provide an overview of merits as well as limitations of the study. Some recommendations are made for future studies of a similar nature and I close the discussion with broad thematic overview of the study in the summary and conclusion section.

5.2 Neighborhood Stability and Physical Activity

This section discusses the study question of whether there was a significant relationship between neighborhood stability during adolescence and levels of physical activity later as adults. Neighborhood stability represents structural aspects of communities and their longitudinal influence on physical activity. My theoretical model emphasized the important role of context that accounts for access to resources and hypothesized the overarching influence of social structure on behavior (Sampson et al., 1999, 2002). I operationalized neighborhood stability via concentrated affluence to account for economic stability and access to resources; length of stay and residential investment to account for residential stability. While homeownership and length of stay are indicators of increased neighborhood stability, in the present study only concentrated affluence emerged as a significant influence on physical activity,

suggesting that economic indicators may have a stronger influence on physical activity. In fact, affluence remained significant influence across all models except for the one tested for interaction (as shown in Model 6 of the results).

The significance of affluence not only confirms the overarching structural influence of neighborhood on physical activity, but also the longitudinal effects of early neighborhood context with easy access to resources on physical activity. Browning & Cagney (2003) found that affluence is a better predictor of health than poverty and that there was a significant interaction between affluence and residential stability. While the present study confirms the powerful influence of affluence similar to their study, residential stability did not pan out as a significant association. Residential stability, in the present study does not exert a significant influence on physical activity and this can be for several reasons. First, while residential stability can aid in formation of close social networks (Kang & Kwak, 2003; Williams et al., 2008) and provide consensus regarding appropriate norms for social behavior, residential stability may be less influential in setting standards for specific health behavior. In my theoretical model, I assumed residential stability can offer the same stabilizing mechanism for physical activity. While residential stability in the Browning & Cagney (2003) study was positive in predicting self-related health, the present study focuses on understanding a particular health behavior rather than overall health. Therefore, while residential stability provides opportunities for better social relationships overall, such stability does not exert significant, longitudinal influence on physical activity as compared to concentrated affluence.

In my theoretical framework, concentrated affluence (Browning & Cagney, 2003; Lenzi et al., 2012; Massey, 1996; Wen et al., 2003) accounts for a resource oriented context to understand health and health behavior. For example, because of a high middle class concentration, higher level of education, and presence of families, there is a greater chance of stable, accessible public infrastructure like parks, recreational facilities, health programs. Such resources are available due to concentration of middle and upper middle class residents in communities

who exert a strong influence on structural factors that aid in health promoting conditions (Browning & Cagney, 2003). The elements of concentrated affluence then represent economic stability. Additionally, in the Browning & Cagney study, residential stability's influences on health diminished when affluence was low. Therefore, an important environmental factor to consider in a choice-enabled framework on physical activity is the level of economic stability, which in turn creates resourceful communities that facilitate health promoting conditions. Additionally, a certain level of affluence may be associated with different norms for health and health standards. In a study that explored the relationship between SES and physical activity in adolescent children (Drenowatz et al., 2010), it was concluded that children from lower SES show a trend of high physical inactivity and spend more time on sedentary behaviors. In another investigation (Lee, 2012), the author investigated physical activity among adolescents in Hong Kong and compared the activity levels of adolescents who lived in low and high SES environments. The results of this Hong Kong study confirmed the hypothesis that children living in high SES had better environmental support for physical activity and also responded better to school based social support for physical activity. In the present study, affluence may be also influencing physical activity via different set of norms associated with health, especially when one takes into account availability of resources to promote healthy behaviors. Additionally, being exposed to resources of an affluent area early on in ones childhood may predispose them to use similar resources differently as they age.

5.3 Early Family Social Integration and Physical Activity

This section discusses the study question that asked whether a relationship exosted between early family social integration (during adolescence) and later levels of physical activity (in adulthood). Early family social integration represents community level social organizational

processes through collective socialization and formal system involvement of parents of participants at Wave 1. I hypothesized that collective socialization or parenting at the community level and parental involvement in formal systems will influence social participation (Wave 3) and physical activity (Wave 4). Contrary to stated expectations found in Model 3, early family social integration did not emerge as a significant predictor.

Collective socialization and formal system involvement theoretically highlighted the mechanism through which families connect to the community. Strong family-community connection represents strong social integration. In the present study, greater family ties to the community implied greater access to social capital. This was expected to increase access to resources at the community level which can influence individual behavior. The association between greater family social integration and physical activity was not significant for several reasons.

Traditionally, parental involvement at the community level has been associated with appropriate social norms and social support that act as protective mechanisms (Brody et al., 2001; Wickrama & Bryant, 2003). The role of collective socialization and formal participation increases consensus and does contribute to stronger ties between the family and community. While such connections provide protective mechanisms by establishing appropriate norms and standards for behavior, it may not translate to particular health behaviors like physical activity. In other words, studies that highlight the protective mechanisms of family ties to community emphasize mechanisms which prevent certain types of behavior. The protective mechanisms of social integration are largely associated with prevention of deviant behavior; where as the present study investigates the relationship of family social integration to promoting a particular health behavior.

Second, protective factors like collective socialization and parental involvement (early family social integration) are likely to emerge as significant in the context of adverse conditions and negative environmental markers (Rutter, 1985). A plethora of studies that

examine family and community institutional ties focus on understanding such influences of delinquency, violence, depression, and other high risk behavior (Brody et al., 2001; Sampson et al., 2002; Wickrama & Bryant, 2003) in the context of relative disadvantage. Following the premise that adversities better account for protective factors, Brody et al. (2001) not only found that the collective socialization prevented adolescent deviant behaviors, but also that collective socialization effects were more pronounced in highly disadvantaged neighborhoods. In the present study, early family social integration was positive, but not significant. This implies that while such mechanisms can influence physical activity, but they do not have a pronounced effect on physical activity as compared to deviant behaviors. The protective, advantageous elements of family social integration again may be more pronounced for such behaviors than something like physical activity.

Third, the family social integration element of parental involvement in the community is measured at Wave 1 and the dependent variable physical activity is measured at Wave 4. The lack of significance may be stemming from temporal influences; in that, family social integration may have implications for physical activity closer to Wave 1 than Wave 4. Overall, early family social integration is not a significant mechanism that can explain longitudinal differences in physical activity.

Finally in Chapter 2, a discussion of the influence of social capital at the collective and individual level was explained as it relates to the theoretical model. Poortinga (2006) argued for both collective individual effects of social capital on health. Despite a strong theoretical presentation, the results showed that beneficial assets of social capital operated through the individual level. Additionally, national levels of aggregate social trust and civic participation were not associated with peoples self reported health. Similarly, in the present study, greater involvement of the family at the community level did not have significant associations with other variables in the study.

5.4 Social Participation and Physical Activity

This section discusses the study question of whether a relationship existed between social participation as young adults and levels of physical activity later in adulthood. Social participation accounted for individual level community involvement through civic engagement and citizenship. Civic engagement refers to social activities which primarily involve voluntary time invested in various civic associations in a community. Citizenship refers to political activities measured through individual ties to political parties and their level of participation in the political process after the age of eighteen. Higher civic engagement and citizenship was associated with greater individual level integration into the community, therefore hypothesized to influence physical activity. As expected, both civic engagement and citizenship emerged as significant influences on physical activity. Additionally, civic engagement and citizenship were measured at Wave 3, implying a temporal dimension to the association to physical activity. Social participation therefore is an important factor to focus on when considering a choice-enabling framework for physical activity for the several reasons.

First, social participation has long been tied to several health benefits. Berkman & Syme (1979) found that level of social involvement was predictive of premature death. Berkman & Glass (2000) note the important contribution by Durkheim in understanding the relationship between suicide and social integration. A general theme in social science research is the value of social involvement, social integration, and its link to positive health outcomes (Browning & Cagney, 2003; Cohen et al., 2006; Fowler & Christakis, 2008; Gottlieb & Gillespie, 2008; Kawachi et al., 2008; Lindstrom, 2008; Mancini et al., 2003; Thomas, 2011). Such positive health outcomes are predicated on direct involvement and interaction with others. Direct involvement through civic engagement and related activities may increase the chances of adopting positive health behaviors. Thus broader theories of physical activity should consider social participation.

Second, the results from the present study are confirmed by other studies in the literature (Greiner et al., 2004; Legh-Jones & Moore, 2012; Lindstrom et al., 2001,0; Lindstrom, 2008). Legh-Jones & Moore (2012) found that lack of individual social involvement was strongly associated with physical inactivity and vice versa. Their study highlighted the importance of social participation and its link to physical activity. In another study by Greiner et al. (2004), among several study variables (self-rated health, depression, smoking, obesity, drinking), only community involvement was strongly associated with physical activity. Their results emphasized the role of social participation in minimizing health risks, especially through a strong association with physical activity.

Third, social participation reduced the significance of concentrated affluence on physical activity, which speaks to the importance of individual involvement in the community. Concentrated affluence although reduced, remained significant at a lower level, implying the persistent influence of social participation and physical activity.

Fourth, Poortinga (2006) theorized about the beneficial properties of social capital at the individual level and the collective level. While community level social capital has positive correlations with health outcomes (Helliwell & Putnam, 2004; Kawachi & Berkman, 2000; Putnam, 2000), benefits of social capital are accrued through individual level action. The significance of social participation in the current study is supported by Poortinga's hypothesis that individual benefits of social capital are transmitted at the person level than the collective level. Therefore, it may be the case that health behaviors like physical activity are better explained by active individual level engagement with community rather than via the collective fund of social capital in the community. The level at which such benefits operate is important for both prevention and intervention science; especially to specify if the intervention target should be person-based or placed-based (Poortinga, 2006; Subramanian et al., 2003b).

5.5 The Social Organizational Theory and Physical Activity

The social organizational theory provided the necessary theoretical consonance to elaborate a choice-enabled model. As mentioned previously, choice enabling framework highlights influences outside of the individual that can equally explain peoples' tendencies to behave in a particular way above and beyond individual make-up. The theory offered several opportunities and limitations.

First, the present study mainly uses the 2005 version of the model (Mancini et al., 2005) to make the distinctions between social structure and social organizational process and individual outcome (physical activity). The 2009 version of the model (Mancini & Bowen, 2009) provided strong anchors to define community antecedents (neighborhood stability) / social structure. Specifically, the community resilience model (Mancini & Bowen, 2009) made a distinction between social (residential stability, people knowing each other) and physical infrastructure (built environment). The present study captured the social infrastructure with residential stability and aspects of physical infrastructure through concentrated affluence.

Second, Mancini and Brown's (2013) focus on the relationship between social structure and social organizational processes provided additional pivots to conceptualize a choice-enabled theory using the social organizational model. While there is an ongoing debate which may ultimately depend on the type of outcome, intention of theory use (intervention, prevention, or research) about the distinction between whether networks are part of social structure or social organizational process (Mancini et al., 2005; Mancini & Bowen, 2013) the present study includes networks as part of social organizational processes. Additionally, the present study also capitalized on the protective (Kretzmann & McKnight, 1993) versus the risk assumption of the theory.

Third, the authors emphasize the role of informal networks and formal systems and these two aspects of network structure play a pivotal role in influencing individual and family results. Therefore, the network aspect of the theory not only emphasizes the family-institution connection but how institutions influence family and individual life. The present study only captured family and individual input to community and does not account for the reverse.

Finally, in the present study, individual social participation and physical activity are significantly associated. The theory however, mainly speaks to the role collective action, reciprocity, and mutuality in the community (community capacity, social capital, and network strengths) and does not fully account for role of individual engagement in explaining outcomes. When applying this theory to research, it is important to account for individual aspects for your study. The authors make note of this in their 2013 review. In reviewing literature that spanned over ten years in family science journals and seminal textbooks over the past few decades, Mancini & Bowen (2013) speak of moderators at the individual level of gender, race, and culture. They claim that social organizational processes may be differently associated for members of different racial and cultural groups. In the present study, both neighborhood structure and social organizational processes were negatively associated with race and gender. It is therefore important to speak of individual level processes that may affect outcomes.

Previous empirical studies have looked at positive perceptions of community capacity on depression (Bowen et al., 2004) and informal social connections influence on family adaptation (Bowen et al., 2004). The social organizational model may operate differently for different levels of outcomes, individual, family, behavioral, biological, cognitive to name a few. The linkages and associations may differ amongst the social organizational processes; social capital at the collective level may influence outcomes differently than individual social capital. In future studies, it is important to specify such nuances.

Overall, it is important to consider individual level actions and its contribution to outcomes. For example, while a community may have high network interaction, reciprocity, individual people may receive them differently depending on their level of social interaction and commitment to such processes. Overall, the social organizational theory of community action and change provided a strong theoretical base to understand environmental, individual, and community level influences on physical activity.

5.6 Clinical Implications of the Study

As a family therapist and a behavioral scientist, the present study has important clinical and theoretical implications for psychotherapy. Of importance, there are two main themes. First, physical activity- a modifiable risk factor in health behavior- has increasing implications on influencing our brain to change the way we learn, think, feel, and behave. Therapy primarily engages the cognitive, emotional, relational, and social spheres of human behaviors but rarely accesses the biological aspects. I briefly discuss how physical activity can directly influence biology and why psychotherapists should consider it as an important part of treatment plan. Second, present study makes a case for the protective role of social organization. I briefly discuss the importance of considering this broader framework of social networks and social participation as part of psychotherapy.

Physical activity and therapy. It is common logic that more physical activity can lead to better health. Philosophers as early as Plato noted that physical activity is important for human development and growth. John Ratey & Hagerman (2008) quotes the following from Plato in his book Spark: "In order for man to succeed in life, God provided him with two means, education and physical activity. Not separately, one for the soul and the other for the body, but for the two together. With these two means, man can attain perfection." (p.1)

As mentioned previously, psychotherapy (both family and individual therapy models) has developed mental and behavioral models to influence emotional and psychological changes. However, biological influences on emotional, psychological and behavioral changes have largely been ignored in psychotherapy. Psychiatry uses medications to influence neurotransmitters and processes but does so with creating an imbalance in the brain (Ratey & Hagerman, 2008) which may create short term gains but often disturb normal neurotransmitter functions, increase likelihood of chronic illness (Whitaker, 2005). Physical activity, intricately connected to workings of the human brain, can trigger similar mechanisms like psychiatric medications to better manage anxiety, depression, and other psychological experiences (Ratey & Hagerman, 2008). Additionally, physical activity enhances the brain's capacity to learn, create new experiences, and negotiate new ways of behaving. As the goal of most psychotherapy is change, physical activity needs to be considered as an important ingredient for change in therapy. Therapists can find creative ways to incorporate physical activity as part of their therapy work with patients. Regular physical activity should be an important element in self-management long after therapy is terminated. Therefore, recommending and prescribing physical activity as part of therapeutic work is one way of influencing biology to better sustain changes made in therapy. I briefly review some important aspects that further substantiate the relationship between mental health, learning, and physical activity.

By the 1980s, there were over 1,000 articles published that provided anecdotal, theoretical, and scientific evidence connecting specific psychological and mental health traits to physical activity. A summative review of these studies was completed by Taylor, Sallis, and Needle (1985). These authors found that physical activity increases academic performance, emotional stability, intellectual functioning, locus of control, sexual satisfaction, work efficiency, memory, mood amongst other benefits. They also noted that physical activity can decrease tension, confusion, depression, headaches, stress response, and anxiety among other

benefits. Their article noted specific studies as it related to depression, anxiety, psychotic behaviors, alcoholism, substance abuse, mental retardation, and other psychological effects. In their conclusion, they reported that physical activity has some benefits on mental life and psychological health. Specifically, it alleviated symptoms of mild to moderate depression and anxiety, increased self confidence, and may alter stress response and may be a beneficial adjunct to substance abuse and alcohol programs. This early attempt to document direct effects provided some solid connections while a majority remained as speculation.

After 23 years, John Ratey, a psychiatrist and Eric Hagerman, a science writer wrote a comprehensive book on the connection between regular exercise and its relation to the brain. The authors provided evidence that regular physical activity can contribute to better learning, decreased depression, anxiety, and increase quality of life in general. Of importance in their comprehensive work on the science of exercise and its connection to mental and physical life is their chapter on learning. In short, regular, moderate physical activity better prepares the brain for learning. Regular exercise can improve alertness, attention, and motivation- which enhance the mindset for learning; improves the process of nerve cells binding, which enhances learning; improves production of new nerve cells for learning. For a detailed review, refer to (Ratey & Hagerman, 2008). Some of the studies reviewed found that aerobic exercises that helped students reach their maximum heart rate consistently performed better in tests and improved their overall functioning. Their overall recommendation is mild to moderate, regular exercise, which can help the body and improve plasticity of the brain. The increased plasticity helps the brain to continuously re-wire, create new connections and enrich existing memories and connections. When therapists help clients focus on exercise as part of their work, the change that follows stimulates growth, learning, immunity, and the capacity of the brain learn and adapt.

Physical activity, therapy, and social organizational theory. In his essay titled, “A Case for Refocusing Upstream: The Political Economy of Illness”, John B. Mckinlay McKinlay

(2008) wrote an analogy using a river and drowning people to describe clinical medicine. He wrote:

> "Sometimes it feels that I am standing by the shore of a swiftly flowing river when I hear the cry of a drowning man. So I jump into the river, pull him to shore, and begin artificial respiration. Just when he begins to breathe, theres another cry for help. So, I jump into the river, reach him, pull him to shore, apply CPR. And then just as he begins to breathe, there's another cry for help, and back in the river again and then another yell, and again and again. So, you know, I'm so busy jumping in rescuing them that I have no time to see who the hell is upstream pushing them all in." (p. 578)

Behavior changes like commitment to regular physical activity and other goals that emerge in therapy has both downstream and upstream factors. While psychological theories help address downstream factors, a lens like the social organization theory can help therapists consider upstream factors. In the present study, social participation, concentrated affluence, being black, female and the type of community (urban versus rural) were all strongly associated with physical activity. Therefore, while therapy is equivalent to performing CPR in the analogy above (as in providing individual care through therapy), a broader perspective can help therapists and clients consider both upstream and downstream factors that are obstacles to behavioral improvement. In addition to existing modalities of treatment, therapists can incorporate individual theories of motivation and planned behavior change to help with physical activity. Using important reviews like Ratey & Hagerman (2008), therapists can better educate patients about how physical activity influences biology and brain functioning to help them work with depression and anxiety. To consider upstream or broader aspects of behavior change, therapists can use the social organizational model of community action

and change. Understanding community antecedents- the physical and social infrastructure- of a patients' social, environmental makeup can be instructive in planning various activities.

For example, in one of my recent clinical encounters, to help a patient manage her hypertension, it was important for us to figure out how, when, and where she would walk for exercise. As part of behavioral change work with her (downstream factors), we mapped out a schedule, identified barriers to walking, solutions to overcome present barriers, and made specific behavioral commitments. We further elucidated her motivations and reasons for her commitment to lifestyle changes (walking more regularly and eating a balanced diet). Then, we mapped out her neighborhood (upstream factors), location of the grocery store, took notice of nearby parks, school grounds. We utilized her own knowledge and used Google Maps to track details during her office visit. All of this was entered into her personalized plan for the appointment. As part of her plan, the patient was able to schedule two walks during the week to go to nearby grocery store as part of her walk schedule, especially to increase fruits and vegetables to her diet. Considering both individual level factors (commitment to behavioral change) and community antecedents (parks, school grounds, route to grocery shop) were important clues to change.

The present study as well as other literature confirms the benefits of social participation and social engagement. In the present study, social participation involved volunteered time and political participation. Assessing how individual patients are engaged or not engaged in community are important clues to unlocking their own individual social capital. According to the social organizational framework, greater involvement in formal systems and informal networks increases social capital. Research has shown that social isolation leads to poorer health, premature death, and increase risk for mental health conditions (Berkman & Syme, 1979; Berkman & Glass, 2000; Cornwell & Waite, 2009; House et al., 1988).

The framework of the current study which emphasizes community and structural effects on individual behavior provides family therapists with a map to intervene at the community

level. While majority of family therapy training focuses on individual, couple, and family level treatment, some writers in the field has emphasized the role of family therapists in change via community engagement and partnerships (Doherty & Carroll, 2002). Such investments in change emphasize the role of broader thinking, building partnerships with the larger community to find solutions for unique challenges. In New Jersey, a project called Doctor Hotspotting demonstrates this type of work, which is directly relevant for Medical Family Therapy professionals. Doctor Hotspotting essentially identifies frequent ER and hospital admissions, tracks them by zip-code, and intervene to prevent further utilization of the health care system. For example, the project identified certain neighborhoods were more vulnerable for higher ER use. Once they identified the repeat visitors within this area, they developed an inter-disciplinary team to address this issue. They started working with each family in their neighborhood. They did preventive measures like disease education, improve home environment, and increased home visits. The study framework has been instrumental in translating this grant idea in my current internship as a medical family therapist. We are currently involved in a project that looks at reducing hospital admissions by targeting certain areas that have higher admissions as well as promoting preventive measures through use of community social networks. Such solutions are systemic as they bring together different parts of the system together to change the outcome for individuals and the healthcare system.

5.7 Contributions of the Study

The current study is unique for several reasons. While several studies have separately assessed the influence of community and individual level variables on physical activity (Berrigan & Troiano, 2002; Boone-Heinonen et al., 2010; Handy et al., 2002; Haskell et al., 2007; Lewis et al., 2002; McGinn et al., 2007), the present study is unique in its theoretical framework

in combining social structural level and social organizational level processes to understand physical activity. Secondly, the social organizational theoretical model is operationalized as a longitudinal model using different three different waves from the National Longitudinal Study on Adolescent Health. Therefore, the present study not only combines multi-level data to understand a "choice-enabled" framework on physical activity, but also adds the dimension of time into the discussion of theory and physical activity. Finally, the social organizational theory of action and change has evolved primarily as an action framework, mainly applied to understand the influence of social organizational processes (Bowen et al., 2001; Huebner et al., 2009; Bowen et al., 2004; Mancini & Bowen, 2013; Bowen et al., 2013) in developing community capacity and improve outcomes for military families. While the theoretical framework have been discussed with partial and anecdotal evidence to frame issues of health (Mancini et al., 2003), this is the first attempt to directly apply the framework to understand a particular health behavior.

5.8 Limitations of the Study

While the extant data from the Add Health provided good sample size and longitudinal data, there were limitations on defining social and environmental concepts as it related to physical activity. Mainly, neighborhood stability measurements were proxies for neighborhood structure via income, education, home ownership, and family investment in the neighborhood. Secondly, community capacity (shared responsibility and collective competence), an important element in the social organizational model was not operationalized due to lack of appropriate items to represent the same. Although concentrated affluence and residential stability represented neighborhood stability (community antecedents), they did not quiet capture the notion of physical and social infrastructure. In the present study, neighborhood was operationalized on factors that assumed will lead to stronger physical and social infras-

tructure. Next, social participation was measured at Wave III and asked about volunteered time at a set of pre-determined social groups like the NAACP or the Sierra Club. The participants were aged between 18 and 24 for this phase. The survey missed other important avenues of social commitment during this developmental (young adult) stage. For example, many participants may have been in college and therefore missed important collegiate level social commitments like student government, special clubs, and local community organizations. The study followed individuals aged 8 through 12 into their college years and again into young adulthood. The study design could not adequately account for developmental changes and age of participants. Finally, census tracts were used to define neighborhood stability. According to Iceland & Steinmetz (2003), while census tracts defined with inputs from residents of the area and represent a denoted geographic region, they are often homogenous in their demographics, standard of living, and economic characteristics. Because tracts were used to define community level variables, the study did not adequately capture across community differences on physical activity.

5.9 Recommendations and Next Steps

Future studies should consider the following aspects to better understand a choice enabled perspective on physical activity. First, using GIS data in Add Health, studies should account for the built environment for communities as a marker of community antecedents (Butler et al., 2011). Second, more than early family social integration, a future study should use the social network data to account for community level processes of participants. Such a study should also operate Level-2 using the school level identification numbers instead of tract identification numbers. While this changes the definition and catchment area from the present study, participants who are students at Wave 1, spend more time in the physical and social environment of the school. Measuring social network influences from school can better

account for peer effects (Fowler & Christakis, 2008), which better accounts for individual social capital of the participant at Wave 1. The shift to measuring community influences at the school level can also account for the social and physical infrastructure that can account for community level (at the school level) integration. Next, in future studies that may use census tracts as Level-2 should consider using all the Neighborhood items instead of concentrated affluence and residential stability from the contextual data set. The neighborhood items in Wave 1 may better account for the social infrastructure than residential stability. Finally, future studies should use census blocks instead of tracks to better account for differential influence of across community differences on physical activity.

While the present study provided a glimpse of choice-enabled elements and their influence on physical activity, there is still a need to identify a stronger theoretical framework to understand broader influences on physical activity. Future studies must continue to document external and environmental influences on physical activity. With increasing public health risks such as coronary heart diseases, Type II diabetes, cholesterol, hypertension, and obesity, understanding upstream factors that influence physical activity are of critical importance for prevention and intervention sciences. Such efforts must also incorporate sound theoretical frameworks that have the capacity to link individual outcome to larger social, environmental, and interpersonal influences.

5.10 Summary and Conclusion

Influences on human behavior are layered within, between, and around individuals. While individual aspects like race, gender, and genetics represent the within aspects, the between is represented via social connections and community involvement. These are further layered into social, economic, and physical infrastructures of communities.

The present study found individual, social, and structural infrastructure have differing influence on physical activity. Mainly, as hypothesized, I found that economic stability is a longitudinal influence on physical activity, while residential stability was not predictive of the same. Second, while individual social participation as young adults influenced physical activity, early family social integration was not significantly associated with physical activity. In the present study, the protective mechanism of social capital better operated at the individual level than the collective level. Therefore contrary to expectations, early family social integration was not a significant influence on physical activity.

Overall, the present study provides results that speak to a "choice-enabled" framework to understand physical activity. The social organizational model of community action and change provide important conceptual anchors to define the broader social and structural influences. As much as physical activity is a personal decision, such individual level choices are heavily influenced by ones social structure, social integration, and social participation over time.

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