COMMUNITY INTERVENTIONS TO PROMOTE PHYSICAL ACTIVITY

A DISSERTATION SUBMITTED TO THE GRADUATE DIVISION OF THE UNIVERSITY OF HAWAI‘I AT MĀNOA IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PUBLIC HEALTH

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Physical activity (PA) is an essential health-promoting behavior. Unfortunately, the majority of U.S. adults are not sufficiently active, and certain groups are even less likely to engage in regular PA. To increase population-levels of PA and resolve PA disparities, community interventions are needed to address multiple levels of a social ecological framework. The purpose of this dissertation research was to contribute to the knowledge about effective community interventions for PA, with a particular focus on the process of engaging community members to participate in the design and implementation of community interventions.

The dissertation research was comprised of three studies. The first study was a systematic literature review of community-based participatory research interventions for PA. The major finding of the systematic review was that community participation was integrated rather inconsistently in the intervention process, but nearly all interventions were able to impact multiple levels of a social ecological framework. In the second study, a grounded theory approach was used to develop a theory of change for how a community coalition, Get Fit Kaua‘i, was able to create policy and environmental changes. This qualitative study was comprised of semi-structured interviews with a purposeful sample of 25 coalition stakeholders. The theory resulting from the interviews highlighted the importance of capacity building, the influence of community context, and the complementary programmatic activities that enabled built environment policy changes. In the third study, a secondary data analysis employed structural equation modeling to assess the cross-sectional association between perceived social and built environment factors with PA levels in a sample of 3,626 Hawai‘i adults. The resulting model confirmed that community interventions must address intrapersonal factors, along with modifiable factors in the built and social environments.

Together, the dissertation studies contribute to the evidence supporting the utility of community interventions to promote PA. The studies reflect the challenges facing community interventions that seek to address the upper levels of policy and environmental change in the social ecological model. Based on the dissertation findings and study limitations, the final chapter provides practice implications and directions for future research.
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<td>BE</td>
<td>built environment</td>
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<tr>
<td>BMI</td>
<td>body mass index</td>
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<td>BRFSS</td>
<td>Behavioral Risk Factor Surveillance System</td>
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<td>CBPR</td>
<td>community-based participatory research</td>
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<td>CCAT</td>
<td>Community Coalition Action Theory</td>
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<tr>
<td>CDC</td>
<td>Centers for Disease Control and Prevention</td>
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<tr>
<td>CVD</td>
<td>cardiovascular disease</td>
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<tr>
<td>DOH</td>
<td>Hawai’i State Department of Health</td>
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<td>GFK</td>
<td>Get Fit Kaua’i</td>
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<tr>
<td>HHI</td>
<td>Healthy Hawai’i Initiative</td>
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<td>MVPA</td>
<td>moderate to vigorous physical activity</td>
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<td>PA</td>
<td>physical activity</td>
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<td>SEM</td>
<td>structural equation modeling</td>
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<td>T2D</td>
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CHAPTER 1

Introduction

Physical activity (PA) is an essential health-promoting behavior. Any bodily movement produced by the contraction of skeletal muscles that results in substantial energy expenditure is considered to be PA (Howley, 2001). PA commonly is regarded as leisure activities like playing sports, jogging, swimming, yoga, and dancing. However, PA also encompasses activities that are a part of daily life, such as active forms of commuting to work (e.g., walking or bicycling), household chores like gardening and vacuuming, and occupational labor like heavy lifting. PA is increasingly being engineered out of daily life as machines and mechanical motors replace the need for human exertion (U.S. Department of Health and Human Services [DHHS], 1996). This is unfortunate because a myriad of health benefits result from being physically active.

The evidence that PA is beneficial to health is very strong and based on a wide range of well-conducted research studies (Physical Activity Guidelines Advisory Committee, 2008). Engaging in regular PA helps control body weight, reduces the risk for chronic conditions like type 2 diabetes (T2D) and cardiovascular disease (CVD), strengthens bones and muscles, contributes to mental and emotional well-being, and increases life expectancy (Centers for Disease Control and Prevention [CDC], 2011). Compared to less active people, active adults have a higher level of cardiorespiratory and muscular fitness, a healthier body mass and composition, and a more favorable biomarker profile related to prevention of T2D and CVD and enhancement of bone health (Physical Activity Guidelines Advisory Committee, 2008). Benefits of PA accrue regardless of weight or body mass index (BMI) status (Ekelund et al., 2015; Physical Activity Guidelines Advisory Committee, 2008). Moreover, PA is effective for both primary and secondary prevention of chronic diseases (Warburton, Nicol, & Bredin, 2006). Research evidence also supports a dose-response relationship between PA and health benefits, in which PA of longer duration or higher intensity reduces risk for CVD and premature mortality (Haskell et al., 2007).

To obtain health benefits, adults need to be physically active on a regular basis. The 2008 Physical Activity Guidelines for Americans (DHHS, 2008) recommend that adults aged 18 to 64 years participate in at least 150 minutes per week of moderate-intensity or 75 minutes per week of vigorous-intensity aerobic activity (or an equivalent combination of moderate- and vigorous-intensity aerobic activity). Aerobic activity should be performed in bouts of at least 10 minutes, and
it ideally should be spread throughout the week. For increased health benefits, the guidelines recommend a total of 300 minutes per week of moderate-intensity or 150 minutes per week of vigorous-intensity aerobic activity. In addition to moderate- or vigorous-intensity aerobic activity, adults should also do muscle-strengthening activities that involve all major muscle groups on two or more days a week.

Despite the many benefits of PA, most of the population is not sufficiently active. Along with poor diet and tobacco use, physical inactivity is a leading cause of death in the global population. The World Health Organization (2012) identifies physical inactivity as the fourth leading risk factor for global mortality. Researchers have proposed that physical inactivity is pandemic, requiring that intervention become a global public health priority (Kohl et al., 2012). A recent study found that, worldwide, inadequate levels of PA caused 9% of premature deaths, equivalent to more than 5.3 million deaths in 2008 (Lee et al., 2012). Moreover, if physical inactivity were reduced by 25%, 1.3 million deaths per year could be prevented (Lee et al., 2012).

In the United States (U.S.), physical inactivity and poor diet account for an estimated 400,000 deaths annually, and the combination of those two behaviors are thought to soon take over tobacco use as the leading preventable cause of mortality (Mokdad, Marks, Stroup, & Gerberding, 2004). U.S. adults who are physically active have a 47% reduced risk for all-cause mortality (Ford, Bergmann, Boeing, Li, & Capewell, 2012). Furthermore, there is a curvilinear and inverse dose-response relationship between activity levels and all-cause mortality, with the steepest gradient at the lower end of the activity scale (Powell, Paluch, & Blair, 2011). Physical inactivity also has substantial economic consequences. An estimated $76 billion per year in medical expenses is directly attributed to physical inactivity in the U.S. (Roux et al., 2008).

Because of its vital relationship to health, there are 15 objectives for PA in Healthy People 2020 (DHHS, 2012). The first objective is to reduce the proportion of adults who engage in no leisure-time PA from 36.2% to 32.6%. The second objective is related to increasing the proportion of adults who meet the current U.S. guidelines for aerobic and muscle-strengthening activities. Surveillance data report that less than half of all American adults are regularly physically active (Carlson, Fulton, Schoenborn, & Loustalot, 2010; CDC, 2007), and only 18.2% meet the targets for aerobic and muscle-strengthening activity as recommended by the 2008 Physical Activity Guidelines (DHHS, 2012). These figures may be substantially lower if activity levels are objectively assessed using accelerometers instead of using self-report (Tucker, Welk, & Beyler, 2011).
Disparities in Physical Activity Levels

Although the majority of Americans are not sufficiently active, certain groups are even less likely to be active than others. In general, higher PA levels in adults are correlated with being male (vs. female) and younger age (Bauman et al., 2012). Disparities in PA levels also exist by race/ethnicity, educational attainment, and other sociodemographic variables. For example, residents of rural areas are less likely to be physically active than residents of suburban or urban areas (Parks, Housemann, & Brownson, 2003). A systematic review by Gidlow and colleagues (2006) also concluded that adults with higher socioeconomic status perform more leisure-time PA than adults with lower socioeconomic status. This is consistent with evidence that those at lower ends of the scale face greater barriers to PA.

Physical Activity Levels of Hawai’i Adults

In 2013, according data from the Hawai’i Behavioral Risk Factor Surveillance System (BRFSS), only 26.5% of adults in Hawai’i achieved recommended levels of aerobic and muscle strengthening activity (Hawai’i Health Matters, 2015). Differences by age, gender, and ethnicity were present. While 35.4% of 18-24 year olds meet PA recommendations, only 18.4% of adults aged 75 years and older meet them. Approximately one-third (32.1%) of males, but only 21.0% of females, achieve recommended levels of PA. Finally, Japanese (19.4%) and Filipino (20.2%) ethnic groups were less likely to meet PA recommendations, while Caucasian (31.0%) and Native Hawaiian (31.5%) ethnic groups were more likely to meet PA recommendations (Hawai’i Health Matters, 2015).

Utility of the Social Ecological Framework

One of the current public health challenges is to develop and implement policies, programs, and other interventions that promote PA in an increasingly sedentary society (Blair & Morris, 2009). Researchers have found that individual behavioral theories are inadequate in their ability to fully explain PA behavior (Bauman, Sallis, Dzewaltowski, & Owen, 2002). Rather, PA is a complex and dynamic behavior with a diversity of determinants and, consequently, multiple pathways to change (Sherwood & Jeffery, 2000). Throughout a person’s life, PA participation varies and is under the influence of different factors, such as time availability, motivation to be active, cultural norms, and access to PA resources and activity-friendly environments. The “complex causal web” requires multilevel models for a comprehensive understanding of PA (Bauman et al., 2002, p. 10).
PA is carried out in multiple life domains, encompassing leisure, occupation, transportation, and the home (Pratt, Macera, Sallis, O'Donnell, & Frank, 2004). Leisure-time physical activity (LTPA) is a broad category that includes activities that people participate in during their free time, including exercise programs, sports, and outdoor recreation. Occupational PA is the activity people get at work, such as postal workers walking from home to home to deliver mail or construction workers engaging in manual labor to remodel buildings. The transportation domain includes active modes of getting from place to place, i.e., non-motorized forms of transport like walking and bicycling. People who use mass transit also engage in active transport as they move between destinations and transit stops. Activity done in the home includes household chores like yard work.

In low-income and middle-income countries, most activity occurs in the occupational, household, and transportation domains, whereas in higher-income countries, LTPA contributes more to total PA levels (Bauman et al., 2012). The determinants of PA for each domain vary (Sallis et al., 2006), implying that an array of interventions is necessary to increase overall PA levels.

A social ecological perspective, which emphasizes the context in which a behavior takes place, is useful in assessing the determinants of PA and determining how to increase PA levels in populations. The social ecological model posits that an intervention can improve PA through influencing individual, interpersonal, organizational, community, and public policy levels—plus the interactions among them (Matson-Koffman, Brownstein, Neiner, & Greaney, 2005; McLeroy, Bibeau, Steckler, & Glanz, 1988; Sallis et al., 2006; Spence & Lee, 2003). Comprehensive interventions that influence multiple levels, especially through policy and environmental changes, are posited to be more effective at creating population-wide, sustainable increases in PA than interventions that target individuals or small groups (Kelly, Hoehner, Baker, Ramirez, & Brownson, 2006; Sallis et al., 2006).

The social ecological framework points out environmental and policy factors as fundamental causes of physical inactivity. Environmental settings encompass both the physical and social environment. The physical environment encompasses the natural environment as well as the built environment (BE). The BE refers to the collective availability of sidewalks, parks, trails, recreational facilities, traffic safety, and other neighborhood characteristics that promote recreational PA and active transport (e.g., walking and bicycling for leisure or to get to work/school) (Ferdinand, Sen, Rahurkar, Engler, & Menachemi, 2012). The BE is shaped by policies that pertain to zoning, development, land use, and transportation regulations (Sallis et al., 2006).
The social environment is another key concept in the social ecological framework. It is usually conceptualized at the interpersonal level, because family members, friends and coworkers model PA behaviors as well as provide social support for PA. However, social influences operate at multiple levels. Community norms can influence an individual’s perceptions about the importance, availability, desirability, and safety of PA. A diverse range of other community and neighborhood social factors that have been linked to PA include culture, crime, incivilities (e.g., litter and graffiti), traffic, and social capital (Bauman et al., 2012; Sallis, Owen, & Fisher, 2008). McNeill, Kreuter, and Subramanian (2006) conceptualize the social environment as consisting of five dimensions that impact PA: social support and social networks, socioeconomic position and income inequality, racial discrimination, social cohesion and social capital, and neighborhood factors. Additional research is needed to operationalize social environmental constructs and illuminate the mechanisms by which they promote or hinder PA.

Community-Level Interventions

To increase population PA levels, there has been a shift away from individually-oriented interventions towards comprehensive community interventions with a wider reach. Community interventions have been defined by a Cochrane systematic review as being comprised of at least two of six possible strategies: (1) social marketing; (2) other communication strategies; (3) individual counseling by health professionals; (4) working with governmental and non-governmental organizations to encourage PA; (5) working in specific settings; and (6) environmental change strategies (Francis et al., 2012).

The majority of evidence-based PA interventions recommended by the Guide to Community Preventive Services (Community Preventive Services Task Force, 2012) seek to influence PA at the individual, interpersonal, organizational, community, and/or public policy levels. Six types of interventions recommended in the Community Guide are: (1) social support interventions in community settings; (2) enhanced school-based physical education; (3) community-scale urban design and land use policies; (4) creation of or enhanced access to places for PA combined with informational outreach activities; (5) street-scale urban design and land use policies; and (6) community-wide campaigns.

An important consideration is that community interventions are cost-effective because they impact a larger group of people and/or can be sustained over a longer time period than individually
focused behavior change interventions (Gidlow et al., 2006). Roux and colleagues (2008) found that interventions based on Community Guide strategies had cost-effectiveness ratios ranging from $14,000 to $69,000 per quality-adjusted life year. However, the need for more economic evaluations of community interventions is ongoing (Community Preventive Services Task Force, 2011).

**Engaging Communities in Intervention Research**

Community interventions should meaningfully involve communities in conceptualizing and carrying out the interventions. As stated by Horowitz, Robinson, and Seifer (2007, p. 2634):

“There has been a fundamental shift in academics’ views of people in communities from patients and research subjects…to invaluable partners and experts who can shed light on the root causes of illness and galvanize their communities to develop effective, novel, sustainable interventions to improve health and eliminate disparities.”

Community members can be engaged in community interventions in multiple ways. For example, they can be partners in intervention research through community-based participatory research (CBPR) approaches. In public health practice, they can also be members of community coalitions that carry out health promotion activities.

**Community-Based Participatory Research**

To address disparities in PA, CBPR is a promising approach to developing and carrying out interventions in partnership with ethnic minority communities and low-income communities (Israel et al., 2010). CBPR has gained traction in public health research and practice for its ability to reduce disparities and improve health status (Minkler & Wallerstein, 2008). In CBPR, academic researchers partner with community stakeholders to inform the design, implementation, and dissemination of research that addresses a health problem salient to the community (Horowitz et al., 2009). Partners apply their expertise to understand a particular phenomenon and integrate the knowledge gained with action to improve the health and well-being of community members (Israel, Schulz, Parker, & Becker, 1998). The emphasis of CBPR is on the participation, influence, and control by non-academic researchers in the process of creating knowledge and change (Israel, Schulz, Parker, & Becker, 2001). The CBPR partnership results in research interventions that are more relevant, sustainable, and actionable than a traditional research approach that is driven by academics without community input and participation.
Community Coalitions

While CBPR is geared towards involving community members in the research process, another mechanism for integrating community participation in PA promotion is community coalitions. Community coalitions are a popular and long-standing strategy for promoting health and preventing disease (Butterfoss, Goodman, & Wandersman, 1993). Community coalitions are both a type of community intervention and an approach to engendering participation by community members. One definition of a community coalition is “a group that involves multiple sectors of the community, and comes together to address community needs and solve community problems” (Wolff, 2001, p. 166). Furthermore, a community coalition: (1) is composed of community members; (2) focuses primarily on local issues rather than national issues; (3) builds on community assets; (4) uses collaboration to help resolve community problems; (5) is community-wide and has representatives from multiple sectors; (6) works on multiple issues; (7) is citizen influenced, if not necessarily citizen driven; and (8) is long-term and not ad hoc (Wolff, 2001). Community coalitions can serve as an organizational structure for strategy, advocacy, and action to increase PA (King, 1998).

Current Research Gaps

There is some evidence to support the effectiveness of community interventions in promoting PA, but the lack of robust study designs and heterogeneity in measurement limit the ability to generate consistent findings (Baker, Francis, Soares, Weightman, & Foster, 2015). For example, a recent systematic literature review found positive associations between the BE and PA; however, study designs were not sufficient to determine causality (Ferdinand et al., 2012). Additionally, while there is growing evidence to support CBPR as an effective way to address health disparities, more research is needed to identify the process through which community participation occurs and what impact partnerships and participation have on health outcomes (Sandoval et al., 2011). Another research gap concerns the social ecological model, which needs to be better articulated, applied, and tested for PA interventions (Glantz & Bishop, 2010). Further study is also needed to understand the policy change process that leads to BE changes (Sallis, Floyd, Rodriguez, & Saelens, 2012).
Conceptual Framework

The conceptual framework for this dissertation is based on the central premise that effective community interventions promote PA through: (1) improvements to the built and social environments, and (2) increased availability of and access to PA programs (Figure 1.1). Community interventions may also address policy changes that modify the BE. Community changes to the BE, social environment, and availability of PA programs will result in increased PA either directly or indirectly by positively influencing individual-level knowledge, attitudes, self-efficacy, and perceptions of the community environment. Community interventions can take place in a variety of settings (neighborhoods, organizations, worksites, and schools), but should include community participation throughout the development, implementation, and evaluation of the intervention process. Integrating community participation in the intervention process—through mechanisms such as CBPR and community coalitions—helps to build community capacity that will enhance intervention outcomes.

Figure 1.1. Conceptual framework for dissertation research.
Purpose

The purpose of this dissertation research was to contribute to knowledge about effective community interventions to promote PA. The primary focus was on the process of designing and implementing community-level PA interventions through the participation of community members, including as partners in CBPR and as members of community coalitions. Because there is also a need to strengthen the evidence for multilevel interventions for PA, the utility of the social ecological model in guiding community interventions also was considered.

Research Questions

The dissertation research was comprised of three distinct studies, which are presented in Chapters 2-4. Three primary research questions (RQs) addressed the use of community interventions to promote PA:

1. What are the key features of PA interventions that use CBPR approaches, and do the interventions result in increased levels of PA? (Chapter 2)
2. What theory of change explains how Get Fit Kaua’i, a community coalition, made policy and infrastructure changes to the BE? (Chapter 3)
3. What is the association between community-level social and built environment factors and PA in Hawai’i adults? (Chapter 4)

A systematic literature review of CBPR interventions for PA was conducted to address the first RQ. The literature review summarized intervention characteristics, examined the extent to which community participation was incorporated into the entire intervention process, and considered how intervention outcomes aligned with a social ecological framework. An increased understanding of the effectiveness of CBPR approaches in promoting PA may help to address disparities in PA levels.

To answer the second RQ, a qualitative study was undertaken to understand how a community coalition in Kaua’i County created BE policy and infrastructure changes. Through a grounded theory approach, semi-structured interviews were conducted with coalition staff, leaders, members, and partners. The purpose was to develop a theory of change for the process through which a community coalition created policy and environmental changes that support PA. Other community coalitions seeking to make similar changes would be able to learn from the experiences of Get Fit Kaua’i.
For the third RQ, a secondary data analysis was conducted. Using structural equation modeling, the contribution of community-level variables to explaining PA levels of Hawai‘i adults was explored. The data for Study 3 came from a cross-sectional telephone survey of a random sample of Hawai‘i adults. This study used a social ecological perspective to build a model that explains PA levels. The findings can be used to inform the design of effective community interventions.

**Community Partnership**

The Healthy Hawai‘i Initiative (HHI), a program of the Hawai‘i State Department of Health (DOH), Chronic Disease Prevention and Health Promotion Division, served as the primary community partner for this research. HHI receives money from the Tobacco Settlement Special Fund to promote healthy lifestyles in the state population through reducing tobacco use, improving nutrition, and increasing PA through policy and environment changes. One component of HHI focuses on community initiatives that increase PA through BE strategies. Examples of the community-level work include partnering with governmental and nongovernmental agencies to implement Complete Streets policies at the state and county levels, piloting a public bicycle share program in the community of Kailua, and funding county coalitions in Maui and Kaua‘i that implement the objectives in the Hawai‘i State Physical Activity and Nutrition Plan. The Kaua‘i County coalition, Get Fit Kaua‘i, was the coalition under study for RQ 2. The findings from this dissertation research can guide future HHI efforts to promote PA among adults in Hawai‘i.
CHAPTER 2

A Systematic Review of Community-Based Participatory Research Interventions to Increase Physical Activity in U.S. Communities

Abstract

Despite the health-promoting benefits of physical activity (PA), most Americans are not sufficiently active. Using community-based participatory research (CBPR) may be particularly beneficial in designing and testing physical activity interventions with disparate populations. CBPR approaches also hold the promise of influencing multilevel changes in individuals, physical and social environments, and public policy, as one CBPR principle requires focusing on the local relevance of public health problems and on ecological perspectives that attend to multiple determinants of health. This literature review aims to determine how community participation is integrated in CBPR interventions for PA and what outcomes result from these interventions in U.S. communities. Two databases, PubMed and PsycINFO, were systematically searched for relevant articles. A total of 28 articles representing 24 interventions met inclusion criteria. Data were extracted on intervention characteristics, community participation in research phases, and PA outcomes. The majority of studies reported community input in the assessment (79.2%), design (100%), implementation (91.7%), and evaluation (66.7%) phases of the PA interventions. Another key finding was that all but one intervention reported outcomes that targeted multiple levels of the social ecological framework. On average, the PA interventions addressed 2.9 ($SD = 1.0$) out of five social-ecological levels. Further research and improved reporting is needed to better link the participatory process to outcomes related to improved health of participants, as well as to changes in community capacity and systems to support PA.

Keywords: literature review, exercise, walking, health disparities, participatory research, social ecological model
Background

Physical activity (PA) is an essential health-promoting behavior. Engaging in regular PA helps with weight control, reduces the risk for chronic conditions like type 2 diabetes and cardiovascular disease, strengthens bones and muscles, contributes to mental and emotional well-being, and increases life expectancy (Centers for Disease Control and Prevention [CDC], 2011). Despite the myriad benefits of PA, less than half of all Americans achieve recommended levels of PA (CDC, 2007). Furthermore, disparities in PA levels exist by gender, age, race/ethnicity, education, and other sociodemographic variables. For example, residents of rural areas are less likely to be physically active than residents of suburban or urban areas (Parks, Housemann, & Brownson, 2003).

To address disparities in PA levels, community-based participatory research (CBPR) may be a promising approach to develop and carry out interventions. CBPR approaches have been increasingly recognized in public health for the potential to reduce disparities and improve health status (Minkler & Wallerstein, 2008). In CBPR, academic researchers partner with community stakeholders to inform the design, implementation, and dissemination of research that addresses a health problem salient to the community (Horowitz, Robinson, & Seifer, 2009). Partners apply their expertise to understand a particular phenomenon and integrate the knowledge gained with action to improve the health and well-being of community members (Israel, Schulz, Parker, & Becker, 1998). CBPR emphasizes the participation, influence, and control by non-academic researchers in the process of creating knowledge and change (Israel, Schulz, Parker, & Becker, 2001). The CBPR partnership results in research interventions that are more relevant, sustainable, and actionable than a traditional research approach that is driven by academics without community input and participation.

There are multiple opportunities to incorporate community participation into a CBPR-guided intervention. Drawing upon elements of community involvement identified in a major CBPR review (Viswanathan et al., 2004), Figure 2.1 shows opportunities for participation by four phases in the research process: assessment, design, implementation, and evaluation.
In the assessment phase, the CBPR partnership conducts formative research to gain a better understanding of the elements needed for a successful PA intervention. This includes gathering data to quantify the problem and explore attitudes, beliefs, and practices in the target population. Commonly, researchers conduct focus groups or interviews with members of the target population to understand the barriers to and facilitators of PA. Community partners may provide input about who should participate in and the types of questions covered by the formative research. Community members can also be used to carry out the actual assessment, such as training them to audit the neighborhood environment for PA supports (Hoehner, Ivy, Ramirez, Meriwether, & Brownson, 2006). In addition, the use of participatory techniques like concept mapping (Kelly, Baker, Brownson, & Schootman, 2007) and PhotoVoice (Hennessey et al., 2010; Findholt, Michael, & Davis, 2011) can be used to further involve community stakeholders in assessing PA barriers and identifying potential solutions.
Following the assessment phase, the focus turns to appropriately designing the intervention. Design considerations include selecting the most appropriate research design, one that balances rigor with acceptability to the community. The CBPR partnership also makes joint decisions on data collection methods and instruments. In the design phase, some CBPR partnerships also submit funding proposals after the major decisions about study design have been made. As an example, LaRowe and colleagues (2007) used a participatory process to develop a culturally appropriate, home-based curriculum that promotes healthy eating and PA for American Indian preschool children and their family caregivers. Academic and tribal researchers, tribal community members, and tribal wellness staff collaborated to create the curriculum content and format, infuse traditional American Indian learning styles and activities, and determine the randomized trial intervention design.

Implementation of the intervention involves recruitment of participants, data collection, and delivery of the intervention components. The partners can have equal responsibility for implementing the intervention in the community. An illustrative study by Tanjasiri and colleagues (2011) described the CBPR approach that enabled their community-university collaborative to explore the factors contributing to obesity among Pacific Islander youth in Southern California. Community partners led the cultural tailoring of instruments and materials, community publicity, and youth recruitment; university partners led the finalizing of instruments, data management, and statistical analyses.

In the last stage, the CBPR partnership interprets the evaluative data to determine success, shares the findings widely, and makes decisions on how to apply the findings to advocate for policy change or improve practices. For example, the Latino Health for All community coalition presents evaluation data to its Community Advisory Board and coalition members to elicit feedback to the questions: (1) What are we seeing?; (2) What does it mean?; and (3) What implications do the data have for adjustment? (Fawcett, Collie-Akers, Schultz, & Cupertino, 2013). Providing the opportunity for sense-making about the coalition’s work helps the CBPR initiative make decisions about how to improve its efforts.

Congruent with an ecological perspective, CBPR acknowledges that the biomedical, social, economic, cultural, historical, and political determinants of health must be addressed (Israel et al., 1998). This orientation suggests that the outcomes of CBPR interventions may be framed using a social ecological perspective. The social ecological model posits that an intervention can improve PA
through influencing individual, interpersonal, organizational, community, and public policy levels—plus the interactions among them (Matson-Koffman, Brownstein, Neiner, & Greaney, 2005; McLeroy, Bibeau, Steckler, & Glanz, 1988; Sallis et al., 2006; Spence & Lee, 2003). Interventions that influence multiple levels, especially through policy and environmental changes, are more likely to create population-wide, sustainable improvements in PA (Kelly, Hoehner, Baker, Ramirez, & Brownson, 2006; Sallis et al., 2006).

For several reasons, CBPR interventions are well suited to impact multiple levels in a social ecological framework. In particular, CBPR emphasizes community capacity building (community-level change) and policy advocacy (public policy-level change) to improve health and promote social justice (Minkler & Wallerstein, 2008). CBPR strives to empower a community to identify and address its own issues (Braun et al., 2011). Thus, successful CBPR interventions are likely to have an impact beyond individual changes in knowledge, attitudes, and behavior.

The majority of evidence-based PA interventions recommended by the Guide to Community Preventive Services (2012) seek to influence PA at the interpersonal, organizational, community, and/or public policy levels. Specifically recommended are: social support interventions in community settings; enhanced school-based physical education; community-scale urban design and land use policies; creation of or enhanced access to places for PA combined with informational outreach activities; street-scale urban design and land use policies; and community-wide campaigns. Moreover, the CDC prioritizes funding for PA interventions that address at least two levels in the social ecological framework (Yee et al., 2006).

Although there is growing evidence to support CBPR as an effective way to address health disparities, more research is needed to identify the process through which community participation occurs and what impact partnerships and participation have on health outcomes (Sandoval et al., 2011). The purpose of this literature review is to: (1) assess how CBPR is used to incorporate community participation into the assessment, design, implementation, and evaluation of PA interventions; and (2) identify the outcomes of the CBPR interventions and characterize them by which levels of the social ecological framework are influenced. To date, there is no known published review of the impact of CBPR interventions for PA (Suminski, Petosa, Jones, Hall, & Poston, 2009). However, one recent systematic review examined community-engaged research interventions in U.S. schools that targeted diet, activity, and weight (Krishnaswami, Martinson, Wakimoto, & Anglemeyer, 2012).
Methods

The PRISMA guidelines (Moher, Liberati, Tezlaff, Altma, & the PRISMA group, 2009) were followed for the systematic search. Two electronic databases, PubMed and PsycINFO, were searched in January 2015 using the search terms physical activity or exercise in combination with community-based participatory research, CBPR, participatory research, or participatory action research. Several search limits were selected: in PubMed, results were restricted to “humans” and English language; in PsycINFO, the limit to only search peer-reviewed journals was selected.

Study inclusion criteria were: (1) English language; (2) published in a peer-reviewed journal; (3) mentioned CBPR or participatory research component in title or abstract; (4) had a PA intervention component; (5) reported intervention outcomes related to PA; and (6) conducted in U.S. community. The following definition of an intervention was adopted: “an organized and planned effort to change behavior among individuals, communities’ norms or practices, organizational structure or policies, or environmental conditions” (Viswanathan et al., 2004, p. 20). Studies were excluded if they: (1) only reported assessment or formative research findings; (2) only reported study design, methods, and/or baseline data; (3) only reported process evaluation data; (4) were conducted primarily to assess intervention feasibility (i.e., feasibility studies with limited efficacy testing for PA outcomes); (4) did not have an intervention component (such as commentaries, perspectives, and CBPR methodological papers); and (5) only described outcomes related to weight, BMI, or biometric measures (e.g., blood pressure) given that many interventions also included a nutrition component.

A total of 365 citations were retrieved from both databases. After removing 62 duplicate citations, 303 citations were screened for inclusion. In the first stage, only abstracts and titles were screened; in the second stage, the full text of articles was reviewed. Through this two-step process, 275 articles were removed: 51 did not have a PA intervention component; 25 did not describe a community participatory research component; 41 were not intervention studies; 81 reported findings from assessment or formative research studies; 27 reported only study design, methods, and/or baseline data; 7 were primarily feasibility studies; and 7 were conducted outside of the U.S. This left 28 articles representing 24 PA interventions for inclusion in this review. Refer to Figure 2.2 for the search flow diagram.
PubMed (n=271) + PsycInfo (n=94) = 365 Items

- 62 duplicates

n=303 unique results

*Screened title and abstract*

- 51 not related to physical activity
- 23 no description of participatory research component
- 41 not intervention study
- 81 assessment or formative research study
- 27 study design/protocol description only
- 32 no report of physical activity outcomes
- 6 conducted outside of US

n=42

*Reviewed full-text articles for inclusion*

- 2 no description of participatory research component
- 4 no report of physical activity outcomes
- 7 feasibility studies
- 1 conducted outside of US

n=28

*Included articles*

n=24

*Intervention studies*

*Figure 2.2. Search flow diagram for citations in the systematic review.*
Data were extracted from the 28 articles to describe key intervention components (e.g., study design, PA measures, and PA outcomes). The articles were also assessed to determine if community participation was incorporated in the four phases of the research process (assessment, design, implementation, and evaluation). If the included article provided citations to earlier articles that described participatory processes, study design, and/or outcomes in more detail, these articles were reviewed and those findings were added to the results.

Lastly, the interventions were categorized by which levels of the social ecological framework were addressed by the PA interventions. If the intervention resulted in or addressed the following types of changes, it was counted as impacting that level:

- **Individual level**: individual knowledge, attitudes, or behavior for PA (including behavioral constructs such as self-efficacy and stages of change);
- **Interpersonal level**: enhanced social support for PA or role modeling;
- **Organizational level**: policy changes or enhanced programmatic and environmental supports in organizations such as churches, schools, and worksites;
- **Community level**: increased community capacity (e.g., training of community members to conduct PA research), dissemination of social marketing campaigns, neighborhood BE changes, or PA programs initiatives and programs available to the entire community;
- **Public policy level**: advocacy, education of policy makers, or public policy action.

### Results

**Intervention Characteristics**

A summary of the characteristics of the 24 interventions included in this systematic review is presented in Table 2.1. Publication dates indicate that PA interventions utilizing CBPR are a recently emerging body of literature: all articles were published from 2007 – 2014, with 75% being published in the past five years (2010 and later). A variety of target populations with disparate levels of PA were covered, including rural, immigrant, socioeconomically disadvantaged, developmentally disabled, and racial and ethnic minority groups. For the 23 interventions that reported where the studies were conducted, 52.2% (12) were conducted in the southern region of the U.S. The remaining represented western states (30.4%), northeastern states (8.7%), and midwestern states (8.7%). Five interventions focused on children and their families, while the remainder targeted adults...
or entire communities. Churches, schools, and entire communities were common settings for the interventions.

Three-quarters of the PA interventions (n=18) included a nutrition component, given that the overall goals of those interventions were to address obesity or reduce the risk of chronic diseases such as metabolic syndrome, hypertension, and type 2 diabetes (not shown in table). Interventions reported a range of outcomes, including biometric, anthropometric, psychometric, behavioral, and environmental changes. Several studies reported small but statistically significant improvements in blood pressure, cholesterol, waist circumference, weight loss, and/or BMI. Two studies did not report results at the individual level, only summarizing community-level changes (Fawcett et al., 2013; Suminski et al., 2009).

There were a few other commonalities to the PA intervention components. Peer mentors, lay health workers, and trained community members were often responsible for implementing the interventions. The most common theoretical frameworks for the interventions were the social ecological model, social cognitive theory, and the transtheoretical model. The majority of interventions relied on self-reported measures of PA, some of which used validated survey instruments (e.g., IPAQ-short form, BRFSS PA module). Only two studies reported objectively-derived PA levels from accelerometers; an additional study used a systematic observational method to assess PA levels in parks.

Regarding study design, the most common design was a single group design with baseline and follow-up assessments (n=11, 45.8%). Seven interventions (29.2%) had quasi-experimental designs that employed some kind of comparison group. The remaining six interventions (25.0%) were a type of randomized controlled trial, typically randomized by group or cluster (i.e., church or school). Study authors reported that community partners influenced study design away from randomized controlled trials. For example, Bazzano et al. (2009) reported that a control group design was not acceptable to community members because they held the value that everyone who was eligible should be allowed to participate. Seven of the included interventions were described as pilot studies.
<table>
<thead>
<tr>
<th>Author(s), Year</th>
<th>Study</th>
<th>Location</th>
<th>Target Population</th>
<th>Description of Physical Activity Intervention Components</th>
<th>Sample Size*</th>
<th>Study Design^</th>
<th>Physical Activity Measure(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bazzano et al., 2009</td>
<td>Healthy Lifestyle Change Program (HLCP)</td>
<td>Los Angeles, CA</td>
<td>Adults with developmental disabilities at risk for diabetes or metabolic syndrome</td>
<td>Small-scale demonstration project in community agency. 7-month, twice-weekly education program including 1-hour of supervised PA. Peer mentors helped implement.</td>
<td>n=44</td>
<td>One group, pre-post test</td>
<td>Self-reported PA (frequency and duration per week), exercise self-efficacy</td>
</tr>
<tr>
<td>Beets et al., 2014</td>
<td>N/A</td>
<td>SC (Midlands region)</td>
<td>Children (5-12 years old) in YMCA after school programs</td>
<td>Professional development and staff training; accountability checklist; detailed activity schedules.</td>
<td>n=895</td>
<td>One group, baseline assessment + three follow-up assessments</td>
<td>Minutes of MVPA as measured by accelerometer</td>
</tr>
<tr>
<td>Cohen et al., 2013</td>
<td>N/A</td>
<td>Los Angeles, CA</td>
<td>Park users and community members living near parks</td>
<td>Parks received $4,000 to increase park usage through signage, activities, and incentives. Park directors and advisory boards received training on outreach and marketing.</td>
<td>n=50 parks</td>
<td>RCT with three conditions: (1) park director; (2) park director + advisory board; (3) control; baseline &amp; follow-up assessments</td>
<td>Systematic observation of park use (SOPARC); surveys with park users and community residents</td>
</tr>
<tr>
<td>Davison et al., 2013</td>
<td>Communities for Healthy Living (CHL) Program</td>
<td>NY (upstate)</td>
<td>Low-income families with preschool children in Head Start programs</td>
<td>Health communication campaign; parents received letters about child BMI status; six-week parent-led education program.</td>
<td>n=154 families (baseline); n=119 families (follow-up)</td>
<td>One group (from five locations), pre-post test</td>
<td>Accelerometer data for child PA levels; Activity Support Scale to assess parenting practices and attitudes</td>
</tr>
<tr>
<td>Farag et al., 2010</td>
<td>N/A</td>
<td>Southwestern OK</td>
<td>Employees in rural public school system</td>
<td>6-month worksite promotion of PA included marking hallways with walking routes, installing treadmills, allowing free periods to be used for exercise, and providing walking handbook and pedometer.</td>
<td>n=187</td>
<td>One group, pre-post test</td>
<td>IPAQ-short version (MET minutes/week)</td>
</tr>
<tr>
<td>Author(s), Year</td>
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<tr>
<td>Fawcett et al., 2013</td>
<td>Latino Health for All Coalition</td>
<td>Kansas City, KS</td>
<td>Latino community residents (primarily low-income and first generation)</td>
<td>Formed coalition action committee to implement PA priority strategies. Awarded mini-grants to community partners for implementation.</td>
<td>N/A</td>
<td>Case study</td>
<td>Community changes</td>
</tr>
<tr>
<td>Folta et al., 2013</td>
<td>Shape Up Somerville</td>
<td>Somerville, MA</td>
<td>Public elementary school children (grades 1-3) in urban, culturally diverse city</td>
<td>Multi-level community intervention designed to impact before, during, and after school environments (e.g., walk to school campaign, classroom curriculum, parent outreach and education).</td>
<td>n=454 students (had pre- &amp; post-parent surveys)</td>
<td>QE, three community groups (one intervention, two comparison), pre-post test</td>
<td>Process evaluation to assess community changes; Parent survey to assess sports, walking to school, TV time</td>
</tr>
<tr>
<td>Kegler et al., 2012</td>
<td>Healthy Homes/Healthy Families</td>
<td>GA</td>
<td>Rural adults</td>
<td>Community coaches provided tailored home environment profile, goal setting, and behavioral contracts.</td>
<td>n=90 households</td>
<td>QE, 2 intervention counties; 1 comparison county; baseline, 2 &amp; 4 month post-baseline measures</td>
<td>Survey items assessing home PA environment and family support</td>
</tr>
<tr>
<td>Kim, et al., 2008</td>
<td>The WORD (Wholeness, Oneness, Righteousness, Deliverance)</td>
<td>NC</td>
<td>Rural African American church members</td>
<td>Trained church members to be lay health leaders. Small groups met weekly for 8 weeks and focused on behavioral strategies for weight loss.</td>
<td>n=61</td>
<td>QE, 2 group delayed treatment (assigned at church level), pre-post test</td>
<td>16-item PA survey to assess duration and frequency (MET hours per week calculated)</td>
</tr>
<tr>
<td>Krieger et al., 2009</td>
<td>High Point Walking for Health</td>
<td>Seattle, WA</td>
<td>Low-income, culturally diverse residents of a public housing site (High Point)</td>
<td>Multiple interventions to promote walking, including walking groups, built environment improvements for walking routes, walking informational campaign, and advocacy for pedestrian safety.</td>
<td>n=53 (walking group members)</td>
<td>One group (walking group participants), pre-post test (baseline and 3 month follow-up)</td>
<td>Survey (minutes walked per day, PA, social connectedness)</td>
</tr>
<tr>
<td>Author(s), Year</td>
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<td>Ries et al., 2014</td>
<td>HOPE Works (Health, Opportunities, Partnerships and Empowerment)</td>
<td>NC</td>
<td>Rural, low-income women (most were African American)</td>
<td>Trained community members (Circle Leaders) recruited women from their social networks to participate in Hope Circles (educational curriculum, goal setting, social support)</td>
<td>n=485 women analyzed at follow-up</td>
<td>QE, 2 groups (intervention and comparison), pre-post test</td>
<td>Modified questions from BRFSS PA module (calculated total min. of MVPA per week), PA stage of change</td>
</tr>
<tr>
<td>Schetzina et al., 2009; Schetzina et al., 2011</td>
<td>Winning with Wellness Pilot Study</td>
<td>Northeast TN (rural Appalachia)</td>
<td>Rural youth from one elementary school</td>
<td>Balance First curriculum lessons, pedometer tracking, indoor and outdoor walking paths, 5-minute movement breaks in class (Move it Moments), wellness initiative for teachers and staff</td>
<td>n=61 (baseline sample); n=65 (follow-up sample)</td>
<td>One group with second cohort assessed in follow-up study</td>
<td>Three items from CATCH survey (activity levels of parents and friends); pedometer steps during school</td>
</tr>
<tr>
<td>Schwartz, Powell, &amp; Keifer, 2013</td>
<td>Compañeros en Salud</td>
<td>ID (two rural communities)</td>
<td>Rural Mexican American families (adults)</td>
<td>Promotora-led intervention consisting of 8 weekly group sessions and weekly home visits</td>
<td>n=450</td>
<td>One group pre-post test with annual follow-ups</td>
<td>Rapid Assessment of PA survey</td>
</tr>
<tr>
<td>Sharpe et al., 2010</td>
<td>Step Up, Step Out!</td>
<td>Sumter County, SC</td>
<td>Women aged 35-54</td>
<td>Intervention group received a 24-week, minimal-contact, self-guided behavioral intervention and was exposed to a county-wide, year-long media campaign.</td>
<td>n=217 (interv. group); n=1,688 (compar. groups)</td>
<td>QE with full intervention group and two comparison groups (exposed &amp; not exposed to campaign), pre-post assessments</td>
<td>Self-reported min of PA and walking per week (BRFSS); self-efficacy for exercise scale (validated); social support</td>
</tr>
<tr>
<td>Siegel et al., 2010</td>
<td>N/A</td>
<td>Los Angeles, CA</td>
<td>Employees in elementary schools in LA Unified School District</td>
<td>Worksite intervention for elementary school personnel. Formed WSW committees to develop and implement health promotion activities.</td>
<td>n=16 schools (n=340 employees)</td>
<td>Group RCT (randomized by school), pre-post test (2 years apart)</td>
<td>IPAQ-short form (Min of PA per week)</td>
</tr>
<tr>
<td>Suminski et al., 2009</td>
<td>Neighborhods on the Move</td>
<td>US (not specified)</td>
<td>Entire community</td>
<td>Created partnerships and collaborations to develop and promote community PA initiatives and small business policies over 12-month period.</td>
<td>N/A</td>
<td>QE with intervention and comparison community, pre-post test</td>
<td># of new PA community initiatives and small business policies that support PA</td>
</tr>
<tr>
<td>Author(s), Year</td>
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<tr>
<td>Wieland et al., 2012</td>
<td>N/A</td>
<td>Rochester, MN</td>
<td>Immigrant and refugee women</td>
<td>2-month pilot fitness program that involved two classes per week (including 60 min of exercise per class).</td>
<td>n=32</td>
<td>One group, pre-post test</td>
<td>Face-to-face interviews assessing self-efficacy and exercise behaviors</td>
</tr>
<tr>
<td>Wilcox et al., 2007</td>
<td>Health-e-AME</td>
<td>SC</td>
<td>African American church members (adults)</td>
<td>Trained church volunteers to deliver 8-week behavioral skills program that integrated spiritual and religious components into PA messages. Implemented praise aerobics, chair exercise, and walking programs.</td>
<td>n=571 (baseline), n=418 (1-yr follow-up), n=316 (2-yr follow-up)</td>
<td>Randomized trial (at church conference level) with delayed intervention control group, pre-post test (baseline, 1 and 2 years)</td>
<td>BRFSS PA question module administered by phone interview (MVPA level), stage of readiness for PA change</td>
</tr>
<tr>
<td>Wilcox et al., 2013; Saunders et al., 2014</td>
<td>The FAN (Faith, Activity, and Nutrition) Program</td>
<td>SC</td>
<td>African American adult church members</td>
<td>Each church formed intervention committee that was trained and delivered intervention. Intervention strategies targeted structural factors (social and physical environments; media).</td>
<td>n=74 churches; n=1,257 church members</td>
<td>Group RCT (randomized by church clusters) with delayed intervention control group; pre-post test</td>
<td>CHAMPS questionnaire (calculated MVPA hours/week); subset of participants wore accelerometer</td>
</tr>
<tr>
<td>Woods et al., 2013</td>
<td>Living Well by Faith Pilot Program</td>
<td>Denver, CO</td>
<td>African American adult church members</td>
<td>Intervention group received individualized wellness plans and participated in 8-week program consisting of educational classes and exercise sessions.</td>
<td>n=5 churches; n=106 adults</td>
<td>Small-scale group RCT (randomized by church); pre-post test</td>
<td>Fitness step test (YMCA protocol)</td>
</tr>
<tr>
<td>Wright, Giger, Norris, &amp; Suro, 2013; Wright &amp; Suro, 2014</td>
<td>Kids Health Research Study, Kids N Fitness Program</td>
<td>Los Angeles, CA</td>
<td>Elementary school children (8-12 years old) in urban, low-income areas</td>
<td>Kids N Fitness 6-week after-school program for parents and children. Intervention schools also participated in school wellness activities.</td>
<td>n=251</td>
<td>Group RCT (randomized by school)</td>
<td>CATCH Student Questionnaire (5 items)</td>
</tr>
<tr>
<td>Zoellner et al., 2007</td>
<td>Fit for Life Steps</td>
<td>Hollandale, MS</td>
<td>Rural African American adults</td>
<td>6-month walking intervention using trained walking coaches to lead walking groups.</td>
<td>n=66</td>
<td>One group with data collected at baseline, midpoint, and end of intervention.</td>
<td>Self-reported walking (Past Week PA Recall), social support, stage of change, self-efficacy</td>
</tr>
<tr>
<td>Author(s), Year</td>
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<tr>
<td>Zoellner et al., 2011; Zoellner et al., 2014</td>
<td>HUB City Steps</td>
<td>Hattiesburg, MS</td>
<td>primarily African American adults</td>
<td>6-month intervention including walking groups led by peer coaches, pedometer diaries, monthly educational sessions, and individual motivational interviewing (MI) sessions; 12-month maintenance phase with low and high doses of MI.</td>
<td>n=269</td>
<td>Two phases: 6-month walking intervention (one group) and 12-month maintenance RCT to test dose effects of MI</td>
<td>6-minute walk test, psychosocial measures that were not reported (social support for PA, stage of change)</td>
</tr>
<tr>
<td>Zoellner et al., 2013</td>
<td>Better Together Healthy Caswell County</td>
<td>Caswell County, NC</td>
<td>Rural adults</td>
<td>Intervention group received access to two weekly fitness classes plus East Smart, Move More, Weigh Less weekly classes.</td>
<td>n=91 (enrolled); n=58 (with follow-up data)</td>
<td>RCT pilot with two groups (fitness sessions + education; fitness only); pre-post test</td>
<td>Godin measure for PA (validated); self-efficacy and social support for PA</td>
</tr>
</tbody>
</table>

Notes:
BRFSS=Behavioral Risk Factor Surveillance System; CATCH=Child and Adolescent Trial for Cardiovascular Health; IPAQ=International Physical Activity Questionnaire; MVPA=moderate-intensity and vigorous-intensity physical activity

*Sample size reflects the number of participants with data that were analyzed and reported

^Study designs: RCT = randomized controlled trial, QE = quasi-experimental
To address the dual purposes of this review, the interventions were assessed for level of community participation in the research phases, and the reported outcomes were characterized by social ecological level. For each intervention, Table 2.2 displays: (1) the phases of intervention research in which community participation was described, (2) a brief explanation of the main PA outcomes achieved by the intervention, and (3) the social ecological levels influenced by the intervention.

Levels of Community Participation in Research Process

Community participation was not incorporated consistently throughout the research process. All studies described community participation in the design of interventions. There were varying levels community participation in the assessment (79.2%), implementation (91.7%), and evaluation (66.7%) phases. Thirteen studies (54.2%) described community participation throughout all four phases of the intervention research, from assessment through evaluation. The average number of research phases with community participation was 3.4 ($SD = 0.8$).

The primary mechanism through which community participation occurred was a Community Advisory Board (CAB), a formal structure composed of academic researchers, community members, and representatives of community-based organizations (e.g., church leaders). Ideally, CABs met on a regular basis to make all decisions relevant to developing, implementing, and evaluating the interventions. Other studies used terms like Leadership Committee, CBPR partnership, and community coalition to describe their decision-making bodies. In terms of the value added by using CBPR, authors also tended to mention that interventions were culturally acceptable to communities and sustained after the intervention period.

Intervention Outcomes by Social Ecological Level

Interventions reported mixed results for PA outcomes. Of the 22 interventions that measured PA at the individual level, 66.7% (16) reported statistically significant increases in PA behavior, such as minutes of walking or MVPA. Other changes included improvements in the built environment to support PA, such as the installment of playground equipment and signage for walking routes. When outcomes were framed by the social ecological levels, nearly all studies (91.7%) reported an impact at the individual level (representing all interventions that assess individual-level outcomes). Individual level changes encompassed both behavioral and psychosocial measures, like progression through stages of change. The majority (75.0%) also impacted the
interpersonal level through social support, parental involvement, or peer influences. Fewer intervention outcomes reached the upper levels of the SEM (i.e., policy and environmental targets in organizations, communities, and societies). Organizational changes occurred in 58.3% of the interventions, primarily in churches and schools. For example, PA-promoting programs were incorporated into regular practice, such as teachers leading students in Move It Moments—five minutes of stretching, strengthening, and aerobic exercises during classroom breaks (Schetzina et al., 2011). Community changes occurred in 54.2% of the studies and included building community capacity by training community members in research methods and increased access to opportunities to be physically active. Societal/public policy changes were the rarest type of outcome achieved (12.5% of interventions).

Three studies (Bazzano et al., 2009; Folta et al., 2013; Krieger et al., 2009) were able to influence all levels of the SEM, from individual up to societal/public policy. Only one study (Woods et al., 2013) had an impact at just the individual level; the remaining 23 interventions demonstrated changes for at least two social ecological levels. On average, interventions had an impact at 2.9 of the five social ecological levels ($SD = 1.0$). There was a moderate positive correlation between the number of participatory research stages and the number of social ecological levels ($r = 0.45$, $p = 0.03$) reported by the interventions.
<table>
<thead>
<tr>
<th>Author(s), Year</th>
<th>Participatory Research Component Described by Phase</th>
<th>Summary of Physical Activity Outcomes</th>
<th>Social Ecological Levels Addressed by Physical Activity Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bazzano et al., 2009</td>
<td>✔ ✔ ✔ ✔</td>
<td>Participants increased exercise self-efficacy and PA frequency and duration. A modified program is being sustained. Policy makers include peer-led programs as funding priority.</td>
<td>✔ ✔ ✔ ✔ ✔</td>
</tr>
<tr>
<td>Beets et al., 2014</td>
<td>✔ ✔ ✔ ✔</td>
<td>Increased the proportion of girls (13.3% to 29.3%) and boys (28.0% to 49.6%) who met the 30-minute MVPA standard at YMCA after-school programs. Staff received professional development and instituted checklists.</td>
<td>✔ ✔</td>
</tr>
<tr>
<td>Cohen et al., 2013</td>
<td>✔ ✔ ✔ ✔</td>
<td>Parks in intervention arms significantly increased park use and energy expenditure (by approximately 600 visits and 1830 MET-hours per week per park). Parks increased signage and increased PA opportunities.</td>
<td>✔ ✔ ✔</td>
</tr>
<tr>
<td>Davison et al., 2013</td>
<td>✔ ✔ ✔ ✔</td>
<td>Slight increase in child light PA (from 21.2 to 22.0 min/hour) and decrease in TV viewing. Parent support for PA significantly increased.</td>
<td>✔ ✔ ✔</td>
</tr>
<tr>
<td>Farag et al., 2010</td>
<td>✔ ✔ ✔ ✔</td>
<td>Increase in PA but ( p = 0.06 ). Decrease in total cholesterol and systolic BP. Environmental supports put in schools.</td>
<td>✔ ✔</td>
</tr>
<tr>
<td>Fawcett et al., 2013</td>
<td>✔ ✔ ✔ ✔</td>
<td>14 community changes related to PA (e.g., creation of soccer field) and 7 community changes related to PA and nutrition (e.g., training promotoras).</td>
<td>✔ ✔</td>
</tr>
<tr>
<td>Folta et al., 2013</td>
<td>✔ ✔ ✔ ✔</td>
<td>Children increased number of organized sports activities per year and decreased overall screen time; no change in active transportation to/from school. Multiple PA changes in schools and community.</td>
<td>✔ ✔ ✔ ✔ ✔</td>
</tr>
<tr>
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</tr>
<tr>
<td>Kegler et al., 2012</td>
<td>✔ ✔ ✔ ✔</td>
<td>Intervention households significantly increased exercise equipment and family support for PA. No change in PA METs, but trend for weight loss.</td>
<td>✔ ✔</td>
</tr>
<tr>
<td>Kim, et al., 2008</td>
<td>✔ ✔ ✔ ✔</td>
<td>Intervention group significantly increased recreational PA METs per week but not overall PA METs. Trained lay health leaders to deliver intervention. Increased networks between churches.</td>
<td>✔ ✔ ✔ ✔</td>
</tr>
<tr>
<td>Krieger et al., 2009</td>
<td>✔ ✔ ✔ ✔</td>
<td>Built environment improvements (successfully advocated for pedestrian safety improvements). Walkers significantly increased total # of min walked per day by mean of 44.1 min.</td>
<td>✔ ✔ ✔ ✔ ✔ ✔ ✔ ✔</td>
</tr>
<tr>
<td>Ries et al., 2014</td>
<td>✔ ✔ ✔ ✔</td>
<td>Women in intervention group increased MVPA by 51.8 min/week and had higher progression through PA stage of change. Trained women from community.</td>
<td>✔ ✔ ✔ ✔</td>
</tr>
<tr>
<td>Schetzina et al., 2009; Schetzina et al., 2011</td>
<td>✔ ✔ ✔ ✔</td>
<td>Students increased their steps per day, teachers implemented the Move it Moments, and teachers supported the continuation of the program.</td>
<td>✔ ✔ ✔ ✔</td>
</tr>
<tr>
<td>Schwartz et al., 2013</td>
<td>✔ ✔ ✔ ✔</td>
<td>Increase in % of participants who were regularly physically active (34.2% to 50% post-intervention; declined to 34.8% at one-year follow-up). Used promotoras to deliver intervention and sustained walking groups.</td>
<td>✔ ✔ ✔ ✔</td>
</tr>
<tr>
<td>Sharpe et al., 2010</td>
<td>✔ ✔ ✔ ✔</td>
<td>Women in full intervention had increased minutes of MVPA and walking; higher park and trail use; increased social support; decreased self-efficacy. PA media messages.</td>
<td>✔ ✔ ✔ ✔</td>
</tr>
<tr>
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</tr>
<tr>
<td>Siegel et al., 2010</td>
<td>✔</td>
<td>No significant increase in PA among employees in intervention group. However, slight BMI reduction of 0.04 kg/m². Schools created wellness committees.</td>
<td>✔</td>
</tr>
<tr>
<td>Suminski et al., 2009</td>
<td>✔ ✔ ✔ ✔</td>
<td>60 new PA initiatives in intervention community; increased number of small businesses with PA-promoting policies; increased hours, activities, and participants in existing PA initiatives.</td>
<td>✔ ✔ ✔ ✔</td>
</tr>
<tr>
<td>Wieland et al., 2012</td>
<td>✔</td>
<td>Participants were more likely to report regular PA, excluding intervention exercise classes. Quality of life score significantly improved.</td>
<td>✔</td>
</tr>
<tr>
<td>Wilcox et al., 2007</td>
<td>✔</td>
<td>Overall, no significant change in MVPA, % meeting PA recommendations, or stage of readiness, but program awareness and pastor support were related to improved PA outcomes. Church volunteers trained and churches across the state were involved.</td>
<td>✔ ✔ ✔ ✔</td>
</tr>
<tr>
<td>Wilcox et al., 2013; Saunders et al., 2014</td>
<td>✔</td>
<td>Participants in intervention group increased self-reported leisure-time MVPA ($d=0.18$, $p=0.02$). Pastors served as role models and churches made organizational changes.</td>
<td>✔</td>
</tr>
<tr>
<td>Woods et al., 2013</td>
<td>✔</td>
<td>Intervention group showed increase in percent of participants performing average or better in fitness step test (from 41% to 70%). No church-level changes reported.</td>
<td>✔</td>
</tr>
<tr>
<td>Wright et al., 2013; Wright &amp; Suro, 2014</td>
<td>✔</td>
<td>Intervention group increased participation in daily PA of 60 min/day and attendance in PE class. Also decreased TV viewing. Parents received education and participated in parent support group. Intervention schools formed School Health Advisory Committees.</td>
<td>✔</td>
</tr>
<tr>
<td>Author(s), Year</td>
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<tr>
<td>Zoellner et al., 2007</td>
<td>✔        ✔       ✔       ✔       ✔</td>
<td>Overall net increase in walking min. but not statistically significant. Positive shift in stage of change for 57% of participants. Walking coaches provided social support during intervention. Increased community capacity by training community members in research activities.</td>
<td>✔        ✔       ✔       ✔</td>
</tr>
<tr>
<td>Zoellner et al., 2011;</td>
<td>✔        ✔       ✔       ✔       ✔</td>
<td>No significant improvement in 6-minute walk-test results. However, significant improvement in blood pressure. Social support was provided by trained peer coaches. Community capacity was targeted by training community members in research and health promotion.</td>
<td>✔        ✔       ✔       ✔</td>
</tr>
<tr>
<td>Zoellner et al., 2013</td>
<td>✔        ✔</td>
<td>Both groups increased leisure-time PA levels and decreased self-efficacy levels. However, intervention group had greater improvements in BMI and waist circumference. Participants reported group cohesion and accountability made classes enjoyable.</td>
<td>✔        ✔</td>
</tr>
<tr>
<td>TOTAL</td>
<td>19       24       22       16</td>
<td>Total: 19 (79.2%), 24 (100%), 22 (91.7%), 16 (66.7%).</td>
<td>22 (91.7%), 18 (75.0%), 14 (58.3%), 13 (54.2%), 3 (12.5%)</td>
</tr>
</tbody>
</table>
Discussion

Interventions that employ CBPR to promote PA comprise an emerging field of study. In general, the studies included in this review support the assertion that CBPR results in the design of relevant, appropriate interventions that benefit communities. The PA interventions were heterogeneous in how they manifested community participation, measured PA, and tracked and reported outcomes. Despite this, virtually all intervention studies demonstrated an influence on multiple levels of a social ecological framework. Moreover, recommended strategies from the Guide to Community Preventive Services were addressed by the CBPR interventions: individual changes included individually-adapted health behavior change programs; interpersonal changes included enhancing social support for PA; organizational changes included improving access to places for PA; community changes included community-wide campaigns to promote PA; and public policy changes—while minimal—resulted from advocacy efforts.

The primary element of CBPR considered in this review was participation by non-academic partners, as one of the key CBPR principles from Israel and colleagues is that CBPR “facilitates collaborative partnerships in all phases of the research” (1998, p. 178). Community participation was most evident in intervention design, and to a lesser extent, in the implementation, evaluation, and assessment phases. Community advisory boards (CABs) were the most common tactic of involving community representatives in decisions of how to best design and execute an intervention. Studies with a higher participatory level also involved CABs in interpreting study findings, making decisions about dissemination, and following through with recommendations for improvement. These findings about the varied level of community involvement are similar to those of other CBPR reviews of intervention studies (Krishnaswami et al., 2012; Viswanathan and colleagues, 2004). Community involvement was typically more common in design and implementation of interventions and less common in identifying the problem, interpreting data, translating findings into action.

While three-quarters or more of the interventions had an impact at the individual and interpersonal levels, and over half achieved changes at the organizational and community levels, impacting the public policy level was limited. Only three studies included in this review demonstrated the ability of CBPR interventions to address all five levels of the SEM for PA. Influencing the upper levels of the social ecological framework is often difficult for all types of health promotion interventions, and may require further enhancements to health education theory,
research, and training (Golden & Earp, 2012). Like the review conducted by Krishnaswami et al. (2012) on diet, activity, and weight outcomes from community-engaged interventions in U.S. schools, this study found a moderate relationship between community participation in the research process and intervention outcomes. However, Krishnasawmi et al. did not specify the metrics that they used to score for community engagement, which limits the ability to compare findings.

The finding that CBPR interventions targeted multilevel influences on PA may be a key advantage of investing in CBPR strategies, since sustainable improvements in health often require that multiple levels are simultaneously targeted (Golden & Earp, 2012). Additional research is needed to substantiate that CBPR interventions effect multilevel changes that benefit communities. Moreover, an interesting question is whether CBPR interventions must result in multilevel changes, effecting changes in systems and policies through capacity building and advocacy, in order to be considered successful. As the PA research field stands, it is difficult to assess the added value of CBPR approaches over research driven by academics without community input. Future studies that compare CBPR to non-CBPR approaches to PA interventions are needed.

The commitment to utilize CBPR principles was not without its challenges. For example, Wilcox et al. (2007) reported that a research design with a true control design was not acceptable to the church partners, noting that “an inherent challenge of CBPR is balancing scientific rigor with the needs, interests, and values of the community group” (p. 137). Established CBPR challenges were also discussed, such as time constraints, sharing limited resources, and ensuring capacity building for nonacademic partners to do research (Cargo & Mercer, 2008).

The CBPR process nurtures long-term relationships between community and academic partners, which in turn allows for better conceived and executed interventions. Unfortunately, we must rely on the authors’ assertions that this is true—most CBPR partnerships do not measure partnership-related outcomes. As Jagosh et al. (2012) note, the main challenge in evaluating the effectiveness of participatory research approaches is that it requires distinguishing between the benefits of co-governance for research process decisions and the benefits that can be attributed to the intervention itself. Therefore, more research that attempts to link participatory processes to outcomes is greatly needed to support CBPR approaches. A first step in this direction is to ensure that CBPR interventions assess the collaboration itself; we must establish first if, in fact, the intervention was true to CBPR principles and methods. Finding that no appropriate CBPR assessment tool existed, Braun and colleagues (2011) developed a 27-item questionnaire to assess
fidelity to key CPBR principles across 25 community networks charged with employing CBPR methods to reduce cancer health disparities. For example, one key principle, fostering colearning and capacity building among all partners, was gauged through three items rated on five-point scales (e.g., “for community participants…were there processes and training activities that allowed them to learn about research methods?”). The scores yielded from this questionnaire could be used as an indicator of how well community members were engaged throughout the research process.

**Study Limitations**

This review identified several issues that warrant caution in interpreting the intervention outcomes. First, many studies did not provide confidence intervals or effect sizes to aid interpretation. Second, most studies relied to questionnaires to collect information on self-reported PA levels, which may have overestimated the amount of PA. Third, the majority of studies employed one-group study designs, which limits internal validity. Fourth, a significant proportion of the included interventions were pilot studies. These studies often used small sample sizes, resulting in lack of power to show statistical significance. Yet, because the results of these pilot studies were promising, larger-scale CBPR interventions are currently underway to extend the pilot studies. Finally, the possibility of publication bias cannot be excluded, and authors may not have reported results for non-significant differences in PA outcomes.

Another challenge in the synthesis of the literature was that authors did not fully describe the participatory components of their studies. Oftentimes, the participatory aspects only merited a passing sentence or two. This makes it difficult to evaluate the participatory process with accuracy. Standardizing the way that authors report CBPR processes will facilitate future attempts to link participation with intervention effectiveness. The need to develop recommendations to improve the quality of CBPR reports is reiterated in Viswanathan et al.’s review (2004). True to a participatory orientation, gathering consensus among CBPR stakeholders about reporting standards for CBPR publications would be a worthwhile endeavor. As a potential model, Harrington and Noar (2012) developed a checklist of reporting standards for tailored interventions.

While studies that were described as pilot interventions were included in this review, one of the exclusion criteria was studies that were primarily intended to test the feasibility of interventions. These studies, if included in the review, could have contributed to an understanding of how community participation was woven into the intervention research process. However, because these studies typically only reported limited efficacy testing related to PA, their results were not included in
this literature review. Since successful feasibility studies are turned into interventions that are more rigorously evaluated using larger sample sizes (e.g., Islam et al., 2013), their results can be included in future literature reviews.

The final limitation is that not all PA studies with community participatory research components may have been identified in the search process. Because authors often parcel information about designing and testing an intervention into multiple manuscripts, the search strategy may have not been adequate to capture all relevant publications. Unless studies explicitly mentioned that they were participatory in either the article title or abstract, they would have been excluded. Therefore, another recommendation would be for CBPR interventions to include some variation of “participatory” in the manuscript’s title, abstract, and keywords.

**Conclusion**

Overall, this review suggests that using CBPR results in interventions that achieve multilevel changes to promote PA in U.S. communities. All interventions should strive to fully integrate community participation throughout the entire research process, but findings suggest that the community participation is not operationalized in a consistent manner across studies. This review examined the extent to which community participation was incorporated into the formative/assessment, design, implementation, and evaluation phases of PA interventions. Yet, this represents just one of the key principles of CBPR proposed by Israel and colleagues (1998). It did not attempt to ascertain whether or not the PA interventions were true to other key CBPR principles, such as promoting a co-learning and empowering process that attends to social inequities. The question of how to best evaluate the process and outcomes of CBPR remains. Improved reporting of CBPR processes and measurement of partnership-related outcomes will help to establish a supportive evidence base for CBPR.
CHAPTER 3
Examining the Process of How a Community Coalition Facilitates Policy and Environmental Changes to Promote Physical Activity

Abstract
Community coalitions are used in public health practice to create policy and environmental changes that address community health problems. However, the process by which community coalitions achieve these changes for the built environment is not well understood. This qualitative study examined how one community coalition, Get Fit Kaua‘i, was able to successfully address the built environment in Kaua‘i County through policy change and programmatic activities. The primary study purpose was to develop a theory that explains the process by which a community coalition made built environment changes that supported physical activity. Using a grounded theory approach, semi-structured interviews were conducted with a purposeful sample of 25 coalition stakeholders engaged in built environment work. The Community Coalition Action Theory (Butterfoss & Kegler, 2009) guided development of the interview questions. The grounded theory model to emerge from the coalition interviews consisted of five phases: (1) coalition formation, (2) capacity building, (3) policy formulation, (4) policy passage, and (5) policy implementation. Community context influenced all of these phases. Other community coalitions that are pursuing built environment changes can learn several lessons from Get Fit Kaua‘i. The first lesson is that using national experts to build the capacity of the coalition and the expertise of key partners can help generate buy-in and momentum for built environment policy change. The second lesson is to be prepared for an evolving coalition role, from leading policy change efforts to supporting policy implementation activities.

Keywords: collaboration, partnerships, environmental change, physical activity, Complete Streets policy, Safe Routes to School program
Background

Community interventions that create policy and environmental changes are posited to be most effective at creating sustainable changes in physical activity (PA) with broad reach (Kelly et al., 2006; Sallis et al., 2006). Typically, such interventions aim to improve the built environment (BE) by creating opportunities for PA where people live, work, play, study, and travel (Schilling, Giles-Corti, & Sallis, 2009). The BE is shaped by policies that pertain to zoning, development, land use, and transportation regulations (Sallis et al., 2006). Accordingly, to increase PA at the population level, the Community Guide of the U.S. Preventive Services Task Force (2012) recommends policies that address urban design and land use at both the community and street scales (e.g., mixed-use zoning codes for communities; traffic calming on streets). However, the process for achieving these types of policy changes requires further study. Despite the increasing emphasis on creating and implementing BE policy changes, there is no roadmap for how to do this.

To address the BE, public health professionals need to forge non-traditional partnerships with representatives from fields like urban planning and design, transportation, architecture, policy studies, and recreation and leisure (Sallis et al., 2006; Srinivasan, O’Fallon, & Darrar, 2003). Interdisciplinary collaboration is essential because the BE is under the purview of a diversity of organizations and sectors (Chehimi, Cohen, & Valdovinos, 2011). Community coalitions are a popular public health tool for fostering collaboration and bringing together participants across sectors to make sustainable systems and environmental changes (Roussos & Fawcett, 2000).

Community coalitions can be effective vehicles for policy change by undertaking advocacy and educational activities (Butterfoss & Kegler, 2012). For example, community coalitions have had notable success in changing policies related to tobacco control and prevention (Butterfoss & Kelger, 2012). Typically, coalitions have been used to address complex public health issues like substance abuse, crime and violence, and adolescent pregnancy (Roussos & Fawcett, 2000). The use of community coalitions to change the BE is relatively new to public health practice and requires further study to examine how they can facilitate BE policy change and implementation.

Community Coalition Action Theory

Although the use of community coalitions in public health initiatives is a common tactic, there is a lack of theory explaining how community coalitions achieve community health outcomes. One theory that attempts to fill that gap is the Community Coalition Action Theory (CCAT), which
Butterfoss and Kegler (2009) developed using empirical research and practice wisdom to increase our understanding of how community coalitions function. CCAT is a complex theory comprised of 14 constructs that are inter-related through 21 propositions, encompassing the stages of coalition development, community context, coalition operations, and coalition outcomes. The CCAT model is displayed in Figure 3.1 and shows the relationships between CCAT constructs. CCAT asserts that coalitions with more formalized rules, roles, and procedures are more effective at generating collaborative synergy, which results from the pooling of coalition members’ perspectives, resources, and skills. There is emerging evidence to support aspects of CCAT (e.g., Kegler, Rigler, & Honeycutt, 2010; Kegler & Swan, 2011), but additional research is needed to operationalize the constructs and validate the propositions. It is not yet known if CCAT applies to community coalitions that focus on the BE, given that BE collaborations are a relatively new field of study.

Figure 3.1. Community Coalition Action Theory. (From Butterfoss & Kegler, 2009)
Get Fit Kaua‘i

This study examined the BE accomplishments of Get Fit Kaua‘i (GFK), the Nutrition and Physical Activity Coalition of Kaua‘i County. Kaua‘i County is a rural county with approximately 67,091 residents, and it is comprised of two islands that total 620 square miles in size (U.S. Census Bureau, 2014; U.S. Department of Agriculture, Economic Research Service, 2007). GFK convened in March 2009 with funding from the Healthy Hawai‘i Initiative (HHI), Hawai‘i State Department of Health. Since then, it has grown to nearly 200 members, representing county and state government agencies, public schools, healthcare organizations, non-profit community-based organizations, and private citizens. GFK is charged with promoting policy, systems, and environmental changes that enhance opportunities for PA and access to healthy foods.

Two GFK task forces, the BE Task Force and the Safe Routes to School (SRTS) Task Force, have made major inroads in the last few years to address Kaua‘i’s BE and to promote walking, bicycling, and other forms of active transportation. The task forces helped to pass a Complete Streets county resolution, launched walking school buses in several elementary schools, and provided training for staff in the county Planning and Public Works Departments to build communities that promote active living. Most recently, in 2013, GFK had a central role in passing a Complete Streets bill that changed the subdivision ordinance to require sidewalks and establish shorter block lengths, which will make it easier to walk in those developments. The focus of this study was limited to the BE activities that GFK accomplished from 2009 through 2013 (therefore ignoring the strides GFK has made towards improving access to healthy foods).

Study Purpose and Scope

The primary purpose of this study was to develop a theory that explains the process by which a community coalition was able to make BE changes that promote PA. A secondary study aim was to examine the applicability of CCAT for community coalitions focused on the BE. Through qualitative research methods and a grounded theory approach, this study was designed to answer the overarching research question: What theory of change explains how Get Fit Kaua‘i, a community coalition, created policy and infrastructure changes to the built environment that promote physical activity? Answering this research question would help to illuminate the mechanisms through which the community coalition was able to influence BE policies and work with government partners to implement infrastructure changes. Other coalitions that are undertaking similar BE activities across the nation may be able to learn from the successes and challenges experienced by GFK.
Methods

Qualitative Approach

This qualitative study consisted primarily of semi-structured interviews to explore the perspectives of coalition stakeholders who were engaged in BE activities. A grounded theory approach was used because it was well-suited to the study goal of developing a theory about the process of BE change based on the experiences and views of coalition participants. Creswell (2013) distinguishes between two perspectives on grounded theory: (1) the more structured and systematic approach advocated by Strauss and Corbin, and (2) the more constructivist and interpretive perspective taken by Charmaz. For this study, the constructivist approach to grounded theory proposed by Charmaz (2006) was adopted. The constructivist paradigm allows for multiple lived realities, acknowledges the importance of the researcher in creating the theory, and is less prescriptive or structured in the analysis than Strauss and Corbin (Creswell, 2013).

Participatory Components

Participatory research processes were incorporated into this study to ensure the findings were relevant and useful to GFK and to the funder (HHI). In the initial stages of study development, the coalition director, chair of the Steering Committee, and HHI contract manager were asked to provide input about the study direction. The director of GFK expressed a desire to attain more in-depth information about what is working well and what can be improved upon for the coalition. Therefore, interview questions were included in the interview guide to gather this feedback. Participation by additional GFK stakeholders was incorporated into the study in several other ways. Specifically, they: (1) guided sample selection by identifying potential participants who would have unique insight into the BE work; (2) participated in pilot testing of the interview guide; and (3) provided feedback on preliminary findings to help validate data interpretation. A presentation also was given at a coalition meeting to solicit further feedback from meeting attendees.

Measures

An interview guide with a core set of standardized, open-ended questions was employed for the semi-structured interviews. The interview guide was used to cover the basic lines of inquiry while allowing for flexibility in probing and exploring the unique knowledge of each participant (Patton, 2002). In line with a grounded theory approach, the interview guide was slightly modified over the course of the interviews to better examine emerging themes. In developing interview questions,
CCAT was used as an organizing framework and input from GFK stakeholders was incorporated. The final version of the interview guide is presented in Appendix A. The primary questions included:

- **What do you think has been one the most significant accomplishments that Get Fit Kaua‘i has made in improving the built environment?**
  - *What was the process for getting this to happen?*
  - *What were the challenges in getting the work done?*
  - *What was it about the place or people of Kaua‘i that helped make this change to the built environment?*

- **What do you think were the successful strategies, if any, that Get Fit Kaua‘i used to create changes in built environment policies?**

- **Moving forward, what do you think Get Fit Kaua‘i can do better to continue to improve Kaua‘i’s built environment?**

At the beginning of the interview, study participants were asked to identify the BE changes achieved by GFK that were the most significant to them. They then shared their perspectives on the process of how the BE changes occurred, which was suited to the primary study aim. Interview questions also covered CCAT constructs such as the influence of community context, development of strategies, and community capacity. At the conclusion of the interview, participants were asked for suggestions for improvement for GFK. This question was included to garner the feedback requested by the coalition director.

Coalition staff and coalition leaders were asked additional questions about CCAT constructs, including coalition operations and processes (e.g., *How often does the BE task force meet?*), coalition staff (e.g., *What are the strengths/weaknesses of the coalition director?*), structures (e.g., *How does the BE task force make decisions about what it is going to work on?*), and synergy (e.g., *What resources are members of your task force bringing to the table?*). Lastly, all interview participants were asked to complete an eight-item demographic information survey to capture basic information such as age, race/ethnicity, and level of coalition involvement (*Appendix B*).

**Sample**

A purposeful sampling strategy (Patton, 2002) was used to include participants who had unique insights and knowledge about the BE activities. A total of 28 people were invited to
participate in the study. The final sample consisted of 25 adults, representing an 89% participation rate (one person declined to participate; two others were not interviewed because of scheduling conflicts). This sample size is congruent with Creswell’s (2013) recommendation for interviewing 20-30 people to achieve saturation for a grounded theory study. Participants included coalition leaders (e.g., Steering Committee Chair, BE Task Force Chair and Vice-Chair), coalition staff (current and past), members of the BE and SRTS task forces, leaders in key county government departments and agencies (e.g., Planning, Public Works, County Council), a representative from HHI, one national expert who served as a paid consultant, and community members who participate in their role as private citizens.

Procedures

This study was granted exempt status by the University of Hawai‘i’s Human Studies Program. All interviews were conducted over a four-month period (August-November 2013). Potential participants were invited by email to be interviewed for the study. Interviews were scheduled at convenient locations for participants on Kaua‘i (e.g., work offices, coffee shops). The interviews were conducted over six one-day trips that the researcher took from O‘ahu to Kaua‘i. One participant no longer lived on island, so the interview was conducted by phone. Participants were emailed the main interview questions prior to the interview. The average interview duration was 51 minutes ($SD = 17$ minutes).

Before beginning the interview, participants were provided with an explanation of the study. All consented to be interviewed and audio recorded (Appendix C). The interviewer took notes during the interview and wrote up a brief summary after the interview was finished. In line with the grounded theory approach, preliminary analysis of the data and memo writing was conducted between interviews. The audio recordings were transcribed verbatim for analysis. Participants received a $10 gift card to thank them for their time.

Analysis

The grounded theory approach to analysis put forth by Charmaz (2006) was used to guide coding, memo writing, and theory construction. In this iterative approach, data collection and analysis proceeded concurrently. The same researcher who conducted the interviews also carried out the data analysis. Memos were written after interviews were conducted to record initial analytic ideas. In addition, the interview guide was slightly modified to cover emerging constructs from earlier
interviews. To fill gaps in information and to confirm some statements made in the interviews, secondary data sources were included in the analysis. Secondary data sources were primarily documents available from the internet, and they included local news articles, County Council meeting minutes, county policies, and progress reports written by the coalition director. All data sources were imported into the NVivo 10 qualitative software program (QSR International, 2012) for coding and analysis.

Coding consisted of several phases. In the first phase, the primary researcher coded each interview transcript line-by-line. In the next phase, focused coding, the number of codes was reduced to the key concepts in the process of BE change. Analytic memos were written throughout the coding phases to help focus the coding and to develop propositions for the emerging theory. Information from the secondary data sources was added to the analytic memos (e.g., date of policy passage), then memos were imported into NVivo and coded using focused codes. In the presentation of findings, illustrative quotes were slightly edited to improve readability without changing the content (e.g., deleting “um” and “uh”).

Several of the validation strategies described by Creswell (2013) were applied in this study. The first strategy, member checking, was employed by gathering the feedback from interview participants and other coalition stakeholders on multiple occasions. Two presentations of preliminary findings were given, and participants were asked to share their suggestions for improving interpretation. All feedback was documented and imported into NVivo for inclusion in the analysis. Participants were also emailed a draft report of the main findings and were asked to give feedback over email. The presentations and final report included the findings for suggested ways that the coalition could improve. Since the main purpose of gathering suggestions for improvement was to provide feedback to the coalition, these suggestions are not shared in detail in this chapter.

The second validation strategy used was peer review by a colleague with an interest in community coalitions. The colleague independently coded a subset of the interview transcripts (n=5). The primary researcher and colleague then met to discuss their codes and construction of the grounded theory model. Full agreement was achieved for coding and theory development.
Results

Participant Characteristics

Basic demographic information about the interviewees is presented in Table 3.1. There was an almost equal split between male and female participants, and approximately two-thirds of participants were aged 45 years or older. Just more than half (56%) identified as Caucasian, 16% identified as Native Hawaiian, 16% identified as Japanese, and 12% identified as other racial/ethnic categories. The sample was highly educated—all participants reported some level of college education. County government was the most represented sector, with 11 participants representing six departments. Community representation included three participants from community-based agencies and six individuals who participate in GFK as private citizens (i.e., they do not represent any organization). Most participants reported a moderate to high level of involvement in the coalition and were formal coalition members who belonged to the BE Task Force.
Table 3.1. Descriptive Characteristics of Interview Participants (n = 25)

<table>
<thead>
<tr>
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<th>%</th>
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<tbody>
<tr>
<td><strong>Gender</strong></td>
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<tr>
<td>Male</td>
<td>12</td>
<td>48</td>
</tr>
<tr>
<td>Female</td>
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<td>52</td>
</tr>
<tr>
<td><strong>Age (years)</strong></td>
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<tr>
<td>55-64</td>
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<td>36</td>
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<tr>
<td>65 or more</td>
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<td><strong>Highest education level completed</strong></td>
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<td></td>
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<tr>
<td>Bachelor’s degree</td>
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<td>Master’s degree or higher</td>
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<td><strong>Race/ethnicity</strong></td>
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<tr>
<td>Caucasian</td>
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<tr>
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<td><strong>Type of organization represented</strong></td>
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<td></td>
</tr>
<tr>
<td>County government agency</td>
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<td>44</td>
</tr>
<tr>
<td>State government agency</td>
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<td>16</td>
</tr>
<tr>
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<td>12</td>
</tr>
<tr>
<td>None – participate as private citizen</td>
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<td>24</td>
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<tr>
<td>Coalition staff (current)</td>
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<td>4</td>
</tr>
<tr>
<td><strong>Participation in coalition groups</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coalition member</td>
<td>21</td>
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</tr>
<tr>
<td>Built Environment Task Force member</td>
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<tr>
<td>Safe Routes to School Task Force member</td>
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<td>36</td>
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<tr>
<td>Steering Committee member</td>
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<td>32</td>
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<tr>
<td><strong>Current level of coalition involvement</strong></td>
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<td></td>
</tr>
<tr>
<td>Low</td>
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<td>4</td>
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<tr>
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<td>12</td>
</tr>
<tr>
<td>Moderate</td>
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<td>12</td>
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<tr>
<td>Moderate – High</td>
<td>7</td>
<td>28</td>
</tr>
<tr>
<td>High</td>
<td>11</td>
<td>44</td>
</tr>
</tbody>
</table>

*Notes.* a Includes participants who identified being Native Hawaiian in part or in full. b Categories are not mutually exclusive. Participants belonged to multiple coalition groups.
Theoretical Model of How a Community Coalition Creates Built Environment Changes

This section presents the grounded theory that describes the process that GFK undertook to create BE changes. The theory is presented in Figure 3.2 and is comprised of the major themes that were identified by interview participants. In summary, the model consists of five phases: (1) coalition formation, (2) capacity building, (3) policy development, (4) policy passage, and (5) policy implementation. Community context is seen influencing all coalition phases. The boundaries (i.e., dashed lines) that delineate the phases are not concrete; overlapping coalition activities took place throughout the policy change process. These activities are explained in more detail in the next section, with the grounded theory components in bold.
Figure 3.2. Process of a community coalition influencing the built environment through policy change.
1. Coalition Formation

Interview participants highlighted two important aspects of coalition formation: funding that was associated with a policy/environmental change mission and getting a very effective coalition staff person on board. To form GFK, HHI provided funding to establish a county coalition that would focus on policy and environmental changes that promote PA and healthy nutrition. GFK had existed in a previous incarnation as an island-wide health and weight-loss challenge (Kaua‘i’s Great Weigh Out, 2002-2007). Therefore, one of the critical first steps for GFK was to build a common understanding of the coalition’s charge of policy and environmental change. This required a shift in thinking for the GFK director who was used to running programs. She asked for an example of policy and environmental change and was told about another county passing a law that would require sidewalks:

“I can’t explain to you what happened in my head there, but I got it. This—not a light bulb, I mean, a torch went off into, in my head. And I got it. I totally got it…And in that very moment, I never wanted to do another program ever! …And from that point on, Get Fit Kaua‘i changed.”

The director went on to describe she how helped to change the mindset of coalition members who wanted to do more programs. She had to teach other coalition members about what policy and environmental approaches entailed and how they were more sustainable than just doing more programs. As the task forces were developing their workplans for the year, the coalition members had to evaluate their activities through a policy/environmental change lens.

All participants felt that the coalition director was integral to the effectiveness of GFK. The coalition director was described as a driving force who built and maintained important relationships, served as the mouthpiece to promote the coalition, and made things happen by working tirelessly and motivating coalition members. Some of the characteristics that made her effective were her dynamic personality, passion, high energy, ability to make the work fun, and persistence in following-up with members to move coalition activities forward (e.g., sending personal emails requesting testimony from key coalition members).

“[The coalition director] is so much of an active participant in it. She doesn’t just sit there and watch from the sidelines. She’s very out there and active and cracking the whip on everyone.”
“[The strengths of the coalition director] are her energy, her sense of humor—you know everyone lights up when she come in a room—her excitement and her having the Mayor’s ear is critical, it’s huge, especially for us that work at the county.”

“She’s a leader, and I’ll tell you there’s not very often you see leaders that are transformational…in vision. She’s definitely transformational. Because at the end of the day, you want somebody that believes in what they’re saying and can help you in the paradigm shift, bring you to that paradigm shift… She has shifted her focus and shifted our way of thinking. And anytime you have somebody who does that, with a level of enthusiasm and consistency, there’s buy-in.”

The initial tasks that the coalition director was responsible for were engaging county agencies and elected officials, recruiting coalition members, and hiring national experts in the BE and healthy community design to provide education and technical assistance. The coalition director was able to rely upon her long-established relationships with community members to recruit initial members to GFK. Moreover, because the coalition director had a good relationship with the Mayor, she was able to approach county agencies and engage department leaders and staff in GFK task forces. In building a partnership between GFK and the county, the coalition director also made sure to engage council members in GFK, either by having them join task forces or by creating opportunities to educate them about BE issues. The coalition director was also responsible for identifying national experts served as consultants to GFK and contributed to the next phase of capacity building.

2. Capacity Building

The capacity building phase was essential to policy change efforts. Importantly, the capacity building activities were viewed by county agency staff as the most valuable contributions of GFK to the process of built environment change because the county did not have sufficient funds to carry out these activities on its own. A flurry of activities took place in this phase, in which capacity building efforts were directed simultaneously at coalition members and county government partners. As the coalition began to convene the BE and SRTS task forces through monthly meetings, coalition members and county partners needed to increase their knowledge and skills to address the BE. Coalition stakeholders first had to understand what was possible for Kaua‘i. It is also
worthwhile to note that while capacity building was most critical in this early coalition stage, in fact, capacity building took place throughout 2009-2013.

The primary form of capacity building was utilizing consultants to provide education, training, and technical assistance. An intentional progression of consultants who were experts in the general design of healthy communities, SRTS, and Complete Streets came to Kaua‘i for about a week at a time. First, to motivate coalition stakeholders, persuasive and charismatic consultants helped to create the case for why built environment policy changes were needed through targeted presentations to elected officials, county departments, and coalition members. As the coalition matured and was able to successfully pass policies, consultants with engineering expertise were called upon to help with implementation of the policies (e.g., redesigning roads to better and more safely accommodate pedestrians). One of the coalition members who represented a county government agency said:

“[The consultants have] contributed so much to just, you know, us seeing it. How it can be, the possibilities is what they’ve enlightened us to and actually providing us with tools and training to be able to have the ability to apply the changes ourselves as well.”

The second form of capacity building was sending coalition stakeholders to national conferences like New Partners for Smart Growth and Safe Routes to School. Although coalition funding initially was used to send coalition staff and representatives of county agencies to conferences, the county agencies eventually began to use their own budgets for conference attendance because of the value of being exposed to national best practices and networking opportunities. Attending conferences together helped with more than just knowledge building—attendees also bonded and formed relationships with each other, which helped to facilitate the BE work once they returned to Kaua‘i. One national consultant who was interviewed for this study spoke of the importance of having a Kaua‘i contingent (including coalition staff, county staff, and council members) on a mobile study tour associated with the Smart Growth Conference. The consultant felt that the participation of the Kaua‘i attendees helped them to make progress at a higher level than any other part of the nation:

“When you get 14 [of the right] people to come from one county to an event, and you have a bus of 55 people and the next largest congregation of people is maybe two…you’re picking
up energy. When you get 14 people to come and brainstorm and to think it through and to fly back and talk about what they learned, that’s powerful stuff.”

3. Policy Development

In the policy development stage, there were four main types of coalition processes that involved deciding upon policy strategies, engaging in advocacy, carrying out programs and community events, and generating earned media. The activities directly related to passing BE policies were developing policy strategies and organizing advocacy activities. The BE task force held monthly meetings to discuss and vet policy strategies. For example, task force members debated for several months what form of Complete Streets policy to pursue (i.e., resolution or ordinance). Task Force members also reviewed draft policy language and provided feedback to the Planning Department staff responsible for crafting the proposed policies. The coalition director organized efforts to have task force members provide testimony, ensuring that a diverse group of members represented the coalition before the County Council. Lastly, consultants helped to educate decision makers by giving presentations to the County Council, Planning Commission, and Mayor’s leadership team. One of the councilmembers observed that the partnership between GFK and the county was mutually beneficial in developing policy strategies:

“One of the key [policy] strategies was getting in the experts…because we’re groping in the darkness without people who have done this before, who have seen communities [that have] done this before, [and] have on-the-ground experience… Get Fit has been extremely instrumental in bringing that in. But if you didn’t have the openness of the county and its staff to work with these people, you wouldn’t get the results that we’re getting.”

In parallel with policy development efforts, task forces carried out complementary programs and community events to increase awareness of GFK and the BE. The programs and community events also helped to solidify the partnership between GFK and the County of Kaua’i. For example, the SRTS task force organized Walk to School Days at several elementary schools to promote walking and bicycling among students. Parents, teachers, and school officials joined the monthly walks, which were described by one interview participant as “a really fun day.” Leaders and staff in the Department of Public Works belonged to the SRTS task force and helped to develop plans to make it safer for the students to walk to school (e.g., crosswalk improvements and traffic
The most frequently mentioned community event was the Mayor-a-thon, an annual celebration of an existing BE resource—Ke Ala Hele Makalae, a four-mile multi-use coastal path. Hundreds of community members attended each Mayor-a-thon to walk, run, or ride bicycles along the path while enjoying many organized activities. Interview participants felt that the Mayor-a-thon helped community members better understand the connection between the BE and health. An elected official who was interviewed for this study also observed that events like the Mayor-a-thon help to build political will:

“[The first Mayor-a-thon] really kind of celebrated him [the Mayor], gave him some really high visibility on a wonderful facility… It was just a really joyous thing. And when you can find those things which make people happy, that’s the best way to bring them on board.”

The fourth component of this stage, earned media, was used to generate awareness of GFK’s activities throughout the policy process. The coalition director was skilled at using several forms of media, contributing articles in the local newspaper and hosting a weekly radio show. Interview participants felt that the earned media helped to build interest about BE issues and create support for proposed policy changes in the larger community. Another positive outcome was that earned media coverage of Walk to School Days helped to recruit new schools to participate in SRTS initiatives. In response to the question of what it would take for GFK to gain and hold the interest of the public, one interview participant said that earned media would play a meaningful role:

“I think what it’s gonna take is…looking for opportunities to get the word out for every victory that we have… Just celebrating the victories and at the same time using it as an opportunity to educate the public because, I mean, the public’s going to see these [articles] and, you know, they’ll be familiar with [the policy changes] and be more supportive and accepting—they see all the good that’s coming out of it. Little by little, they’ll start seeing it happening.”

4. Policy Passage

As a result of the coalition’s relationship- and capacity-building activities, all GFK policy efforts were successful. Input from policy makers, county departments, and community representatives had been taken into consideration, which minimized the potential delay in the policy
passage process: “I think [GFK] did a really good job at…getting everything lined up ahead of time so that by the time it got put in front of the council, they could vote on it.”

Between 2009-2013, the coalition played a critical role in passing three policies: (1) in 2010, the Complete Streets county resolution; (2) in 2012, the state-level SRTS legislation (HB2626) that channeled funding from traffic fines to counties for SRTS programs; and (3) in 2013, the Complete Streets county bill in that amended the subdivision ordinance to shorten block lengths and require sidewalks in new developments. Thus, GFK was able to have an impact on policy making at both local and state levels. Several interview participants also felt that it was noteworthy that the two county-level policies were passed unanimously by all council members—they thought this reflected the education that GFK did prior to the votes.

5. Policy Implementation

Once policies were passed, GFK had to figure out how to ensure that the policies were implemented to create actual BE changes. Interview participants described how the role of GFK evolved from driving BE initiatives to (1) supporting county implementation efforts, and (2) holding the county accountable and monitoring progress:

“In terms of the actual implementation…it’s the county’s responsibility… The road, the road network, doing construction and implementation, that’s really the county’s job and not Get Fit Kaua‘i’s job… The county needs to take the lead and Get Fit Kaua‘i is the support… There’s two things that I think are probably [GFK’s] role. One is helping [the county with] community outreach and building their support and educating. And the other is holding our feet to the fire to make sure we’re actually doing what we had promised we would do at these community meetings and calling us out if we’re not…holding the county accountable to get these things done.”

To support the county, GFK would continue to run SRTS programmatic activities (that now had a dedicated funding source from the SRTS policy) and increase community outreach for BE issues. One interview participant viewed it as shifting educational efforts from the county agencies to communities. To monitor implementation efforts, the BE task force developed performance measures for the Complete Streets policy and tracks indicators through annual reports. The coalition director felt somewhat “lost” in the transition, but was coming to terms with GFK’s new supportive role: “We are the core, we are the base, we are the meeting place, we are the gathering place. We are the people that bring all the people together.”
6. Community Context

The influence of community context spanned all stages of the coalition work. Community context was viewed as a primarily positive influence that enabled GFK to move forward quickly on BE issues. One national consultant observed that the stars appeared to be aligned for Kaua‘i County because GFK was able to capitalize on the political support, openness of leaders in county agencies to developing partnerships, and funding availability to push BE policy changes forward. Political support was present from both the Mayor and elected county councilmembers. The partnership between the Mayor and GFK was formed early on in the coalition’s development, facilitated by the working relationship and friendship that the coalition director and Mayor had established through prior job positions. Several participants referred to the congruence between GFK’s policy change objectives and the Mayor’s Holo Holo 2020 Vision, which explicitly calls for implementing Complete Streets and SRTS and for creating built environment improvements like extending the coastal multi-use path (Carvalho, Jr., 2013). To carry out his vision, the Mayor directed his newly appointed department leaders, “Make it happen.” Interestingly, the department leaders that were appointed to the Mayor’s cabinet in 2010 were mostly newcomers to county government (i.e., they came from the private sector). The new department leaders were willing to partner with GFK to achieve BE goals and displayed an openness to collaboration. The top-down support from department leaders trickled down to the staff level, enabling staff to participate in GFK activities as part of their jobs.

The contextual factor that was most frequently pointed out by interview participants was the smallness of the rural island county. As a small community, coalition members knew each other from previous work in the community and had a history of being able to work well together towards goals that they saw benefitting the community. Coalition members felt very connected to their community and were used to participating in political processes; Kaua‘i County was seen as having a culture of citizen activism. The smallness of the island was also reflected in the small county departments. For example, having only a few employees in the Planning Department meant that they all knew what was happening with the Complete Streets policy and worked together to push it through the policy process. Furthermore, the coalition members had relatively easy access to the department leaders and were able to build personal relationships with them. Finally, the smallness of Kaua‘i made it was easier to get earned media—the local newspaper was eager to cover GFK stories.
To a minor extent, community context also was seen as hindering the ability of GFK to make changes to the BE. Some community members expressed resistance to the term, “Complete Streets,” viewing it as a “mainland” (i.e., Continental U.S.) concept that threatened the rural island character of Kaua‘i. Because the desire to preserve to rural island character was so strong in some communities, there was immediate opposition to Complete Streets efforts—without a full understanding of how Complete Streets policies and infrastructure projects could actually help to preserve the rural character. Therefore, one identified next step for GFK was community education and outreach that would improve communities’ knowledge of how Complete Streets policy implementation would beneficial.

**Applicability of CCAT**

To address the secondary study aim, this section considers how the major themes to emerge from the interviews fit with CCAT. Overall, the interview themes were closely aligned with most CCAT constructs. The importance of community context, effective staff, and engagement of coalition members was confirmed. Collaborative synergy was reflected by the intertwined work of GFK and the County of Kaua‘i. The community-government partnership was pointed to as a key reason why multiple BE changes were made during a relatively short time period. CCAT is also applicable in the way it conceptualizes community-level outcomes. In addition to the policy changes and the programmatic activities accomplished by GFK, other outcomes related to the BE were discussed by participants. These short-term outcomes are categorized by CCAT as community change outcomes, which are precursors to community capacity and health/social outcomes.

**Community Change Outcomes**

BE changes take a long time to materialize, reflecting the time-consuming process of planning, designing, and constructing infrastructure projects. Interview participants from both the county and community expressed frustration (“The red tape just kills me.”) and acknowledged the need to be patient (“I’ve never been a patient guy, but I learned patience and hold my tongue and smile.”). GFK, instead of trying to force the county to make changes, took a collaborative approach:

“Everybody has their passions, so to get the passions working positively is a challenge… My pet peeve is, yeah, you can complain to me and criticize all you like, but be part of the solution. [Don’t] just criticize and leave me hanging to solve the problem by myself. Be part of the solution. So that’s what [the coalition director] does. She is part of the solution.”
Before the BE could be modified to be more accommodating of and safe for pedestrians, bicyclists, and transit users, GFK helped to facilitate several critical community changes through capacity building activities. The first community change outcome was breaking down silos between county agencies—especially Planning and Public Works—to improve communication and coordination for BE changes. A significant moment for GFK was when consultants helped county staff realize that they were working in their departmental silos and that implementing the Complete Streets policy would require them to talk to each other. One of the leaders of the Public Works Department describes what happened at one of the workshops led by a GFK consultant:

“It was very apparent from my side that the various county agencies or departments were not talking to Public Works and were working in silos… But the warmest welcome I got was from the Planning Department. So you know we built these bridges with Planning and tried to break down the silos over time, but in that initial onset, I was thinking, ‘Wow, everybody talking individually what they doing but not what we’re doing collaboratively as the county to support this newly signed [Complete Streets] resolution.’”

By recruiting staff from multiple county agencies to the BE and SRTS task forces, GFK provided a mechanism for breaking down silos. One Planning Department employee explained that GFK increased the network among county agency staff:

“Our county is so small [that breaking down silos happens through] people. Like we have [person’s name] from Transportation on our taskforce… She comes to almost every meeting as well. So it’s just us, our network. Now whenever she has a question about things, she emails or calls me. So I think that we just all support each other when it comes to getting more bus, pedestrian, bike facilities constructed or planned for in this county.”

GFK further built the capacity of county agencies to address the BE by using consultants to provide necessary education and technical assistance to county leaders and staff. The experience and expertise of the consultants helped to overcome resistance to change among county agency staff. One interview participant described that one of the challenges was getting engineers to be open to the new concepts that are part of Compete Streets:

“[Some of our engineers are] so fixed in what they know. And that’s gospel. [The challenge was] to open themselves up for new information and direction and opportunities. Look at things as an opportunity versus the negative side—how are we going to pull this off?... So it’s
the fear of the unknown…not knowing how we going implement. You just gotta go in and dive head first.”

As a result of the training and technical assistance provided by the consultants, the partnership between GFK and the County led to what one participant described as a social norm change in the County:

“The building of knowledge from the Mayor to the Planning Department and…Public Works—all of the departments have gained this knowledge and are now working together to move this built environment movement forward, and I think they have a larger vision now that they work together on, and so I think that’s just that social norm change is the biggest thing ‘cause it is such a sustainable thing.”

The increased capacity is also reflected in what the Director of the Planning Department viewed as a significant accomplishment of GFK:

“What I think is the other unmeasurable but tangible kind of greatest accomplishment is that you have people not only in my department, but you have people across many sectors talking the same language… Everyone knows what a roundabout is. Everybody knows what a road diet is… The proficiency by which people can talk in Complete Streets terms or understand Complete Streets concepts, maybe at least on a superficial level, bypasses like the whole educational phase that really I think has been happening over the past few years.”

The importance of initial efforts to build coalition capacity and increase transdisciplinary collaboration was central to GFK’s success. These strategies led county agencies to buy in to GFK efforts to change the BE. Thus, GFK’s strategic use of consultants to build capacity in early stages of coalition functioning should be highlighted as a critical coalition process.

**Discussion**

The diverse perspectives of the interviewees were used to develop a theory about how GFK was able to successfully influence the BE in Kaua’i County through policy change and programmatic activities. Upon coalition formation, the community coalition initially used national experts to provide education and training that brought the county agencies on board and developed coalition capacity to address the BE. Next, GFK decided upon policy strategies and organized advocacy efforts to successfully change policies. The partnership between GFK and the county government
partners evolved during the policy implementation stage. GFK stepped back from a leadership role and took a more supportive role as the county took over responsibility for policy implementation. Community context was a factor that influenced all phases in the process. Importantly, the alignment of political support from the Mayor, the dynamic coalition director, and funding support for capacity building were significant enablers to GFK’s accomplishments.

This study contributes to what is known about collaborative approaches to improving the BE for PA. Previous studies have explored the successes and challenges of other collaborations that focus on the BE. For example, Gustat and colleagues (2013) found that the main challenges experienced by active living collaboratives were funding and personnel changes. Litt and colleagues (2013) found that collaborative groups that provided testimony in public hearings were more likely to achieve policy change. However, the actual process for achieving BE policy and infrastructure changes has not been yet described in detail.

**Implications for CCAT**

This study was not designed to comprehensively examine the utility of CCAT for coalitions tackling the BE. Because of the complexity of CCAT, it is difficult to assess the many constructs and propositions through qualitative interviews. A comprehensive case study consisting of multiple data sources (e.g., process evaluation measures like meeting minutes and quantitative data collection like coalition member satisfaction surveys) would be better suited to validate CCAT.

Nevertheless, the results of this study suggest one important way that CCAT can be extended to apply to coalitions focused on BE changes. The suggestion is to emphasize capacity building processes that increase the buy-in, knowledge, skills, and tools of coalition stakeholders. Since new approaches to community and street design may be counterintuitive to how Planning, Public Works, and Transportation departments have traditionally functioned over the past decades, GFK first had to create the case for why the BE needed to change to accommodate active transportation modes. GFK achieved buy-in by using national experts to provide presentations, trainings, and specific technical assistance to county government partners. The capacity building activities could be featured as a distinct coalition process in CCAT.

**Implications for Practice**

The results of this study can help to inform other community coalitions seeking to produce similar BE outcomes. For GFK, the use of national experts was an effective strategy for increasing
awareness of BE issues in the community, improving the ability of county government partners to make BE policy and infrastructure changes, and educating coalition stakeholders about BE policy changes. GFK had the resources to hire these consultants, and the interview participants felt that they were a vital part of the Complete Streets and SRTS initiatives. However, the consultants were not needed on a permanent basis. Once community and county capacity had been developed sufficiently, the county was able to take over responsibility for implementing BE policies. For example, the county was leading efforts to rewrite roadway design standards and coordinating community charrettes to gather feedback from communities about plans and projects to improve walking, bicycling, and use of public transit. This meant that GFK took a step back from leading capacity building and policy change efforts to becoming more supportive to the county. Interview participants saw an evolving role for GFK which involved more intensive community outreach and education for the BE and keeping the county accountable for implementation. Acknowledging this evolving role may help other community coalitions during the transition from policy change to policy implementation.

**Study Limitations**

This study had several limitations. One limitation was the restricted scope: while it would be ideal to assess the link between BE policies and any resulting increase in PA levels, data on the latter are not available yet, and the study was not designed to make such a causal inference. Additional participants could also have been interviewed to ensure theoretical saturation, even though the sample size was within Creswell’s recommendation for interviewing 20-30 individuals to develop a well-saturated grounded theory. This study could have been expanded to include additional County council members, Safe Routes to School Task Force members, representatives of community-based organizations, and national consultants.

There are several inherent limitations to interviews as a qualitative methodology. One of these limitations is recall bias, as described by Becker and Geer (1978):

“Changes in the social environment and in the self inevitably produce transformations of perspective, and it is characteristic of such transformations that the person finds it difficult or impossible to remember his former actions, outlook, or feelings. Reinterpreting things from his new perspective, he cannot give an accurate account of the past…” (p. 81-82). Social desirability may have been another source of bias, as participants may have only been willing to speak of GFK in a successful or favorable light because of confidentiality concerns. Despite
attempts to protect the confidentiality of participants, on such a small island, it is likely that other coalition members would be able to guess the identity of participants. Participants may have also wanted to assure continued funding for GFK, so may have minimized any coalition problems and instead focused on successful aspects of the coalitions. Finally, the constructivist approach taken to analysis in this study acknowledges the active role of the researcher in developing the grounded theory. The researcher who conducted the interviews and analyzed the data for this study has provided program evaluation support to GFK for several years. Therefore, this additional interaction had an influence on the construction of the grounded theory; another researcher who did not have this interaction may have reached different findings.

Future Research Directions

A logical next step is to conduct a subsequent study that focuses specifically on policy implementation and the role of community coalition in facilitating implementation. GFK is currently working on policy implementation, so additional interviews can be conducted to ask about implementation strategies, challenges, successes, and lessons learned. Follow-up questions could also cover if GFK conducted the recommended community outreach and education, as well as what steps it took to track progress and keep the county accountable. To learn more about the long-term community outcomes in CCAT, it would also be interesting to attempt to link coalition activities to increases in PA levels and improved community capacity to address other health problems. In order to do this, better measures need to be developed that capture the relationship-building, collaborative synergy, and other intangible coalition outcomes.

Since this study only focused on one community coalition, GFK, additional research is needed to determine the generalizability of these findings to other coalitions. Community context had a large influence on coalition functioning, so it is yet to be determined if the strategies employed by GFK would work for other community coalitions. Further consideration of community context should involve identification of leverage points that enable BE change (e.g., garnering support from elected officials).
Conclusion

“What’s the policy? What are the legal requirements? What’s going to be approved, you know, when somebody brings a project to the county and wants to develop land? What shape is it going to take? And that’s built environment. That’s the fundamental level we’re working at, that’s so invisible today.”

The quote above from one of the study participants illuminates a significant challenge of BE collaborative efforts: working on an invisible level. When a policy is successfully passed, changes to the environment may not be evident until 10-15 years later, and not until the environment is more supportive would PA be expected to increase. Community coalitions have a key role to play in keeping partners engaged in implementing the BE policy and ensuring that meaningful changes take place. GFK is a successful model of how a community coalition can influence the BE through engaging government partners, spearheading policy change efforts, and building the capacity of all community stakeholders. Through a combination of programmatic activities like Safe Routes to School, community outreach events like the Mayor-a-thon, and support for implementation activities, GFK serves a catalyst for BE collaboration in Kaua‘i County.
CHAPTER 4

Exploring the Relationship between Community Environmental Factors and Physical Activity among Hawai‘i Adults: A Structural Equation Model

Abstract

To increase population levels of physical activity, the social ecological model posits that we need to consider factors outside the individual, addressing community environments so that adults have safe, accessible, and convenient places to be physically active. The purpose of this secondary data analysis was to investigate the relationship between perceived social and built environment community characteristics and physical activity levels in Hawai‘i adults. Data were collected through a random digit dial telephone survey administered in 2011 to 3,626 Hawai‘i residents aged 18-55 years old. Data analysis was conducted in three parts: (1) exploratory factor analysis of community environmental variables; (2) confirmatory factor analysis of community environmental variables; and (3) structural equation modeling. Results suggest that the perceived community social environment has a mixed impact on self-reported physical activity: lower rating of the social environment was associated with higher physical activity, while higher rating of the social environment was indirectly associated with higher physical activity level through an association with self-efficacy. The perceived community built environment did not have a strong relationship with physical activity; in the final model, it was only associated with the social environment. The results of this study confirm the need for community interventions that target multiple levels of a social ecological framework.
Background

Physical activity (PA) is an essential health-promoting behavior, contributing to a healthy body weight, reduced risk of chronic diseases, and a sense of well-being (Centers for Disease Control and Prevention [CDC], 2011). To accrue the health benefits of PA, regular PA each week is required. The 2008 Physical Activity Guidelines for Americans (U.S. Department of Health and Human Services, 2008) recommend that adults aged 18 to 64 years participate in at least 150 minutes per week of moderate-intensity or 75 minutes per week of vigorous-intensity aerobic activity (or an equivalent combination). Unfortunately, most Americans do not achieve recommended levels of PA (CDC, 2007), and comprehensive efforts are required to increase population-levels of PA.

A social ecological framework can be used to identify the determinants of PA and increase our understanding of how to increase PA levels in populations through a focus on policy and environmental interventions. Environmental settings, as a root cause of physical inactivity, encompass both the physical and social environment. The physical environment includes the natural environment and the built environment (BE), which refers to the collective availability of sidewalks, parks, trails, recreational facilities, traffic safety, and other neighborhood characteristics that promote recreational PA and active transportation (Ferdinand, Sen, Rahurkar, Engler, & Menachemi, 2012). The social environment is a more complex construct that includes social support, community norms, safety, crime, incivilities (e.g., litter and graffiti), traffic, and social capital (Bauman et al., 2012; Sallis, Owen, & Fisher, 2008).

To test the utility of the social ecological model in explaining PA, structural equation modeling (SEM) is a promising approach. SEM is a broadly applicable and increasingly popular multivariate statistical procedure that has unique and flexible capabilities for analyzing latent variables (Tomarken & Waller, 2005). Several studies to date have used the SEM to investigate socioecological influences on PA levels. For example, Pichon and colleagues (2007) found that acculturation was positively associated with PA levels in Latina adults, but perceived neighborhood safety/aesthetics were not associated with PA levels. Li et al. (2012) used SEM to determine social-ecological factors that were related to leisure-time PA in church-going African Americans. Self-efficacy and perceived access to PA facilities were indirectly associated with PA levels in this study. In a sample of Japanese adults, Ishii et al. (2010) found that the neighborhood environment influenced PA via self-efficacy. Finally, McNeill, Wyrwich, Brownson, Clark, and Kreuter (2006)
demonstrated both direct and indirect effects of the physical and social environment on PA in black and white American adults. Thus, while there have been mixed findings about the impact of neighborhood environments, self-efficacy has had both direct and indirect impacts on PA in adults, and elements of the environment may influence self-efficacy.

The purpose of this study was to use SEM to assess the contribution of community environmental variables in explaining levels of PA among adults residing in Hawai‘i. This study aims to answer the research question: What is the association between community-level social and built environment factors and PA in Hawai‘i adults? The results can help to identify factors that can be targeted by community interventions to promote PA in Hawai‘i adults.

**Methods**

This study is a secondary data analysis that uses data collected in 2011 from the Healthy Hawai‘i Initiative (HHI) cross-sectional telephone survey. The HHI cross-sectional telephone survey employed random digit dialing (RDD) techniques to conduct telephone interviews with adult residents of Hawai‘i. Survey questions covered three primary health behaviors: tobacco use, nutrition, and PA. Because tobacco use is a focal area, the survey aimed to include at least 500 smokers in the final sample. The study was approved under exempt status by the University of Hawai‘i Committee on Human Subjects Research.

The 2011 data were collected by a professional survey firm, SMS Inc., using trained interviewers and computer-assisted telephone interviewing software. SMS Inc. generated the RDD sample, which included residential land lines and cell phone numbers. Inclusion criteria for participants were: (1) aged 18-55 years old; (2) Hawai‘i resident; (3) English-speaking; and (4) possessing either a landline or cellular telephone number. The participation rate was 24.0%: 15,108 adults were contacted over the year, and 3,626 agreed to participate in the survey. Approximately half (49.3%) of the interviews were completed by respondents using cellular telephones.

**Measures**

**Dependent variable**

The outcome variable for this study was the amount of PA as measured by the Short Last 7 Days Telephone Format International Physical Activity Questionnaire (IPAQ-S), a validated measure recommended for monitoring and surveillance of population PA levels (Craig et al., 2003). Using the IPAQ scoring algorithm (IPAQ, 2005), the amounts of walking, moderate PA, and
vigorous PA per week were calculated in metabolic equivalent hours per week (MET-hours/week). These three variables were then used as indicators to construct a latent variable for PA.

Explanatory variables

The independent variables explored in the structural equation model are listed in Table 4.1 by their hypothesized factor structure. The first factor, self-efficacy, was comprised of two indicators that assess how confident a person is in her/his ability to be active under certain conditions (when it’s raining and when feeling that there is no time). Each item was measured on a four-point scale, in which a higher score reflects higher self-efficacy. In a social ecological framework, the self-efficacy factor represents an intrapersonal-level construct.

The dataset contains 11 items that assess perceived community environmental influences on PA. The items were drawn from two different surveys assessing neighborhood environments (Boehmer, Hoehner, Deshpande, Ramirez, & Brownson, 2007; Sallis et al., 2010), and the wording of items was slightly modified. The resulting combination of survey items had not been evaluated previously for its psychometric properties. It was hypothesized that the community-level indicators would group into two factors, one representing the perceived built environment and one representing the perceived social environment. Altogether, the items represented several types of community influences: (1) perceived access to PA resources and presence of amenities, such as destinations within walking distance, facilities for PA, sidewalks, and bike lanes; (2) perceived social conditions (litter, maintenance of facilities); (3) perceived neighborhood safety from crime and traffic; and (4) community norms for being physically active. Nine of the items were scored on a five-point Likert scale (strongly disagree to strongly agree), and the two items related to safety were scored on a four-point ordinal scale (not safe at all to extremely safe).
### Table 4.1. Hypothesized Factor Structure for Model

<table>
<thead>
<tr>
<th>Factor</th>
<th>Variable</th>
<th>Indicator</th>
<th>Response Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-efficacy</td>
<td>conf1</td>
<td>Are you confident that you would be able to exercise when it is raining?</td>
<td>4= Very confident</td>
</tr>
<tr>
<td>(individual level)</td>
<td></td>
<td></td>
<td>3= Somewhat confident</td>
</tr>
<tr>
<td></td>
<td>conf2</td>
<td>Are you confident that you would be able to exercise when you feel that you don’t have the time?</td>
<td>2= Not very confident</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1= Not at all confident</td>
</tr>
<tr>
<td>Built Environment</td>
<td>CE1</td>
<td>Many shops, stores, markets or other places to buy things I need are within easy walking distance of my home.</td>
<td>5= Strongly agree</td>
</tr>
<tr>
<td>(community level)</td>
<td>CE2</td>
<td>There are many places to be physically active in my community not including streets (e.g., parks, trails, playgrounds).</td>
<td>4= Somewhat agree</td>
</tr>
<tr>
<td></td>
<td>CE3</td>
<td>I can walk to a park, walking trail, or private fitness facility within 5 minutes from my home.</td>
<td>3= Neither agree or disagree</td>
</tr>
<tr>
<td></td>
<td>CE4</td>
<td>There are sidewalks on most of the streets in my neighborhood.</td>
<td>2= Somewhat disagree</td>
</tr>
<tr>
<td></td>
<td>CE5</td>
<td>There are bike lanes on most of the streets in my community.</td>
<td>1= Strongly disagree</td>
</tr>
<tr>
<td></td>
<td>CE6</td>
<td>My home is within a 10-15 minute walk to a transit stop (such as bus or trolley).</td>
<td></td>
</tr>
<tr>
<td>Social Environment</td>
<td>CE7</td>
<td>My neighborhood is generally free from garbage, litter, or broken glass.</td>
<td>5= Strongly agree</td>
</tr>
<tr>
<td>(community level)</td>
<td>CE8</td>
<td>My neighborhood is well-maintained.</td>
<td>4= Somewhat agree</td>
</tr>
<tr>
<td></td>
<td>CE9</td>
<td>A lot of the people in my neighborhood are physically active.</td>
<td>3= Neither agree or disagree</td>
</tr>
<tr>
<td></td>
<td>CE10</td>
<td>How safe from crime do you feel while you are walking or riding your bike in your neighborhood?</td>
<td>2= Somewhat disagree</td>
</tr>
<tr>
<td></td>
<td>CE11</td>
<td>How safe from traffic do you feel while you are walking or riding your bike in your neighborhood?</td>
<td>1= Not at all safe</td>
</tr>
</tbody>
</table>

### Covariates

Several covariates were also assessed (*Table 4.2*). PA levels are often higher in men than women and in younger than older individuals (Bauman et al., 2012), so gender and age were included in the initial model. To account for the sampling quota for smokers, smoking status was also added as a covariate. Ethnicity was dummy coded into five categories: Caucasian, Native Hawaiian (in-part or full), Filipino, Japanese, and Other. Finally, respondents were asked for their zip code. This was used to identify the county that they lived in. Residents of O’ahu were categorized as living in an urban county, while the remaining three counties were categorized as rural (U.S. Department of Agriculture, Economic Research Service, 2007).
Table 4.2. Covariates Considered for Inclusion in the Structural Equation Model

<table>
<thead>
<tr>
<th>Variable</th>
<th>Response Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>0 = Male; 1 = Female</td>
</tr>
<tr>
<td>Age</td>
<td>Number of years</td>
</tr>
<tr>
<td>Current smoker</td>
<td>0 = No; 1 = Yes</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>Caucasian (reference group); Native Hawaiian; Filipino; Japanese; Other</td>
</tr>
<tr>
<td>Urban or rural county</td>
<td>0 = urban (Honolulu City and County); 1 = rural (Hawai‘i, Kaua‘i, or Maui)</td>
</tr>
</tbody>
</table>

Data Analysis

Data were initially screened for missing values, and the distributions of all variables were examined. All variables had less than 5% missing data. Computed variables and descriptive statistics were generated using SPSS version 22.0 (IBM Corp., 2013). Mplus version 7.3 was used to conduct the remainder of the data analysis (Muthén & Muthén, 2014).

To first determine the factor structure of the 11 community environment variables, the dataset was randomly split into two data sets. An exploratory factor analysis (EFA) was conducted using the default oblique rotation, GEOMIN, to determine the best-fitting factor solution (Muthén & Muthén, 2012). Next, the second half of the data set was used to cross-validate the factor structure that was determined by the EFA through confirmatory factor analysis (CFA). Model fit statistics provided by MPlus were used to assess the model goodness-of-fit. The model fit statistics used were the: (a) χ² test (which is sensitive to sample size); (b) Comparative Fit Index (CFI), in which a value > 0.95 is good, but a value >0.90 is acceptable; (c) Tucker-Lewis Index (TLI), with the same cutoff values as CFI; (d) Root Mean Square Error of Approximation (RMSEA) with associated 90% confidence interval (C.I.), in which a value < 0.05 indicates a good fit; and (e) Standardized Root Mean Square Residual (SRMR), with the same cutoff value as the RMSEA (Byrne, 2012).

In the final analysis phase, the entire dataset was used for SEM. Using zip code to develop community groupings based on the Hawai‘i BRFSS, the suitability of using multilevel SEM was explored. However, the intraclass correlation coefficient was < 1%, so the analysis proceeded with general SEM analysis. Because of the high levels of kurtosis in the PA indicator variables, the MLR estimation method was employed to provide standard errors that are robust to non-normality.
(Muthén & Muthén, 2012). First, the measurement model was determined, and modification indices were used to achieve an adequate model fit. Lastly, the full SEM analysis was conducted to develop the best-fitting structural model. Fit indices were assessed using the same criteria described for the CFA. The reliability of the latent constructs was calculated using coefficient $H$ (Mueller & Hancock, 2008) and Cronbach’s alpha. Values above 0.70 were considered as satisfactory indicators of construct reliability.

**Results**

**Participant Characteristics**

A summary of participant characteristics is provided in Table 4.3. There were slightly more female respondents than male respondents, and the average age of the participants was 38.6 years. Although four ethnic groups (Caucasian, Native Hawaiian/part-Native Hawaiian, Japanese, and Filipino) represented the majority of the respondents, 27.9% fell into the “other” category. The sample was comprised of 15.6% current smokers, similar to the 16.8% proportion reported in the 2011 Hawai‘i BRFSS (Hawai‘i Health Matters, 2015). The majority of participants (68.0%) resided in the urban City and County of Honolulu, while the remainder resided in the rural counties of Hawai‘i, Kaua‘i, and Maui. The proportion of urban-dwelling residents is comparable to the 2011 U.S. Census estimate of 70.1% of Hawai‘i residents living in the City and County of Honolulu (Hawai‘i Department of Business, Economic Development & Tourism, 2015).

For the two variables assessing self-efficacy, on average, participants were more confident that they would be able to exercise when it was raining than if they lacked the time to exercise. For community environment variables, participants generally agreed that they had access to community places to be active, had sidewalks on most streets in their neighborhoods, and were within walking distance of transit stops. They agreed less frequently that they had bike lanes on their streets and that they could walk to shops and stores near their homes. Neighborhoods were mostly free from litter and were well-maintained. The majority of participants also felt that a lot of people in their neighborhoods were physically active. In terms of perceived safety, participants felt quite safe or extremely safe from crime while walking or bicycling in their neighborhoods; however, they felt less safe from traffic. The correlation matrix for the 11 community environment variables is presented in Appendix D.
Table 4.3. Participant Characteristics (n = 3,626)

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>1,674</td>
<td>46.2</td>
</tr>
<tr>
<td>Female</td>
<td>1,952</td>
<td>53.8</td>
</tr>
<tr>
<td><strong>Age (years)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean ± SD</td>
<td>38.6 ± 11.2</td>
<td></td>
</tr>
<tr>
<td><strong>Race/ethnicity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>907</td>
<td>25.0</td>
</tr>
<tr>
<td>Native Hawaiian(^a)</td>
<td>762</td>
<td>21.0</td>
</tr>
<tr>
<td>Japanese</td>
<td>490</td>
<td>13.5</td>
</tr>
<tr>
<td>Filipino</td>
<td>431</td>
<td>11.9</td>
</tr>
<tr>
<td>Other</td>
<td>1,013</td>
<td>27.9</td>
</tr>
<tr>
<td>Missing (don’t know/refused)</td>
<td>23</td>
<td>0.1</td>
</tr>
<tr>
<td><strong>Smoking Status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current tobacco smoker</td>
<td>565</td>
<td>15.6</td>
</tr>
<tr>
<td>Non-smoker</td>
<td>3,061</td>
<td>84.4</td>
</tr>
<tr>
<td><strong>Rural or Urban County</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban (Honolulu City &amp; County)</td>
<td>2,467</td>
<td>68.0</td>
</tr>
<tr>
<td>Rural (Hawai‘i, Kaua‘i, Maui)</td>
<td>1,109</td>
<td>30.6</td>
</tr>
<tr>
<td>Missing</td>
<td>50</td>
<td>1.4</td>
</tr>
<tr>
<td><strong>Self-efficacy</strong></td>
<td>Mean (SD)</td>
<td></td>
</tr>
<tr>
<td>Are you confident that you would be able to exercise when it is raining?</td>
<td>3.17 (1.02)</td>
<td></td>
</tr>
<tr>
<td>Are you confident that you would be able to exercise when you feel that you don’t have the time?</td>
<td>2.62 (1.04)</td>
<td></td>
</tr>
</tbody>
</table>

\(^a\) Includes respondents who identified Native Hawaiian as one of their ethnic groups.
Table 4.3. (Continued) Participant Characteristics (n = 3,626)

<table>
<thead>
<tr>
<th>Community Environments</th>
<th>Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Many shops, stores, markets or other places to buy things I need are within easy walking distance of my home.</td>
<td>2.97 (1.68)</td>
</tr>
<tr>
<td>There are many places to be physically active in my community not including streets (e.g., parks, trails, playgrounds).</td>
<td>3.85 (1.44)</td>
</tr>
<tr>
<td>I can walk to a park, walking trail, or private fitness facility within 5 minutes from my home.</td>
<td>3.43 (1.76)</td>
</tr>
<tr>
<td>There are sidewalks on most of the streets in my neighborhood.</td>
<td>3.67 (1.74)</td>
</tr>
<tr>
<td>There are bike lanes on most of the streets in my community.</td>
<td>2.50 (1.67)</td>
</tr>
<tr>
<td>My home is within a 10-15 minute walk to a transit stop (such as bus or trolley).</td>
<td>4.23 (1.44)</td>
</tr>
<tr>
<td>My neighborhood is generally free from garbage, litter, or broken glass.</td>
<td>4.21 (1.31)</td>
</tr>
<tr>
<td>My neighborhood is well-maintained.</td>
<td>4.27 (1.13)</td>
</tr>
<tr>
<td>A lot of the people in my neighborhood are physically active.</td>
<td>3.71 (1.23)</td>
</tr>
<tr>
<td>How safe from crime do you feel while you are walking or riding your bike in your neighborhood?</td>
<td>3.17 (0.82)</td>
</tr>
<tr>
<td>How safe from traffic do you feel while you are walking or riding your bike in your neighborhood?</td>
<td>2.77 (0.96)</td>
</tr>
</tbody>
</table>

Physical Activity

Because PA is typically non-normally distributed in populations, the IPAQ scoring guidelines (2005) recommend presenting the median and interquartile range values for PA indicators. These values are provided in Table 4.4 in MET-hours per week. In this sample, the PA indicators were positively skewed (skewness values ranged from 2.2 to 2.7) and leptokurtic (kurtosis values ranged from 4.7 to 8.4). As previously mentioned, the non-normality of the outcome variables was addressed by using the MLR estimator for SEM analysis.

Table 4.4. Levels of Physical Activity among Participants (n = 3,505)

<table>
<thead>
<tr>
<th></th>
<th>Median</th>
<th>Interquartile Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>MET-hours of walking per week</td>
<td>7.70</td>
<td>12.10</td>
</tr>
<tr>
<td>MET-hours of moderate activity per week</td>
<td>6.00</td>
<td>16.00</td>
</tr>
<tr>
<td>MET-hours of vigorous activity per week</td>
<td>6.00</td>
<td>24.00</td>
</tr>
<tr>
<td>Total MET-hours of physical activity per week</td>
<td>25.50</td>
<td>46.33</td>
</tr>
</tbody>
</table>
EFA Results

Although two factors were hypothesized, the 11 community-level variables were examined in an EFA that explored the suitability of a one, two, three, and four factor solution. The number of extracted factors was based on examination of eigenvalues, scree plots, and interpretability of the solution. A two-factor solution was found to be the most adequate. Three items that did not load uniquely on a factor or did not load with other items were eliminated from the final solution (CE1, CE9, CE11). The rotated factor loadings for the final solution with eight community environment variables are presented in Table 4.5. As hypothesized, the first factor reflects characteristics of the built environment and the second factor reflects characteristics of the social environment. Factor 1 and Factor 2 were slightly correlated with each other, $r = 0.216, p < 0.05$.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Factor 1 (Built Environment)</th>
<th>Factor 2 (Social Environment)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE2</td>
<td>0.502*</td>
<td></td>
</tr>
<tr>
<td>CE3</td>
<td>0.590*</td>
<td></td>
</tr>
<tr>
<td>CE4</td>
<td>0.566*</td>
<td></td>
</tr>
<tr>
<td>CE5</td>
<td>0.424*</td>
<td></td>
</tr>
<tr>
<td>CE6</td>
<td>0.445*</td>
<td>0.766*</td>
</tr>
<tr>
<td>CE7</td>
<td></td>
<td>0.766*</td>
</tr>
<tr>
<td>CE8</td>
<td>0.851*</td>
<td>0.429*</td>
</tr>
<tr>
<td>CE10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*$p < 0.05$; Note: only factor loadings $| > 0.4 |$ are shown.

CFA Results

The second randomly-generated data set was used to cross validate the factor model from the EFA using the eight community-environment indicator variables. Fit indices reflect an adequate fit: $\chi^2 = 84.3 (df = 18, p < 0.001)$, CFI = 0.972, TLI = 0.956, RMSEA = 0.046 (90% C.I.: 0.036, 0.056), and SRMR = 0.035. One residual covariance between CE2 and CE3 was added to improve model fit. The standardized estimates for the CFA model are shown in Figure 4.1.
Measurement Model

Using the full dataset, SEM was first used to test an initial measurement model for the latent variables representing PA, self-efficacy, and the social and built environments. By using the modification indices provided by Mplus, the model was further refined. One of the indicators, BE5, was removed from the model to improve model fit. The remaining seven community environment variables were used as indicators for the built and social environment factors. One residual covariance term for CE4 and CE6 was included. The fit of the measurement model was good: model $\chi^2 = 268.7$ ($df = 47$, $p < 0.001$), CFI = 0.969, TLI = 0.956, RMSEA = 0.036 (90% C.I.: 0.032, 0.040), and SRMR = 0.030. All standardized coefficients for the PA, self-efficacy, built environment, and social environment latent variables were statistically significant, $p < 0.001$ (Table 4.6). The correlations among latent variables are shown in Table 4.7.
Table 4.6. Standardized Factor Coefficients for Measurement Model (n = 3,626)

<table>
<thead>
<tr>
<th>Latent Variables with Indicators</th>
<th>Standardized Coefficient</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical Activity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate MET-hours</td>
<td>0.829***</td>
<td>0.014</td>
</tr>
<tr>
<td>Vigorous MET-hours</td>
<td>0.694***</td>
<td>0.014</td>
</tr>
<tr>
<td>Walking MET-hours</td>
<td>0.478***</td>
<td>0.016</td>
</tr>
<tr>
<td><strong>Self-efficacy</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Confident – rain</td>
<td>0.579***</td>
<td>0.023</td>
</tr>
<tr>
<td>Confident – no time</td>
<td>0.564***</td>
<td>0.022</td>
</tr>
<tr>
<td><strong>Built Environment</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CE2</td>
<td>0.545***</td>
<td>0.021</td>
</tr>
<tr>
<td>CE3</td>
<td>0.656***</td>
<td>0.023</td>
</tr>
<tr>
<td>CE4</td>
<td>0.428***</td>
<td>0.020</td>
</tr>
<tr>
<td>CE6</td>
<td>0.329***</td>
<td>0.021</td>
</tr>
<tr>
<td><strong>Social Environment</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CE7</td>
<td>0.740***</td>
<td>0.015</td>
</tr>
<tr>
<td>CE8</td>
<td>0.868***</td>
<td>0.015</td>
</tr>
<tr>
<td>CE10</td>
<td>0.455***</td>
<td>0.016</td>
</tr>
</tbody>
</table>

***p < 0.001

Table 4.7. Correlations among Factors in Measurement Model (n = 3,626)

<table>
<thead>
<tr>
<th>Latent variable</th>
<th>Physical activity</th>
<th>Self-efficacy</th>
<th>Built environment</th>
<th>Social environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical activity</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>0.556***</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Built environment</td>
<td>0.071**</td>
<td>0.172***</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Social environment</td>
<td>-0.012</td>
<td>0.108***</td>
<td>0.230***</td>
<td>1.00</td>
</tr>
</tbody>
</table>

**p < 0.01; ***p < 0.001

Structural Equation Model

The final structural equation model is presented in Figure 4.2. It explained 37.8% of the variance in the latent variable for PA. The model fit indices were good: $\chi^2 = 438.1$ ($df = 87, p < 0.001$), CFI = 0.952, TLI = 0.937, RMSEA = 0.034 (90% C.I.: 0.031, 0.037), and SRMR = 0.0034. Reliability coefficients were adequate, except for the self-efficacy construct, which only had two indicators (Table 4.8).
Table 4.8. Reliability Coefficients for Latent Variables (n = 3,626)

<table>
<thead>
<tr>
<th>Latent Variable</th>
<th>Coefficient $H$</th>
<th>Cronbach’s alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Activity</td>
<td>0.74</td>
<td>0.65</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>0.49</td>
<td>0.49</td>
</tr>
<tr>
<td>Built Environment</td>
<td>0.75</td>
<td>0.59</td>
</tr>
<tr>
<td>Social Environment</td>
<td>0.81</td>
<td>0.72</td>
</tr>
</tbody>
</table>

To develop the final model, all covariates were included with direct effects on PA. However, the model fit was inadequate when the variables for ethnicity were modeled, so ethnicity was removed from the final model. The model modification indices were also examined, and paths from covariates to latent variables were added in a step-wise fashion to improve model fit. Several residual covariance terms were also included based upon the model modification indices.

The covariates of age and gender had statistically significant ($p < 0.01$) associations with PA in the expected direction: being younger was associated with increased PA and being female was associated with decreased PA. There were significant paths from age to social environment and from gender to self-efficacy. Smokers were had slightly higher levels of PA than non-smokers ($\beta = 0.046$, $p < 0.05$). Living in a rural county was associated with a higher level of PA ($\beta = 0.046, p < 0.05$); additionally, living in a rural county was associated with lower community BE amenities ($\beta = -0.542, p < 0.001$) but higher community social environment ratings ($\beta = 0.142, p < 0.001$).

In the final structural model, both self-efficacy ($\beta = 0.542, p < 0.001$) and the neighborhood social environment ($\beta = -0.085, p < 0.01$) were directly associated with PA. The neighborhood built environment was not significantly associated with PA directly or indirectly through self-efficacy. However, the neighborhood built environment was significantly related to the social environment ($\beta = 0.227, p < 0.001$). Self-efficacy also mediated the relationship between the social environment and PA ($\beta = 0.106, p < 0.001$); thus, the social environment was both directly and indirectly associated with PA.
Figure 4.2. Final structural equation model with standardized parameter estimates. (Latent factors: PA = physical activity, SE = self-efficacy, social = social environment, built = built environment)
Discussion

In the first part of this study, the factor structure for 11 community environment variables was examined. Of the 11 community environment variables, only eight variables were retained in the final solution. Two factors emerged, one representing built environment amenities like parks, access to transit, and sidewalks. The other factor represented more of a social construct, reflecting the presence of garbage/litter, how well a neighborhood was maintained, and perceptions of being safe from crime while walking and bicycling. The construct of the social environment requires further study to refine how it is defined and measured. Future research is needed to develop a valid and reliable scale for community social environments that can be used in SEM analyses.

Through SEM analysis, an acceptable-fitting model of community environmental factors, individual self-efficacy, and PA levels was determined. Only seven community environment variables were used in the SEM analysis. The model implied that community level environments had a mixed relationship with PA levels of Hawai‘i adults. Given the cross-sectional nature of the data, no causal inferences can be made. However, communities with higher built environment amenities also had social environments that were well-maintained and perceived as safe from crime. The social environment had a direct negative effect on PA, but a positive effect when self-efficacy was included. One reason why the social environment may have a negative association with PA is that the latent variable for PA included walking, moderate PA, and vigorous PA indicators. If the PA outcome variable only included leisure-time PA, perhaps the relationship may have been reversed—people who perceived their environments as safe and well-maintained may have been more likely to spend leisure-time walking, jogging, or bicycling in their neighborhoods. Alternatively, residents of disadvantaged communities are more likely to walk for transportation than residents living in more advantaged communities (Turrell, Haynes, Wilson, & Giles-Corti, 2013). Other studies that have investigated the relationship between neighborhood safety, the built environment, and PA similarly have found inconsistent patterns (Bracy et al., 2014; Carlson et al., 2014).

The findings of this study imply that designing community-level interventions should target both environmental and intrapersonal components. Self-efficacy, similar to previous studies, was identified as an important correlate of PA levels. Interventions to increase self-efficacy should take into account the impact that community environments may have on individual self-efficacy levels.
Limitations

Since this study is a secondary data analysis, there were several associated limitations, including lack of control over the survey questions. A major limitation was that previously validated scales for self-efficacy and community environmental variables were not used in this study. Future research is still needed to develop reliable scales for community environments that can be used for SEM. There is also a lack of documentation regarding the data collection procedures. The professional survey firm developed the specific sampling strategy and methodology, but information about how non-respondents differ from respondents is not available. This study attempted to account for the sampling strategy for smokers by including smoking status as a covariate in the final model. Caution will have to be used in generalizing the findings of this study to the entire population of Hawai‘i adults and U.S. adults.

An important limitation is that this study relies on self-reported data. Community-level variables reflect respondents’ perceived neighborhood environments. Although perceptions of the BE are not necessarily congruent with objective assessments of the BE, it is important to study both perceived and actual environments because of their independent associations with PA (McCormack et al., 2004; McGinn, Evenson, Herring, Huston, & Rodriguez, 2007). The measures also are subject to other sources of error. For example, the IPAQ-S may overestimate the PA outcome. In a recent review article, Lee and colleagues (2011) found that the IAPQ-S overestimated PA levels by an average of 84% compared to objective measures of PA. However, a strength of using SEM is the ability to incorporate measurement error into the model and produce robust estimates for data that do not follow a normal distribution. A final consideration is posed by Sallis and colleagues (2008), who suggest that testing hypotheses derived from ecological models can be challenged by a lack of variation in social, environmental, and policy variables across units of study—in this case, adults living in Hawai‘i.

Conclusion

SEM was a useful analytic technique to study influences on PA through a social ecological framework. Despite the limitations of the data, perceived community-level variables were found to be associated directly and indirectly with PA levels of Hawai‘i adults in this study. Community interventions should focus on multilevel strategies that include both the environmental context and individual psychosocial constructs.
CHAPTER 5

Conclusion

This dissertation research examined several facets of community-level interventions to increase physical activity (PA) levels. Given that PA is an essential health-promoting behavior, interventions are warranted to address groups with disparate levels. However, many challenges confront community interventions, including a lack of evidence supporting their effectiveness in creating community-wide changes in PA (Baker et al., 2015). To better develop, implement, and evaluate community interventions, the PA field needs to resolve measurement and other methodological issues. Towards that aim, this chapter summarizes the main findings from the three dissertation studies, offers suggestions for policy and practice, and provides directions for future research.

Summary of Findings

In the first study, a systematic literature review found that community-based participatory research (CBPR) was applied in a diverse range of PA interventions, from pilot projects to large-scale randomized controlled trials. CBPR was a promising approach for increasing PA in disparate groups, but additional research is needed to demonstrate increases in PA behaviors and better capture community-level changes, such as increased community capacity. The CBPR interventions included in the systematic review targeted multiple levels of a social ecological framework. Yet, only a few studies attempted to address the public policy level. Using CBPR to foster policy advocacy is one of the mechanisms through which a CBPR approach can address health disparities (Israel et al., 2010). Thus, future CBPR interventions for PA should incorporate policy and environmental change strategies that address the upper levels of a social ecological framework.

The second study presented a theory of change that explains how a community coalition, Get Fit Kaua‘i, served as a catalyst for built environment policy changes in partnership with the county government. Both the community coalition and the county government were needed to meaningfully address the built environment, reflecting the construct of collaborative synergy in Community Coalition Action Theory. Capacity building was a critical step in creating built environment changes, and it should be highlighted as a distinct phase in coalition efforts to develop programs and policy strategies that target the built environment. Community change outcomes
created by Get Fit Kaua‘i included increased connections between county departments, social norm change among county employees, and enhanced knowledge and skills of county employees to work on built environment changes. Thus, the county departments were able to assume responsibility for implementing built environment policies, while the coalition took on a more supportive role focused on community outreach and education.

The third study confirms the applicability of a social ecological framework in explaining PA levels. In a sample of 3,626 adults living in Hawai‘i, this secondary data analysis found that the built environment and social environment were associated directly and indirectly with PA levels. One strength of the study was the use of structural equation modeling (SEM) for data analysis, which generated latent constructs to represent community-level variables and took measurement error into account. The major study limitation, however, was the cross-sectional study design. Thus, no causal inferences could be made about the relationship between PA levels and individual and community variables. The findings of this study support the assertion by Giles-Corti and Donovan (2002) that a supportive built environment may be necessary but insufficient to increase community-levels of PA. The authors recommended complementary strategies that target individual and social environmental factors.

**Implications for Policy and Practice**

Based on the dissertation research, several recommendations for public health policy and practice are offered. First, the process of integrating community participation into the development, design, implementation, and evaluation of community interventions should be assessed and reported, in addition to findings about PA impacts. Measuring the process and outcomes of community participation will help other researchers better understand when community participation is most helpful in the intervention process and how community participation is linked to enhanced intervention outcomes. Although community participation is ideally integrated throughout the intervention process, community members have limited time and resources that may be most efficiently leveraged at certain points in the intervention. Suggestions are to use process evaluation to better document the specific ways in which community participation occurs and to employ participatory evaluation to develop objectives and outcomes for community participation.

This dissertation research contributes to the evidence that community coalitions are functional vehicles for policy and environmental change. Get Fit Kaua‘i was able to foster the
transdisciplinary collaboration required for built environment change. Similarly to the ability of CBPR intervention approaches to include policy advocacy, the community coalition successfully engaged in policy advocacy efforts to pass Complete Streets and Safe Routes to School policies that address a supportive built environment for PA. Now that the built environment policies are in place, coalition stakeholders believed that there was a new role for the coalition to take on—a role that involved outreach and education to individual communities, especially those which were resistant to the Complete Streets bill because they perceived it as a threat to the rural identity of their communities. This finding reflects the need for community interventions to address policy and environmental levels in conjunction with individual-level factors, such as increasing intrapersonal awareness and knowledge of how the built environment shapes health.

Despite the multiple policy successes, implementing the policies to create actual changes to the physical environment have not occurred yet in Kaua‘i County. Thus, the role of a community coalition in implementing physical changes to the built environment is a research area worthy of future investigation. The research should be expanded to multiple case studies to gain an understanding of how generalizable the experience of Get Fit Kaua‘i is to other community coalitions. In addition, the practice implication is that community-level interventions should be of a sufficient duration to encompass both policy advocacy and policy implementation activities.

**Future Research Directions**

Further research is needed to substantiate the impact of community interventions for PA on multiple levels of a social ecological framework. Researchers particularly have found it challenging to evaluate the relative importance of the intrapersonal, social, and environmental influences on PA. Individual and interpersonal variables are more frequently studied than policy and environmental variables (Bauman et al., 2012). In the few studies that have examined multiple levels of influences on PA, built environment variables were found to explain the least variance (Sallis et al., 2008). Moreover, many PA research studies have used cross-sectional designs to report associations between PA and intrapersonal, social, and environmental variables (Bauman et al., 2002). While cross-sectional studies add to our understanding of PA correlates, they do not support causal inferences. Longitudinal study designs are needed to examine if variations in determinants of PA are followed systematically by variations in PA behavior (Bauman et al., 2002).
Thus, changes to the built and social environment need to be linked to changes in PA behaviors in the target population. One of the required steps in doing this is developing measures that are sensitive to changes in the built and social environments. Although there are validated measures of the built environment (e.g., Sallis et al., 2010), there is no agreed upon definition for the social environment, and thus there is a lack of commonly used measures for the social environment as it relates to PA (McNeill, Kreuter, & Subramanian, 2006). Developing a scale for the social environment would enable SEM to link social environmental factors to PA levels. The flexibility of SEM and its ability to address multilevel research designs, relationships among latent variables, and measurement error (Schumacker & Lomax, 2010) make it a desirable analytic tool for future research based on a social ecological framework.

Conducting additional research on community interventions to promote PA will lead to a better understanding of a participatory intervention process and will help to identify effective strategies for ensuring that all people live in communities that enable them to be physically active.
APPENDIX A

Get Fit Kaua'i Interview Guide

Date: _______________  Time Start: __________  Time End: __________

Location: _______________  First Name: __________  ID Number: ________

Introduction

Thank you so much for your willingness to be interviewed. I am doing this study as part of my dissertation research at the University of Hawai‘i. I am trying to understand how Get Fit Kaua‘i has worked to promote physical activity, particularly by influencing the built environment. I am focusing on the work that coalition has accomplished over the past several years and what factors have impacted that work.

Before we get started, I would like to explain more about this interview process.

- Talking with me is completely voluntary. You don’t have to answer any questions you don’t want to and we can stop talking at any time. This won’t affect your ability to participate in Get Fit Kaua‘i in any way.
- What you tell me is private. I won’t tell anyone what you share with me. I am planning to write a report that will summarize what I learn from this study. I will not use your name, but I may describe your role on the coalition. For example, I may attribute a quote to a “Built Environment Task Force Member.” This means that people may be able to figure out who said what. If the information is very sensitive, then I will not report the coalition role associated with the quote.
- Please review this informed consent form and sign it to participate in this study. If you agree to let me voice record this interview, please check the box.
- I would like to thank you for your time and sharing your thoughts by giving you this gift card. Please acknowledge that I gave you this card by checking this box.

Do you have any questions for me before we get started?

Interview Questions

1. How have you been involved with Get Fit Kaua‘i’s efforts to promote physical activity?
   a. Why did you first get involved with Get Fit Kaua‘i?
   b. Has your level of involvement stayed the same throughout? Why or why not?
   c. Why have you continued to stay involved with GFK?
2. What do you think has been one the most significant accomplishments that Get Fit Kaua’i has made in improving the built environment?
   a. What was the process for getting this to happen?
   b. What do you think were the ingredients for success?
   c. What were the challenges in getting the work done? How were the challenges overcome?
   d. Do you think that this accomplishment would have happened without Get Fit Kaua’i? Why or why not?
   e. What was it about the place or people of Kaua’i that helped make this change to the built environment? (As compared to another county in the state or US.)
      *Prompts: politics, culture, people, geography, access to/use of mass transportation, existing neighborhood infrastructure or barriers (sidewalks, stray dogs, crime, lighting, graffiti)*
   f. As a result of this accomplishment, what will be the impact on the people of Kaua’i?

3. In terms of changing policies that influence the built environment, what do you think were the successful strategies, if any, that Get Fit Kaua’i used?
   a. How did Get Fit Kaua’i decide on these strategies?
   b. How would these strategies work for other coalitions (in Hawai’i, in the nation)?

4. Who do you work with in Get Fit Kaua’i? (Staff, Steering Committee, other Task Force members, etc.) How do you work with other people in GFK? What makes it easy to work with them? What makes it difficult?

5. In your opinion, is Get Fit Kaua’i creating community capacity to change the built environment to encourage children and adults to be more physically active? If yes, how?

6. Moving forward, how do you think Get Fit Kaua’i can improve its efforts to change the built environment and promote physical activity?
   a. What do you think is needed to sustain the current level of efforts?
   b. What kind of training or technical assistance would you need to continue the work?
   c. What else should be done to gain and hold the interest of the public?

7. Is there anything else you would like to share related to Get Fit Kaua’i’s efforts in improving the built environment and increasing physical activity?

**Additional Interview Questions for Coalition Staff and Leaders**

1. Tell me more about how the coalition works. How often does the BE/SRTS task force meet? How many people regularly attend these meetings? How are decisions made? What is the role of the Steering Committee in built environment and SRTS activities?
2. Leadership is an important factor for any coalition to be effective. What do you think are some of the strengths of [name redacted], the coalition director? What are some of the issues that you think were challenging for [her] and do you have any suggestions for how she could deal with them?

3. What resources are members of the BE/SRTS task force bringing to the table? What are the ways in which they can influence the built environment to promote physical activity?

Closing

Great. That was the last question I had. Thank you so much for sharing your thoughts! I may be in touch to follow-up on some of the thoughts you shared today to gain clarification or ask for your insights on ideas that develop over the course of this study. I am also planning to let you review a draft of the report before it is finalized. I will share the results of this study with Get Fit Kaua‘i and hope it will be useful to your work.
APPENDIX B
Demographic Questionnaire for Get Fit Kaua‘i Interview Participants

Participant Information Sheet

Please answer a few questions about yourself. This information will be kept confidential and will only be shared in summary form.

1. Are you a member of Get Fit Kaua‘i (GFK)?
   - Yes
   - No
   - Not sure

2. If yes, when did you first join Get Fit Kaua‘i?
   - Before 2009
   - 2009
   - 2010
   - 2011
   - 2012
   - 2013
   - Not sure

3. Do you participate in Get Fit Kaua‘i as part of your job?
   - No, I participate as a private citizen.
   - Yes, I represent this organization: ____________________________

4. Do you belong to any of these Get Fit Kaua‘i groups? (Check all that apply.)
   - Steering Committee
   - Built Environment Task Force
   - Safe Routes to School Task Force

5. On a scale from 1 to 5, how would you rate your current level of participation in Get Fit Kaua‘i?
   - 1: Low (inactive, do not attend meetings, do not participate in GFK activities)
   - 2: Low-Moderate
   - 3: Moderate (somewhat active, attend some meetings, participate in some GFK activities)
   - 4: Moderate-High
   - 5: High (very active, attend most/all meetings, participate in most/all GFK activities)

6. What is your age?
   - 18-24 years
   - 25-34 years
   - 35-44 years
   - 45-54 years
   - 55-64 years
   - 65+ years

7. What best describes the highest level of school that you have completed?
   - Some high school
   - High school degree
   - Some college
   - Associate’s degree (A.A., A.S.)
   - Bachelor’s degree (B.A., B.S.)
   - Master’s degree or higher

8. Which racial/ethnic groups do you identify with? (Check all that apply.)
   - African American
   - Caucasian
   - Chinese
   - Filipino
   - Hispanic/Latino
   - Japanese
   - Korean
   - Native Hawaiian
   - Portuguese
   - Other: ____________________________
APPENDIX C

Informed Consent Form for Get Fit Kaua‘i Interviews

University of Hawai‘i

Consent to Participate in Research Project:
Community Interventions to Promote Physical Activity

My name is Lehua Choy and I am conducting my dissertation research for a doctoral degree in Public Health at the University of Hawai‘i at Mānoa. The purpose of my dissertation research is to learn more about promoting physical activity through community interventions. This research study is focusing on Get Fit Kaua‘i, the Nutrition and Physical Activity Coalition of Kaua‘i County, and its built environment activities. I am asking you to participate in this project because of your involvement in Get Fit Kaua‘i.

Project Description - Activities and Time Commitment: If you participate, I will interview you once, at a location that is convenient for you. The interview will last for about an hour. If you permit, I will record the interview using a digital audio-recorder. I am recording the interview so I can later type a transcript – a written record of what we talked about during the interview - and analyze the information from the interview. If you participate, you will be one of approximately 25 people who I will interview individually. One example of the type of question I will ask is, “What do you think has been one the most significant accomplishments that Get Fit Kaua‘i has made in improving the built environment?” If you would like to preview a copy of all of the questions that I will ask you, please let me know now.

Benefits and Risks: I believe there are no direct benefits to you in participating in my research project, but the results of this project will hopefully provide Get Fit Kaua‘i with insights about its built environment activities and ideas for improvement in the future. In addition, the results of this project might help me and other researchers learn more about the role of coalitions in passing and implementing built environment policies. I believe there is little or no risk to you in participating in this project. If, however, you are uncomfortable or stressed by answering any of the interview questions, we will skip the question, or take a break, or stop the interview, or withdraw from the project altogether.

Confidentiality and Privacy: During this research project, I will keep all data from the interviews in a secure location. Only I will have access to the data, although legally authorized agencies, including the University of Hawai‘i Human Studies Program, have the right to review research records.

After I transcribe the interviews, I will erase the audio-recordings. I will not use your name on the transcript; instead I will assign your interview a numerical identifier. When I report the results of my research project, I will not use your name. Instead, I may use a description of your role on the coalition, like “Built Environment Task Force Member.” I will give you a copy of the findings that I put into my final report.
**Voluntary Participation:** Participation in this research project is voluntary. You can choose freely to participate or not to participate. In addition, at any point during this project, you can withdraw your permission without any penalty of loss of benefits.

**Questions:** If you have any questions about this project, please contact me via phone (808) 956-6226 or e-mail (lehuac@hawaii.edu). If you have any questions about your rights as a research participant, in this project, you can contact the University of Hawai‘i, Human Studies Program, by phone at (808) 956-5007 or by e-mail at uhirb@hawaii.edu.

This portion of the consent form is for your records. If you agree to participate in this project, please sign the following signature portion of this consent form and return it to me.

**Signature(s) for Consent:**

I have read the information provided and agree to participate in the research project entitled *Community Interventions to Promote Physical Activity*. I understand that I can change my mind about participating in this project, at any time, by notifying the researcher.

☐ By checking this box, I give my permission to have my interview be audio-recorded.

☐ By checking this box, I acknowledge receiving a $10 Starbucks gift card for participating in this study.

_Last 4 digits of gift card: _____________

Your Name (Print): _____________________________________________

Your Signature: _____________________________________________

Date: ______________________________
## APPENDIX D

### Correlation Matrix for Community Environment Variables

<table>
<thead>
<tr>
<th></th>
<th>CE1</th>
<th>CE2</th>
<th>CE3</th>
<th>CE4</th>
<th>CE5</th>
<th>CE6</th>
<th>CE7</th>
<th>CE8</th>
<th>CE9</th>
<th>CE10</th>
<th>CE11</th>
</tr>
</thead>
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* *p <0.05, **p <0.01, ***p <0.001*
REFERENCES


Giles-Corti, B., & Donovan, R. J. (2002). The relative influence of individual, social and physical environment determinants of physical activity. *Social Science and Medicine, 54*, 1793-1812.


