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WASHINGTON UNIVERSITY IN ST. LOUIS

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Exploring Contextual Differences in Environment and Policy Strategies to Promote Physical
Activity in Disadvantaged Communities

by

Natalicio Hector Serrano, MPH

A dissertation presented to
The Graduate School
of Washington University in
partial fulfillment of the
requirements for the degree
of Doctor of Philosophy

August 2021

St. Louis, Missouri

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Washington University in St. Louis

August 2021

ABSTRACT OF THE DISSERTATION

Exploring Contextual Differences in Environment and Policy Strategies to Promote Physical Activity in Disadvantaged Communities

by

Natalicio Hector Serrano

Doctor of Philosophy in Public Health Sciences

Brown School

Washington University in St. Louis, 2021

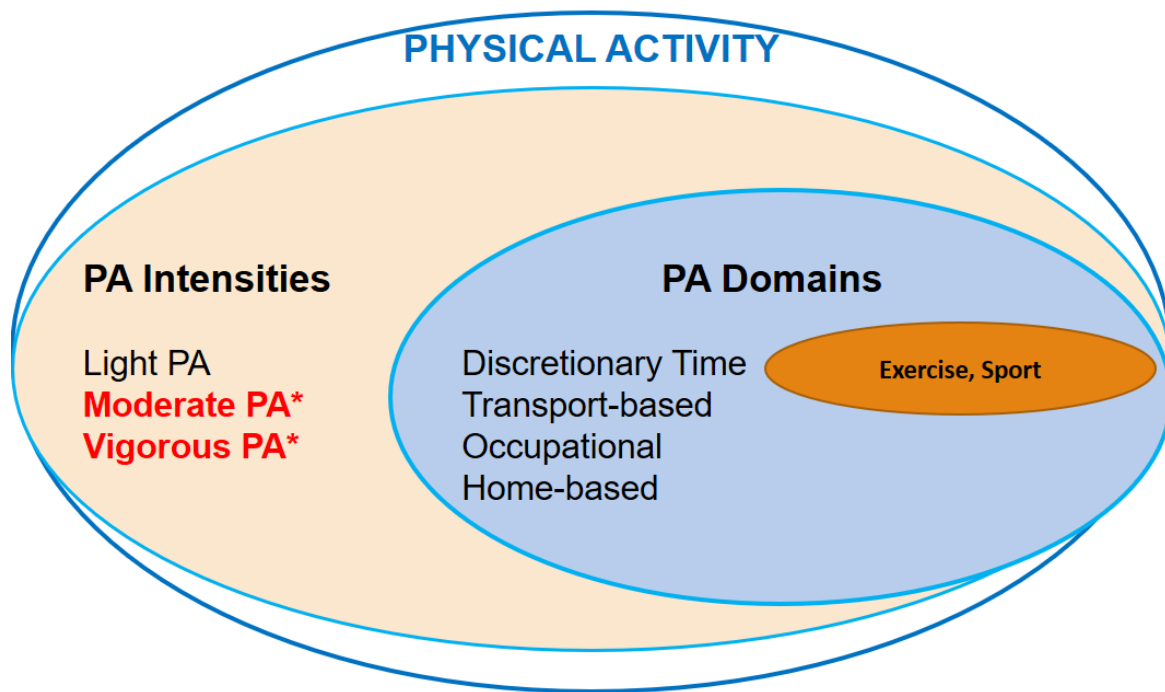
Professor Ross C. Brownson, Chair

The benefits of physical activity for health are far reaching, including the reduced risk of several chronic diseases.¹ However, only about 24% of US adults meet recommended guidelines of physical activity, with traditionally disadvantaged populations such as rural residents and persons of color facing even lower rates.² Ecological models of health behavior help to understand correlates of physical activity that impact population health,³ but may not be as useful in disadvantaged populations where the evidence base is either lacking or not as rigorous. Furthermore, measures and methods may be underdeveloped in disadvantaged populations and there is a lack of understanding of context (social-cultural, political, economic) in these settings. A health equity lens is needed to address some of these barriers and help equalize opportunities to be active and healthy.^{4,5} The present study seeks to contribute to health equity and the evidence base by addressing three aims in key disadvantaged populations: 1) Examine sub-population differences in the relationship between the perceived built environment and rural residents' objectively assessed physical activity; 2) Assess how community development strategies influence the built and social-cultural environment to promote physical activity; and 3)

Describe the impacts (benefits and consequences) of community development strategies for health promoting environments. Rural midwestern adults, particularly women, have disproportionately lower levels of physical activity, but there is evidence to suggest that increased self-efficacy for physical activity and recreational access (including walking trails) may help to promote physical activity in this group. However, a lack of clear associations between perceived environmental factors and physical activity, suggests the importance of gender in driving physical activity behaviors. Community development strategies that have traditionally focused on social and economic benefits for disadvantaged communities, may also benefit the health of communities by providing infrastructure and opportunities to be physically active. Neighborhood improvements such as the implementation of smart growth strategies and complete streets are shown to influence physical activity behaviors. However, successful community development that benefits all community members should also focus on capacity building for key stakeholders in the community (e.g., community members, public health practitioners, advocates) and community engagement. Public health practitioners and advocates should engage with community members, but also across sectors.

Chapter 1. Introduction & Specific Aims

Physical activity, is defined as “bodily movement produced by the contraction of skeletal muscles that increases energy expenditure above the basal level,”⁶ and is operationalized, according to intensity levels and daily living activities (**Figure 1**),⁷ and quantified by frequency and duration. Physical activity intensity levels are defined according to metabolic equivalents or METS, as light (1.1 – 2.9 METS), moderate (3-5.9 METS) and vigorous (6+ METS) physical activity levels.⁸ Daily living activities further classify activities according to domain specific physical activities as leisure time (i.e., discretionary time), occupational, transport based, and home based.⁹ Exercise is considered to be component of physical activity, and is typically categorized under leisure time physical activity as it is “...done to improve or maintain 1 or more components of physical fitness.”⁶ Additionally, frequency characterizes the number of times an activity is performed at a certain intensity level within a specified time frame; while duration quantifies the amount of time that activity is performed. Understanding how physical activity is operationalized and quantified, also provides context for the public health implications of being physically active. The 2018 Physical Activity Guidelines for Americans for example, recommends aerobic guidelines of 150 minutes of moderate to vigorous physical activity (MVPA), and two or more days a week of muscle strengthening activities, with key messaging indicating that some physical activity is better than none.^{1,10}



*health-enhancing physical activity (activity of these intensities contributes towards physical activity guidelines)

Figure 1. Physical activity constructs: Total physical activity, domains, and intensity levels⁷

1.1 Public health implications of physical activity

In line with the 2018 Physical Activity Guidelines for Americans, the benefits of regular physical activity are well established.^{11–13} Because physical activity influences aerobic capacity, lipid profiles, insulin levels, immune function, and hormone levels, those who are physically active have a decreased risk of developing cardiovascular disease¹⁴ and cancer.^{15,16} Physical activity is also inversely associated with lung function—specifically the heart’s ability to pump blood to your lungs.¹⁷ Physical activity can help prevent and control obesity through increasing energy expenditure, reducing abdominal and visceral fat, building lean body mass, and moderately increasing metabolic rate.¹⁸ Even those who are overweight or have obesity, but are physically active have much lower death rates from cardiovascular disease and all-cause

mortality than people who are sedentary and unfit.¹⁹ Continued adherence to high levels of physical activity is also associated with long-term success in weight loss maintenance.²⁰

Physical activity is also related to certain mental health and cognitive outcomes. For example, regular increased levels of physical activity is associated with decreased levels of depression, and higher levels of self-esteem.²¹ Physical activity also promotes overall psychological well-being.²² Additionally, those who participate in regular physical activity are also at lower risk of declining cognitive function as they get older.¹⁷ In addition to the many long term health benefits, short term health benefits should also be considered. These short term or immediate benefits can include improved sleep quality, reduced blood pressure, and reduced short term feelings of anxiety.¹⁰

Despite the potential short and long term health benefits, in 2018 only 30% of adults met aerobic guidelines for physical activity, with even fewer (24.1%) meeting the combined aerobic and muscle strengthening guidelines for physical activity.² When considering the fact that some physical activity is better than none, it is especially concerning that about half (46%) of all adults engage in little or no leisure-time physical activity.² Additionally, since 2006 the trends of meeting physical activity guidelines suggest no significant improvements in adherence to aerobic guidelines in adults.²³ Even more concerning, there are significant disparities in physical activity by race/ethnicity, socioeconomic status, gender, rural status, and age.^{24,25} Age and gender have consistently been associated with physical activity, with women engaging in less physical activity than men and an inverse association seen with age.^{24,26} Indicators of socio-economic status are also associated with physical activity. Adults with more education and adults living above the poverty level are more likely to meet physical activity guidelines than those with less education and those who are at or below the poverty level respectively.²⁷ Furthermore, when

controlling for income, racial/ethnic minority groups face disproportionately lower rates of meeting physical activity guidelines, with only 20% of non-Hispanic blacks and 22% of Hispanics meeting these guidelines compared to 25% of their White counterparts in 2018.² Additionally, rural residents in the United States face physical activity rates that are disproportionately lower when compared to those from urban and suburban communities.^{28,29} Therefore, equitably promoting physical activity across all communities remains one of the most important public health issues in the US and worldwide.^{30,31}

1.2 Ecological frameworks and multi-level influences on physical activity

In considering strategies to promote physical activity across all individuals, **Figure 2** and **Figure 3** illustrate conceptual frameworks for how multilevel correlates relate to physical activity behaviors and their health implications.³² As physical activity behaviors are driven by an individual's interaction within their environment (built, social-cultural, policy), this dissertation is informed not only by multilevel correlates of physical activity behaviors, but more broadly by ecological models of health behavior.^{3,33–36} Ecological models of health behavior posit that different levels (i.e., intrapersonal, interpersonal, environment, and policy) influence health behaviors (e.g., physical activity, smoking, nutrition) both individually and together through interaction. Ecological models target/examine multiple levels of influence with the goal of creating more population wide change, in this case with the goal of increasing physical activity.

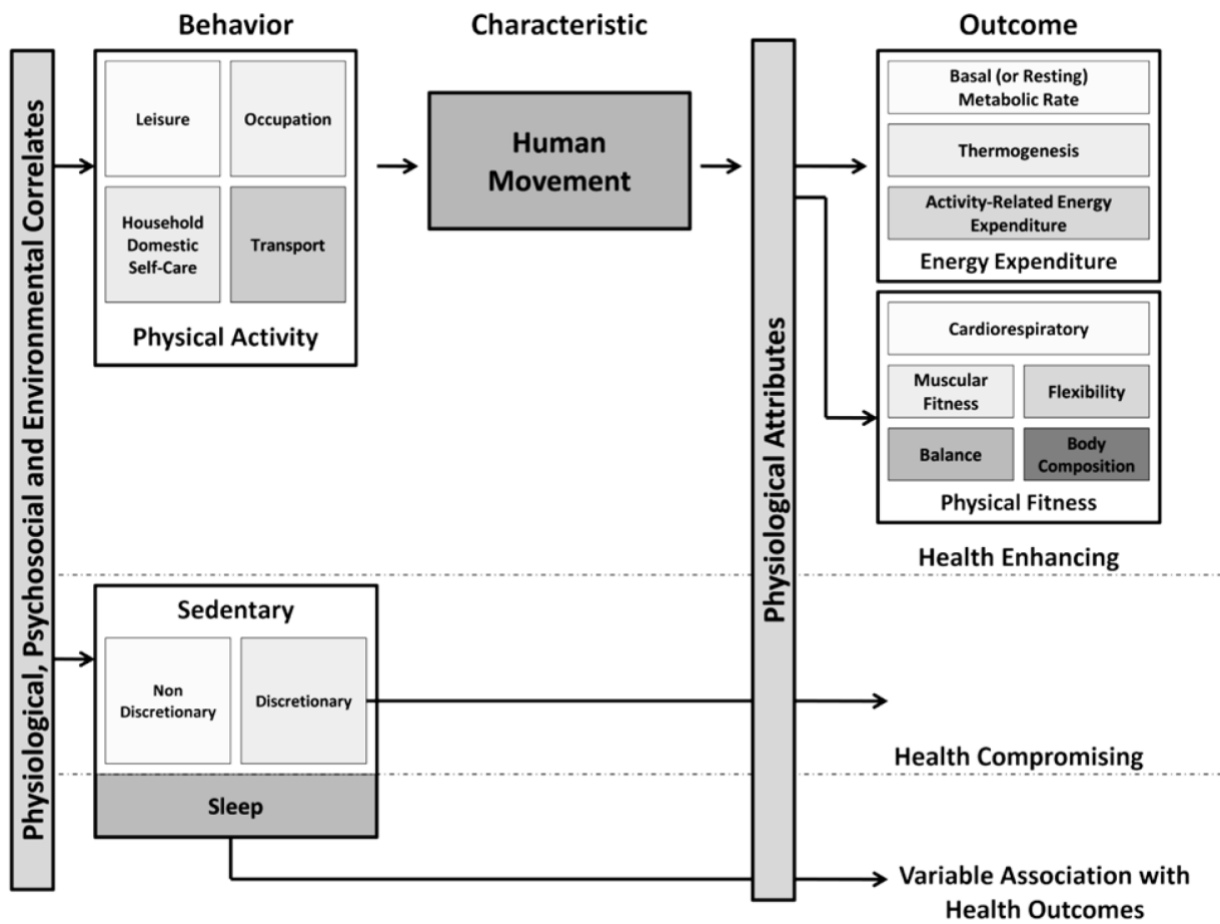


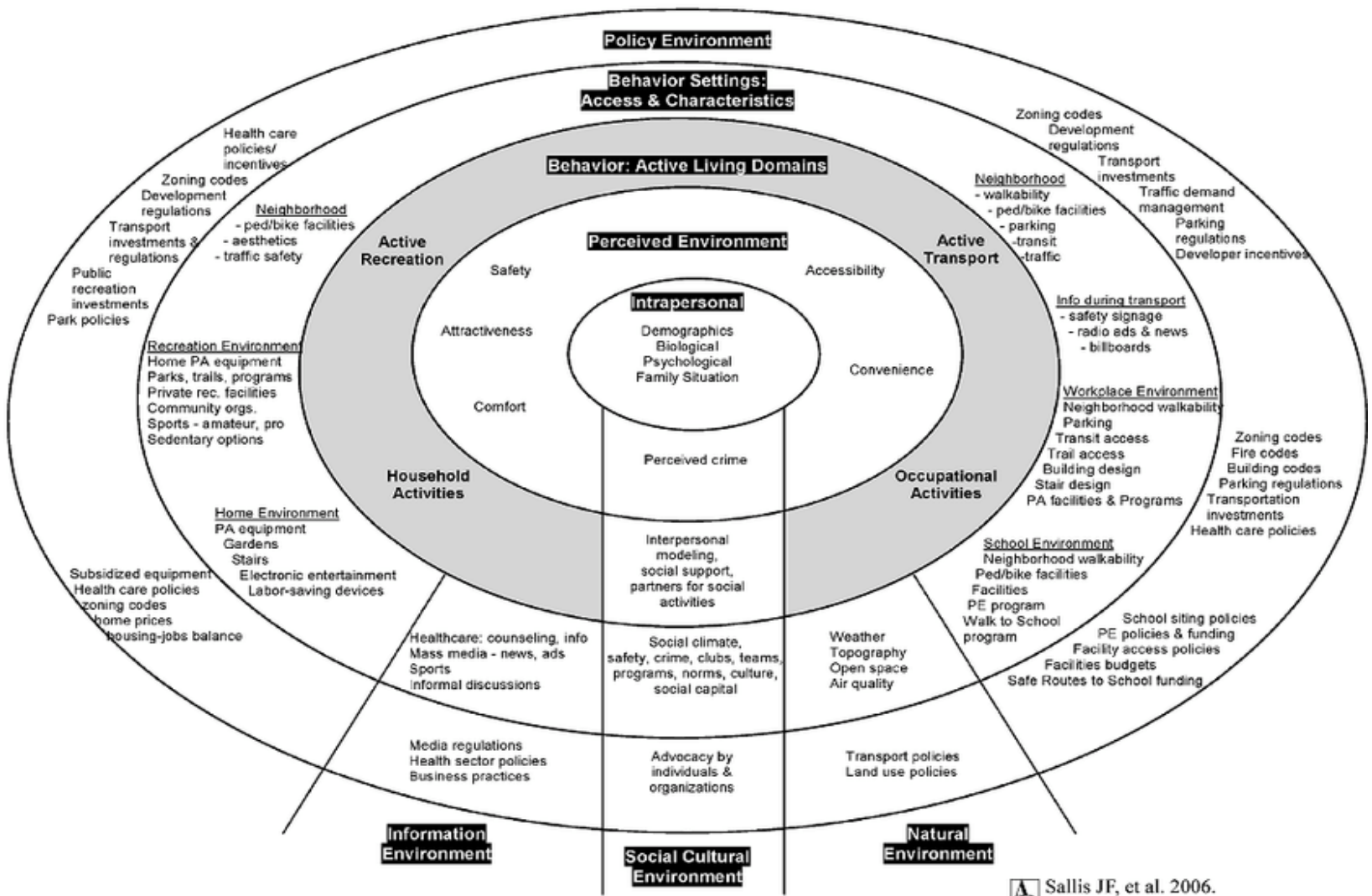
Figure 2. A conceptual framework for physical activity as a complex and multidimensional behavior³²

A notable ecological model in the realm of physical activity includes the ecological model of the four domains of active living.³ Active living is a term used to convey physical activity as a behavior that is not just done for recreational purposes or exercise, but that is done through a person's daily living activities including for transportation, occupation, or in the household.³ In this ecological model (**Figure 3**), the four domains of active living include active transport (Transportation related physical activity), active recreation (leisure time physical activity), household activities (Household physical activity), and occupational activities (Occupational physical activity). Each of these domains has a set of specific influencers that

come from the same general levels of influence: intrapersonal, perceived environment, behavior settings (access and characteristics), policy environment, information environment, social cultural environment, and natural environment.

In this dissertation, the ecological levels examined include the intrapersonal level, interpersonal level, the environment (i.e., built, social-cultural), and policy. Intrapersonal level factors refer to individual level characteristics which can be demographic (e.g., race, income, education), biological (e.g., biomarker), behavioral (e.g., travel behaviors), psychological or internal factors (e.g., self-efficacy, self-perceptions). Interpersonal correlates refer to between people influences, such as spousal social support. Environmental level correlates refer to higher level factors that are outside of one's control. These include community and institutional level influences such as the built and social-cultural environment. Finally, policy level correlates are policies (local, national, or global) associated with health, in this case physical activity. As stated earlier, understanding each level of correlates of physical activity may help inform strategies to equitably promote physical activity, but also provide insight for examining physical activity in disadvantaged communities.

Ecological Model of Four Domains of Active Living



Sallis JF, et al. 2006. Annu. Rev. Public Health 27:297-322

Figure 3. Ecological Model of Four Domains of Active Living

1.2.1 Intrapersonal & Interpersonal

When considering intrapersonal level correlates of physical activity, as mentioned before there are significant disparities by race/ethnicity, socioeconomic status, gender, rural status, and age.^{24,25} Though these disparities are important for targeting physical activity promotion strategies, it is also important to examine modifiable correlates of physical activity. Psychosocial variables including self-efficacy for physical activity, and intentions of being physically active have shown to be positively associated with levels of physical activity.^{24,37,38} Additionally, interpersonal correlates, including social support for physical activity have been positively associated with levels of physical activity.^{24,39-41}

1.2.2 Environment

Environmental correlates involve aspects of the built environment and the social-cultural environment; the built environment includes aspects of the physical environment made by human activity, including, land use patterns and the transportation systems.⁴² In order to maintain healthier lifestyles and create sustainable opportunities for community members to be physically active, recent strategies have included changes in community design that make neighborhoods more supportive of active living.^{3,43-45} This is illuminated in the Community Guide recommendation for built environment approaches that combine improvements in transportation such as sidewalks, bicycle lanes, and expanded public transit, with land use and community design changes such as improved parks and recreation facilities and mixed-use development that enable housing in proximity to destinations such as businesses and schools.⁴⁶ The social-cultural environment may include perceptions of the neighborhood environment that are socially focused and can include an individual's perceptions of safety, attractiveness, comfort, accessibility, and convenience.³ Though less studied than the built environment, aspects of the social-cultural

environment including, perceived safety from crime, perceptions of the neighborhood aesthetics, and perceived access to recreational facilities have also been positively associated to physical activity.⁴⁷⁻⁴⁹ It has been shown that both built and social-cultural aspects should be addressed when examining physical activity related behaviors.⁵⁰

1.2.3 Policy

Additionally, the policy environment can include either of the “small p” or “Big P” policies.⁵¹ Big P policies are the higher-level policies that are formally enacted by government. These can include formal laws, codes, and regulations at the national, state or local level. In the realm of physical activity, a ‘Big P’ policy would be a law mandating physical education classes in public school systems. Small p policies operate at an organizational level and are often enacted in the private sector or internally within agencies without legislative action. A ‘small p’ policy in physical activity could be a worksite policy that encourages sitting less, and moving around more. Though less studied than all other levels of correlates, policies that mandate investment in key resources (e.g., bike lanes, recreational facilities) or mandate guidelines of physical activity (e.g., worksite policies, school policies) have shown to be positively associated with physical activity.²⁴

1.3 Health (in)Equity & Disadvantaged communities

Though an ecological framing may help to target disadvantaged communities, or those groups that face disparities in physical activity and it’s adverse health outcomes (e.g., cardiovascular disease, obesity, cancer); a *health equity* framing is vital toward not only reducing or eliminating these disparities but striving to promote social justice and equalize opportunities to be active and healthy.⁵ Key challenges to achieving health equity include

limitations of the evidence base, underdeveloped measures and methods, and inadequate attention to context.⁴

While there is a clear evidence base for correlates of physical activity²⁴, the evidence is less consistent for a range of disadvantaged populations (e.g., minority populations, rural residents).⁵² Most correlate studies have focused on mostly white, middle and upper income populations, with one large systematic review highlighting the importance of examining correlates in lower income or developing countries, as relationships between multilevel factors and physical activity may look different when compares to developed or middle to high income countries.²⁴ Furthermore, one review highlighted the need to improve the quality of evidence when examining built environment effects of physical activity through a health equity lens.⁵³ In considering methods and interventions for physical activity, a review of physical activity interventions in socioeconomically disadvantaged communities highlighted that most (70%) interventions were considered low quality, and had issues with recruitment and retention of participants.⁵⁴ This implies that there may be a broader disconnect between the implementation of strategies and understanding the social-cultural, economic, and political context that shapes disadvantaged communities. For example, even if opportunities for physical activity (e.g., parks, expanded public transit) exist in socio-economically disadvantaged communities, they tend to have fewer amenities, are not well-maintained, and are perceived as unsafe.⁵⁵

In order to achieve health equity, a more concerted effort to promote physical activity and improve physical activity infrastructure in disadvantaged communities is necessary. Building the evidence base, tailoring strategies for physical activity, cross-sectoral promotion of physical activity, and capacity building are strategies that may help to achieve health equity with regards to physical activity.^{4,56}

1.3.1 Need to improve equity in access to physical activity opportunities

In ensuring health equity, there is a need to improve equity in access to physical activity opportunities in disadvantaged populations. Specifically, rural communities are a key disadvantaged group that requires attention. Demographically, rural settings have higher proportions of lower-income and less-educated individuals when compared to urban settings.^{57,58} Rural settings also have less and often poorer access to key health and social services such as healthcare facilities, cultural hubs, and higher education.⁵⁹⁻⁶¹ Specific to physical activity, rural settings also face disparities in access to physical activity opportunities. Parks and other recreational facilities are more common in urban communities.²⁸ Additionally, there is a lack of these recreational facilities in rural settings or they are not well maintained.⁶² Accessing community spaces such as schools and churches has shown to provide sufficient opportunities for physical activity.⁶³ However, the quality and accessibility of these recreational facilities has been cited as a huge barrier to physical activity in rural residents.⁶² As rural populations in the US have significantly higher chronic disease rates than urban residents, increasing physical activity by reducing barriers in rural settings is critical in improving public health and striving towards health equity.^{64,65}

1.3.2 A key strategy for health equity in physical activity: community development

One broad strategy that may be effective in achieving health equity with regards to physical activity is community development. Community development has been described as a means to elicit social, economic, political, and environmental change in communities in response to dismal conditions and areas in decline.⁶⁶ Community development strategies may be federally funded initiatives such as Community Development Block Grants, but can also be driven by community members or non-profit organizations.⁶⁷ Historically, these strategies have focused on

improving social and economic outcomes,⁶⁸ typically in the form of ensuring housing and providing social services. Recently, there has been a shift and focus on community development as a way to support healthy living.^{67,69,70} This impact on health is realized through the social determinants of health. Specifically, community development may help to ensure that community members are able to control their own destinies and participate in the social factors that influence their lives.⁷¹ Another process by which community development can influence health is through improvements in the built and policy environment; which have consistently been shown to be associated with obesity⁷²⁻⁷⁶ as well as physical activity behaviors.^{77,78} This aligns with the idea that where people live and play has the biggest influence on how long and how well they live.⁷⁹⁻⁸¹

The evidence on the overall health disparities in socioeconomically disadvantaged communities (even across zip codes), has created interest in making communities more equitable in terms of providing access to healthy environments, potentially through community development strategies.^{82,83} Because of this, many community development and transportation funding opportunities recommend or require components of equity within project proposals.⁸⁴⁻⁸⁷ In order to maintain healthier lifestyles and create sustainable and equitable opportunities for community members to be physically active, recent strategies have included changes in community design that make neighborhoods more supportive of active living.^{3,43-45} This is illuminated in the Community Guide recommendation for built environment approaches that combine improvements in transportation such as sidewalks, bicycle lanes, and expanded public transit, with land use and community design changes such as improved parks and recreation facilities and mixed-use development that enable housing in proximity to destinations such as businesses and schools.⁴⁶ Improving infrastructures for physical activity in socioeconomically

disadvantaged communities has the potential to decrease health inequities because the changes would likely serve long term residents.²

1.3.3 Potential consequences: gentrification & displacement

However, potential consequences of these community improvements may be decreased affordability and gentrification of neighborhoods.⁸⁸ Improvements in opportunities for physical activity can also be tied to broader socio-economic development and capitalization of areas, resulting in increased property values, but also an increased cost of living. The Urban Displacement Project defines gentrification as “a process of neighborhood change that includes economic change in a historically disinvested neighborhood —by means of real estate investment and new higher-income residents moving in - as well as demographic change - not only in terms of income level, but also in terms of changes in the education level or racial make-up of residents.”⁸⁹ As part of this process, the historical disinvestment in an area experiencing gentrification, may amplify existing socioeconomic inequalities and become a process that can potentially increase health disparities among residents.⁹⁰⁻⁹² This is highlighted by a recent systematic review on the health impacts of gentrification, which found that Black and low-income individuals suffered negative effects of gentrification including mental health issues and poor self-rated health.⁹³

Furthermore, a key negative outcome associated with gentrification is displacement of long-term residents. There are clear social and economic impacts of displacement such as a loss of social networks, housing stability, and educational opportunity.^{94,95} Similar to gentrification, displacement may lead to negative health effects for marginalized communities. This is partially due to a loss of resources or social capital that can lead to negative health behaviors. For example, displacement may lead to lower accessibility to healthy food options or transportation

choices.^{91,96} There is also the potential to increase disparities in physical activity, as the displacement of residents who are already disadvantaged may lose access to opportunities to be physically active. More directly, displacement of residents may lead to loss of healthcare access as well as mental health issues.^{97,98}

Leaders of the Transportation, Land Use, and Community Design Sector of the National Physical Activity Plan⁹⁹ have included gentrification as a priority objective for future study (**Figure 4**). However, the extent to which advocacy and planning agencies implementing health promoting environment improvements to address gentrification either through prevention or mitigation is unknown.

Table 1. NPAP Transportation, Land Use, and Community Design Sector’s Relevant Objective

Strategy	Tactic	Objective
Communities should change zoning laws to require or favor mixed-use developments that place common destinations within walking and bicycling distance of most residents and incorporate designated open space suitable for physical activity. (TLC-2)	Develop and disseminate policy tools to reduce the possible impacts of gentrification on low-income neighborhoods that adopt healthy design principles, as they become more desirable and experience rising home values. (TLC-2.3)	By 2025, a national transportation, city planning, or housing organization will take the lead in compiling an inventory of state and local organizations that have adopted codes, policies, and practices designed to reduce gentrification and equitable economic development.

Source: <http://www.physicalactivityplan.org/theplan/transportation.html>

Figure 4. NPAP Transportation, Land Use, and Community Design Sector’s Relevant Objective

1.4 Research aims & conceptual model

Although there is a wealth of evidence on the multiple levels (i.e., intrapersonal, interpersonal, environment, policy) of influence on physical activity, there is a need to address health equity in framing the promotion of physical activity. This is in part due to the lack of evidence about distinctions in the relationship between the intrapersonal, interpersonal,

environment, and policy on physical activity in disadvantaged communities. In addition to this, interventions promoting physical activity in disadvantaged communities have been of low quality and have struggled with both recruitment and retention of participants.⁵⁴ One way to improve this is to acknowledge the importance of context and to embed multilevel, contextual elements (e.g., measures of or changes to the social-cultural, economic, political) in studies examining the factors associated with physical activity. In order to address these gaps, this dissertation will focus on the following specific research aims in the form of three papers:

Perhaps add a sentence about how little we know about the effects on gentrification and displacement on PA, and the role of community development on this relationship.

1. Examine sub-population differences in the relationship between the perceived built environment and rural residents' objectively assessed physical activity.
2. Assess how community development strategies influence the built and social-cultural environment to promote physical activity.
3. Describe the impacts (benefits and consequences) of community development strategies for health promoting environments.

To include a health equity lens for the intended research, a conceptual model for community development, multi-level factors (i.e., intrapersonal, interpersonal, environment, and policy), and physical activity is proposed. The following conceptual model (**Figure 5**) shows an ecological representation of the relationship between the intra/inter-personal levels, environments, and policy on physical activity. Community development strategies are shown to influence physical activity through both the environment and policy. Additionally, gentrification is operationalized as not only a byproduct of community development but also a factor present as part of the environment (social-cultural). Furthermore, specific factors of influence are listed for each level

in the model. Each aim or paper is distinguished by blue arrows or lines. Paper one (aim one) is highlighted as examining the the intra/inter-personal levels and the the environment, while papers two and three explore community development and gentrification respectively within the realm of this model.

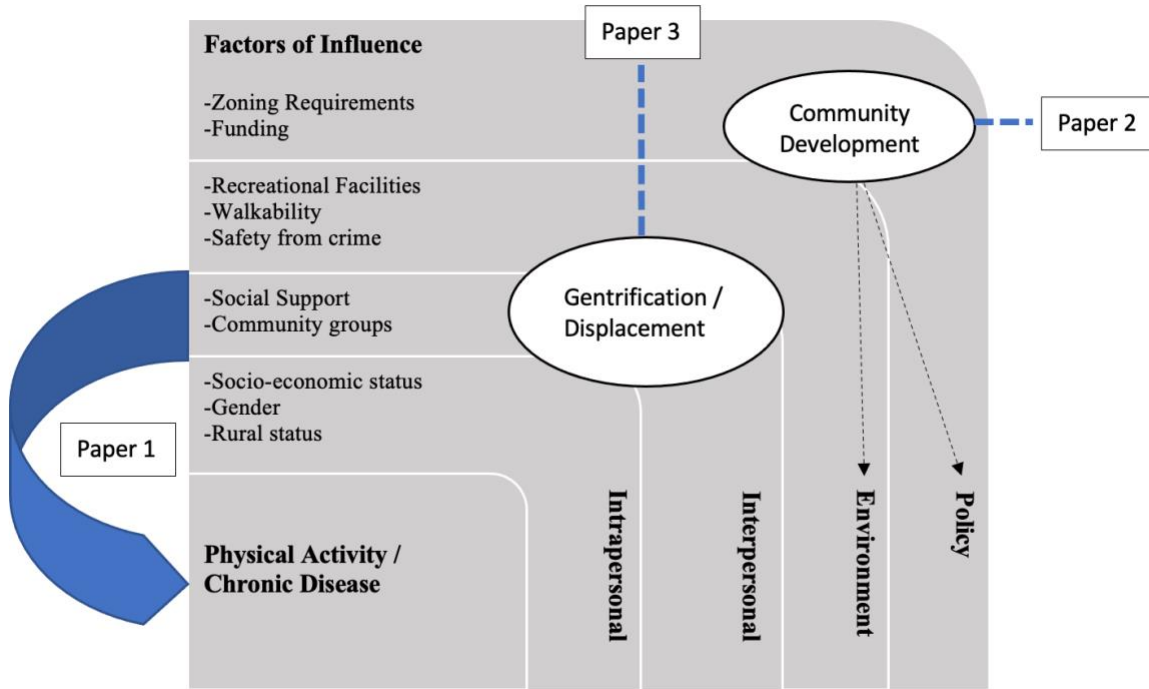


Figure 5. Multilevel influences of physical activity in disadvantaged communities: a health equity lens

Chapter 2. Examining the associations of intrapersonal, and perceived environmental factors with physical activity among rural Midwestern adults

2.1 Introduction

Rural populations in the US have significantly higher chronic disease rates than urban residents. Given the health-promoting and disease-preventing benefits of physical activity, increasing this behavior by reducing barriers to physical activity in rural populations is critical in improving public health.^{64,65} Residents of rural communities in the United States have physical inactivity rates that are disproportionately higher when compared to those from urban and suburban communities.^{28,29,100} In considering the clinical implications of physical activity,¹ it is especially concerning that, half of all residents from non metropolitan statistical areas did not meet the 2018 physical activity guidelines of 150 minutes of moderate intensity physical activity per week, 75 minutes of vigorous intensity physical activity per week, or a combination of both.² Disparities also exist within rural populations. For example, rural women face even higher rates of physical inactivity when compared to their male counterparts.¹⁰⁰ In order to alleviate these disparities in physical activity within rural communities, ecological models provide an opportunity to understand contextual factors of physical activity, and may help to target strategies to increase physical activity.^{3,101}

Per the ecological models of health behavior, different levels (i.e., intrapersonal, interpersonal, environment, and policy) influence health behaviors (e.g., physical activity, smoking, nutrition) both individually and together through interaction. Ecological models target/examine multiple levels of influence with the goal of creating more population wide change, in this case with the goal of increasing physical activity. The built and social-cultural environment can account for several modifiable factors in rural settings. For example, increasing

access to recreational opportunities for leisure time physical activity may be beneficial to rural settings as opposed to having sidewalks or interventions of transportation systems, which are important to urban settings. However, parks and other recreational facilities are more common in urban communities.²⁸ Additionally, there is a lack of these recreational facilities in rural settings or they are not well maintained.⁶² Accessing community spaces such as schools and churches has shown to provide sufficient opportunities for physical activity.⁶³ However, the quality and accessibility of these recreational facilities has been cited as a huge barrier to physical activity in rural residents.⁶²

Similar to urban settings, larger towns may have some sort of downtown center and increased density. Urban-based solutions may be more applicable in this sort of environment as this creates more active living opportunities (e.g., multiple destinations within walking distance).⁶³ However, many rural communities have built environments that are not supportive of physical activity (i.e., minimal active living opportunities). Rural residents are less likely to report the presence of sidewalks, streetlights, access to exercise facilities, and the presence of others exercising in their neighborhood, and are more likely to report the presence of unattended dogs.²⁸

There is some evidence on the characteristics of the built and social-cultural environment which support physical activity in rural settings. However, the evidence does not adequately address distinguishing demographic correlates such as gender. One study examining correlates of physical activity in rural women highlighted the importance of social environment factors such as attending religious services as important towards physical activity, but had inconclusive evidence on the physical or built environment.¹⁰² Additionally, most studies examining correlates of physical activity in rural women have focused on intrapersonal or interpersonal level

factors.^{102–104} For example, several studies have shown that psychosocial variables such as social support for physical activity, as well as self-efficacy for physical activity are associated with physical activity in rural women. That is having social support for physical activity and self-efficacy for physical activity are associated with increased physical activity in rural women.^{62,103,105} Overall, most of the studies presented are qualitative and/or are based on self-report data. Objectively assessing physical activity behaviors consist of a more valid approach towards examining correlates of overall physical activity.¹⁰⁶ However, no known studies have examined the association of individual, and neighborhood environment factors with objectively-measured physical activity in rural communities.

To better understand the correlates and moderators of weekly moderate to vigorous physical activity (MVPA) in rural communities, the aims of the present study were to (1) objectively estimate weekly MVPA and proportion of participants meeting guidelines; to (2) investigate associations of intrapersonal and environmental factors with weekly MVPA, and to (3) test interactions between intrapersonal (i.e., gender) and environmental factors in relation to objectively-measured MVPA. We expect positive associations of favorable perceptions of the environmental factors with weekly MVPA. Finally, the test of interactions between intrapersonal and perceived environmental factors in relation to weekly MVPA is exploratory, as there are few studies in this area. This study will add to the literature in understanding interactions of intrapersonal and environmental factors for physical activity, with the potential to improve ecological models specific to rural communities.

2.2 Methods

Participants and procedures

The present analyses will use baseline data collected between Fall of 2019 and Spring of 2020 from a sample of rural community members participating in the Heartland Moves

intervention to promote physical activity in Southeast Missouri.¹⁰⁷ The main trial includes 14 rural communities across Southeastern Missouri. In this study, rural communities were defined as a nonmetropolitan area with a population of less than 50,000. To be eligible, participants had to be between 18 and 70 years of age, be able to be physically active, reside in the targeted communities with a walking trail, and be willing to complete a survey at three time points. Among the full baseline sample of 1,252 participants, a sub-sample of 280 respondents participated in additional data collection measures. For the present analyses, data were collected from a sub-sample of participants from the main trial who agreed to wear an accelerometer and GPS device. The goal of the sub-study is to examine combined GPS-accelerometer data in order to objectively assess overall weekly MVPA along with location-based physical activity. Baseline measures were collected via a telephone survey in which participants would further consent to the sub-study mentioned above. If participants agreed to participate they were then mailed accelerometer and GPS devices to wear for at least 12 h/day for seven days, in addition to completing a quantitative survey. The survey includes items on demographics and perceptions of the community environment, including their neighborhoods and walking trails. Prior to data collection, Research Assistants obtained informed consent from participants. This study was approved by the Institutional Review Board of the sponsoring institution.

Measures

Accelerometry assessed physical activity. Participants are asked to wear an Actigraph wGT3X-BT accelerometer device.¹⁰⁸ Staff instructed participants to wear the device on a belt around their waist for at least 12 hours per day for seven days. Valid wear time was defined as at least 8 hours per day for at least three days, which has been used in several studies.^{109–112} The data were processed with each minute counted by using the Freedson cut-points to define MVPA

as 1952 counts per minute or more.¹¹³ From this, we computed weekly total MVPA minutes. Additionally, meeting the 2018 physical activity guidelines¹ was dichotomized as meeting 150 minutes or more per week of moderate-intensity, or 75 minutes or more per week of vigorous-intensity physical activity or an equivalent combination of aggregate moderate to vigorous physical activity.

Demographics/Intrapersonal characteristics. Demographic information was collected for all participant's including age, gender, education, race/ethnicity, and income. Gender was dichotomized by being male or female. Education was dichotomized by having a high school education (\leq High School Degree vs. $>$ High School Degree). Race was dichotomized by identifying as white or non-white, and annual household income was dichotomized by using a median split of \$50,000 (i.e., \leq \$50,000 vs. $>$ \$50,000). Intrapersonal characteristics related to physical activity behavioral factors were also collected, and included trail use and self-efficacy for physical activity. Trail use was also characterized by participant's reporting having used their local trail or not. Additionally, one psychosocial subscale was used from Bandura's Exercise self-efficacy scale (five items, Cronbach's $\alpha = 0.91$).¹¹⁴ Response options for each item in self-efficacy for physical activity ranged on a four-point likert scale (1= "Not sure at all" to 4= "very sure"), and were averaged to compute a mean score.

Perceived neighborhood environment. Three perceived neighborhood environment subscales were used from the abbreviated Neighborhood Environment Walkability Scale (NEWS), along with the Rural Active Living Perceived Environment Support Scale (RALPESS).^{115,116} RALPESS subscales used included indoor recreational access (six items, Cronbach's $\alpha = 0.91$), as well as the area around the home (five items, Cronbach's $\alpha = 0.79$). The NEWS subscale used characterizes Safety from traffic (five items, Cronbach's $\alpha = 0.74$).

Response options for each item ranged on a four-point likert scale (1= “strongly disagree” to 4= “strongly agree”). Negative statements were reverse coded, and items were averaged to compute scores for each subscale.

Analysis

Descriptive statistics (i.e., means and frequencies) were conducted for all variables of interest. Generalized linear mixed models were used for the main outcome (weekly MVPA), to examine associations with the intrapersonal and perceived neighborhood environment factors. Bivariate associations were conducted to include only statistically significant variables of interest. We used models with negative binomial distributions due to the skewed distribution and high number of zeros in counts. Regression coefficients were exponentiated and can be interpreted as Rate Ratios. That is, results can be interpreted as the percent increase/decrease in the dependent variable (weekly MVPA) for every unit increase in continuous independent variables. For a dichotomous independent variable, the percent increase/decrease in weekly MVPA is compared to the reference category of the independent variable. Models were adjusted for wear time and town. Moderating effects were examined by testing two-way interactions between the intrapersonal and perceived environmental factors, and using a backwards elimination approach to include only significant interactions in the model. All analyses were conducted using STATA software Version 15.1 (StataCorp LLC, College Station, Texas).¹¹⁷

2.3 Results

Sample Characteristics

The final sample dropped from 280 participants to 229 participants due to missing data on intrapersonal and environmental factors. No significant demographic differences were seen between the final sample and participants with missing data. The sample (mean age (SD) =

54.6(15.3)) was predominantly White and female, and had a household income at or less than \$50,000 (**Table 1**). On average, participants engaged in 96.6 (SD=117.7) minutes per week of MVPA, with 21.4% of participants meeting recommended guidelines for physical activity. Additionally, 65% of participants reported using walking trails.

Table 1. Characteristics of Rural Adults (N=229), *Heartland Moves*, Southeast Missouri

Characteristic	Mean (SD) or %
Intrapersonal	
<i>Demographics</i>	
Age, mean (SD)	54.6 (15.3)
Gender (Female), %	70.3%
Annual Income (\leq \$50,000), %	51.5%
<i>Physical Activity Behavioral Factors</i>	
Self Efficacy for physical activity, mean (SD)	2.3 (0.9)
Trail Use, %	65.1%
Perceived Neighborhood Environment	
Indoor Recreational Access, mean (SD)	3.3 (0.6)
Area Around Home, mean (SD)	2.3 (0.6)
Safety From Traffic, mean (SD)	2.5 (0.4)
Physical Activity	
Weekly MVPA, mean (SD)	96.6 (117.7)
Meet PA Guidelines, %	21.4%

Intrapersonal Correlates

When examining intrapersonal correlates (i.e., demographics and physical activity behavioral factors) of weekly MVPA minutes, age, gender, trail use, and self-efficacy for physical activity were all statistically significant, with only income being insignificant (**Table 2**). For every year increase in age, participants' weekly minutes of MVPA lowered by 1% (95% CI = 1%, 2%) with all other variables held constant. When compared to their male counterparts, female participants had 52% (95% CI = 35%, 64%) less minutes of weekly MVPA. Additionally, those who reported using trails had 66% (95% CI = 26%, 120%) more minutes of weekly MVPA, when compared to those who didn't report using trails. Finally, for every unit increase in

favorable self-efficacy for physical activity, there is an increase of 43% (95% CI = 21%, 69%) for minutes of weekly MVPA with all other variables held constant.

Environmental Correlates

In examining perceived environmental correlates of weekly MVPA minutes, more favorable perceptions of both indoor recreational access and safety from traffic were inversely associated with weekly MVPA, though statistically insignificant (**Table 2**). More favorable perceptions of the home neighborhood environment were positively associated with weekly MVPA minutes, though also insignificant.

When exploring intrapersonal moderators of environmental correlates, one statistically significant interaction was found. For females, more favorable perceived safety from traffic is associated with less weekly MVPA minutes; whereas in males more favorable perceived safety from traffic is associated with higher weekly MVPA minutes (**Figure 6**).

Table 2. Multivariate associations of intrapersonal and perceived environmental level factors with weekly MVPA minutes in rural Midwestern adults, (N=229)

	Model 1		Model 2	
	Rate Ratio	95% CI	Rate Ratio	95% CI
Intrapersonal factors				
<i>Demographics</i>				
Age	0.99	(0.98 – 0.99)	0.99	(0.98 – 0.99)
Annual Income (<\$50,000)	0.94	(0.72 – 1.24)	0.97	(0.74 – 1.26)
Gender (Female)	0.48	(0.36 – 0.65)	2.62	(0.47 – 14.45)
<i>Physical Activity</i>				
<i>Behavioral Factors</i>				
Self-efficacy for physical activity	1.42	(1.22 – 1.67)	1.42	(1.22 – 1.65)
Trail Use	1.66	(1.26 – 2.20)	1.67	(1.27 – 2.20)
Perceived environmental factors				
Indoor recreational access	0.81	(0.65 – 1.01)	0.81	(0.65 – 1.02)

Safety from traffic	0.92	(0.66 – 1.29)	1.40	(0.82 – 2.39)
Area around home	1.01	(0.82 – 1.24)	0.99	(0.81 – 1.21)

Significant Interactions

Gender X Safety from traffic	-	-	0.51	(0.26 – 0.99)
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Models control for wear time, and only significant intrapersonal factors (i.e., age, annual income, gender, self-efficacy for physical activity, trail use) were included when examining bivariate associations. Bold indicates a significant association

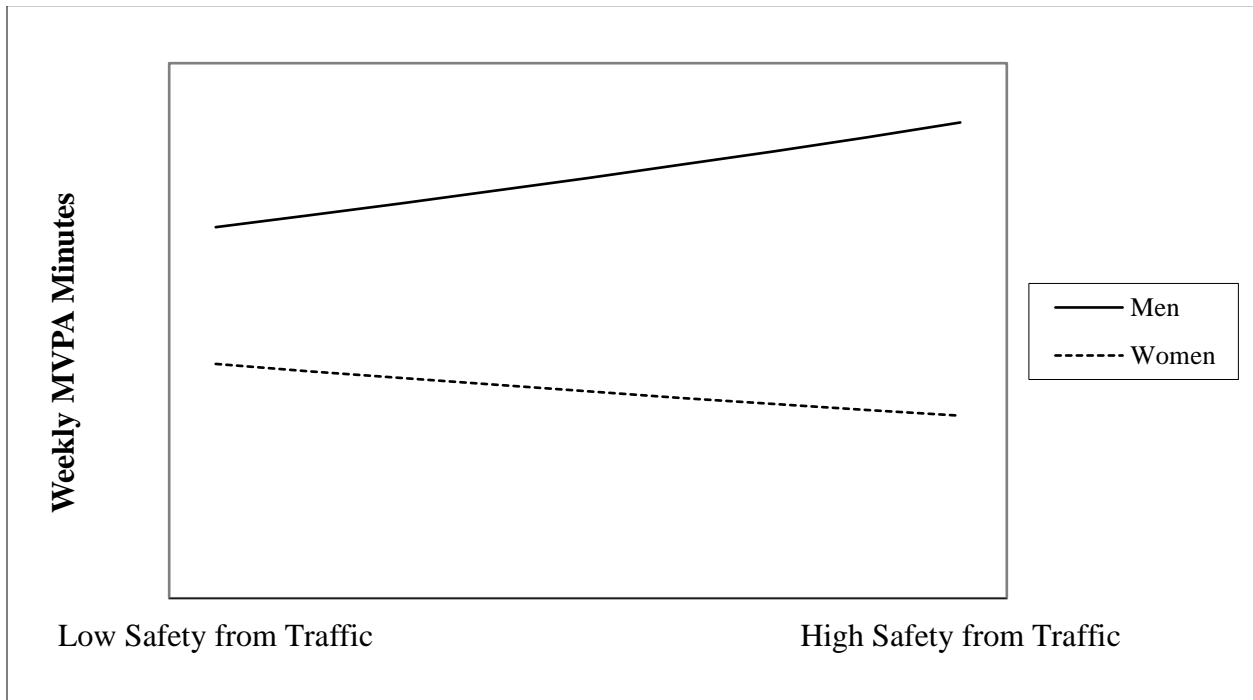


Figure 6. Association of safety from traffic with weekly minutes of accelerometer-based MVPA: effect modification by gender

2.4 Discussion

This is one of the first studies to examine multi-level (i.e., intrapersonal and environmental) correlates of objectively assessed physical activity in rural adults in the US. On average, over 75% of rural residents in this sample were not meeting recommended guidelines for physical activity, with the average respondent only participating in 96 minutes of weekly MVPA. This is considerably lower than nationally representative self-report data which show that about 50% of residents from non Metropolitan areas meet recommended guidelines for

physical activity.² This may suggest a wider disparity in physical activity than previously considered, and illuminates the importance of identifying multilevel correlates of physical activity. Several intrapersonal correlates were significantly associated with weekly MVPA minutes. Consistent with most literature, age and being female were inversely associated with weekly MVPA minutes. When examining gender, there is a concerning disparity in weekly MVPA with female participants reporting about 52% lower minutes of weekly MVPA. Digging deeper into the clinical implications of this disparity, only about 15% of females met physical activity guidelines as opposed to 35% of males. This is similar to a study using self-report data which found a similar disparity between rural men and women; however, this gap wasn't quite as large (16% of females vs. 21% of males).¹⁰⁰ As expected, rural residents who used trails and those who reported higher self-efficacy for physical activity had higher levels of physical activity. These results are similar to previous studies, and highlight the importance of recreational behaviors for physical activity. Promoting trail use may be an effective strategy for physical activity promotion in rural communities. Walking trails increase opportunities to be physically active, and may be easier to implement in rural settings as land is more affordable.^{118,119} In addition to trail use, interventions utilizing social cognitive theory¹²⁰ may be effective in promoting physical activity when considering self-efficacy; a strategy that has been utilized in several physical activity interventions in rural communities¹²¹ including in the present study's parent study.¹⁰⁷ Social cognitive theory utilizes motivations and self-efficacy for being physically active to explain physical activity behaviors.^{114,120} Physical activity interventions designed around social cognitive theory address education and behavior change techniques to build confidence in being physically active.

When considering, perceived environmental correlates, there were no significant associations with weekly MVPA minutes. The lack of significant associations may be due to the lack of specificity as to where physical activity was occurring; as physical activity was not assessed within one's own neighborhood the links between perceived neighborhood environment factors may not be as directly linked. However, a more likely explanation may be the increased importance of social-cultural factors, including gender norms, as drivers of physical activity behaviors in rural communities. Though built environment characteristics such as access to recreational opportunities have been associated with physical activity, previous studies have used either qualitative or self-report data. Additionally, there is some evidence to suggest that occupational physical activity is a key component of overall physical activity levels in rural residents.¹²² This may help explain the null associations with neighborhood environment factors that would not be conceptually linked to occupational physical activity. Additionally, social-cultural norms of not being active or having the time to be physical active outside of work may limit these associations. Gender norms in rural communities, including the domestic role of women, which limits economic empowerment may help to explain the wide disparity in physical activity levels.¹²³ This may also explain a lack of social support, as men may not be physically active outside of work. However, these factors are hard to measure and further qualitative research may help to explain social-cultural and gender norms in driving physical activity behaviors.

In exploring intrapersonal moderators of perceived neighborhood correlates of physical activity, gender significantly moderated the relationship between perceived safety from traffic and weekly MVPA minutes. In men, more favorable perceived safety from traffic was associated with higher weekly MVPA, with the opposite being the case in women. This further suggests

that gender norms and roles may be driving these behaviors of physical activity, including the neighborhood environment factors associated with them.

Limitations and Strengths

Our focus on rural communities in southeastern Missouri limits our generalizability of study findings. Future studies should focus on a nationally representative sample of rural residents, though the non-heterogeneity and many definitions of rural communities in the US is still a potential limit to generalizability. However, focusing on this specific population which face several health disparities, allowed us to examine patterns of physical activity in a population that could benefit from strategies promoting physical activity. The cross-sectional nature of the current study limits our ability to test cause-effect relationships. Additionally, important social-cultural factors, such as gender norms are hard to measure and further qualitative research may be beneficial to explain drivers of physical activity. A key strength of this study is the use of objectively-assessed physical activity data, which is understudied in rural communities. Several studies have noted the reliability and validity of using accelerometry to estimate minutes of MVPA.¹²⁴⁻¹²⁷ Studying the associations of multi-level correlates, including interactions is also a strength of this study.

Conclusion

Given the public health importance of meeting physical activity guidelines, there is a need to understand the correlates of weekly MVPA minutes in rural populations who face some of the highest rates of physical inactivity and chronic disease in the nation. Our results indicate significantly lower levels of physical activity in women, highlighting the need to further explore the drivers of physical activity in this sub-group. Targeting the use of walking trails may be an effective strategy to promote physical activity in rural communities, although perceived

neighborhood environment characteristics were insignificantly associated with weekly MVPA minutes. Efforts to increase self-efficacy for physical activity may also be beneficial towards increasing weekly MVPA minutes. Prospective studies are needed to examine how strategies promoting physical activity (e.g., use of walking trails) can in fact promote physical activity in rural communities, with a special focus on rural women. Further qualitative research may help to further explain the disparities seen.

Chapter 3. State of the science on community development, the neighborhood environment, and physical activity

3.1 Introduction

Community development has been described as a means to elicit social, economic, political, and environmental change in communities in response to dismal conditions and areas in decline.⁶⁶ Community development strategies may be federally funded initiatives such as Community Development Block Grants, but can also be driven by community members or non-profit organizations.⁶⁷ Historically, these strategies have focused on improving social and economic outcomes,⁶⁸ typically in the form of ensuring housing and providing social services. Recently, there has been a shift and focus on community development as a way to support healthy living.^{67,69,70} This impact on health is realized through the social determinants of health – the conditions in which people live, learn, work, and play which effect health.¹²⁸ Specifically, community development may help to ensure that community members are able to control their own destinies and participate in the social factors that influence their lives.⁷¹ Another process by which community development can influence health is through improvements in the built and policy environment; which have consistently been shown to be associated with obesity^{72–76} as well as physical activity behaviors.^{77,78} This aligns with the idea that where people live and play has the biggest influence on how long and how well they live.^{79–81}

Promoting physical activity benefits the overall health of communities, helping to sustain longer healthier lives.^{10,129–131} However, less than half (46%) of US adults engage in enough physical activity to achieve substantiable health benefits.² In order to maintain healthier lifestyles and create sustainable opportunities for community members to be physically active, recent strategies have included changes in community design that make neighborhoods more supportive

of active living.^{3,43-45} This is illuminated in the Community Guide recommendation for built environment approaches that combine improvements in transportation such as sidewalks, bicycle lanes, and expanded public transit, with land use and community design changes such as improved parks and recreation facilities and mixed-use development that enable housing in proximity to destinations such as businesses and schools.⁴⁶ Broadly, these recommendations may be characterized as smart growth strategies which encourage a mix of building types, and housing and transportation options to promote active living and community engagement.⁸⁴ A key example of expanded transportation options includes the implementation of complete streets policies which require streets to be accessible to users of all ages, and of all modes of transport.¹³²

However, communities with high disparities in physical activity and chronic disease also are likely to be racial/ethnic minorities or low income communities.^{133,134} The Community Guide recommendations have the potential to benefit low-income neighborhoods and communities of color, as these neighborhoods tend to lack features of supportive environments for active living.^{131,135} Additionally, even if opportunities for active living (e.g., parks, expanded public transit) exist in these communities, they tend to have fewer amenities, are not well-maintained, and are perceived as unsafe.⁵⁵ The evidence on the overall health disparities has created interest in making communities more equitable in terms of providing access to healthy environments. Health equity works towards not only reducing/eliminating health disparities, but strives for social justice and equalizing opportunities to be active and lead longer healthier lives.⁵ A recent Surgeon General initiative for ‘Community Health and Economic Prosperity’, highlights the need for community development in these communities.¹³⁶

To date, community development and physical activity connections have been poorly explored, with few studies implemented or empirically tested.⁸³ However, some conceptual linkages between community development, the neighborhood environment, and public health have been partially explored through various frameworks, processes, and theories.^{83,137} Some of these frameworks present what has been done with regards to community development, while others propose how community development strategies may relate to social, economic, and health outcomes.

Despite some proposed connections between community development, improvements in the neighborhood environment, and physical activity behaviors; there is very limited empirical evidence on community development strategies and their impact on physical activity. Hence, this scoping review adds to the current knowledge of community development and physical activity promotion strategies by examining all community development interventions and programs related towards physical activity. Specifically, this review focuses on neighborhood environment characteristics of community development. The following objectives are addressed through one broad systematic search:

- (1) To summarize the proposed, implemented, and evaluated connections between community development, the neighborhood environment, and physical activity; and
- (2) To review the empirical evidence of these community development strategies on increasing physical activity

3.2 Methods

This scoping review consisted of a systematic review, which included articles that either (1) described the proposed, implemented, and evaluated connections between community development, the neighborhood environment, and physical activity; and/or (2) provided

empirical evidence of the connections between these community development strategies and physical activity. Using the literature gathered from both “reviews,” we outlined this complex relationship between community development, the neighborhood environment, and physical activity.

Search Strategy

The present review consisted of one broad systematic search outlined in **Table 3**. The search encompasses objective one and two respectively. To be included in this review, studies must have been published between 2000 and 2020. This timeframe is in line with the shift in focus of community development strategies to include a more direct connection with health. The strategy included terms for “community development” and “physical activity,” with additional terms added that allude to the “neighborhood environment.” The “neighborhood environment” is not included as a separate term as this limits the literature included based on a preliminary search strategy.

Table 3. Search Strategy for Systematic Review

Search Strings for Titles and Abstracts

1. "community development" OR "comprehensive community initiative" OR "economic development" OR "community economic development" OR "community social development" OR "community development corporation" OR "community organization*" OR "revitalize*" OR "new markets tax credit*" OR "NMTC" OR "low income housing tax credit*" OR "LIHTC" OR "choice neighborhood*" OR "promise neighborhood*" OR "promise zone*" OR "neighborhood stabilization program" OR "historic tax credit*" OR "community development block grant*" OR "CDBG" OR "tax increment financ*" OR "TIF" OR "empowerment zone*" OR "enterprise zone*" OR "renewal communities"

OR

2. “walkab*” OR “sustainab*” OR “livab*” OR “planning” OR “smart growth” OR “active* friendly”

AND

3. "physical activit*" OR "exercis*" OR "fitness" OR "walking" OR "cycling" OR "active"

Studies were identified on November 10th, 2020 using four databases (CINAHL Plus, Global Health, APA PsychInfo, and MEDLINE) from the EBSCO host database. Studies were excluded if they were not administered for the purpose of community development as outlined above (e.g., correlations between urban design and physical activity). As the community development process varies by country and certain mechanisms (e.g., Community Development Block Grants) do not translate outside of the United States, we excluded non-US based articles. All articles included were deemed relevant to objective one. Meanwhile, studies were excluded from objective two if they did not empirically test the relationship between the community development strategy with physical activity in any form as an outcome of interest. The selection of studies identified for each objective is described in **Figure 7**.

Data Abstraction

Study title and abstract screenings were completed by NS. Two reviewers (NS & RD) screened and evaluated each full text article for inclusion, and independently abstracted data. Discussions were held between the two reviewers to reconcile any discrepancies. Data were extracted using a standardized form in Microsoft Excel. For objective one, variables of interest include key components/elements of community development (i.e., capacity building, built environment, or social environment), how the components are connected to physical activity (including the direction), the study population, and whether the strategy was empirically tested in relation to physical activity (**Table 4**). For objective two, variables of interest include study design, type of broad community development strategy (capacity building, built environment, social environment), which physical activity measure is used as an outcome as well as any secondary measures, and the relevant findings (**Table 5**).

3.3 Results

Based on search criteria, 1067 articles were identified, with 1017 of those excluded after going through title and abstract screening (**Figure 7**). Fifty articles were screened for full text. Of those, 17 articles met all eligibility requirements for objective one (**Table 4**), and five of those also met eligibility requirements for objective two (**Table 5**).

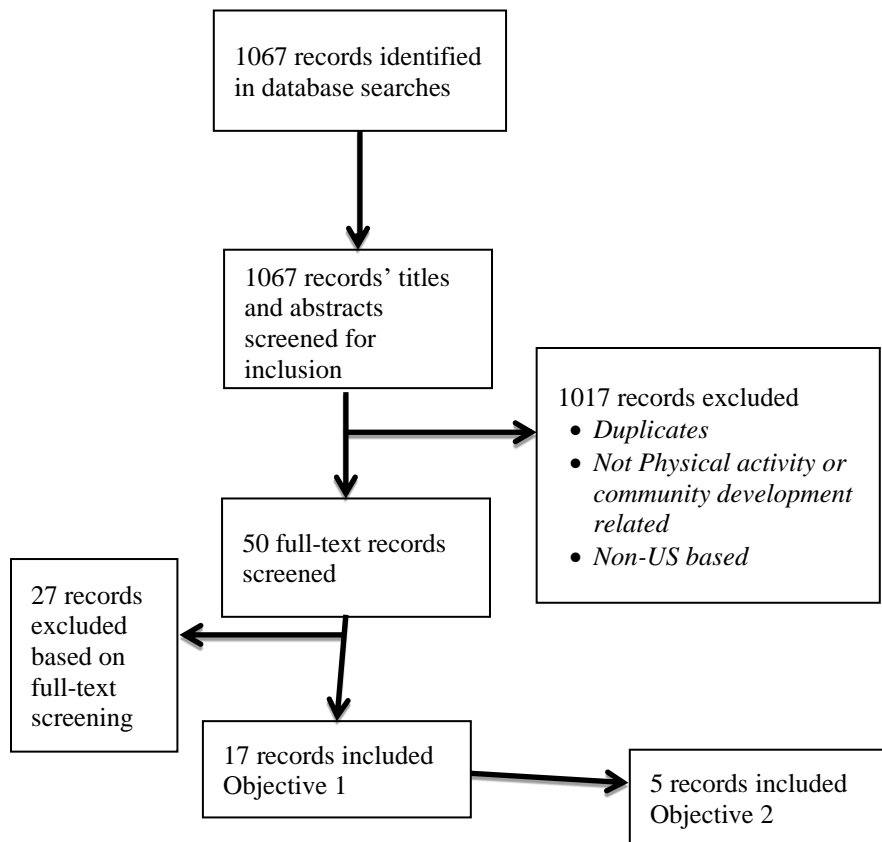


Figure 7. Identification and selection of studies for Scoping Review

Summary of community development and physical activity (Objective one)

All articles included in this review centered around urban populations in the United States. Articles ranged from highlighting proposed connections between community development and physical activity, discussing implemented strategies for community development and physical activity, and testing the relationship between community development

strategies and physical activity. All community development strategies included in this review fell into three main categories: built environment, social environment, and capacity building. Though most strategies seemed to be community driven, either by local governments or the community members themselves, there is some evidence of traditional federal funding initiatives such as Community Development Block Grants.

Neighborhood environment. Of the 17 articles reviewed, only four did not include a feature of the neighborhood environment (i.e., built or social environment) in relation to community development. Most articles featured elements of the built environment, while only two articles featured social environment elements. Built environment strategies included access to recreational opportunities, creating walkable neighborhoods, improving transportation systems, land use mix, or a mix of these mentioned strategies. In the two articles that focused on recreational access, one focused on a community initiative that created a monthly temporary park/open street while another was a community driven approach that repurposed an old airport into a community walking trail. Walkable neighborhoods were either addressed specifically or as part of smart growth strategies that include walkability as a key component. While one article focused on a Safe Routes to School strategy for school aged children. Transportation system related community development strategies focused on complete streets including a new light rail system, or development of bicycle infrastructure. Land use mix was typically included as part of larger development strategies including smart growth strategies. The two social environment community development strategies included community wide physical activity programming for older adults, and the social environment effects that come with open streets.

Capacity Building. Of 10 articles that featured an element of capacity building, only four were not in conjunction with a neighborhood environment strategy. Capacity building for

communities included collaboration between key stakeholders in communities, including partnership building and formation of advisory committees that can best represent the needs of communities. Another common theme addressed was the importance of securing long term funding for the community development strategy. Additionally, multiple articles highlighted the importance of long term assessment and evaluation of community development strategies. This includes routinely assessing community needs, but also assessing the implementation of community development strategies as well as their effectiveness. Sustained advocacy was also a key strategy in two articles that highlighted the importance of advocacy efforts in local government institutions, and also the importance of community development corporations. In each of these 10 studies, it is highlighted that these capacity building elements are vital towards not only the development and implementation of community development strategies, but also the long term success associated with them.

Table 4. Community development strategies influencing infrastructure for physical activity

Studies		Community Development Strategy			Physical Activity	
Author (Year)	Location	Capacity Building	Built Environment	Social Environment	Connection to physical activity	Evaluated (Y*/N)
Braun (2018) ¹³⁸	Chicago, IL; Minneapolis, MN, Oakland, CA	Importance of neighborhood assessments and community input when allocating funds and development (e.g., improvements were made in areas where it wasn't needed)	Bicycling infrastructure		This strategy is vital for impactful implementation of active living infrastructure	N
Cheadle (2010) ¹³⁹	Seattle, WA	Networking and partnering organizations for sustainable physical activity programs, policies, and practices for older adults.		Community wide physical activity programs	This strategy builds a network to support and promote PA	N
Deehr (2009) ¹⁴⁰	Seattle, WA	Importance of leveraging partnerships within a community, funding, and promoting health	Safe Routes to School, complete streets		These strategies are important for successful implementation of active living strategies to promote physical activity, and	N

		in addition to key development.			important for community	
DeGregory (2016) ¹⁴¹	Brooklyn, NY	Importance of support and assessment of projects, this community planning initiative had various formats community input (surveys, forums, events). Community partnerships are vital for implementation	Bicycling infrastructure		This strategy is vital for successful implementation of active living infrastructure	N
Dunton (2012)	San Bernardino, CA		Smart growth strategies (land use mix, high street connectivity, housing layout encourages interaction)		Smart growth strategies encourage and offer more active living opportunities	Y
Glasgow (2009) ¹⁴² Kraft (2012) ⁴³ Bors (2012) ¹⁴³	Active Living by Design funded Cities	Importance of community and stakeholder collaboration, partnership expansion, permanent advisory committees, funding, and	Need for zoning changes and comprehensive plans		These “inputs” are important for successful implementation of active living by design strategies that promote physical activity	N

		evaluation of these strategies				
Green (2011) ¹⁴⁴	Columbus, OH	Sustained advocacy in the form of an agency dedicate to advocating for active living opportunities – specifically in zoning applications, increases collaboration between communities and agencies			Increases zoning applications with active living features	N
Jensen (2017) ¹⁴⁵	Salt Lake City, UT		Complete Streets (light rail transit stops, wider sidewalks, pedestrian amenities, bike lanes)		This strategy offers active transportation opportunities	Y
Jerrett (2013)	Chino, CA		Smart growth Strategies (walkability, land use mix, green space)		These strategies increase active living opportunities	Y
Matsuoka (2005)	Kona, HI	Community based partnerships and planning process (community engagement between organizations and residents,	Public recreation space - walking trail		Repurposing a space for recreational purposes will increase opportunities for being active	Y

		volunteering) for revitalization of old airport space as a walking trail				
Miller (2009) ¹⁴⁶	Cleveland, OH (Slavic Village)	Built partnerships to address active living related community development, stakeholder collaboration key to successful implementation.			Vital towards successful implementation of physical activity related development.	N
Suminski (2014) ¹⁴⁷	Kansas City, MO	Capacity building for Community Development Corporations to evaluate the implementation of physical activity related community development			This strategy looked to evaluate implementation of physical activity related (based off of literature) community development changes	N
Walfoort (2009) ¹⁴⁸	Louisville, KY	Leveraging partnerships, promoting health, securing funding in addition to key development (in this case HOPE VI Grant)			These strategies are important for successful implementation of active living strategies to promote physical activity, and important for community	N
Xu (2016) ¹⁴⁹	Dallas, TX		Tax Increment Financing and		TIFs lead to increased	N

			development related to physical activity infrastructure		infrastructure for physical activity	
Zieff (2014) ¹⁵⁰	San Francisco, CA		Monthly temporary park / open streets (Ciclovía) for residents	Include	Promoting an accessible, safe space for active living	Y

* “Evaluated” refers to empirical studies which examined the effectiveness of a community development strategy with regards to physical activity as an outcome. See Table 2 for more information on empirical studies, only these studies will have information on study design and populations.

Empirical evidence in the relationship between community development and physical activity (Objective Two)

Study Design and Methods. The five empirical studies reviewed all varied in design. Three studies were cross-sectional, and two were quasi-experimental. As mentioned previously, all studies reviewed centered around urban populations in the United States. Additionally, all five studies were in the Western part of the United States (three in California, one in Utah, and one in Hawaii). Study populations varied greatly. For two of the three cross-sectional studies, study populations consisted of adult participants. Interestingly, for both quasi-experimental studies, participants were children, with one focused on low to middle income children. The smallest sample size was 121 participants, with the largest being 639 participants. One study focused on counts of trail use as opposed to individual participants. Both quasi-experimental studies focused on smart growth strategies as interventions, with comparable communities as control sites. The three cross-sectional studies examined the associations of either complete streets, a newly repurposed walking trail, and a temporary park on physical activity.

Primary (physical activity) and secondary outcomes. There was no consistent evaluation of physical activity across the five studies. All studies showed a positive effect of community development on physical activity, while four of the five studies showed a significant positive association. No studies showed a null or negative effect on physical activity. Three studies used objectively assessed physical activity outcomes using accelerometry data. In both quasi-experimental studies, daily moderate to vigorous physical activity (MVPA) was assessed using accelerometry, with one being neighborhood specific daily MVPA. Only the study examining neighborhood specific daily MVPA found statistically significant findings with a net increase of 46% in daily MVPA. The third study combined accelerometry with GPS data to summarize

active transportation minutes. This study found that closer proximity to the complete streets development was associated with increase active transportation minutes. The study on a temporary park reported self-report data on duration of physical activity, and whether participants were physically active on the temporary park days. Participants reported being physically active, with increased attendance to the temporary park associated with increased physical activity minutes. One study examining the impact of repurposing an old airport into a walking trail reported a 20% increase in number of people using the trail over a period of three years.

Table 5. Community development strategies and their effectiveness in promoting physical activity

Author (Year)	Study Design	Study Population	Physical Activity Outcome(s)	Secondary Outcome(s)	Findings
Dunton (2012) ¹⁵¹	Quasi-experimental	121 low to middle income children, with intervention group consisting of those who recently moved to a smart growth community	Daily MVPA (accelerometry assessed)	Body Mass Index	No significant physical activity findings
Jensen (2017) ¹⁴⁵	Cross-sectional	536 adult participants residing near complete streets development	Active Transportation measured by GPS/Accelerometer data	Perceived walkability	Living closer to the complete street was related to increased active transportation
Jerrett (2013) ¹⁵²	Quasi-experimental	386 children, with intervention group consisting of those who recently moved to a smart growth community	MVPA per day in the neighborhood		46% increase in MVPA
Matsuoka (2005) ¹⁵³	Cross-sectional	Walking counts of local residents using the walking trail	Number of people walking		After three years number of walkers increased by 20% in the area
Zieff (2014) ¹⁵⁰	Cross-sectional	639 adult participants at three Ciclovía events	Self-reported type and duration of physical activity; also	Participation in Ciclovía	Participants report being physically active, those who participate in Ciclovía more

		physical activity on event days		than once are more physically active.
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3.4 Discussion

The objectives of this review were to synthesize existing literature on community development and physical activity, as well as to critique empirical studies on the relationship between community development strategies and physical activity among US populations. Community development strategies make a concerted effort to improve the health of traditionally disadvantaged communities, and may be a tool to promote health equity of communities. Though community development strategies have historically been geared towards social and economic outcomes,^{66,68-70} including the social determinants of health,^{70,71} this review provides evidence of community development strategies being beneficial for physical activity, and the overall health of communities. Specifically, community development strategies which influence the neighborhood environment (i.e., built and social-cultural environment) mainly through land use and transportation systems (e.g., smart growth strategies, complete streets) may be beneficial towards promoting physical activity behaviors. However, one review on built environment effects on physical activity suggests that the benefits of infrastructure improvements may be inequitably distributed.⁵³ Furthermore, only five studies empirically tested the relationship between community development strategies and physical activity, making it difficult to highlight any patterns. It is also important to note community development strategies that were deemed successful in development and implementation tended to have some element of capacity building for the intended communities.^{142,143,154} This included building partnerships between key stakeholder groups (e.g., community members, local government institutions, advocacy/community organizations),^{139,144,155} securing long term funding,^{147,155} and long term assessments of the entire community development process.^{141,147} As most of the strategies reviewed were community driven as opposed to government funded initiatives (e.g., Community

Development Block Grants), this capacity building for communities is important towards benefiting the intended communities (e.g., communities of color, low-income communities).

Though there are some positive public health implications of this review, some key gaps and challenges were also brought to light. First, there is a lack of evidence base examining the actual effects of community development strategies on physical activity and health. As mentioned before, only five studies empirically tested the relationship between the community development strategy and physical activity.^{145,150-153} Though all studies suggested positive associations between community development strategies and physical activity levels, there is not enough evidence to suggest which community development strategies are effective, if there are significant improvements in physical activity, or who may be benefiting from these community development strategies. Second, there is no consistency in methods or measurement in assessing the relationship between community development strategies and physical activity. This is illuminated by the need for consistent and long term assessment of the development, implementation, and effectiveness of community development strategies on physical activity.^{141,142,147} Across all empirical studies there was no consistent measurement of either the community development strategies or the outcome of physical activity. These inconsistencies make it difficult to assess patterns and supplement the existing evidence base. Finally, there is a need to address the social, economic, and political context of communities in order to benefit the intended communities. Several studies highlighted the importance of capacity building for communities, but it is unclear whether or not this capacity building is a common part of the community development process. Additionally, community development encompasses a wide array of strategies which means a wide array of sectors/disciplines can contribute to the field. This highlights the need for contribution from those in the public health sector, specifically those

invested in creating healthy and active living opportunities. In conjunction with contributing, it is important to have cross-sectoral collaboration in order for community development strategies to be successful. One key obstacle is the disconnect across fields (e.g., public health, transportation, social policy, social work, urban planning, community development)⁵⁶, specifically in the knowledge and understanding of community development.

In addressing health equity, it is important to address these key challenges including limitations of the evidence base, underdeveloped measures and methods, and inadequate attention to context.⁴ Long term funding is needed to further research the effectiveness of community development strategies for promoting physical activity, and whether or not disadvantaged community members are in fact benefiting from these strategies. Additionally, funding is needed in order to facilitate capacity building including building partnerships with key stakeholders, collaboration across stakeholders, and general assessment of community development strategies. In doing so it is important to take advantage of key institutions such as community development corporations, health departments, and advocacy organizations which already have a key role in the community development process.^{142,147,156,157} Leveraging these key stakeholders and facilitating partnerships are considered important towards not only capacity building, but community engagement.^{141,158}

Limitations

As community development covers a wide array of strategies influencing a variety of outcomes, a key limitation of the current study is the broad operationalization of community development related to physical activity. We mitigated this issue by conducting a literature search and working with experts to conduct a wide ranging but precise search strategy. Additionally, research and articles published in the physical activity literature may not have a

full understanding and/or coverage of the impacts of community development. This illuminates a broader need of cross sectoral collaboration in community development and promotion of physical activity. Additionally, there were very few empirical studies examining community development and physical activity, making it difficult to come to any conclusions. In light of the existing literature, this study highlights the potential for community development to not only influence physical activity, but also benefit disadvantaged communities.

Conclusion

This systematic synthesis of literature adds to the evidence base on the impact of community development strategies on physical activity promotion. Specifically, strategies that influence the built environment and social-cultural environment show promise in creating opportunities to be physically active. The limited amount of empirical studies suggest a need to further research the effectiveness of community development strategies for physical activity, with a focus on which communities are benefiting from these strategies. Community development strategies are intended to benefit traditionally disadvantaged communities, but some evidence suggests an inequitable distribution of benefits.⁵³ Capacity building for communities, including community engagement in the community development process may help ensure the intended communities are benefiting from these community development strategies. Though community development strategies show promise for promoting physical activity and building healthy communities, numerous limitations and challenges of the evidence base exist. There are several opportunities to improve the evidence base, including more research on the effectiveness of community development strategies in promoting physical activity, and further examining which communities are actually benefiting from these strategies. Furthermore, it is important to explore the unintended or negative consequences that have been associated with

community development strategies (e.g., increased cost of living due to rising property values, gentrification, and displacement). There is limited evidence that community development strategies related to physical activity infrastructure may lead to gentrification of neighborhoods and potentially the displacement of long term residents.^{90,92,93,97} More studies are needed to understand all of the impacts of community development strategies so that we can ensure that any benefits reach ALL community members.

Chapter 4. Perspectives on community development for active living: how do we deal with displacement?

4.1 Introduction

Community development has been described as a means to elicit social, economic, political, and environmental change in communities in response to dismal conditions and areas in decline.⁶⁶ Community development strategies may be federally funded initiatives such as Community Development Block Grants, but can also be driven by community members or non-profit organizations.⁶⁷ Historically, these strategies have focused on improving social and economic outcomes,⁶⁸ typically in the form of ensuring housing and providing social services. Recently, there has been a shift and focus on community development as a way to support healthy living.^{67,69,70} This support is realized through addressing the social determinants of health— the conditions in which people live, learn, work, and play which effect health.¹²⁸ Specifically, community development may help to ensure that community members are able to control their own destinies and have empowerment over the social factors that influence their lives (e.g., housing, employment, hopefulness).⁷¹

Another process by which community development can influence health is through improvements in the neighborhood environment; which have consistently been shown to be associated with obesity⁷²⁻⁷⁶ as well as physical activity behaviors.^{77,78} In order to maintain healthier lifestyles and create sustainable opportunities for community members to be physically active, recent strategies have included changes in community design that make neighborhoods more supportive of active living.^{3,43-45} This is shown in the Community Preventive Services Task Force recommendation for built environment approaches that combine improvements in transportation such as sidewalks, bicycle lanes, and expanded public transit, with land use and

community design changes such as improved parks and recreation facilities and mixed-use development that enable housing in proximity to destinations such as businesses and schools.⁴⁶ These built environment recommendations are in line with the idea that where people live and play has the biggest influence on how long and how well they live.⁷⁹⁻⁸¹

However, there is too often an inequitable distribution of opportunities for healthy behaviors in certain communities (e.g, racial/ethnic minorities, low income populations) that have higher rates of physical inactivity and related chronic diseases.^{133,134} As such, there is increasing interest from public health practitioners in community initiatives to improve access to healthy environments for low-income neighborhoods and communities of color, and promote health equity. Health equity works towards not only reducing/eliminating health disparities, but strives for social justice and equalizing opportunities to be active and lead longer healthier lives.⁵ Over time, these investments in addition to other factors like housing and shifts in the job market can escalate development. However, an unintended consequence of these community improvements may be decreased affordability and gentrification of neighborhoods.⁸⁸ The Urban Displacement Project defines gentrification as “a process of neighborhood change that includes economic change in a historically disinvested neighborhood —by means of real estate investment and new higher-income residents moving in - as well as demographic change - not only in terms of income level, but also in terms of changes in the education level or racial make-up of residents.”⁸⁹ As part of this process, the historical disinvestment in an area experiencing gentrification, may amplify existing socioeconomic inequalities and become a process that can potentially increase health disparities among residents.⁹⁰⁻⁹² This is highlighted by a recent systematic review on the health impacts of gentrification, which found that Black and low-

income individuals suffered negative effects of gentrification including mental health issues and poor self-rated health.⁹³

Furthermore, a key negative outcome associated with gentrification is displacement of long-term residents. There are clear social and economic impacts of displacement such as a loss of social networks, housing stability, and educational opportunity.^{94,95} Similar to gentrification, displacement may lead to negative health effects for marginalized communities. This is partially due to a loss of resources or social capital that can lead to negative health behaviors. For example, displacement may lead to lower accessibility to healthy food options or transportation choices.^{91,96} More directly, displacement of residents may lead to loss of healthcare access as well as mental health issues.^{97,98}

In order for community development strategies to be effective and benefit the intended communities, several studies have highlighted the importance of building community partnerships and collaboration between key stakeholders such as health departments, advocacy organizations, and community members.^{141,144,155,159} These stakeholders may play an important role in community development, including decision making power, but less is known about perceptions of community development, gentrification, and displacement from these key stakeholders involved in community development related to active living. The current study will explore the perspectives on community development, gentrification, and displacement, from relevant leaders of public health departments and key community and advocacy organizations.

4.2 Methods

Interview Guide Development

To develop the most relevant questions for the key informant interviews, a systematic review was conducted exploring the relationship between community development strategies and

physical activity (Chapter 3). Language and themes from this review, along with recent studies related to perceptions of community development and displacement were used to develop a list of questions and a draft interview guide. The guide was developed to assess general perceptions of community development including impact of community development, and perceptions of gentrification and displacement, including potential mitigation or prevention strategies for both. This project was approved by the Institutional Review Board at Washington University in St. Louis (#202101013). The guide was pilot tested with a former health department employee in active living, which resulted in minor changes in wording, but no substantive thematic revisions

Sample

Input was sought from public health practitioners and advocacy organizations working in active living. These groups were identified as key stakeholders in the community development process. The CDC's State Physical Activity and Nutrition (SPAN) Program funding recipients were used to sample public health practitioners who were nationally representative and that we were certain were working in the area of community development related to active living. As part of the SPAN program, the "CDC funds 16 state recipients to implement evidence-based strategies at state and local levels to improve nutrition and physical activity", with most states employing strategies related to infrastructure for active living. We invited the principal investigator or director of each state's SPAN program to participate. From this list, we researched key advocacy organizations that worked with the SPAN program recipients or any other active living related work.

Data Collection

Members of the research team (NS, LS) sent emails to 32 potential key informants (16 public health practitioners, 16 active living advocates) to request participation in a video chat

interview. Participants who agreed to the study were interviewed over video chat, at times/days convenient to their schedule. Interviews were audio recorded and professionally transcribed.

Interviewer notes supplemented the transcriptions.

Analysis

A codebook was developed to facilitate analysis of the transcripts. Two members of the research team (NS, LS) read over the same four transcripts and came up with a draft list of code categories. They then had a discussion of these codes and refined the list. Using this new list, both team members coded one transcript in detail to ensure consistent interpretation of the coding schemes. The transcripts and codebook were uploaded into NVIVO v11, a qualitative analysis software program. Two team members coded each transcript using constant comparative coding methodology,¹⁶⁰ and a pursuant discussion on the coded documents rectified any discordance. Once all transcripts were coded and discussed, text within each code was grouped and thematically summarized. Direct quotes were used to represent the main themes that emerged.

4.3 Results

The following analysis focused on a comparison of the views of public health practitioners and advocates on community development, gentrification and displacement, and potential solutions. Though there seems to be common ground on the topics, there are differing views on the overall framing of community development, gentrification, and what can be done to avoid potential consequences (i.e., displacement). **Table 6** summarizes key domains, including points of agreement and differing views. Out of 32 potential interviewees, 17 key informants were interviewed (10 – SPAN public health practitioners, 7 – leaders of active living advocacy

organizations). Most SPAN recipients worked at state health departments, with two working in a university setting. Interviews lasted between 17 and 51 minutes (Mean = 35 minutes).

Table 6. Comparison of responses on perceptions of community development from practitioners and advocates

Domain	Practitioners	Shared Perceptions	Advocates
Role in Community Development	<ul style="list-style-type: none"> • Provide technical assistance to communities • Fund and implement strategies 	<ul style="list-style-type: none"> • Community capacity building 	<ul style="list-style-type: none"> • Community engagement, ensuring community members take part in the process
Benefits of Community Development	<ul style="list-style-type: none"> • Strategies benefit all community members 	<ul style="list-style-type: none"> • Building healthier neighborhoods • Improved quality of life • Economic benefits (e.g., tax base) 	<ul style="list-style-type: none"> • Strategies only tend to benefit those in power with privilege
Consequences of Community Development		<ul style="list-style-type: none"> • Displacement • Marginalized communities tend to be disadvantaged 	<ul style="list-style-type: none"> • Gentrification
Identifying Gentrification	<ul style="list-style-type: none"> • Economic investments that attracts new businesses and /or housing, may lead to increased cost of living 		<ul style="list-style-type: none"> • Socio-economic / racial shift in neighborhood demographics due to development • Directly related to displacement
Identifying Displacement		<ul style="list-style-type: none"> • Existing community members forced out due to rising costs 	<ul style="list-style-type: none"> • Loss of cultural identity

Addressing
gentrification &
displacement in
the community
development
process

- Education and tools on the issue are vital, as it isn't within traditional scope of work
 - Need for equitable community stakeholder engagement
 - Lack of access to planning meetings is a barrier
 - More upstream policies are needed (e.g., raising minimum wage, zoning requirements)
 - Use different channels (social media, in-person) to engage with community and educate
 - Need for cross-sectoral collaboration
 - Need for equity in all decision making processes
-

The impact of community development

Both practitioners and advocates felt they had a role to play in the community development process. Both practitioners and advocates felt they had a role in building up capacity for communities, while also ensuring they had a seat at the table throughout the community development process. However, there were some key differences in how advocates and practitioners viewed their roles in the community development process. Practitioners seem to provide more technical assistance (e.g., health impact assessments, data analysis), and have more to do with what is actually being done (i.e., what community development is being funded or implemented). Advocates noted they participate more in community engagement and ensuring community members play an active role in the community development process.

“the work that we do is related to primarily implementing or encouraging strategies around policy system and environmental changes within local communities” -Practitioner

“we do a lot of turning people out to local planning meetings about different projects that are happening, different planning processes, that kind of thing. And also educating and building the grassroots capacity for people to engage in those processes.” -Advocate

When considering the impacts (i.e., benefits and consequences) of community development there was a lot of cross over between practitioners and advocates. Both groups considered the building of healthier neighborhoods (e.g., creating walking/biking trails, increased fresh food accessibility, transportation systems), improved quality of life, and increased property values/tax base to be a benefit. However there was a sharp contrast on who each group felt benefited from this development. Practitioners asserted that in their process of community development everyone shared or should share the benefits, whereas advocates considered developers and those community members with privilege, power, or political ties to be the beneficiaries of community development.

“a lot of potential to improve the built environment to support different types of people, and I usually always think from the transportation standpoint, but I like to say, not just to help people get around, but really to help people thrive and to have access to quality of life.” -Advocate

“in really purposeful community development that's equity driven, you would hope that it's the community that benefits from it” -Practitioner

“So the people who benefit are inevitably like those who have power and voice, and that looks different in different places.” -Advocate

Conversely, both practitioners and advocates were in agreement on displacement including the loss of culture in a neighborhood as being a potential consequence of community development. However, practitioners were careful not to mention gentrification as a consequence, while advocates did list it as a consequence if it led to displacement. Both felt that traditionally marginalized communities including low income, racial/ethnic minorities, and persons with disabilities were the groups who were disadvantaged by community development; and commented on the fact that they may not have a seat at the table.

“If you go in converting neighborhoods from low value to high value, and let's bring in some more business or let's improve the housing, and then you nudge out the folks who live there and work there, we lose some of that community's history, and culture, and the social capital that was there. It gets pushed out to be replaced by something that maybe is a little more palatable to the general public.” -Practitioner

“So I don't necessarily think gentrification is negative if it doesn't lead to displacement. However, if gentrification leads to displacement, that's when I think the gentrification is bad.” -Advocate

“poor folks and black and brown people and young folks, older people, immigrants, people living with disabilities, all these folks I would say are probably disadvantaged, when they're also the ones who stand to benefit the most from good investment in community development.” -Advocate

Gentrification and displacement

When asked to define gentrification, practitioners noted it as economic investment in a community that attracts new businesses and/or housing that raises the cost of living in the

community. A general theme among practitioners was that this economic investment improves the existing community, though there was mention that it is probably for newer and wealthier residents. Advocates defined gentrification as a socioeconomic and racial shift in a neighborhood demographics due to development. Advocacy groups were more likely to incorporate displacement in their definition of gentrification, either directly or indirectly. Though these groups identified these communities as likely to be low-income and/or minority, their language used fewer negative connotations when compared to the practitioners (e.g., “rundown, low value”)

“you might have a rundown neighborhood and then some developers decide that they like it and they're going to invest in it...with the intention that because of that, it's making this neighborhood better” -Practitioner

“it quickly turns into what was a lower middle class income neighborhood is filled with primarily a richer neighborhood often more homogenous and less diverse” -Advocate

Both defined displacement as a process whereby existing community members are forced out due to being unable to afford to continue to live in this community. Advocacy groups talked more about the demographic changes and loss of cultural identity than did practitioners.

“Gentrification 2.0, we've finally done it. We've booted people out because they can't afford to live where they've always lived and again it is such an interesting thing that there aren't in many cases intentional efforts to move people out of a location” - Practitioner

“like the loss of the cultural identity and people who grew up in a neighborhood and it no longer feels like home. So there's also just that also just social hostility that comes along with that kind of change” -Advocate

Solutions for successful community development and anti-displacement

When considering how to ensure community development does benefit those who need it most including traditionally marginalized communities, both practitioners and advocates identified the primary barrier as a lack of equitable community stakeholder engagement in the

planning process. Both groups identified a lack of access to planning meetings due to time, location, or technology as the primary barrier to community stakeholder engagement.

Practitioners also identified developers' focus on profits, limitations on their scope of work, and un-representative local government as barriers. They also described that their role in working with communities was to "lend a voice," "guide," or as a "connector.," but admitted to not knowing what to do about displacement. Advocates identified use of social media and meeting communities where they are as facilitators to community engagement. Advocates also identified support of local government, and education of community members as other overall facilitators of equitable community development. However, they also mentioned lack of cross-sectoral collaboration as huge barrier.

"making sure that all the right partners are at the table. So you talked about making sure we're connecting to the community, which I think can be more challenging than we think. We sometimes think we have partners at the table, but there's probably partners and people that either don't, haven't been reached or are reluctant to be reached by a State Health department" -Practitioner

"it's about process, taking the time and having the respect for the history of a neighborhood and for the experiences that people have had in that neighborhood, especially low-income black neighborhoods that have a traumatic history when it comes to development, it comes to how they were treated" -Advocate

"Sometimes, we stay so focused and siloed into our work, that people don't think of broader partners that they could have, to begin some of the work, and of course, this work doesn't happen overnight. It takes a long time" -Practitioner

"I feel like the planning process is so short, it's really not designed to get meaningful public input. It's designed for developers to just get their project off the ground as quickly as possible" -Advocate

Practitioners discuss a range of governmental stakeholders in the community development process which ranged from the local to Tribal to Federal. The majority of practitioners who identified government as a stakeholder also mentioned specific entities within their health departments whose work focuses on community development (e.g., "Center for

Community Capacity Development,” “State Department of Economic and Community Development”). Advocates were more likely to talk about local or city-level government and did not address Federal-level government. Advocates also discussed a wider range of stakeholders than did practitioners, which included unions, colleges, and faith-based organizations.

“There's a lot of distrust within that community and then you add in, here's the county commissioner and here's the state government and here's the federal government that it just becomes this tug of war between resources and policy...” -Practitioner

“we primarily work with community organizations, so it might be other advocacy based organizations, transportation organizations, political action committees, also RCOs which are residential community organizations. And so lots of neighborhoods, neighborhood organizations, and also nonprofits.” -Advocate

In addition, both groups discussed potential solutions for displacement. Practitioners and advocates both identified upstream policies as the predominant strategies for both mitigating and preventing displacement. Practitioners identified policies, such as raising minimum wage or requiring developers to build low-income housing, as well as improving equity within impacted communities to be potential mitigation strategies. While practitioners discussed improving equity within communities, the language does not suggest community engagement. Advocacy groups identified policies such as supporting transportation infrastructure and changes to property tax. Additional non-policy mitigation strategies include ensuring equity in the development process and educating communities on planning decisions and issues regarding affordable housing. All prevention strategies identified by advocacy groups fall within the upstream policies category, including control of prices (rental, property taxes, utilities), requiring racial equity assessments, and policies that regulate development. Overall, both groups considered this to be a challenging issue.

“making sure that there's plans for affordable housing in any type of development that's proposed... You can't leave it up to the corporation. So it has to be government policies” -Practitioner

“... I don't think we can prevent displacement because I think the mechanisms that influence those things are beyond and outside of our control and the same goes with gentrification...policies on rent and prices in terms of utilities and cities, negotiating that with who provides them services. So I think it's really, we need more government intervention within to prevent displacement.” -Advocate

“focusing more on process, equity in the process and decision making process as our policy... It's who has power in setting the agenda and controlling resources...how are we going about setting our advocacy agenda and whose voice matters in that? So it's building the infrastructure and trust and relationships and processes to make sure that our work is being driven by people who are most impacted. And that we have a clear understanding of who we're talking about when we say that” -Advocate

4.4 Discussion

These findings provide insight into the perspectives of community development, including the unintended consequences (e.g., displacement) from two key stakeholder groups of active living opportunities. As studies have highlighted the importance of stakeholder collaboration in the community development process¹⁴², it is important to understand perspectives from these groups. In summary, both practitioners and advocates in this study discussed playing an important role in the community development process – though practitioners described having more say in the actual process (i.e., implementing and funding community development) whereas advocates participated more in community engagement. Both groups felt community development held important benefits, specifically by creating healthy living opportunities, while also potentially leading to the displacement of legacy or long time residents. This is similar to other studies that have shown the active living benefits of community development strategies,^{149,151,152,161} and also provides more evidence for the potential harm stemming from the gentrification of neighborhoods.^{90,93,162} However, practitioners firmly believed the benefits were for ALL community members, whereas advocates felt the benefits were only seen in those in a position of power or privilege, and the consequences were

disproportionately seen in marginalized communities (e.g., low income, racial/ethnic minorities, persons with disabilities). Both practitioners and advocates understood gentrification as a change in the makeup of a neighborhood, but practitioners tended to focus on development and economic change whereas advocates focused on the demographic and cultural changes occurring. While the original coining of the phrase focused on class, these thoughts of participants are in line with contemporary definitions of gentrification, particularly in the U.S. context, which tend to include a class *and* racialized component, and a recognition of structural socioeconomic complexities.^{162,163} Both groups also understood the displacement of long-term residents of a neighborhood, but only advocates highlighted the cultural changes that also come with that. This is in line with a publication highlighting the impacts of gentrification on the health of legacy or long term residents.¹⁶⁴

A common theme in both groups was the need for community development that was “done right.” However, practitioners and advocates had different ways of framing this. Both felt the need for equitable strategies that combated the lack of diverse community engagement throughout the entire community development process. Both mentioned the difficulty in getting diverse representation for community engagement. Practitioners discussed this as if it was out of their control (mainly up to governments or developers), whereas advocates actively discussed solutions for getting engagement from a more diverse group of community members that included marginalized communities. This may be part of the reason why practitioners focused on developers and federal government as being key stakeholders in this process whereas advocates also discussed a diverse group of neighborhood and community organizations. Several studies have highlighted this need for community engagement throughout the community development process, and cross-sectoral collaboration.^{56,142,157} In addition, both groups felt mitigation and

prevention of displacement was connected to more upstream policies having to do developers, local governments, and affordable housing. This is line with current toolkits which suggest that displacement is only an issue of affordable housing.^{89,165} Though Advocates also felt ensuring an equitable community development process would help against issues of displacement (and gentrification), a factor being brought up in a more current review of anti-displacement strategies.

Limitations and Strengths

Limitations of the present study include the use of a convenience sample in recruiting public health practitioners and advocates. However, this allowed the authors to recruit a nationally representative sample that had a specific role in active living related community development. Additionally, a lack of generalizability inherent to qualitative research is present. However, the purpose of this study was to explore perspectives of those who are key stakeholders in the community development process. To our knowledge, this study is the first of its kind to gain perspectives of the community development process from key stakeholders. This may help inform policymakers and others in decision making roles how to best communicate and engage with practitioners and advocates. A lack of social, economic, and political context is a key challenge in promoting health equity of communities.⁴ This paper identifies some gaps in how communities are perceived, and how to best engage with community members in the community development process.

Conclusions

Community development strategies are useful tools that can be beneficial for community members, but equally consequential for traditionally marginalized community members. Understanding how key stakeholders including practitioners and advocates navigate the community development process may help provide insight to help ensure it is an equitable

process. More work is needed to further elucidate best practices for health and social equity in the community development process. Both groups do identify displacement as an issue of concern but suggest that more context and understanding is needed to combat it. Future studies should describe which “anti-displacement” strategies are available and accessible to practitioners and advocates, while also examining their effectiveness towards preventing displacement and the implications of equity.

Chapter 5. Conclusions and Implications

5.1 Dissertation Overview

This dissertation fills several research gaps in understanding contextual differences in environment and policy strategies to promote physical activity in disadvantaged communities, particularly in traditionally vulnerable or marginalized communities (i.e., rural, low-income, racial/ethnic minorities). Strategies targeting the built environment, social-cultural environment, and policy have shown to influence physical activity, but less is known about how these strategies are implemented in and impact disadvantaged communities. Rural midwestern adults, particularly women, have disproportionately lower levels of physical activity, but there is evidence to suggest that increased self-efficacy for physical activity and recreational access (including walking trails) may help to promote physical activity in this group. However, a lack of clear associations between perceived environmental factors and physical activity, suggests the importance of gender in driving physical activity behaviors. Community development strategies that have traditionally focused on social and economic benefits for disadvantaged communities, may also benefit the health of communities by providing infrastructure and opportunities to be physically active. Neighborhood improvements such as the implementation of smart growth strategies and complete streets are shown to influence physical activity behaviors. However, successful community development that benefits all community members should also focus on capacity building for key stakeholders in the community (e.g., community members, public health practitioners, advocates) and community engagement. Public health practitioners and advocates should engage with community members, but also across sectors. Overall, ensuring an equitable process of community development, including diverse community engagement may help in addressing the issue of displacement, which is a potential consequence of community

development. In considering multilevel correlates of physical activity in disadvantaged communities a *health equity* lens is vital toward not only reducing or eliminating health disparities that exist related to physical activity, but striving to promote social justice and equalize opportunities to be active and healthy.⁵ Key challenges to address in achieving health equity include limitations of the evidence base, underdeveloped measures and methods, and inadequate attention to context.⁴

5.2 Multilevel drivers of physical activity in disadvantaged communities

Ecological models of health behavior,^{33,35} including the ecological model of the four domains of active living,³ provide some understanding of what may drive physical activity, but can also be vital towards targeting multilevel (i.e., intrapersonal, interpersonal, environment, policy) strategies to increase physical activity. Framing these multilevel strategies around health equity is important in disadvantaged communities in order to ensure these strategies such as the implementation of walking trails, smart growth, and complete streets are equitable and sustainable for everyone. In Chapter 2, we saw that trail use was an important factor towards being physically active in rural communities. Still, no associations were found between perceived environmental factors and weekly MVPA minutes. Possible interpretations of these null associations could be that the neighborhood environment may not be as influential in rural settings, or that neighborhood environment factors may be equally unfavorable for all rural residents, making it difficult to highlight neighborhood environment factors that are supportive of physical activity. However, another component of these null associations between neighborhood environment factors and physical activity is that we are just not measuring or asking the right questions about rural neighborhood environments with regards to physical activity. Even more concerning, there are contextual factors in rural communities that could be

driving the overall disparity in physical activity in rural residents and the wider disparity seen in rural women. Social-cultural factors in rural settings such as gender norms may be more influential in rural settings and warrant deeper exploration. In Chapters 3 and 4, we found that community development strategies intended to benefit disadvantaged communities did in fact improve infrastructure for physical activity and increase access to opportunities for physical activity. However, these benefits aren't necessarily seen by the disadvantaged communities they are intended for. Community development improvements can also lead to demographic and cultural shifts in neighborhoods and the displacement of long term residents, often leading to even more health issues. This dissertation provides evidence for the importance of multilevel drivers of physical activity in disadvantaged communities, but also the need to bring a health equity lens when addressing any level of influence for physical activity. It is vital to understand contextual factors of disadvantaged communities; and to do this we must further research multilevel and often understudied factors in rural settings. This research may help inform equitable strategies for physical activity.

5.2 Research Implications

This dissertation fills an important research gap in the study of environment and policy influences of physical activity in disadvantaged communities, but work remains in assuring equitable strategies for physical activity. As disadvantaged communities often reside in unsupportive environments of physical activity, it is important to understand the contextual factors related to physical activity in these communities. Though there is evidence supporting a link between the environment and physical activity in rural populations, no studies to our knowledge have examined this at multiple levels (i.e., intrapersonal and environment) and with objectively assessed data. Furthermore, no studies to our knowledge have reviewed community

development strategies and their potential for increasing physical activity through multilevel strategies. Thus, Chapters 2-4 have provided further evidence regarding the utility of ecological models in disadvantaged settings.

However, these chapters illuminated contextual differences in disadvantaged settings and the need for more focused research with an equity lens. First, an increased evidence base is needed examining multilevel influences of physical activity in disadvantaged settings. Though there is a clear evidence base for correlates of physical activity,²⁴ the evidence is inconclusive when focusing on disadvantaged communities.⁵² Furthermore, one review highlighted the need to improve the quality of evidence when examining built environment effects of physical activity through a health equity lens.⁵³ In considering methods and interventions for physical activity, a review of physical activity interventions in socioeconomically disadvantaged communities highlighted that most (70%) interventions were considered low quality, and had issues with recruitment and retention of participants.⁵⁴ This implies that there may be a broader disconnect between the implementation of strategies and understanding the social-cultural, economic, and political context that shapes disadvantaged communities – factors that were further illuminated by this dissertation. Specifically, Chapter 2 elucidates an important gap of not understanding why rural women are less active. This highlighted the need to further explore contextual factors of rural settings such as social-cultural factors (e.g., gender norms) in order to inform strategies to measure and possibly intervene on physical activity in rural residents, especially rural women. Chapter 3 and 4, address the need to further examine the short and long term impacts of community development strategies. This includes examining the effectiveness of community development strategies for increasing physical activity and improving health, but also looking at the long term effects including negative consequences such as displacement. Increasing and

improving the evidence base with a focus on the context of disadvantaged communities is a first step towards ensuring environmental and policy strategies for physical activity are equitable. This includes having consistent and reliable measurement, while also improving research design and having rigorous methods.

5.3 Practice and policy implications

This dissertation provided evidence to inform effective and equitable policies for improving physical activity, as well as health promoting environments. By adding evidence for ecological models of physical activity in rural populations, Chapter 2 helped inform environmental policies and strategies to influence physical activity in rural communities. Creating policies and allocating funding towards public spaces and recreational facilities is imperative for the health of rural communities, including rural women. Chapter 3 and 4 explored effective and equitable community development strategies and policies, with regards to physical activity and overall health. Community partnerships between communities, public health practitioners and relevant organizations who work to promote healthy environments (e.g., America Walks, Physical Activity Society, TrailNet) can help accumulate resources and capacity important towards increasing physical activity, and creating healthy communities. However, there are some obvious shortcomings in ensuring that environment and policy strategies for physical activity are both sustainable and equitable.

In striving for health equity, there is a need for community engagement and cross-sectoral collaboration when implementing strategies for physical activity, such as walking trails and other community development strategies. Community engagement must be diverse and reach a wide array of community members, with a concerted effort in disadvantaged populations. Taking advantage of partnerships and stakeholders outside of health (e.g., schools, religious

organizations, advocacy organizations, worksites) is relevant towards ensuring health equity.⁵⁶

These strategies may help to ensure benefits of strategies for physical activity are realized across all communities, especially the most disadvantaged ones. More work is needed to examine the challenges faced in these cross-sectoral collaborations, including the understanding of social, economic, and political contexts of different sectors whose primary motivations are not to improve health through physical activity.

A component of this is the need for effective messaging tailored to different and diverse audiences. Previous research has shown in order to effectively implement environment and policy strategies, information on health disparities need to be more effectively communicated to policymakers.¹⁶⁶ Furthermore, messaging should stem from key partnerships and include an array of potential benefits not only rooted in health (e.g., economic benefits of development).¹⁶⁷ Working across sectors can also be important in mobilizing for change and social justice. Ensuring that key stakeholders such as advocacy organizations who may be more driven by health equity are a part of any process in implementing strategies for physical activity is vital.

5.4 Conclusions

Improving access to physical activity for ALL people, especially those who are disadvantaged or at higher risk of chronic diseases, will improve population health. All papers (Chapters 2, 3, and 4) highlight the importance of the environment and policy in influencing physical activity, and provide guidance on how environment and policy strategies such as walking trails and other community development can help to promote physical activity in disadvantaged groups. Community development strategies, which do not always have the primary motivation of improving health, may be an effective way to work across sectors and provide sustainable benefits for physical activity. However, ensuring capacity building, including

diverse community engagement, may help to address issues of displacement and ensure an equitable distribution of benefits. In addition to further examining the long and short terms impacts of these environment and policy strategies, future research should dig deeper into social, economic, and political context of where these strategies are being implemented in order to have a better understanding of the implications of equity.

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