UNIVERSITY OF CALIFORNIA

Los Angeles

Evaluating Community and Individual-Level Psychosocial Factors to Improve Chronic Disease-Related Dietary Behaviors: A Case Study of Los Angeles County

A dissertation submitted in partial satisfaction of the

requirements for the degree Doctor of Philosophy

in Community Health Sciences

by

Brenda Robles

2018

ABSTRACT OF THE DISSERTATION

Evaluating Community and Individual-Level Psychosocial Factors to Improve Chronic Disease-Related Dietary Behaviors: A Case Study of Los Angeles County

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Doctor of Philosophy in Community Health Sciences

University of California, Los Angeles, 2018

Professor Courtney S. Thomas, Chair

This dissertation applied two theoretical perspectives, the Biopsychosocial Model and Environmental Affordances Model, to conduct a case study of potential community- and individual-level psychosocial factors that can be addressed to reduce the burden of chronic disease in a large racially/ethnically diverse urban jurisdiction undergoing major transformations in how physical and mental health services are delivered locally.

The first study, *Examining the relationships between psychosocial community characteristics, food choice factors, and dietary behaviors in a racially/ethnically diverse urban population*, sought to better understand the linkages between diet and the social and psychological dynamics of communities, as well as how other psychosocial food choice factors shape this relationship. These factors were operationalized

as *psychosocial community characteristics* (PCCs) and *other food choice factors* (FCFs). Multivariable regression analyses indicated that certain PCCs, including perceived neighborhood violence and social cohesion, are predictive of diet, although racial/ethnic differences exist. Findings also suggest that FCFs may explain and moderate the relationship between PCCs and diet.

The second study, *Examining the role of psychological well-being in the relationship between community characteristics and dietary behaviors in a racially/ethnically diverse urban population*, built upon the first dissertation study to assess the potential intervening role that psychological well-being (i.e., a measure of mental health) plays on the relationship between PCCs and diet. Results from multivariable regression analyses found evidence that PWB explains and moderates the relationship between PCCs and diet.

The third study, *A geo-spatial assessment of community-based psychosocial risk factors associated with chronic disease-related dietary behaviors in Los Angeles County*, examined the regional distribution of structural and psychosocial factors that have the potential to influence chronic disease. These included dietary behaviors, community-level economic hardship, density of restaurant retail food establishments, psychological well-being, and density of available of mental health counseling services. Disparities in diet-related chronic disease risk were observed in Los Angeles County, both in terms of their exposure to adverse community environments which may negatively impact individuals' food choice decisions and in terms of individuals' access to structural resources that may help them better deal with these negative community environments.

This dissertation of Brenda Robles is approved.

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DEDICATION PAGE

This dissertation is dedicated to my parents, who made incredible sacrifices crossing the border to ensure that my brothers and I had better life opportunities. Also to other family and friends, who are also sources of inspiration and have given me the motivation to persevere during times of adversity. Si se puede!

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History will judge societies and governments- and their institutions- not by how big they are or how well they serve the rich and the powerful, but by how effectively they respond to the needs of the poor and the helpless. Cesar Chávez

This dissertation took a village and would not have been possible without the help of many individuals, including my amazing mentors, friends, and family. Special thanks to my advisor, Courtney S. Thomas, for her guidance and mentorship throughout my academic journey. I am deeply indebted to have been paired with such an incredible mentor who not only challenged me to take my work to the next level, but who was also a constant source of professional and emotional support. I give her credit for reinvigorating my passion for research. I would also like to thank my committee members— May Sudhinaraset, Anne Pebley, and Adriana Galván— who were also incredibly supportive and provided me the guidance I needed to get to the finish line. Also special thanks to Carol S. Aneshensel, who helped me believe in myself and gave the courage to pursue a research topic that I am passionate about.

Thank you to my other informal mentors at UCLA and beyond, including: Otto Santa Ana from Chicana/o Studies at UCLA who planted a research seed in my brain as a young Bruin and who continues to encourage me to dream big; Ellie Hernandez from Chicana/o Studies at UCLA who was a constant source of support and guidance as an undergraduate and helped make UCLA feel a little more like home; Tony Sandoval, who as my freshman year Chicana/o Studies TA walked me to the Writing Success Program at the Community Program's Office at UCLA because he knew that I needed to get a good grasp on writing if I was to succeed at UCLA, who helped put me on a trajectory for success, and who has been a very close

friend and mentor ever since; Eloisa Gonzalez from the Los Angeles County Department of Public Health, who was my preceptor for my MPH practicum and who has continued to be a wonderful colleague, mentor and friend— Eloisa, thanks for being an inspiration for Latina woman like myself pursuing higher education; Lisa V. Smith from UCLA's Department of Epidemiology, who I have immense gratitude for being one of my biggest champions, for always keeping it real, and who I credit for opening up so many opportunities— Lisa, I will forever be your "Pookie"; and Tony Kuo, from UCLA's Department of Epidemiology and the Los Angeles County Department of Public Health, I am so grateful and humbled by your constant support and mentorship throughout the years— TK, seriously, thanks for everything.

I would also like to thank other staff at the Department of Community Health Sciences and from elsewhere. Special thanks to Jennifer O'Brien from who helped me navigate complicated paperwork process with efficiency, ease and a smile, always. I would also like to thank the UCLA Institute for Digital Research and Education for their statistical consulting and help. Christine Wells, Joni Ricks, Johnny Lin, and Andy Lin— thank you for your patience and for sharing your statistical expertise throughout the years. I would also like to give thanks to the Community Programs Office at UCLA, the Chicana/o Studies Department at UCLA, and United American Indian Involvement; I would not have gained a critical consciousness without the formative experiences I learned from working in these settings. Also, thank you Los Angeles County for allowing me to create wonderful memories, meet amazing people, and for providing me with a place I call home— you will always hold a special place in my heart.

This dissertation was supported financially through the 2014-2018 Eugene V. Cota-Robles Fellowship, sponsored by the Department of Community Health Sciences and UCLA's Graduate Division. Thank you, UCLA, for this assistance.

Words cannot express how grateful I am to all my friends and cheerleaders. My academic journey would have been lonely without this remarkable group of friends. ***CHS friends:*** Chiao-Wen Lan, Lena Riess, Stephanie Ly, Rachel Adams, Devin Peipert, Anna Hing, Monique Gill, Joanna Calderon, Paul Chandanabhumma, Heather Frank, Katie Branson, Shelly Jung, Adva Goth. ***DPH friends:*** Ranjana Wickramasekaran, Michelle Wood, Allison Kwan, Stephani Cook, Jennifer Torres Mosst, Elaine Lai, Patricia Cummings, Mirna Ponce, Lupe Bustamante. ***Besties from my past and present:*** Thanh Tran, Laura Barrera, Linh Nguyen, Lauren Macheski Loyd, Manoa Hui, Jose Miguel Pulido Leon, Eric Sanchez, Robin Bueno, Rachel Fernandez, Terry Dip, Crystal Lee, Cinthia Loera, Tony Sandoval.

My animals also deserve an acknowledgement. To my cats Fiona and Myrtle Robles—your unconditional love and constant entertainment helped me forget my worries and made me a happier person despite life setbacks. To all my chickens, especially Cruella, who encouraged me go outside and take breaths of fresh air.

Last, but not least, I want to thank my family for being a pillar of strength, providing me with unwavering support, and inspiring me be the change I want to see in the world. I could not ask for a better family, for a more supportive and reliable family. Special thanks to my parents, Juan and Olimpia Robles, who instilled in me their immigrant optimism, taught me to work hard, and to never give up. To all my tios and tias—

especially Chuy and Casi Robles— who I consider my second parents. To my brothers (Omar and Juan Robles), my double cousins/practically sisters (Angelica and Aurora Robles), my sisters-in-laws (Kimberly and Claudia Robles), and brother-in-law (Sam Farfsing) for being there for me when I needed it most, for using humor to keep me grounded, and for helping me see the light at the end of the tunnel. Thank you to my nieces, Mila Isabella and Annalise Robles, for inspiring me work hard to create healthier community environments for future generations. To all my cousins, there are too many to name, but thank you for rooting me on. Also special thanks to my Italian family— my future in-laws (Anna Maria and Roberto Tadei), future brother-in-law (Alessandro Tadei), and Sonia Zavialova— for their support and encouragement. I feel so lucky to become part of your family soon. Finally, to Federico Tadei, my future husband and love of my life. From the bottom of my heart, thank you for being my rock and standing by my side through my darkest hours. You are my best friend and life partner. I look forward to spending the rest of my life with you and embarking on future life journeys together.

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CHAPTER 1: INTRODUCTION

The global burden of chronic diseases across diverse populations is indisputable (Bauer, Briss, Goodman, & Bowman, 2014; Murray et al., 2012; Organization, 2015; World Health Organization, 2014). Chronic diseases are recurring, non-communicable conditions that develop over time (Bernell & Howard, 2016; WHO, 2017). Cardiovascular diseases, cancers, chronic respiratory diseases, and diabetes are examples of chronic diseases with the greatest mortality burden (World Health Organization, 2014). The magnitude of this problem was recently highlighted by the World Health Organization (WHO), who estimated that chronic conditions account for almost 70% of all deaths worldwide (World Health Organization, 2017). While the WHO also projected that the number of chronic disease-related deaths will increase to 52 million by 2030— with significant growth in developing nations (World Health Organization, 2014)— these issues are not limited to developing countries. Despite having more social and economic resources than developing nations, high-income countries such as the United States also experience undue chronic disease burden. For example, an examination of the 2012 National Health Interview Survey found that more than 50% of U.S. adults experience at least one chronic condition; nearly 25% have two or more (B. W. Ward, Schiller, & Goodman, 2014). Moreover, seven of the top ten causes of death in the United States are chronic diseases, with heart disease and cancer together accounting for almost half of all deaths (CDC, 2017; CDC National Center for Health Statistics, 2015).

The increasingly high rates of chronic disease in the United States have been attributed to poor lifestyle choices such as poor diet and physical inactivity (Bauer et al., 2014; Dietz, Douglas, & Brownson, 2016). Certain groups, such as racial/ethnic minorities and immigrant populations, are particularly taxed by a high prevalence of chronic disease (McWilliams, Meara, Zaslavsky, & Ayanian, 2009; E. Ward et al., 2004). There is also evidence that socioeconomic disparities magnify chronic disease burden in certain populations and create further inequities (Braveman, Cubbin, Egerter, Williams, & Pamuk, 2010; Seligman

& Schillinger, 2010). As a result, reducing barriers to healthy decision-making across diverse populations may be an effective approach to reduce racial/ethnic health inequalities in the United States.

In the last decade, numerous federally-funded efforts have sought to reduce obesity as a strategy to combat the burden of chronic diseases and related costs in the United States (Bunnell et al., 2012; CDC, 2015, 2016a; Christopher et al., 2017; USDA, 2017). This strategy makes sense, as prior research indicates that obesity is a key risk-factor in the development of many chronic diseases (Bastien, Poirier, Lemieux, & Després, 2014; Bauer et al., 2014; Field et al., 2001; Gaal Luc F. Van, Mertens, & De Block, 2006). Maintaining a good diet and achieving adequate levels of physical activity are two key lifestyle-related and evidence-based recommendations for preventing obesity (Fock & Khoo, 2013). These behaviors also have long-term benefits for improving population health and reducing overall chronic disease risk (Roberts & James Barnard, 2005). To reduce rates of obesity, recent federally-funded efforts have focused on improving structural environmental barriers at the community level that may impede individuals within low-income or historically under-resourced communities from adhering to physical activity and dietary recommendations.

These structural-change focused efforts have been largely informed by a growing body of evidence that physical environments lacking availability of healthy foods and/or physical activity opportunities contribute to the rising burden of obesity and chronic diseases, and as a result, health inequalities in the United States (Franco, Bilal, & Diez-Roux, 2015; Simone A French, Story, & Jeffery, 2001; Huang, Drewnosksi, Kumanyika, & Glass, 2009; Igel & Grande, 2015; M. S. Mujahid et al., 2008; Reidpath, Burns, Garrard, Mahoney, & Townsend, 2002; Story, Kaphingst, Robinson-O'Brien, & Glanz, 2008; Suglia et al., 2016). For example, some studies have highlighted how a poorly-built physical environments (e.g., unsafe sidewalks) discourage individuals from engaging in physical activity, thereby increasing risk for excess adiposity and the development of chronic diseases over time (Owen, Salmon, Koohsari, Turrell, &

Giles-Corti, 2014). Similarly, others have demonstrated that living in food desserts (i.e., areas deprived retail stores selling affordable healthy nutritious foods such as fruits and vegetables) (Walker, Keane, & Burke, 2010) or food swamps (i.e., areas with an abundance of fast-food restaurants and other retail outlets selling obesogenic foods) (Hager et al., 2017) limit individuals' ability to select healthy foods and encourages them to eat poorly, putting them at greater risk for obesity and related chronic diseases (Bauer et al., 2014). Undoubtedly, addressing these structural, built-environmental factors is necessary to help individuals adopt better physical activity and dietary behaviors. However, since individuals may also encounter a variety of challenges that make it difficult to engage in healthy lifestyle behaviors, focusing solely on increasing access to healthy eating and physical activity opportunities may be insufficient to combat obesity and chronic diseases in the population.

The social and psychological dynamics of communities that shape individuals' lived experiences may also exert a strong influence on individuals' ability to adopt and maintain healthy lifestyle behaviors. This is because community-based psychosocial factors capture how individuals perceive or experience their actual built environment surroundings. It is worth emphasizing that these factors represent an important, added dimension to understanding community health as they capture individuals' *perceptions* about their communities, which are subjective and differ across groups. For example, there is mounting evidence that racial/ethnic group differences in the perceptions of neighborhood risks exist, those which may subsequently have important implications for health (Mair, Diez Roux, Osypuk, et al., 2010; Schulz et al., 2008). Such findings point to the need to examine psychosocial dynamics of community. In terms of obesity and chronic disease prevention efforts, they also highlight that improving population-level health decisions/behaviors requires consideration of factors that extend beyond individuals' objectively measured access to structural, built community environments.

Essentially, it is also important to consider psychosocial correlates of health decision-making behaviors. In this dissertation, these factors are conceptualized as *psychosocial community characteristics* and hereinafter are referred to as PCCs. Independent of built environments, PCCs may make it easier or more difficult for individuals to engage in healthy behaviors. This is because individuals' perceptions of community-level factors such as community risks/resources and social connections have the potential to shape how individuals respond to and engage in physical/structural/built environments. This assertion is based on a growing body of evidence suggesting that a range of community and neighborhood factors negatively or positively impact obesity, chronic disease, and physical health outcomes (Berkman 2000; Carver, Timperio, and Crawford 2008; Cohen et al. 2006; Cohen, Farley, and Mason 2003; Cradock et al. 2009; Fisher et al. 2004; de Jong et al. 2012; Kim, Subramanian, and Kawachi 2008; Lochner et al. 2003; Reingle et al. 2014; Santaularia et al. 2014). There is also evidence that individual-level, social and psychological factors within communities shape individuals' health behaviors such as those related to food choices (Blair et al., 1996; Roberts & James Barnard, 2005; Steptoe, Perkins-Porras, Rink, Hilton, & Cappuccio, 2004). However, although examining how individuals perceive and experience their community is critically important to study, no studies to date have collectively examined how multiple PCCs may help or deter individuals from making healthy lifestyle decisions within a single study. Filling these gaps in the evidence-base may help to strengthen and tailor current and forthcoming obesity and chronic disease efforts for diverse populations.

The present dissertation seeks to address this gap by providing a comprehensive understanding of how multiple PCCs impact obesity and chronic disease-related health behaviors, namely dietary behaviors. Although physical activity is also an essential component of obesity and chronic disease prevention, the present dissertation focuses on dietary behaviors because it is often easier for individuals to consume excess calories than it is for them to expend them; this is especially true given the pervasiveness of obesogenic food environments across the United States (Walker et al., 2010). Other

researchers have also asserted that addressing physical inactivity alone is insufficient to address the growing obesity epidemic and that emphasis should be placed on improving diets (Malhotra, Noakes, & Phinney, 2015).

Within the context of improving dietary behaviors of racially/ethnically diverse populations, this dissertation adds to the growing literature on the role of psychosocial community environments by identifying and examining two key domains of PCCs that may shape dietary behaviors. These domains are conceptualized as follows in the present dissertation: (1) *perceived neighborhood risks and resources*- individuals' perceptions about the barriers and facilitators to healthy dietary decisions in their community; and *(2) sense of community*- feelings of closeness to others feel within their community. For instance, the perception of economic barriers within the neighborhood (e.g., high levels of community economic hardship) may be related to unhealthy dietary behaviors such as low fruit and vegetable consumption and excess soda consumption. Conversely, perceived neighborhood resources (e.g., lower levels of community economic hardship) may encourage individuals to consume optimal levels of healthy foods such as fruits and vegetables and limit unhealthier foods such as soda.

While these linkages are not well-established in the literature, prior research provides evidence for their existence. For example, neighborhood risks such as higher levels of economic hardship or living in poor neighborhoods have been previously associated with retail food environments that have a limited inventory of fruits and vegetables and that carry an abundance of unhealthier products (Laxy, Malecki, Givens, Walsh, & Nieto, 2015). Exposure to these poor food environments put individuals at risk for obesity and related chronic conditions (Inagami, Cohen, Finch, & Asch, 2006). There is also empirical evidence that the one's sense of community can have a positive or detrimental impact on dietary behaviors. For instance, higher levels of collective efficacy— that is, "the willingness of community members to look out for each other and intervene when trouble arises" (Cohen et al., 2006)— have been

associated with mortality (Cohen et al., 2003; Skrabski, Kopp, & Kawachi, 2004), cardiovascular disease risk (Ahern, Galea, Hubbard, & Syme, 2009; Lochner et al., 2003), and adiposity (Cohen et al., 2006). Similarly, other studies have found that higher levels of social support, collective efficacy, social capital, and social networks generally have a protective effect on physical health (Berkman, 2000; Cohen et al., 2003, 2006; Kim et al., 2008; Lochner et al., 2003). However, as previously mentioned, no studies have explicitly examined the linkages between multiple PCCs and dietary behaviors within a single study. Additional research is needed to disentangle the ways in which psychosocial aspects of community environments influence individuals' dietary decision-making processes that impact their obesity and chronic disease risk.

Clarifying the linkages between PCCs and dietary behaviors also includes examining underlying factors through which PCCs shape these behaviors. While a multitude of factors can impact the relationship between PCCs and diet, based on existing literature, these may include other *food choice factors (FCFs)* and *psychological well-being (PWB)*. FCFs are conceptualized in the present dissertation as: *the frequency in which individuals consume foods prepared away from home.* FCFs, which include fast-food and sit-down restaurant consumption, may be one potentially important intervening factor in the relationship between PCCs and dietary behaviors because they represent an individuals' lack of agency in preparing meals with a healthier nutrient profile since they have less control over the ingredients and preparation methods comprising their meals. Increased temptation to highly palatable foods that are typically unhealthier could be another reason. Fast-food and sit-down restaurant venues typically sell foods and beverages that put individuals at risk for unhealthy eating, including inadequate fruit and vegetable consumption and excess consumption of sugary drinks (An, 2016; Larson, Neumark-Sztainer, Laska, & Story, 2011; Powell & Nguyen, 2013).

It is possible that these FCFs may explain and/or moderate the relationship between PCCs and dietary behaviors. In terms of first mechanism, it is possible that that FCFs explain the relationship

between PCCs and diet because PCCs directly impact FCFs. For example, neighborhoods with the highest levels of economic hardship have been previously found to have a disproportionate density of fast-food establishments (Laxy et al., 2015; Morland, Wing, Diez Roux, & Poole, 2002). These FCFs may then directly impact dietary behaviors. For instance, consumption of foods prepared at fast-food and sit-down restaurants which are often high in calories have been previously associated poor diet and increased risk for obesity (Ayala et al., 2008; Bezerra, Curioni, & Sichieri, 2012; Bowman, Gortmaker, Ebbeling, Pereira, & Ludwig, 2004; Casey et al., 2008; S A French, Harnack, & Jeffery, 2000; Paeratakul, Ferdinand, Champagne, Ryan, & Bray, 2003; Rosenheck, 2008; Seguin, Aggarwal, Vermeylen, & Drewnowski, 2016). In terms of the second mechanism, FCFs can act as an intermediary factor that has the potential to reduce or strengthen the relationship between PCCs and dietary behaviors. However, it appears no studies to date have explored the extent to which FCFs explain and/or moderate the relationship between PCCs and diet. Understanding these relationships warrants further exploration.

Another potentially important factor in the relationship between PCCs and dietary behaviors is *psychological well-being (PWB),* a multi-faceted concept generally understood as a psychological state of balance (Dodge, Daly, Huyton, & Sanders, 2012). PWB is often assessed by psychological distress, an indicator of negative emotional states and poor psychological functioning (Veit & Ware, 1983). Although there are likely other pathways linking PCCs and dietary behaviors, the present project focuses on examining the intermediary impact of PWB in the relationship between PCCs and diet given the current geo-political climate that has likely heightened Americans' psychological distress levels in recent months. For example, a recent survey conducted annually by the American Psychological Association recorded its first statistically significant increase in American's stress levels from the previous year since the survey's 10-year inception (Greenberg, 2017). The national prevalence of obesity has also been recently estimated to be at an all-time high (Hales et al., 2017).

Similar to FCFs, prior research suggests there are two possible mechanisms through which PWB impacts the relationship between PCCs and dietary behaviors. First, PWB may explain the relationship between PCCs and dietary behaviors. In other words, PCCs may directly impact PWB, which then directly impacts dietary behaviors. Specifically, negative PCCs such as high hardship or low social cohesion may contribute to elevated psychosocial distress, which may lead individuals to engage in negative behaviors such as those related to diet. Conversely, positive PCCs such as low hardship or high social cohesion may be protective against psychosocial distress, helping individuals maintain healthier dietary behaviors. Essentially, high distress may result in perceived psychosocial dimensions of community becoming barriers to healthy dietary decisions. Although no studies have examined these linkages, there is empirical evidence for these relationships. Prior research has found that living in poor neighborhood conditions exacerbate individuals' stress levels and contribute to diminished PWB (Diez Roux & Mair, 2010; Mair et al., 2008; Mair, Diez Roux, & Morenoff, 2010; Reingle et al., 2014; Santaularia et al., 2014; Wong, Schrager, Holloway, Meyer, & Kipke, 2014). While mostly studied in clinically mentally ill populations, there is also some evidence that poor PWB negatively impacts individuals' dietary decisions and puts them at risk for obesity (Boseck et al., 2007; Colles, Dixon, & O'Brien, 2007; Grave, Calugi, Petroni, Di Domizio, & Marchesini, 2010; Rein, Mühlhans, & de Zwaan, 2007).

The second possible mechanism is that PWB may also have a moderating effect on the relationship between PCCs and dietary behaviors— i.e., the relationship between PCCs and dietary behaviors may be conditional on one's level of PWB. Psychological distress, which is often used to measure PWB and overall mental health, has the potential to exacerbate or diminish the impact of PCCs on diet. High distress, for instance, may attenuate the impact of negative PCCS and attenuate the benefits of positive PCCs. Conversely, low distress levels may diminish the impact of negative PCCs and enable individuals to maintain healthier behaviors. In other words, PCCs will have an impact on diet regardless, but an individual's level of PWB may reduce or strengthen its impact. For example, an individual with

greater levels of PWB may be better able to cope with poor PCCs. As a result, their dietary behaviors may be less impacted by poor PCCs. Conversely, an individual with lower levels of PWB may be less able to cope with poor PCCs, and therefore, be more likely to succumb to the impact of deleterious PCCs.

Few interventions to-date have recognized the practical implications of PCCs as barriers for obesity and chronic disease-related dietary behaviors, including accounting the role of FCFs and PWB. A possible explanation could be due to the paucity of studies on this topic. In fact, it seems that no studies to-date have examined the extent to which PCCs shape dietary behaviors, especially among racially/ethnically diverse populations. Additionally, while obesity and chronic disease prevention interventions have largely taken into account research finding that consumption of away-from-home prepared meals increases one's obesity and chronic disease risk (Bezerra et al., 2012; Rosenheck, 2008; Seguin et al., 2016), they have failed to consider how FCFs impact the relationship between PCCs and dietary behaviors. This is likely due to a scant evidence on this topic. Therefore, it is prudent to shed light on this important topic as this may help tailor interventions to priority populations at greatest risk for obesity and chronic diseases. Similarly, it appears that no studies have examined the intervening role that PWB plays in the relationship between PCCs and dietary behaviors. Furthermore, from a program planning standpoint, little is known about the geographic distribution of PCCs, FCFs, and PWB at the local level. Filling these gaps may help to tailor current and forthcoming obesity-prevention interventions to better address the needs of target populations, as well as programs and policies focused on reducing chronic disease burden.

To address these gaps in research and practice, **the three studies of my dissertation seek to examine the relationships among PCCs, FCFs, PWB, and dietary behaviors in Los Angeles County.** As previously mentioned this dissertation focuses on diet because although physical activity is also an essential component of obesity and chronic disease prevention, there is consensus that addressing physical inactivity alone is insufficient to address the growing obesity epidemic and that efforts should

focus on improving diets (Malhotra et al., 2015). Simply put, it is often easier for individuals to consume excess calories than it is for them to expend them. This dissertation also focuses on Los Angeles County because it is among the most racially/ethnically diverse and most populous county in the nation. As such, lessons learned from studying this jurisdiction have the potential to inform and strengthen delivery of current and forthcoming interventions seeking to combat obesity and related chronic diseases in diverse communities across the United States.

While public health practitioners and similar players, due to financial or geopolitical constraints, cannot always improve structural/built environments to combat obesity and chronic disease risk in the population, it may be possible to enhance PCCs even in communities experiencing major obstacles. Addressing community contexts to improve how individuals engage within the context of their structural, built community environments may be one effective strategy to improve health behaviors among populations burdened with obesity and chronic disease. Past obesity and chronic disease prevention efforts have failed to consider that individuals' perceptions of and psychological experiences within adverse community environments may be equally important as addressing built-environments to help individuals adopt healthier behaviors. Thus, these psychosocial factors may be just as important as not having access to healthy eating and physical activity environments. Likewise, in light of growing recognition that mental health is a key component of physical health (Repetti, Taylor, & Seeman, 2002; US Surgeon General, 1999; Walker et al., 2010), addressing community factors that contribute to poor PWB also represents an opportunity to improve health behavior decisions and related physical health outcomes among populations burdened with high prevalence of obesity and chronic diseases.

In the sections that follow, I will first discuss key background research on dietary behaviors and their contribution to obesity-related chronic diseases. Second, I describe the prominent theoretical perspectives that have guided past studies on PCCs, FCFs, PWB, and dietary behaviors. I also present a

new, integrative conceptual framework to address the limitations of prior research. Third, I provide a project overview and describe the data sources used in this work. Fourth, the proceeding sections include Studies 1-3, respectively. Finally, I conclude the dissertation with a critical discussion of the collective findings and implications of this project.

CHAPTER 2: BACKGROUND

Reducing Obesity and Chronic Disease Risk Through Diet-Related Health Behavior Improvements

The high prevalence of obesity is a major issue in the United States, one often referred to as a public health "problem" or "crisis" (US Office of the Surgeon General et al., 2001; Williams, Mesidor, Winters, Dubbert, & Wyatt, 2015; Wyatt, Winters, & Dubbert, 2006). For instance, a recent survey found that over 67% of county officials in the United States rank obesity as the leading health problem in their jurisdiction (Christopher et al., 2017). Moreover, there is evidence that this epidemic may even be worsening. A prior assessment of national data reported that rates of obesity more than doubled across a forty-year period, increasing from 13% in 1960 to 32% by 2004 (Wang & Beydoun, 2007). More recently, the overall age-adjusted prevalence of obesity for adults was even higher, at almost 38% between 2013-2014 (Flegal, Kruszon-Moran, Carroll, Fryar, & Ogden, 2016). Obesity is a problem due its contribution to poor chronic disease outcomes in the population (Bastien et al., 2014; Field et al., 2001; Kearns, Dee, Fitzgerald, Doherty, & Perry, 2014). Failure to curb obesity-related chronic diseases not only puts a significant strain on the healthcare system (Ahn et al., 2013; Steiner & Friedman, 2013), but also has significant ramifications for individuals' quality of life (US Department of Health and Human Services, 2010). These economic and social costs are important to address as they threaten the health, safety, and livelihoods of individuals and communities alike. Therefore, improving population-level dietary behaviors represents an important point of intervention for combatting the growing prevalence of obesity and related chronic diseases.

What individuals eat has significant health ramifications, as improper energy balance is a major way in which individuals put on weight and increase their risk for obesity and chronic conditions. Essentially, individuals gain weight when they consume more energy (calories) than they burn. Due the important role of that diet plays on obesity and chronic disease risk, recent nutrition-focused public health

efforts have heavily focused on improving two key dietary behaviors that put individuals at risk for energy imbalance and consequently obesity: (1) inadequate fruit and vegetable (F+V) consumption; and (2) excess consumption of sugar-sweetened beverages (SSB)s, such as carbonated soft drinks, fruit juice, sports, energy, and other high calorie beverages that contain excess sugar. On average, F+Vs have a higher water, a higher fiber content, and are less energy dense than less healthy foods; consuming F+Vs helps individuals feel more satiated, and leads to reductions in energy intake (Rolls, Ello-Martin, & Tohill, 2004). This explains why higher F+V consumption is also associated with slower weight gain, a protective factor against obesity (Giskes, Avendaňo, Brug, & Kunst, 2009; Ledoux, Hingle, & Baranowski, 2011; Pearson, Biddle, & Gorely, 2009) and cardiovascular mortality risk (Wang, Ouyang, Liu, Zhu et al., 2014).

Conversely, the primary ingredient of SSBs is sugar, an energy-dense nutrient that is devoid of essential micro-nutrients and one that contributes to obesity risk (Rugg-Gunn, Hackett, Jenkins, & Appleton, 1991). Since SSBs are essentially liquid sugars due to their high sugar content, they have also been noted as a major contributor of "empty calories" in the American diet (Nestle, 2000). Excess consumption of SSBs have also been implicated in the obesity epidemic because their consumption makes maintaining proper energy balance difficult, as individuals are apt to consume excess calories faster than they are able to expend them (Bray, Nielsen, & Popkin, 2004; Ludwig, Peterson, & Gortmaker, 2001; Malik, Popkin, Bray, Després, & Hu, 2010a; Malik, Schulze, & Hu, 2006). In addition to strong empirical evidence that SSB consumption increases risk for gaining weight and becoming obese (Hu & Malik, 2010; Malik, Pan, Willett, & Hu, 2013; Malik et al., 2013, 2010a, 2006), SSBs have also been found to increase risk for preventable type 2 diabetes and other cardiovascular diseases (Hu & Malik, 2010; Malik et al., 2010a). Soda consumption, in particular, has been the target of recent interventions due to their easy access (Babey, Wolstein, & Diamant, 2011), ease in which individuals can easily overcome empty calories (Nestle, 2000; Wang, Bleich, & Gortmaker, 2008), as well increasing evidence that they are addictive (Chiu et al., 2014; Nestle, 2015; Yeh, Shalmiyev, & Fagan, 2013) and reap rewards on the brain similar to that of drugs

(Fortuna, 2012; Nasser, Evans, Geliebter, Pi-Sunyer, & Foltin, 2008; O'Doherty, 2004; Volkow, Wang, Fowler, & Telang, 2008).

Federal attention on improving these dietary behaviors is not new strong evidence of the importance of dietary behaviors for long-term health. Since 1980, the *Dietary Guidelines for Americans* have outlined the key components of a healthy diet that can help individuals lead healthier lives by reducing obesity risk and chronic disease burden (US DHHS, 2015). For instance, the *2015-2020 Dietary Guidelines* recommend that individuals "consume a healthy eating pattern that accounts for all foods and beverages within an appropriate calorie level" (US DHHS, 2015). These guidelines also point out that a key component of a healthy diet includes eating whole fruits and a variety of vegetables and consuming "less than 10 percent of calories per day from added sugars" (US DHHS, 2015). The *2015-2010 Dietary Guidelines* also demonstrate a recognition that rates of non-communicable chronic diseases have risen alongside worsening diet-related lifestyle behaviors, including those related to F+V and SSBs (US DHHS, 2015).

With growing recognition of the impact of diet on obesity and chronic disease outcomes, it also comes to no surprise that past and recent obesity prevention efforts seeking to combat chronic diseases have focused on promoting F+V consumption and discouraging consumption of SSBs. Also, given that low F+V consumption and excess SSB consumption levels serve as a surrogate measures of obesity risk (Epstein et al., 2001; Hu, 2008; Micha et al., 2017), ensuring that high-risk groups across the United States have equitable access to F+V and live in environments that discourage consumption of SSBs has become a key component of the U.S. public health system's response for improving health outcomes among diverse populations across the United States (Brownell et al., 2009; Brownell & Frieden, 2009). The next section describes recent efforts to improve access to healthy food environments in the United States.

Nutrition-Focused Obesity Prevention Public Health Efforts

Focus of Recent Nutrition-Focused Policy, System, and Environmental Change (PSE) Efforts

A myriad of recent federally-funded nutrition-focused public health efforts have sought to mitigate the health and economic burden of obesity and related chronic diseases among Americans. These include those funded by the Centers for Disease Control and Prevention (CDC)— e.g., the $400 million Communities Putting Prevention to Work (Bunnell et al., 2012), $103 million Community Transformation Grants (CDC, 2016a), the $15 million Sodium Reduction in Communities Program (CDC, 2016b), and $69.5 million State and Local Public Health Actions to Prevent Obesity, Diabetes, and Heart Disease and Stroke (CDC, 2015). The United States Department of Agriculture (USDA) has also invested a significant amount of funding to improve dietary behaviors as a strategy to combat obesity and related chronic conditions in the population through the Supplemental Nutrition Education and Obesity Prevention Grant Program in recent years (USDA, 2017).

At the local level, these CDC and USDA-funded efforts aim to improve the socio-ecologic barriers to healthy eating and physical activity through an array of *policy, system, and environmental change (PSE)* strategies that aim to intervene at multiple levels, from the workplace food procurement policies to community-level access to farmers' markets (Bunnell et al., 2012; Kamphuis et al., 2006; Lyn et al., 2013; Nichols, Ussery-Hall, Griffin-Blake, & Easton, 2012). Socio-ecologic barriers are those highlighted in the Social Ecological Model (see **Figure 1**). These include *intrapersonal factors* (e.g. knowledge/beliefs), *interpersonal factors* (e.g. family/friend social support), *institutional factors* (e.g. rules and regulations), *community factors* (e.g. social networks and norms), and *public policy* factors (e.g. local/federal/state policies or regulations) (McLeroy, Bibeau, Steckler, & Glanz, 1988).

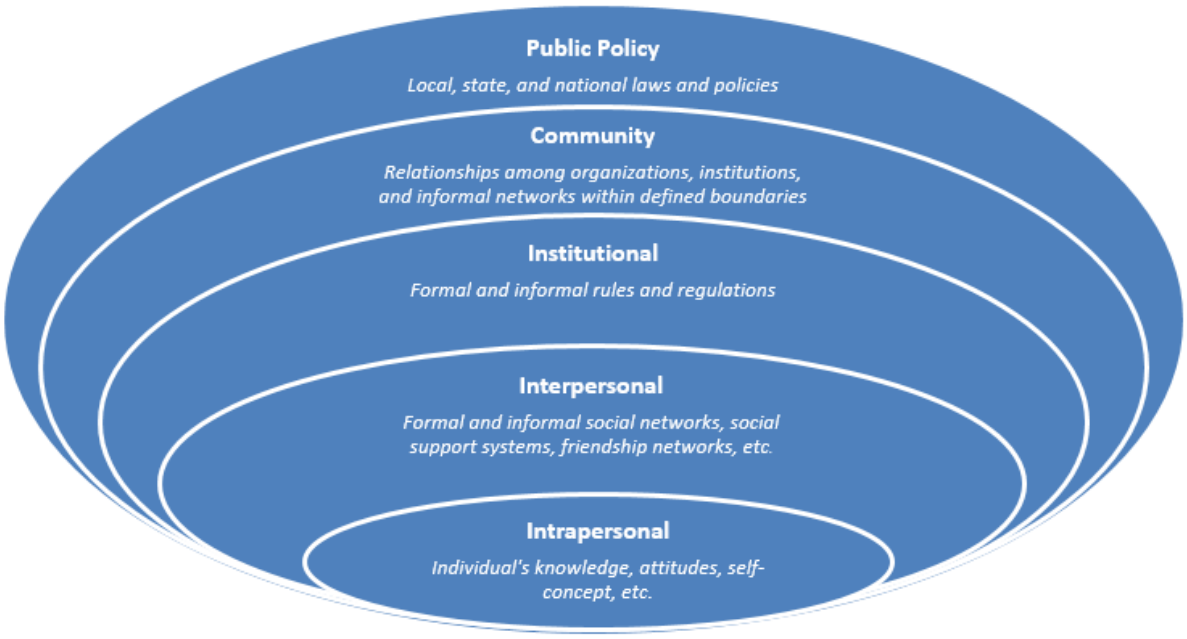


Figure 1. Socio-ecologic levels of health from the Social Ecological Model

Source: (McLeroy et al., 1988)

This focus on addressing the underlying socio-ecologic barriers to healthy eating is based on research that highlights linkages between macro-level structural and environmental factors (e.g., built environment) and individual-level behaviors around nutrition (Feng, Glass, Curriero, Stewart, & Schwartz, 2010; Kamphuis et al., 2006; Lovasi, Hutson, Guerra, & Neckerman, 2009; K. B. Morland & Evenson, 2009; Story et al., 2008). A salient theme across recent obesity prevention PSE interventions is that they seek to make healthy eating and active living an easy choice by removing the structural, built environmental barriers (e.g., access to fresh fruits and vegetables, access to physical activity opportunities) that often impede individuals from adopting healthier lifestyle behaviors. Nutrition-focused PSE interventions from the CDC's 2010-2012 Community Putting Prevention to Work Program, for instance, included corner-store conversions to increase access to and affordability of fruits and vegetables in under-resourced communities (Bunnell et al., 2012; Pitts et al., 2013). Other strategies included implementation of healthy

food procurement policies to improve the nutritional content of foods served and sold across a variety of institutional setting; increasing acceptance of Supplemental Nutrition Assistance Program (SNAP) benefits at healthy foods retailers (e.g., farmers' markets) to help low-income individuals overcome financial barriers related associated with the purchase of nutritious foods; and integrating of point-of-purchase promotion and other behavioral-economic approaches (e.g., pricing, menu-labeling, other signage) to nudge individuals to make better food selection decisions (Bunnell et al., 2012). The USDA's Nutrition Education and Obesity Prevention Grant Program has focused on similar PSE approaches to encourage healthier dietary behaviors in the population as a strategy to combat obesity (USDA, 2015b, 2017).

Despite being guided by the Social Ecological Model, however, these PSE interventions have primarily addressed the "outer" social ecological levels (i.e., public policy factors, community factors, institutional factors) that shape dietary behaviors. In particular, they focus on the *structural* or *physical* environmental barriers that can reduce individuals' access to healthy foods such as fruits and vegetables. With less focus on the "inner" levels of the Social Ecological Model (i.e., intrapersonal and interpersonal factors), recent PSE interventions have failed to adequately address other community and individual-level decision-making factors that may deter individuals from consuming adequate levels of fruits and vegetables and that may encourage individuals to consume SSBs in excess.

Specifically, a key limitation of recent PSE interventions is that they fail to take into the account the impact of community and individual-level psychosocial drivers of food decision-making behaviors across diverse targeted populations. While interventions have heavily focused on discouraging consumption of away-from-home consumed meals, they have not considered the influence of *psychosocial community characteristics* (PCCs)— i.e., factors discussed in the previous section of this dissertation as capturing how individuals perceive and experience their structural/built environments. Also, few obesity and chronic disease-prevention interventions to-date have directly sought to improve

distressing community conditions that may be related to other food choice factors (FCFs) or *psychological-wellbeing* (PWB). In the present dissertation other FCFs are understood as *the frequency in which individuals consume away-from-home prepared foods,* including those purchased from fast-food and sit-down restaurant retail food establishments. *PWB,* on the other hand, is a measure of mental health that is shaped by one's ability to maintain positive relationships with others, environmental mastery, personal growth and autonomy, and level of purpose and meaning in life, as well as one's level of self-acceptance (Ryff, Lee, & Keyes, 1995; Ryff & Singer, 2008). It is possible that when individuals experience adverse community contexts, their PWB is diminished, making selection of healthy foods more challenging and less of a priority. Within this context of FCFs and PWB, PCCs may significantly influence individuals' capacity to engage in healthy lifestyles, regardless of their access to healthy foods. Therefore, it is it is critical that we examine how people experience and engage in their structural/built community environments, how these experiences may impact their mental health, and ultimately their ability to make food health behavior decisions.

As previously mentioned in the *Introduction* of this dissertation, studies have failed to consider how FCFs impact the relationship between PCCs and dietary behaviors. However there is evidence that these relationships exist, as consumption of away-from-home prepared meals has been found to increase individuals' obesity and chronic disease risk (Bezerra et al., 2012; Rosenheck, 2008; Seguin et al., 2016). Similarly, while it appears that no studies have examined the relationships between PCCs, PWB, and dietary behaviors, there is some evidence supporting their linkages. This hypothesis is informed by prior research, which has found that some psychosocial dimensions of communities, such as perceived neighborhood safety/violence and social cohesion, may increase levels of stress and depressive symptoms, factors that may lead to negative health behaviors and poor physical health outcomes (Diez Roux & Mair, 2010; Mair et al., 2009; Mair, Diez Roux, & Morenoff, 2010; Mujahid et al., 2008). Thus, failure to consider the PWB of individuals when developing interventions may weaken the effectiveness

and reach of obesity and chronic disease prevention efforts. Improving these psychosocial factors at the community and individual level, may therefore, be an effective way to reduce chronic disease burden across the United States and represents a missed opportunity that has not yet been fully explored.

Target Populations of Recent Nutrition-Focused PSE Efforts

In general, the number of Americans who consume the recommended levels of F+Vs is low, representing only about 10% of the national population (Lee-Kwan, Moore, Blanck, Harris, & Galuska, 2017). The opposite relationship is true for SSBs, with the majority of Americans consuming SSBs in excess (Han & Powell, 2013). It is also important to note that sociodemographic differences exist in F+V and SSB consumption. For example, men have been found to consume lower levels of F+Vs (Blanck, Gillespie, Kimmons, Seymour, & Serdula, 2008; Serdula et al., 2004) and higher levels of SSBs relative to women (Kit, Fakhouri, Park, Nielsen, & Ogden, 2013). Compared to their older counterparts, it appears that younger adults consume lower levels of fruits and vegetables (Serdula et al., 2004) and higher levels of SSBs (Kit et al., 2013). Meanwhile, other studies have found that Blacks and Hispanics consume less F+V than their white counterparts (Dubowitz et al., 2008). There are also racial/ethnic differences in levels of SSB consumption, although interactions exist by other sociodemographic characteristics such as gender and age (Kit et al., 2013).

Acknowledging these disparities is important, as groups that consume the least amount of F+V and most SSBs face the greatest risk for obesity and chronic conditions (Bleich & Wang, 2011; Bleich, Wang, Wang, & Gortmaker, 2009). These include low-income and less educated populations, as well as racial/ethnic minorities such as Blacks and Hispanics (Han & Powell, 2013; Storey & Anderson, 2014). Within this context, it is critically important to take into account that different groups perceive communities differently (Mair, Diez Roux, Osypuk, et al., 2010), and thus, recognize that psychosocial

community factors may be as important as addressing structural built environments. Past research has often attributed racial/ethnic group differences to environmental factors (e.g. access, availability), which makes individuals less likely to consume the recommended levels of F+V and SSBs (Kamphuis et al., 2006). For example, low-income and minority groups have been found to live in communities where it is difficult to access healthy foods such as fresh fruits and vegetables and that promote consumption of unhealthy foods such as SSBs (Larson, Story, & Nelson, 2009; Story et al., 2008). However, more research is needed to better understand how other food choice factors and poor mental health status shape the relationship between psychosocial community contexts and dietary behaviors, especially in historically disadvantaged communities. Low-income and minority groups, for instance, experience greater exposure to community-level and individual-level psychosocial stressors and risk for psychological distress (Nguyen et al., 2018; Turner et al., 2013), which may potentially have a deleterious impact on dietary behaviors. This is a topic that should be further explored, and current and forthcoming obesity and chronic disease-prevention interventions should consider addressing poor psychosocial community contexts as a strategy to promote health equity across the nation.

Gaps in Research and Practice

In summary, obesity is certainly a complicated public health issue, as evidenced by the wide array of approaches that have been implemented in past years. This may explain why progress on obesity prevention has often been described as "patchy" and criticized for centering on "overly simplistic dichotomies" (e.g., individuals vs. environments, personal vs. collective responsibilities) (Roberto et al., 2015). Some have even argued that obesity-focused community-based interventions may have adverse unintended consequences (Walls, Peeters, Proietto, & McNeil, 2011), such as leading to the stigma and mistreatment of overweight/obese individuals (Ashmore, Friedman, Reichmann, & Musante, 2008;

Friedman, 2004). These critiques align with results from meta-analyses and systematic reviews finding tenuous evidence on the effectiveness of recent prevention interventions (Beauchamp, Backholer, Magliano, & Peeters, 2014; Wang et al., 2015).

The ongoing obesity epidemic underscores an urgent need to explore more effective solutions to address obesity in the United States. Current PSE nutrition-focused interventions mostly focus on increasing access to healthier food environments by addressing public policy, community, and institutional ecologic barriers related to healthy eating. However, these interventions do not appear to adequately address inter- and intra-personal psychosocial ecologic barriers that may deter individuals from making better foods choices. This limitation could be due to our limited understanding of the psychosocial correlates of dietary behaviors and dietary decision-making processes.

This lack of knowledge comes from **three critical gaps** in the literature. First, there is *a* ***lack of attention to social and psychological community dynamics that in addition to structural/built environments, may also impact individual-level dietary decision-making behaviors****.* To-date PSE interventions have primarily focused on increasing structural access to healthy foods. However, this alone may be insufficient to shift decision-making behaviors encouraging individuals to consume F+Vs because simply increasing their availability does not guarantee that individuals will select them (Cummins, Flint, & Matthews, 2014). Addressing the psychosocial aspects of communities may help to augment individuals' ability to take advantage of structural improvements to their built community environments. These gaps in practice are also reflected in research. Studies have generally paid less attention to the ways in which individuals experience their community environment. Thus, examining these psychosocial community dynamics that are captured by PCCs may provide important insights into the mechanisms through which structural factors in neighborhoods shape food choices. PCCs that have the potential to shape dietary behaviors include neighborhood risks and resources (e.g., neighborhood violence, community-level

economic hardship) and sense of community factors (e.g., perceived social cohesion, neighborhood satisfaction).

Related to this, a second limitation is that ***few studies have explored how other food choice factors (FCFs) are an intervening factor in the relationship between individuals' perceptions of their community and their dietary decisions.*** As previously mentioned, FCFs pertain to the frequency in which individuals consume foods prepared away from one's home, including those from fast-food and sit-down restaurants. They may be one potentially important intervening factor in the relationship between PCCs and dietary behaviors because they represent an individuals' lack of agency in preparing meals with a healthier nutrient profile, as well as increased temptation to highly palatable foods that are typically unhealthier could be another reason.

Similarly, a third limitation is that ***there has been little consideration of how psychological well-being (PWB) shapes the ways individuals engage in the dietary decision-making process within the psychosocial context of their communities.*** Despite limited attention in past studies, PWB may actually be a key pathway linking PCCs and dietary behaviors. First, PCCs may reduce or exacerbate individuals' stress levels and thus, reduce or increase their levels of PWB. For example, adverse community contexts, which induce psychological distress and poor PWB may lead individuals to consume highly palatable but unhealthy foods such as soda to better cope with external community-level stressors and poor mental health. There is empirical evidence that supports this idea and demonstrates that dietary decisions are complex and extend beyond simply having access to healthy foods. The brain plays a central role in controlling hunger and regulating eating behaviors (Berthoud & Morrison, 2008), likely making healthier food selection decisions more difficult when individuals are enticed with inexpensive and highly palatable foods or beverages that reap the biggest rewards on the brain (Nasser et al., 2008; O'Doherty, 2004), especially under stressful life circumstances. Soda consumption is particularly problematic. It is an energy-dense and highly palatable beverage that puts individuals at risk for excess calorie consumption, and

consequently, obesity (Briefel, Wilson, & Gleason, 2009; Templeton, Marlette, & Panemangalore, 2005; Vartanian, Schwartz, & Brownell, 2007). There is also accumulating evidence that soda consumption engenders a physiological response similar to that of drugs (Fortuna, 2012; Volkow et al., 2008). In addition to soda, away-from-home foods such as meals purchased from fast-food or sit-down restaurants are oftentimes considered highly palatable (Garber & Lustig, 2011), and may also be represent a link between stressful community environments and poor dietary behaviors. In contrast, individuals may find less palatable foods such as F+Vs less desirable under stressful circumstances and when their mental health is poor as these healthier foods do not have the same rewards for the brain. Ultimately, improving psychosocial community contexts to mitigate community-level stressors that adversely impact mental health may help individuals make healthier eating decisions and therefore, benefit populations burdened with obesity and chronic conditions.

To summarize the first three gaps, there is limited research on the connections between psychosocial community environments, other FCFs such as fast-food or sit-down restaurant consumption, PWB, and dietary behaviors. The third gap builds on these, recognizing that improving access to mental health services in at-risk communities may serve as an additional strategy to improve dietary behaviors and reduce obesity and chronic disease risk. Specifically, another gap is that there is a ***limited understanding of the current geo-spatial distribution of PCCs, FCFs, PWB, and availability of mental health services, particularly in Los Angeles County.*** Evaluating how these factors are distributed is critical for local program planning and delivery of chronic disease prevention interventions for several reasons. First, since there is evidence that PCCs such as community-level economic hardship shape chronic disease burden, it is important to know which neighborhoods experience the highest burden of PCCs that may adversely impact dietary behaviors. This will help policy makers and public health practitioners better understand where to disseminate resources to improve these community-level psychosocial health barriers. Along these lines, it is equally important to identify geographic disparities in levels of FCFs and

PWB to better disseminate resources in areas at greatest risk for chronic disease and poor mental health. Furthermore, given the potential significance of PWB on dietary behaviors, a geospatial assessment can also be utilized to identify gaps in mental health service availability. Mental health supports have the potential to be used as a strategy to reduce the impact of negative PCCs and enhance mental well-being, which can enhance individuals' ability to engage in healthy obesity and chronic disease-related dietary behaviors. Getting a snapshot of the geo-spatial landscape may help policy makers and public health practitioners to identify high need areas and better understand where to distribute necessary services. Geospatial information is a tool that can be used to identify opportunities to address psychosocial barriers that make it difficult for individuals adopt better health behaviors. Ultimately, conducting a geospatial analysis examining the geospatial distribution of PCCs, FCFs, PWB, and availability of mental health services will also help address health disparities in both physical and mental health.

The existence of these four gaps in public health practice can be explained by the paucity of studies that have examined the extent to which PCCs influence both healthy and unhealthy dietary behaviors. Moreover, the extent to which FCFs and PWB intervene in the relationship between PCCs and dietary behaviors has also yet to be comprehensively studied. By elucidating these relationships, future studies have the potential to inform and strengthen ongoing efforts that aim to reduce adiposity across racially/ethnically diverse populations. It also appears no studies have comprehensively conducted a geo-spatial landscape analysis to understand gaps in mental health services that may benefit mental health outcomes, and consequently, physical health outcomes, of individuals. Ultimately, addressing these gaps provides an opportunity to better understand psychosocial and mental health factors that can improve physical health outcomes.

CHAPTER 3: THEORETICAL FRAMEWORK

Obesity prevention research and practice has focused on improving structural/physical environmental barriers as a strategy to increase access to healthy foods and encourage individuals to make healthier food selection decisions. However, it is important to also address psychosocial factors to ensure that individuals will actually take advantage of increased access to healthy foods such as fruits and vegetables (F+Vs). The influence of psychosocial community characteristics (PCCs) on dietary behaviors, including the roles of food choice factors (FCFs) and psychological well-being (PWB), are key areas of research that are largely unexplored. Shedding light on these relationships may help to improve the impact of current and forthcoming obesity prevention interventions.

Currently there is no single theoretical framework to help guide research on this proposed topic. However, the Biopsychosocial and Environmental Affordances Models, in combination, have practical and theoretical applications for addressing existing gaps in the evidence base. The Biopsychosocial Model can serve as the broader guiding framework, whereas the Environmental Affordances Model can help to explain the relationships between stress, health behaviors, mental health, and physical health. These models are described in more detail below. Integrating these two theories provides important new insights and a more comprehensive model that highlights the relationships among PCCs, FCFs, PWB, and chronic disease-related dietary behaviors.

The Biopsychosocial Model

The Biopsychosocial Model is a useful framework for considering how multiple levels work together to shape health outcomes. Essentially, this model is a more elaborate adaption of the social ecological models commonly used in public health practice. The Biopsychosocial Model can be used to explain the linkages between dietary behaviors and obesity as it acknowledges the intersections between

sociological factors, psychological factors, and biological factors that shape health and health outcomes (Seeman & Crimmins, 2001). It consists of four main components: 1) sociological; 2) psychological; 3) biological; and 4) health. The relationships between these factors are illustrated in **Figure 2**.

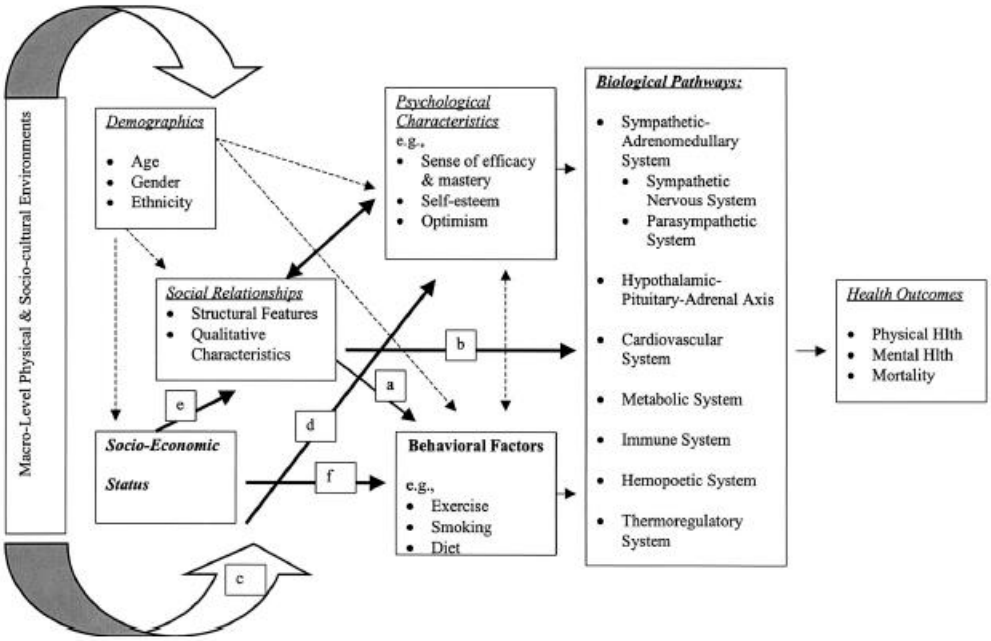


Figure 2. Biopsychosocial Model

Source: (Seeman & Crimmins, 2001)

In contrast to biomedical models that treat individuals as objects rather than humans with subjective experiences (Engel, 1980), the Biopsychosocial Model better explains the underlying drivers (i.e., biological, psychological, and societal factors) that individually and collectively influence disease development (Natale-Pereira, Enard, Nevarez, & Jones, 2011; Seeman & Crimmins, 2001). As illustrated in **Figure 2**, this model proposes that sociological factors such as macro-level physical and socio-cultural environments impact psychological characteristics of individuals, which can also have a bidirectional

relationship with some sociological factors. Sociological factors such as social relationships then directly impact individuals' health behaviors, including their dietary decision-making processes. There may also be a bidirectional relationship between individuals' psychological characteristics and decision-related health behaviors. Subsequently, both psychological characteristics and decision-related health behaviors have a direct impact on biological pathways that impact both physical and mental health outcomes.

Application of the Biopsychosocial Model has utility for addressing two gaps discussed in the previous section of this proposal: (1) the lack of research on how PCCs impact individual dietary decision-making behaviors, especially within the context of FCFs; and (2) the lack of research on how PWB may influence the relationship between PCCs and the dietary decision-making process. In terms of the first gap, there is currently not enough research to understand the extent to which PCCs, including the domains *neighborhood risks and resources* and *sense of community*, influence both healthy and unhealthy dietary behaviors. Also, little is known how FCFs shape these relationships. FCFs are also important to consider as they capture additional constraints of individuals in being able to make healthy food selection decisions and that ultimately, contribute to inequalities. The Biopsychosocial Model is a useful tool to fill this gap, as it highlights the linkages between sociological factors related to PCCs that have the potential to shape individuals' dietary decisions, as well as the influence of macro-level environments in this relationship. In terms of the second gap, the Biopsychosocial Model also explains how psychological factors are connected to PCCs and health behaviors. It can be argued, then, that the Biopsychosocial Model supports the hypothesis that PCCs and psychological well-being are an important point of intervention to combat obesity and related chronic diseases.

However, this model is not without limitations. It only broadly highlights how health outcomes such as chronic disease are shaped by the inter-relationships between sociological factors (e.g., PCCs), psychological factors (e.g., PWB), and health decision-making factors (e.g., diet). It does not adequately

explain how exactly sociological factors such as community contexts and PCCs are linked to individual-level psychosocial factors such as PWB. It also fails to explain how environmental factors and psychosocial stressors contribute to racial/ethnic health disparities. These gaps are problematic, as better understanding the underlying factors that shape dietary behaviors are crucial for tailoring obesity and chronic disease-related interventions to the needs of target populations. The next section presents a secondary theoretical model that can be used to augment the Biopsychosocial Model and address these limitations.

The Environmental Affordances Model

The Environmental Affordances Model addresses these previously mentioned limitations of the Biopsychosocial Model as it explicitly highlights the importance of stress in terms of physical and social contexts, health behaviors, mental health, and physical health outcomes (Mezuk et al., 2013). These relationships are illustrated in **Figure 3.** The Environmental Affordances Model was originally developed to explain a major paradox in health disparities research: although Blacks have fewer economic resources, greater exposure to psychosocial stressors, and report worse physical health outcomes than non-Hispanic whites, Blacks generally experience lower rates of stress-related psychopathological factors (e.g., depression, anxiety) (Mezuk et al., 2013). This is a useful perspective for explaining racial/ethnic inequalities in chronic disease (Mezuk, Concha, Perrin, & Green, 2017) and has previously been applied in other health disparity research (Reid et al., 2016; Rodriquez et al., 2018).

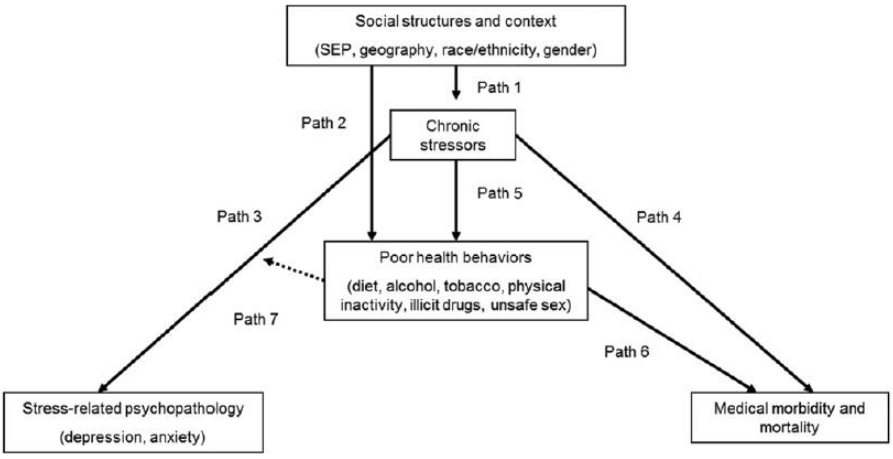


Figure 3. Environmental Affordances Model

Source: (Mezuk et al., 2013)

A major underlying premise of the Environmental Affordances Model is that contextual environments serve as "both as a source of constraints (or stress) and a source of affordances" (Briana Mezuk et al., 2013). Affordances have been previously defined as stress reduction opportunities (Greeno, 1994). It recognizes that social context is associated with coping behaviors related to material resources (Mezuk et al., 2013). In other words, the Environmental Affordances Model points to the significance of social stressors within environmental context, but also emphasizes the significance of PWB for shaping physical health and health behaviors. It focuses on the ways that individuals draw on available coping resources within their communities that may beneficial or hurtful for physical and psychological health. In other words, individuals who live in disadvantaged neighborhoods may engage in some health behaviors that are harmful for physical health but helpful psychologically. This is evidenced in research. Case in point, there is evidence that individuals living in stressful neighborhood environments consume more highly palatable SSBs such as soda, a beverage containing excess sugar and that reaps the biggest reward on the brain (Nasser et al., 2008; O'Doherty, 2004). However, while consuming soda may benefit

one's short-term mental health, in the long-term, consuming such unhealthy foods has serious ramifications to individuals' risk for physical health (Briefel et al., 2009; Templeton et al., 2005; Vartanian et al., 2007).

Key constructs of the Environmental Affordances Model are stress, social context, health behaviors, mental health, and physical health— all which fall within the broad components of the Biopsychosocial Model. For instance, *stress* and *mental health* in the Environmental Affordances Model align with the *psychological* component of the Psychosocial Model. Similarly, *social context* within the Environmental Affordances Model falls within the *sociological* component of the Biopsychosocial Model. Moreover, *health behaviors* and *physical health* in the Environmental Affordances Model fall within the *health* component of the Biopsychosocial Model.

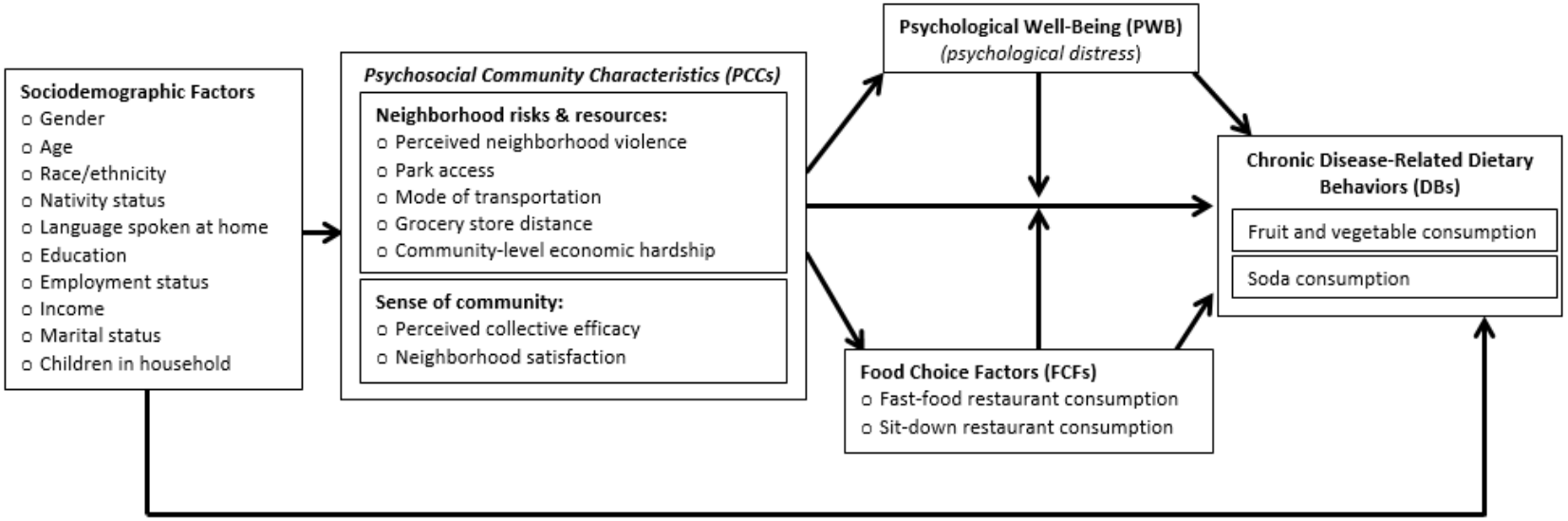
However, as previously mentioned, the Biopsychosocial Model only broadly explains that health outcomes such as chronic disease are shaped by the inter-relationships between sociological factors (e.g., PCCs), psychological factors (e.g., PWB), and health decision-making factors. It fails to explain *why* these relationships exist. The Environmental Affordances Model, on the other hand, fills these gaps by explaining *how* sociological factors, psychological factors, and biological factors shape health and health outcomes. Where the Biopsychosocial Model implies that there are linkages between health behaviors and social environments (but fails to go into depth as to how this occurs), the Environmental Affordances Model explicitly delineates ways in which social environments shape health behaviors directly— that is, through the stress pathway. Another limitation of the Biopsychosocial Model is that it does not consider racial/ethnic differences in how individuals cope with community-level stressors that beset health disparities. The Environmental Affordances Model does. It highlights that communities vary in affordances, leading individuals to adapt (sometimes through maladaptive behaviors) to cope with stressful life circumstances in different ways that have the potential to create health disparities at the

community level. Better yet, the Environmental Affordances Model acknowledges that racial inequality is a function of structural and community-based inequalities and not necessarily a problem inherent to minority groups themselves. Unlike other theoretical perspectives, it does not blame individuals and seeks to holistically understand why individuals engage in a variety of health behaviors. Integrating the two models can help to clarify the potential relationships between race, ethnicity, and social characteristics associated with disadvantaged community and how to translate maladaptive coping behaviors. Ultimately, both models are useful for guiding research on how community- and individual psychosocial factors impact dietary behaviors and consequently the burden of chronic disease in the population.

Overarching Conceptual Framework

Integrating key principles from the Biopsychosocial Model and the Environmental Affordances Model provides a more comprehensive framework explicating why disparities in chronic disease outcomes and related health behaviors exist. This integrated framework is presented in **Figure 4.** It addresses a broad range of psychosocial aspects of the community that have the potential to shape both healthy and unhealthy dietary behaviors. This is the model that will be used to guide analyses in the present dissertation focused on a case study of Los Angeles, a racially/ethnically diverse jurisdiction on the cusp of undergoing a major transformation in its healthcare delivery and community health model. Results from studies examining these relationships in this large urban jurisdiction may inform obesity prevention efforts in other jurisdictions in the nation.

Figure 4. Integrated Conceptual Framework on the Relationships Between Psychosocial Community Characteristics, Other Food Choice Factors, Psychological Well-Being, and Chronic Disease-Related Dietary Behaviors



*The present model was informed by the Biopsychosocial Model and Environmental Affordances Model. Solid lines indicate measured relationships, whereas dotted lines indicate unmeasured relationships

Overarching Dissertation Goal: To conduct a case study of potential community- and individual-level psychosocial factors that can be addressed to reduce the burden of chronic disease in a large racially/ethnically diverse urban jurisdiction undergoing major transformations in how physical and mental health services are delivered locally.

Study #1 Goal: *To examine the relationship between PCCs and DBs and how FCFs shape this relationship in a racially/ethnically diverse urban population.*

Study #2 Goal: *To examine the ways in which PWB shapes the relationship between PCCs and DBs in a racially/ethnically diverse urban population.*

Study #3 Goal: *To inform chronic disease-related program planning efforts by conducting a geospatial needs assessment looking at the distribution of and relationships between DBs, PCCs, structural FCFs, PWB, and availability of mental health counseling services by Service Planning Area in a large racially/ethnically diverse urban jurisdiction.*

This integrated model is based on three key premises based on the previously described literature. *The first premise is that psychosocial community characteristics (PCCs) capture how individuals perceive the structural/built environments in which they live, and how these perceptions shape their dietary behaviors.* Essentially, PCCs are individuals' perceptions of the structural community environment and represent the extent to which the environment presents barriers or facilitators to healthy choices. A second premise is that FCFs shape this relationship between PCCs and dietary behaviors. There are two possible mechanisms in which FCFs impact the relationship between PCCs and dietary behaviors. The first is that FCFs explain this relationship, as PCCs may influence other FCFs such as fast-food and sit-down restaurant consumption behaviors, which subsequently shape individuals' healthy and unhealthy dietary behaviors. The second possible mechanism is the FCFs have a moderating impact on the relationship between PCCs and healthy and unhealthy dietary behaviors such that FCFs may strengthen or diminish the relationship between PCCs and diet.

Similarly, a third premise is that PWB may also explain or moderate the relationship between PCCs and dietary behaviors. As previously mentioned, this could be because poor PWB may lead individuals to engage is poor dietary behaviors (e.g., low levels of F+V consumption, higher levels of SSB consumption) as a coping mechanism to deal with lower PWB. In summary, both FCFs and PWB may modify the relationships between PCCs and individuals' dietary behaviors because both these factors are linked to the ways in which individuals experience the social and psychological dynamics of their community environments and make lifestyle decisions based on these experiences. Evaluating whether these hypotheses are correct is the focus of the present dissertation.

Los Angeles County: A Local Case Study

This dissertation applies this integrated framework/model to study the relationships between PCCs, FCFs, PWB, and dietary behaviors in Los Angeles County. It also conducts a geo-spatial landscape analysis of PCCs, FCFs, and PWB at the local level to help policy makers and public health practitioners in the region to better understand opportunities to address psychosocial barriers impeding individuals from engaging in healthy dietary behaviors, a risk factor for obesity and chronic disease. This will serve to address health disparities in both physical and mental health at the regional level.

There are several reasons why Los Angeles County is an ideal jurisdiction in which to examine the mentioned gaps in the literature. First, given its diverse population, findings studying the previously mentioned relationships can be applied to others across the nation. It is the most populous county in the United States (Bureau, 2015) and a region characterized by over 4,000 square miles, 88 cities, and more than 10 million residents from an array of sociodemographic and economic backgrounds (LACDPH, 2017a). Second, it is a jurisdiction burdened by chronic disease health problems and whose residents engage in poor behaviors that put them at risk for these conditions. Studying the factors that shape chronic disease-related health behaviors, such as those related to diet, may provide better insights on how to improve them. For example, almost a fourth of all adult residents have reported being diagnosed with hypertension (23.5%) and high blood cholesterol (25.2%) (LACDPH, 2017a). Excess adiposity in the population is also problematic. About 35.9% of Los Angeles County adults are overweight and about 23.5% obese (LACDPH, 2017a). Los Angeles County residents also engage in unhealthy dietary behaviors that put them at risk for these conditions; only about 15% of adults consume five or more fruits and vegetables a day, whereas about a third (31.4%) drink one SSB or more per day (LACDPH, 2017a). In terms of neighborhood context, less than half of residents (47.5%) use walking paths, parks, playgrounds, or sports fields in their neighborhood (LACDPH, 2017a). Moreover, disparities exist by geographic region. While

about 84% of residents reporting feeling safe in their neighborhoods, only 40.3% of those living in the Service Planning Area 6 (i.e., South Los Angeles) share similar perceptions (LACDPH, 2017a).

Third, Los Angeles County residents have also been heavily targeted by an array of PSE-focused obesity prevention interventions in recent years. Given the millions of dollars invested and their focus on community environments, it is imperative to get a comprehensive understanding of other community factors that may impede individuals from taking advance from recent investments. Just for the USDA Nutrition Education and Obesity Prevention Grant Program alone, Los Angeles County received approximately $42 million to implement interventions focused on improving dietary and physical activity of Los Angeles County residents between 2012-2016. Previously, in 2010 through the CDC-funded Communities Putting Prevention to Work Program, Los Angeles County received $32 million to implement PSE strategies combat obesity. Shedding light on ways in which residents' may be more likely to take advantage of structural changes to the food environment is critical for combatting the growing obesity epidemic.

Fourth, Los Angeles County is undergoing a major transformation on health service delivery, using a complex case management model to provide health services to those experiencing an array of physical health, mental health, and social issues. This is an opportune time to inform ways in which to bridge the gap between psychological well-being, physical health, and social factors. To attenuate the number of hospital trauma visits in the region, there have also been growing public health efforts to reduce violence in the community through efforts such as the Parks After Dark effort. It is a gang prevention effort led by the Los Angeles County Parks and Recreation department and including other key agencies such as the Sheriff's Department, the Los Angeles County Department of Public Health, the Probation Department, and the Office of Child Protection (LACDPH, 2014). Parks After Dark is a community-based program seeking to improve psychosocial aspects of the community through reduction of violence. This program seeks to safely keep parks open late at night during summer weekend evenings and in conjunction provide

free programming (e.g., exercise classes, educational classes) (LACDPH, 2014). Parks After Dark is part of the local health department's Trauma Prevention Initiative, which includes other efforts such as development of trauma informed communities that seek to recognize the signs and symptoms of how trauma is spread in communities (LACDPH, 2017b). Given the studies' focus on community context, results from a case study of Los Angeles County will inform current and forthcoming efforts and may allow results to be translated to other regions across the nation experiencing high burden of chronic disease and health disparities.

Finally, understanding the geographic distribution of PCCs, FCFs, and PWB (i.e., potential obesity and chronic disease-related risk factors) is imperative to identify local-level disparities and help disseminate pertinent resources in areas that need them most. Since poor psychological well-being may lead to poor dietary behaviors, mapping these factors is imperative for ensuring that individuals receive the right supports to help them improve their mental health status. This indirect approach can be a potentially effective way to address poor dietary behaviors in the population because efforts to-date have largely neglected to consider the influence of psychosocial dimensions of community and psychological well-being on dietary behaviors. In this light addressing individuals' mental health— as well as the community contexts that impact their mental status— represents an opportunity to help individuals take advantage of increased access to healthier food environments. Mapping the location of these services also has the potential to help policy makers and public health professions better target individuals at risk for obesity and chronic disease-related health disparities.

For these reasons, Los Angeles County is an opportune region in which to examine the geographic distribution of PCCs, FCFs, PWB, and availability of mental health supports. Past, current, and forthcoming efforts in the region have sought to increase access to mental health services and programs (e.g., counseling, drug rehabilitation therapy) and bring mental health to the forefront of public health. For example, the Los Angeles County Board of Supervisors (BOS) passed a motion in 2015 that aims to

integrate the Department of Health Services, Department of Mental Health, and Department of Public Health into a single agency so to streamline comprehensive healthcare and mental health service delivery for Los Angeles County residents (Antonovich, 2015). This builds upon the BOS's addition of the Health Neighborhood Initiative into the 2014 Los Angeles County Strategic Plan, an initiative focused on augmenting mental health service delivery and make access to treatment more easily accessible for Los Angeles County residents (Center for Health Services and Society, 2016). Aligning with the BOS's 2016 County of Los Angeles department integration efforts, increasing coordination of care between mental health, physical health, substance abuse, and other social services (e.g., housing, employment) is among this initiative's objectives. Examples of BOS integration activities include encouraging County staff to partner and collaborate with existing neighborhood-level initiatives in conjunction with communities, clients, and families. This initiative is a step towards a comprehensive service delivery model that seeks to holistically address the health of Los Angeles County residents. Furthermore, the 2016 Los Angeles County Homeless Initiative focuses on strategies that may help to improve the mental health and reduce homelessness in the region (CEO, 2016). However, these mental health service delivery efforts have not necessarily focused on improving obesity and chronic disease-related dietary behaviors and it is also not clear areas that need both physical and mental health services most. Therefore, a geospatial landscape analysis would help to inform future program planning efforts.

CHAPTER 4: PROJECT OVERVIEW

With strong empirical evidence that obesity contributes to the development of chronic conditions that represent the leading causes of death and disability in the United States, the deleterious impact of obesity on the health and safety of Americans is indisputable. A key focus of efforts seeking to combat the growing obesity epidemic has been to improve dietary behaviors in the population. Recognizing that environments can serve as barriers or facilitators for individuals' ability to adopt a healthy diet, recent obesity prevention efforts have sought to improve structural aspects of communities through *policy, system, and environmental change* (PSE) approaches. However, while these interventions seek to make healthy eating the easy choice for individuals, they often neglect the psychosocial influence of community contexts on the promotion of healthier diets. The overall goal of this dissertation is three-fold: 1) examine the impact of *psychosocial community characteristics* (PCCs) on dietary behaviors; 2) evaluate the intervening role that *food choice factors* (FCFs) and *psychological well-being* (PWB) play in the relationship between PCCs and dietary behaviors; and 3) conduct a geographic needs assessment to inform current and forthcoming programs and policies focused on reducing chronic disease burden in Los Angeles County and across the nation.

<u>STUDY #1:</u> Examining the relationships between psychosocial community characteristics, other food choice factors, and dietary behaviors in a racially/ethnically diverse urban population

Recent obesity prevention efforts have employed policy, system, and environmental change strategies to improve the dietary behaviors of populations disproportionately burdened by high rates of chronic disease (e.g., low-income population, communities of color). These efforts, disseminated locally across communities in the United States, have been largely informed by research suggesting that structural factors related to the food and built environment impede individuals from eating healthy. However, less is understood about how both healthy and unhealthy dietary behaviors are shaped by psychosocial

aspects of the community such as neighborhood risks (e.g., violence), neighborhood resources (e.g., park access), and sense of community factors (e.g., collective efficacy). Moreover, how other food choice factors (FCFs) such as the frequency of consuming away-from-home prepared foods impacts this relationship is also not well understood.

Using a cross-sectional dataset of Los Angeles County residents, this study will examine the relationships between PCCs, FCFs, and dietary behaviors. The goal of this study is to examine the impact of PCCs on dietary behaviors in a large racially/ethnically diverse urban population, as well as the extent to which FCFs explain and/or moderate this relationship. I propose the following aims and accompanying hypotheses:

Aim #1: Identify sociodemographic patterns in PCCs among Los Angeles County residents.

Hypothesis #1.1: *Disadvantaged status is linked to greater neighborhood risks and fewer neighborhood resources.*

Hypothesis #1.2: *Disadvantaged status is linked lower sense of community.*

Aim #2: Examine the relationships between PCCs, FCFs, and dietary behaviors among Los Angeles County residents.

Hypothesis #2.1: *Negative PCCs are associated with lower fruit and vegetable (F+V) and higher soda consumption, even after controlling for FCFs.*

Hypothesis #2.2: *Positive PCCs are associated with lower F+V and higher soda consumption, even after controlling for FCFs.*

Aim #3: Assess whether the relationships between PCCs and FCFs on dietary behaviors persist after accounting for sociodemographics.

Hypothesis #3.1: *Negative PCCs are associated with lower F+V and higher soda consumption, even*

after controlling for sociodemographic and FCFs.

Hypothesis #3.2: *Positive PCCs are associated with lower F+V and higher soda consumption, even after controlling for sociodemographic and FCFs.*

Aim #4: Evaluate the extent to which FCFs explain the relationships between PCCs and dietary behaviors.

Hypothesis #4.1: *Higher consumption of foods from fast-food restaurants explain the relationship between PCCs and F+V consumption.*

Hypothesis #4.2: *Higher consumption of foods from fast-food restaurants explain the relationship between PCCs and soda consumption.*

Hypothesis #4.3: *Higher consumption of foods from sit-down restaurants explain the relationship between PCCs and F+V consumption.*

Hypothesis #4.4: *Higher consumption of foods from sit-down restaurants explain the relationship between PCCs and soda consumption.*

Aim #5: Assess whether FCFs moderate the associations between PCCs and dietary behaviors.

Hypothesis #5.1: *Higher consumption of foods from fast-food restaurants reduce the relationship between PCCs and F+V consumption.*

Hypothesis #5.2: *Higher consumption of foods from fast-food restaurants amplify the relationship between PCCs and F+V consumption.*

Hypothesis #5.3: *Higher consumption of foods from sit-food restaurants reduce the relationship between PCCs and F+V consumption.*

Hypothesis #5.4: *Higher consumption of foods from sit-food restaurants amplify the relationship between PCCs and soda consumption.*

<u>STUDY #2:</u> Examining the role of psychological well-being in the relationship between psychosocial community characteristics and dietary behaviors in a racially/ethnically diverse urban population

There is growing recognition of the synergistic relationships between physical and mental health. The current geo-political climate has increasingly heightened Americans' exposure to psychological stress and bolsters the need to examine the role of PWB on physical health. Yet, largely absent from nutrition-focused chronic disease prevention research and practice is consideration of the ways in which PWB shapes the relationships between psychosocial community characteristics (PCCs) and dietary behaviors. Psychological distress may explain the impact of community contexts on dietary behaviors because underlying stressors at the community level may increase an individual's psychological distress levels, which may subsequently make healthy eating more challenging. For example, psychological distress may lead individuals to crave highly palatable obesogenic foods. Failure to take into account the impact of community characteristics on PWB, as well as how PWB shapes dietary behavior choices, represents a missed opportunity to strengthen existing and future obesity prevention interventions.

To address this gap, this study builds on Study #1, the goal of the present study is to examine the ways in which PWB shapes the relationships between PCCs and dietary behaviors in a racially/ethnically diverse sample of Los Angeles County residents. I propose the following aims and accompanying hypotheses:

Aim #1: Identify the relationships between PCCs and PWB among Los Angeles County residents.

> ***Hypothesis #3.1:*** *Negative PCCs (e.g., higher perceived neighborhood violence) are associated with lower levels of PWB.*
>
> ***Hypothesis #3.2:*** *Positive PCCs (e.g., lower perceived neighborhood violence) are associated with higher levels of PWB.*

Aim #2: Examine the relationships between PWB and dietary behaviors among Los Angeles County residents.

Hypothesis #2.1: *Lower levels of PWB are linked to higher fruit and vegetable consumption (F+V) and lower soda consumption.*

Hypothesis #2.2: *Higher levels of PWB are linked to lower F+V consumption and higher soda consumption.*

Aim #3: Determine the extent to which PWB explains the relationships between PCCs and dietary behaviors among Los Angeles County residents.

Hypothesis #3.1: *Higher PWB explains the relationship between PCCs and F+V consumption.*

Hypothesis #3.2: *Lower PWB explains the relationship between PCCs and soda consumption.*

Aim #4: Assess whether PWB moderates the associations between PCCs and dietary behaviors among LAC residents.

Hypothesis #3.1: *Higher PWB amplifies the relationship between PCCs and F+V consumption.*

Hypothesis #3.2: *Lower PWB reduces the relationship between PCCs and soda consumption.*

<u>STUDY #3:</u> A geo-spatial assessment of community-based psychosocial risk factors associated with chronic disease-related dietary behaviors in Los Angeles County

Community contexts may influence chronic disease-related dietary behaviors, both directly and indirectly through psychological distress. While recent efforts have sought to mitigate structural/built environmental factors that discourage individuals from eating healthy such as inadequate access to fresh and affordable fruits and vegetables, few have examined the geographic distribution of community- and individual-level psychosocial community factors that have the potential to adversely impact obesity and chronic disease-related dietary behaviors at the local level. In particular, there is a lack of information on the distribution of PCCs, FCFs, PWB. Given emerging evidence that FCFs and PWB matters for the

relationship between PCCs and diet, understanding the distribution of influential community characteristics has utility in helping policymakers and program planners better disseminate resources in areas that need it most. Moreover, the distribution of mental health supports, which have the potential to be used as a strategy to reduce the impact of negative PCCs and enhance mental well-being so to enhance individuals' ability to engage in healthy obesity and chronic disease-related dietary behaviors, is also not well characterized at the local level.

The goal of this study is to inform chronic disease-related program planning efforts by conducting a geospatial needs assessment examining the distribution of and relationships between dietary behaviors, psychosocial community characteristics (i.e., community-level economic hardship), structural FCFs (i.e., density of fast-food and sit-down restaurant establishments), PWB, and the availability of mental health counseling services by Service Planning Area (SPA) in Los Angeles County. I propose the following aims and accompanying hypotheses:

Aim #1: Identify health risks of Los Angeles county residents by mapping the geospatial distribution of dietary behaviors (DBs), community-level economic hardship (EH), structural FCFs, PWB, and density of available mental health counseling services.

Hypothesis #1.1: *The distribution of DBs, EH, structural FCFs, PWB, and availability of mental health counseling services will vary within and across SPAs.*

Aim #2: Determine whether the geographic distribution of PWB, structural FCFs, availability of mental health counseling services, and DBs varies by EH.

Hypothesis #2.1: *Areas with a higher distribution of EH will have higher distribution poor PWB and structural FCFs linked to obesity risk within and across SPAs.*

Hypothesis #2.1: *Areas with a higher distribution of EH will have lower distribution of mental*

health counseling services within and across SPAs.

Aim #3: Compare the geographic distribution of PWB with density of available mental health counseling services.

Hypothesis #3.1: *Areas with lower distribution of PWB will have a lower density of available mental health counseling services within and across SPAs.*

Aim #4: Explore racial/ethnic disparities in DBs, EH, FCFs, PWB, and availability of mental health counseling services.

Hypothesis #4.1: *Historically disadvantaged minority groups (e.g., Hispanics and African Americans) reside in areas characterized by poor dietary behaviors, high EH, lower levels of PWB, and a lower density of available mental health counseling services.*

Hypothesis #4.2: *Whites reside in areas characterized by better dietary behaviors, lower EH, higher PWB, and a higher density of available mental health counseling services.*

CHAPTER 5: DATA SOURCES

2014 Los Angeles County Injury and Violence Prevention Survey

Study Design and Sample

The 2014 IVPP Survey is a cross-sectional internet panel survey that was commissioned by the Los Angeles County Department of Public Health to USamp, a California-based firm specializing in internet panel surveys. The IVPP survey was conducted from October 10th to November 15th, 2014. Los Angeles County adults were recruited from USamp's global proprietary panel of approximately 14 million subscribers. While adults were defined to be between the ages of 18 to 99, in the final recruited sample the oldest respondent was 83 years of age. To be enrolled into USamp's panel, subscribers were required to complete a questionnaire (including sociodemographic characteristics) that USamp company uses as part of its standard protocol to screen prospective survey participant's eligibility into various surveys.

In addition to age criterion (i.e., be 18 years of age or older) and residence criterion (i.e., Los Angeles County resident), prospective panel participants had to meet sociodemographic quota targets based on the 2010 U.S. Census estimates for Los Angeles County adults. **Table 1** compares study sample to quota criteria based on 2010 U.S. Census estimates.

Table 1. Sociodemographic Characteristics of Respondents of the 2014 Los Angeles County Department of Public Health Injury and Violence Prevention Internet Panel Survey compared to 2010 U.S. Census Estimate Quota Criteria for Los Angeles County, (n=1000)*

Characteristics	% of respondents from 2014 IVPP Survey	% based on 2010 U.S. Census Los Angeles County
Gender		
Female	49.1%	48.7%
Male	50.9%	51.3%
Age (years)		
18-29	20.8%	24.5%
30-44	53.8%	28.9%
45-54	11.3%	18.4%
55-64	9.0%	13.7%
65+	5.1%	13.4%
Race/ethnicity		
Hispanic/Latino	48.1%	48.1%
Black	9.0%	6.7%
White	26.6%	27.6%
Asian/Pacific Islander	14.5%	14.2%
Other	1.8%	3.5%
Income		
Under $25,000	22.2%	22.5%
$25,000-$49,000	23.3%	22.9%
$50,000-$74,999	18.1%	17.6%
$75,000-$99,000	12.6%	12.0%
$100,000-$149,000	12.7%	13.4%
$150,000+	11.1%	11.5%
Education		
High school or less	19.0%	44.6%
Some college[1]	35.9%	29.1%
College[2]	45.1%	26.3%

*Note: some categories from the 2014 IVPP survey will be grouped together to better align with 2010 U.S. Census based quota criteria.
[1]In 2014 IVPP Survey, corresponds to the responses of "technical/vocational school" or "some college."
[2]In 2014 IVPP Survey, corresponds to the responses of "college graduate" or "post-graduate"

Only USamp's panel subscribers who matched quota criteria for target demographics were sent an initial recruitment email informing them of their eligibility for the IVPP survey. To enroll into the survey, eligible panel subscribers had to log into their unique "dashboard" (i.e., USamp's web-based platform for each panel subscriber) and click the link directing them to take the IVPP survey. Eligible panel subscribers who did not respond to the initial email were sent two follow-up reminder emails reminding them to log into their dashboard to take the IVPP survey. Only USamp panel subscribers who clicked on the IVPP survey invitation link were administered the IVPP survey, which was available in English. Once quotas

were filled, the company stopped recruiting eligible panel subscribers. It took survey respondents an average of 20 minutes to complete the survey. Only respondents who completed 70%-100% of survey questions received dashboard points equivalent to a direct cash deposit of $2.25. All study protocols and materials were reviewed and approved by the Los Angeles County Department of Public Health's Institutional Review Board.

Participation Rate

Of the given number panel subscribers who were invited to participate, only 3020 clicked into the survey. Of these, 1421 (47%) were excluded due to over quotas (i.e., as closely as possible internet panel survey sample had to reflect the 2010 Census data for sociodemographic characteristics including gender, ethnicity, age, income, and education) or not meeting survey qualifiers (i.e., under the age of 18 or not a Los Angeles County resident). Of the remaining eligible 1599 subscribers who started the survey, 1000 completed the survey. The final participate rate was about 33% (1000/3020).

Survey Measures

The 123-item questionnaire administered via the vendor's web-based survey platform was developed by the Los Angeles County Department of Public Health. With the exception of one question asking respondents to qualitatively describe their neighborhood, all questions were closed-ended, with survey respondents asked to choose their answers from a short list of possible answer alternatives or by providing a numeric response. Survey measures included: a) sociodemographic characteristics; b) social/neighborhood characteristics (e.g., perceived neighborhood social cohesion, perceived neighborhood informal social control, perceived neighborhood violence); c) eating behaviors; d) workplace environment; and e) mental health status as measured by the Mental Health Inventory-5 (MHI-5). Questions included in the survey were adapted from previously validated items such as the Project on

Human Development in Chicago Neighborhoods Community Survey (Earls & Al., 1994), the Los Angeles County Department of Public Health Food Field Poll Survey, and the Los Angeles County Nutrition and Health Examination Survey II. However, when validated survey questions were not available for select topics they were developed by DPH specifically for the survey.

Zip code information was also collected from each survey respondent, which was linked to the Los Angeles County 2008-2012 Economic Hardship Index (EHI). This index, developed by the Los Angeles County Department of Public Health, was informed by a prior economic hardship index created by the Nelson A. Rockefeller Institute of Government (Montiel, Nathan, Wright, & Director, 2004; Nathan & Adams, 1976, 1989). The 2008-2012 Los Angeles County EHI represents a composite score pertaining to the following health indicators: 1) crowded housing (% occupied by housing units with more than 1 person per room); 2) poverty (% of persons living below the federal poverty level); (3) unemployment (% of persons over the age of 16 years who are unemployed); 4) education (% of persons over the age of 25 years without a high school education); 5) dependency (% of the population under 18 or over 64 years of age); and 6) per capita income. It corresponds to 121 places and Los Angeles City Council Districts in Los Angeles County using 2012 5-year estimates from the American Community Survey from the U.S. Census Bureau. Communities were defined using U.S. Census Designated Place boundaries. Due to its large size, the City of Los Angeles was further divided using Community Planning Areas obtained from the City of Los Angeles Planning Department. The index has been previously used to examine the associations between community-level economic hardship and childhood obesity prevalence in Los Angeles County (Shih, Dumke, Goran, & Simon, 2013); albeit indicators were based on older (2000) U.S. Census estimates. More recently, the Los Angeles County EHI was updated using 2012 ACS 5-year U.S. Census estimates. This updated index was used to examine public support for nutrition-focused policy, systems and environmental change strategies in the region (Robles & Kuo, 2017). Index scores in this study ranged between 13.2 (lowest economic hardship) and 82.9 (highest economic hardship).

2016 Department of Consumer Affairs Licensee List Database

The 2016 Department of Consumer Affairs Licensee Database is an Excel database that was used to identify individualized mental health supports and resources in Los Angeles County using geographic information system (GIS) mapping techniques. This database includes the name, addresses, and other pertinent information for over 150 professional license types issues through the Department of Consumer Affairs. While an array of licensee types are available, only licensee types pertaining to the following individual mental health supports were extracted and analyzed: "psychologists," "registered psychologists," "psychiatric mental health nurses," "licensed clinical social workers," "licensed educational psychologists," and "licensed marriage and family therapists." These providers were included in the definition of 'individual mental health supports' because they typically employ cognitive behavioral therapy approaches delivered on a one-on-one level that are among the most evidence-based and well-established treatments for an array of mental health conditions, including depression (Butler, Chapman, Forman, & Beck, 2006; Stewart & Chambless, 2009). Addresses from this database were then geocoded in GIS to pinpoint location of individual mental health supports across the Service Planning Areas (SPAs) in Los Angeles County.

Los Angeles County Department of Mental Health Providers Locations

This dataset is available as a GIS shape file that includes the name, address, service planning area, supervisorial district, languages/cultures, and description of types of publicly-funded program services provided at all inpatient, outpatient, and residential publicly funded mental health service locations in Los Angeles County. The Los Angeles County Department of Mental Health updates this database every six months. The most recent iteration of the database at the time of analysis was used in the present study was downloaded in April 2018. It was retrieved from the Los Angeles County Department of Public GIS portal (Los Angeles County 2018).

CHAPTER 6

STUDY #1- EXAMINING THE RELATIONSHIPS BETWEEN PSYCHOSOCIAL COMMUNITY CHARACTERISTICS, FOOD CHOICE FACTORS, AND DIETARY BEHAVIORS IN A RACIALLY/ETHNICALLY DIVERSE URBAN POPULATION

INTRODUCTION

Maintaining a healthy diet is a cornerstone for reducing risk for obesity and chronic diseases (Fock & Khoo, 2013). Key components of a healthy diet include consuming adequate levels of *fruits and vegetables* (F+V) and limiting consumption of *sugar-sweetened beverages* (SSBs) such as soda (US DHHS, 2015; USDA, 2015c). F+V consumption is considered a healthy dietary behavior that is protective against obesity (Giskes et al., 2009; Ledoux et al., 2011; Pearson et al., 2009) and cardiovascular mortality risk (X. Wang et al., 2014). This is likely because these foods help individuals feel more satiated, leading to reductions in energy intake (i.e., calories) associated with obesity (Rolls et al., 2004). Conversely, consumption of SSBs is considered an unhealthy dietary behavior given these beverages are primarily comprised of sugar, an energy-dense nutrient that is devoid of essential micro-nutrients (Rugg-Gunn et al., 1991). Since SSB consumption makes maintaining proper energy balance difficult, it comes as no surprise that these sugary drinks are also strongly implicated in the obesity epidemic (Bray, Nielsen, & Popkin, 2004; Ludwig, Peterson, & Gortmaker, 2001; Malik, Popkin, Bray, Després, & Hu, 2010; Malik, Schulze, & Hu, 2006). Thus, efforts to improve F+V consumption and reduce SSB consumption are imperative to assuage the growing burden of excess adiposity in the population.

It is well-known that the communities in which individuals live can play a critical role in their consumption of F+V and SSBs (French et al., 2001; Jaime, Duran, Sarti, & Lock, 2011; Kamphuis et al., 2006; Kipke et al., 2007; Lyn et al., 2013; Story et al., 2008). Obesity and chronic disease-prevention research

and efforts to-date have primarily centered on structural/built-environmental factors that impede individuals from making healthy dietary decisions (Feng et al., 2010; Gordon-Larsen, Nelson, Page, & Popkin, 2006; Larson et al., 2009; Lovasi et al., 2009; Story et al., 2008; Walker et al., 2010). This focus has been largely informed by the Social Ecological Model, which emphasizes the interactive effects of multiple ecological levels that shape health behaviors (McLeroy et al., 1988). For example, studies have found that structural environmental barriers, such living in "food desserts" or areas deprived retail stores selling affordable healthy nutritious foods, make it difficult for individuals to access F+V and other healthy foods (Walker et al., 2010). Similarly, living in "food swamps" or areas with an abundance of fast-food restaurants and other retail outlets selling obesogenic foods have been previously linked with overconsumption of energy-dense and nutrient-poor foods that that increase obesity and chronic disease risk (Hager et al., 2017).

While the built food environment and availability of healthy foods are certainly important factors in individuals' dietary decisions, it is also necessary to understand how individuals make sense of and react to these environments. In other words, it is important to understand the ways that individuals evaluate diet-related risks and resources and draw on social connections within their communities to make these decisions. Yet, how individuals navigate community contexts to make healthy dietary decisions is an unexplored area of research and practice. Less attention has been paid to the ways in which social and psychological dynamics within communities influence healthy and unhealthy behaviors. Thus, while there is indisputable evidence that the environments in which people live, work, and play have significant ramifications for individuals' dietary decisions, the limited examination of the aforementioned community dynamics that shape their lived experiences and contribute to population-level dietary disparities is a missed opportunity to more effectively address the obesity epidemic and related conditions.

The present study addresses these gaps in knowledge by evaluating the extent to which social and psychological community factors shape dietary behaviors in a large, racially/ethnically diverse urban

population. This study builds on prior research by examining multiple community factors, collectively conceptualized here as *psychosocial community characteristics* (PCCs). PCCs may capture how individuals perceive and experience their surroundings within the built environment. Consequently, PCCs may exert a strong influence on individuals' ability to adopt and maintain healthy dietary behaviors. There is evidence for this, as studies show that perceptions of physical/built community environments are subjective and differ across social groups, with potentially important health implications (Mair, Diez Roux, Osypuk, et al., 2010; Schulz et al., 2008). Although these dimensions have been examined across various studies, to my knowledge, the present study is the first to assess such a broad array of community characteristics simultaneously. By conceptualizing and examining two domains of PCCs (i.e., perceived risks and resources and sense of community), this study also enhances to our understanding of the ways that multiple community factors may contribute to food choice decision-making processes. This information may ultimately help policymakers and program planners tailor forthcoming obesity and chronic disease prevention efforts to diverse populations burdened with obesity and chronic disease.

Previous Dietary Interventions

Diet interventions have historically employed individual-based health education and communication strategies to improve dietary behaviors within communities (Nutbeam, 2000). A major assumption of these interventions is that individuals have complete autonomy over what they eat. Yet, a growing body of research guided by the Social Ecological Model (McLeroy et al., 1988) highlights that food selection behaviors extend beyond personal responsibility and are also influenced by a synergy between various social-ecological factors, such as those related to public policies, institutions, communities, interpersonal interactions, and the individual (Fleury & Lee, 2006; Gregson et al., 2001; James F Sallis, Owen, & Fisher, 2015). As a result, major funders such as the Centers for Disease Control and Prevention (CDC) and United States Department of Agriculture (USDA) have used the Social Ecological Model to guide

the development of nutrition-focused interventions focused on addressing underlying structural social-ecologic factors related to healthy eating (Bunnell et al., 2012; USDA, 2015a). These efforts are also informed by evidence that policies and institutional factors may result in disparities in access to healthy foods or ubiquitous access to unhealthy foods in certain communities, factors that have important implications for individuals' food selection behaviors (French et al., 2001; Larson et al., 2009; Story et al., 2008). While the primary goal of recent federally funded efforts is to make healthy eating "the easy choice" for individuals (Ashe, Graff, & Spector, 2011), there is also a need to evaluate the structural, interpersonal, and individual processes that contribute to the decision-making process of healthy eating.

New Approaches with the Social Ecological Model

Improving structural environmental barriers to healthy eating has prevailed as a way to combat the rising epidemic of obesity and related chronic conditions in the United States (N. I. Larson et al., 2009; Story et al., 2008; Walker et al., 2010). This approach is often referred to as "policy, system, and environmental change" (PSE) (Honeycutt et al., 2015)(Honeycutt et al., 2015) or "structural approaches" (Lieberman, Golden, & Earp, 2013). These nutrition-focused strategies have ranged from corner-store conversions that seek to improve access to affordable fruits and vegetables to increasing acceptance of Supplemental Nutrition Assistance Program (SNAP) benefits at healthy foods retailers (e.g., farmers' markets) to help low-income individuals overcome financial barriers related associated with the purchase of nutritious foods (Bunnell et al., 2012).

Millions of federal, state, and local U.S. dollars have been spent in the last decade to combat the obesity epidemic and related chronic conditions via PSE or structural change interventions (Christopher et al., 2017). The U.S. Department of Health and Human Services and U.S. Department of Agriculture are among the biggest federal agencies funding such nutrition-focused interventions (ECE, n.d.). As previously mentioned, in practice, these federal agencies have used the Social Ecological Model as a tool to guide

the development and dissemination of nutrition interventions focused on eliminating diet-related health disparities. This framework sheds light on the multifaceted and interactive relationships between individuals and exposure to various types of environments within a social system by highlighting the intersections between multiple levels of influence that shape health— i.e. public policy factors, community factors, institutional factors, interpersonal processes and primary groups, and intrapersonal factors (McLeroy et al., 1988). Essentially, public policy factors such as local, state, and national laws have the broadest level of influence over the other levels. They then impact community-level factors (i.e., relationships among organizations, institutions, and informal networks), which subsequently shape institutional rules and regulations locally. These rules and regulations then have a trickle-down effect on interpersonal processes (e.g., social support, social networks), which ultimately impact individuals' health knowledge, attitudes, beliefs, and behaviors.

Yet, the effectiveness of recent nutrition-focused PSE or structural change efforts, such as those from the 2010-2012 *Communities Putting Prevention to Work Program* or 2012-2015 *Community Transformation Grant,* may be limited due to their lack of attention to PCCs that drive individuals' eating decisions. This is a problem that must be addressed, as evidence suggests that structural-change environmental approaches alone may be insufficient to improve dietary behaviors of Americans. For example, a prior study found that simply increasing access to grocery stores selling healthy foods did not necessarily increase fruit and vegetable consumption in target populations (Cummins et al., 2014). Such findings may explain why high obesity levels in the population remains unabated (Flegal et al., 2016), despite millions of dollars spent over the last decade to combat this growing epidemic. Ultimately, mitigating the prevalence of obesity and related chronic diseases begins with better understanding the extent to which PCCs impact dietary behaviors. This research has the potential to help improve delivery and potential effectiveness of current and forthcoming nutrition-focused obesity and chronic disease prevention interventions.

Need to Access Psychosocial Dimensions of Community

Despite the intention of recent nutrition-focused interventions to address the multiple social ecological levels that influence dietary behaviors in the population, federal efforts have primarily focused on addressing the outer levels of the SEM (i.e., public policy, community, and institutional), while neglecting the second innermost level: interpersonal factors. Specifically, recent research and practice efforts have failed to consider the impact of psychosocial community characteristics (PCCs) on individuals' food decision-making processes. As previously mentioned, PCCs is a construct conceptualized in the present study which refers to social and psychological dynamics of communities that shape dietary behaviors. These community contexts may represent additional barriers *or* facilitators that are independent of objectively measured food environments because of how they impact individuals' perceptions and reactions to actual physical/built environmental structures. Related to this, the extent to which other food choice factors, such as fast-food and sit-down restaurant food consumption, also intervene in the relationship between PCCs and dietary behaviors is unclear. In this study, other food choice factors (FCFs) are conceptualized as the frequency in which individuals consume meals prepared away from one's home. The conceptualization of and potential relationships between PCCs and FCFs are described in more detail the next sections of this study.

To explore the relationships between PCCs and dietary behaviors, and how FCFs modify this relationship, a theoretical model that better explains the aforementioned linkages is needed. Thus, this study presents a new model that integrates multiple theoretical perspectives and existing diet-related research to elucidate the influence of psychosocial community-level characteristics on health behaviors that ultimately impact overall health. Based on this conceptual model, which is presented in ***Figure 1.1***, two main domains of PCCs were identified: (1) neighborhood risks and resources; (2) sense of community factors.

Domain 1: Neighborhood Risks & Resources

In the present study, *neighborhood risks and resources* are defined as individuals' perceived access to physical environments or resources that may help or hinder efforts to eat healthily. Indicators of neighborhood risks and resources include perceived neighborhood violence, park access, mode of transportation to nearest grocery store, distance to nearest grocery, and community-level economic hardship. Higher levels of perceived neighborhood violence can deter individuals from eating healthy if they are worried about the safety of their neighborhood and limit themselves from going outside to shop at grocery stores that sell fresh fruits and vegetables. Higher perceived neighborhood violence may also exacerbate individuals' stress levels, leading them to seek out foods/beverages that reap higher rewards on the brain (e.g., soda) as a coping mechanism. In contrast, lower levels of perceived neighborhood violence may have the opposite impact on F+V and soda consumption. Although the impact of neighborhood violence on dietary behaviors is relatively understudied, there is recent evidence that neighborhood violence may impact dietary behaviors. For example, Pointak and colleagues (2017) found that exposure to neighborhood violence is associated with consumption unhealthy foods and beverages (Pointak et al., 2017). The opposite relationship has also been noted, that consumption of soda is associated with higher aggressive of undesirable behaviors (Solnick & Hemenway, 2012; Suglia, Solnick, & Hemenway, 2013; Ziegler & Temple, 2015). Moreover, physical activity, another lifestyle behaviors which may indirectly impact dietary behaviors (Lowry, Michael, Demissie, Kann, & Galuska, 2015; Pate, Heath, Dowda, & Trost, 1996; J F Sallis, Prochaska, & Taylor, 2000), has also been associated with perceived neighborhood violence (Carver et al., 2008; Echeverria, Kang, Isasi, Johnson-Dias, & Pacquiao, 2014; Kneeshaw-Price et al., 2015; Timperio, Veitch, & Carver, 2015). This may explain why recent studies have found that perceived neighborhood violence puts certain populations, such as African American females living in disadvantaged neighborhoods, at greater risk for obesity and cardiovascular disease (Assari, Moghani Lankarani, Caldwell, & Zimmerman, 2016; Barber et al., 2016).

Park access is another factor within the domain of *neighborhood risks and resources* that has been demonstrated to help individuals attain higher levels of physical activity (Giles-Corti et al., 2005; Kaczynski et al., 2014; Roemmich et al., 2006; James F Sallis et al., 2016), as well as lower obesity prevalence (Jaime et al., 2011). Physical activity matters for diet, as it has been found to work in concert with diet to "remodel physiological structures and processes toward healthful ends" (Baranowski, 2004). For example, previous studies have found linkages between physical activity and a healthy diet such as adequate fruit and vegetable (F+V) consumption (Lowry et al., 2015; Pate et al., 1996; J F Sallis et al., 2000). This relationship make sense, as it is possible that increased physical activity encourages individuals to consume more water and nutrient dense foods such as F+V. Given this body of evidence, it comes to no surprise that organizations such as the American Diabetes Association, American Association of Diabetes Educators, and Academy of Nutrition and Dietetics recognize physical activity as an important risk factor for diet-related chronic conditions (Powers et al., 2016). Similarly, others have found that frequent soda consumption is associated with less physical activity (Lowry et al., 2015; Rehm, Matte, Van Wye, Young, & Frieden, 2008). Contrary to this finding, others have found positive association between physical activity and unhealthy dietary behaviors such as soda consumption, and argued this is likely because individuals consciously or unconsciously justify consuming unhealthier foods if they believe they've attained appropriate energy balance through physical activity (Lowry et al., 2015). These disparate findings indicate that more research is needed to disentangle these relationships between healthy and unhealthy dietary behaviors and PCCs such as perceived neighborhood violence and park access.

Other *neighborhood risks and resources*, such as mode of transportation and proximity to a nearest grocery store, may also be important determinants of dietary selection decisions, as both may influence individuals' desire and/or ability to travel to a grocery store to buy healthier foods such as F+Vs or facilitate purchase of unhealthier foods such as soda. Mode of transportation has been previously identified as one of the major community-level barriers to FV access (Haynes-Maslow et al., 2013).

Individuals may be more likely to purchase foods from stores nearest to them if they have to take an inconvenient mode of transportation (e.g., bus) to get to a grocery store or have to travel a far distance. Nearby stores oftentimes include smaller corner stores or convenience stores, which tend to stock unhealthy foods and beverages such as chips and soda (Gittelsohn, Rowan, & Gadhoke, 2012; Lucan, Karpyn, & Sherman, 2010). An examination of 20 years of data from a coronary artery risk study found that presence of neighborhood convenience stores is strongly associated with lower quality diet (including consumption of soda and other sugar-sweetened beverages) (Rummo et al., 2015). There is also empirical support that mode of transportation and distance to these stores matter for dietary decisions (Inagami et al., 2006; Morland & Evenson, 2009; Walker et al., 2010). Some researchers have found that certain modes of transportation (i.e., automobiles) are linked to lower levels of F+V consumption in some groups, while other modes of transportation (i.e., public transportation) are associated with lower levels of adiposity (Fuller, Cummins, & Matthews, 2013). F+V consumption has also been positively associated with access to a car (Sorensen et al., 2007; Gustat et al., 2015). Moreover, distance to the nearest food store (e.g., grocery stores) may also matter for population-level F+V consumption (Rose & Richards, 2004), as do certain transportation behaviors (Robles, Montes, Nobari, Wang, & Kuo, 2017). Increased distance to a grocery store, in particular, is associated with decreased consumption of F+V (Sharkey et al., 2010; Michimi & Wimberly, 2010). Conversely, decreased distance/easy access to grocery stores is positively associated with F+V consumption (Moreland & Roux, 2002; Moreland, Wing, & Roux, 2002; Rose et al., 2004; Gustat et al., 2015). Yet, while overall, higher density of grocery stores is positively associated with more healthful dietary behaviors such as F+V consumption (Moreland & Roux, 2002; Jaime et al., 2011), it is not well-understood how mode of transportation and distance to a nearest grocery store shape dietary behaviors after taking into account other PCCs and food choice factors.

Finally, communities' levels of economic hardship may also impact dietary behaviors. Eating healthy is often more expensive than buying cheap, energy-dense food. Therefore, having higher

economic hardship may create financial barriers for individuals being able to afford healthier foods such as fruits and vegetables. Sorensen and colleagues (2007), for instance, found that lower F+V consumption in households was associated with household financial strain. Greater levels of community economic hardship have also been found to put individuals at risk for obesity and chronic diseases (Shih et al., 2013). However, there is a paucity of studies exploring the relationships between community-level economic hardship and both healthy and unhealthy dietary behaviors, especially considering other food choice factors such as fast-food and sit-down restaurant consumption.

In summary, there is evidence that PCCs such as perceived neighborhood violence, park access, model of transportation to a nearest grocery store, distance to the nearest grocery store, and community-level economic hardship singularly shape dietary behaviors. However, how these PCCs *collectively* positively or negatively impact healthy dietary behaviors and unhealthy dietary behaviors have yet to be examined.

Domain 2: Sense of Community

In the present study, *sense of community* is conceptualized as how socially connected and happy individuals feel within their community. These include factors such as collective efficacy and neighborhood satisfaction. Collective efficacy has been previously defined as "social cohesion among neighbors combined with their willingness to intervene on behalf of the common good" (Sampson, Raudenbush, & Earls, 1997). Collective efficacy pertains to both social cohesion and informal social control in a neighborhood. Previous studies have examined the relationships between collective efficacy and neighborhood violence (Sampson, Raudenbush, & Earls, 1997). However, it appears that only one study to date has explicitly examined the associations between collective efficacy and dietary behaviors. This study, by Halbert and colleagues (2013), found that the likelihood of meeting recommended fruit and vegetable guidelines increased with higher levels of collective efficacy (Halbert et al., 2014). Despite

limited studies on the direct relationships between collective efficacy, other studies indirectly support the existence of this relationship. For example, park access has been previously linked to higher levels of collective efficacy (Cohen, Inagami, & Finch, 2008). This matters for diet, because as previously noted, park access promotes physical activity, a lifestyle behavior linked to diet. Moreover, other studies that indirectly bolster the relationship between collective efficacy and diet have explored the linkages between collective efficacy and obesity, albeit results are mixed. For instance, one study in a sample of Los Angeles residents found that higher collective efficacy is associated with lower BMI (Cohen et al., 2006), whereas another found that in some vulnerable populations having higher collective efficacy puts individuals at risk for obesity (Baquero, Molina, Elder, Norman, & Ayala, 2016). Regardless of whether collective efficacy reduces or increases an individual's obesity risk, what these studies suggest is that collective efficacy has the potential to shape diet given what one eats has major implications for obesity risk. Moreover, while not explicitly related to collective efficacy, a number of studies have found that greater levels of social networks or social support is positively associated with greater F+V consumption (Kelsey et al., 1996; Langenberg et al., 2000; Sorensen et al., 2007). There is evidence that such sense of community factors have a significant impact on other lifestyle behaviors such as physical activity, which as previously mentioned is linked to diet (Baranowski, 2004). For example, individuals residing in communities with higher levels of social cohesion have been found to be more physically active (Cradock et al., 2009; K. J. Fisher et al., 2004). Neighborhood informal social control may also be a deterrent to engaging in physical activity (Cohen et al., 2006). However, that few studies has explicitly examined the relationships between collective efficacy and both healthy and unhealthy dietary behaviors highlights that more research is needed on this topic.

Another PCC within the domain of *sense of community*, neighborhood satisfaction, considers the extent to which individuals feel happy within their neighborhood. While studies have not directly examined the relationships between neighborhood satisfaction and dietary behaviors, it is possible that

if individuals are happier in their neighborhoods, they may be more apt to talk to their neighbors and be willing to share resources that are conducive to healthy food selection decisions. These resources can include health knowledge and/or sharing fruits and vegetables grown at home. Having higher neighborhood satisfaction may also encourage individuals to participate in community gardens, which have been linked to higher fruit and vegetable consumption among adults (Alaimo, Packnett, Miles, & Kruger, 2008). Community gardens have also been argued to "enhance neighborhood satisfaction, pride, social capital, and decrease fear of crime" (Allen et al., 2008; Alaimo, Reischl, & allen, 2010), as well as collective efficacy (Teig et al., 2009). Other studies have also found a positive linear association between neighborhood satisfaction and individual physical activity levels (de Jong et al., 2012). This is important, because as previously mentioned, physical activity indirectly impacts diet. However, as with the previously mentioned PCCs, few studies have explicitly examined the impact of neighborhood satisfaction on both healthy and unhealthy dietary behaviors. Similar to PCCs in the *neighborhood risk and resource* domain, there is evidence that the PCCs, collective efficacy and neighborhood satisfaction, singularly shape dietary behaviors. However, how these PCCs collectively positively or negatively impact healthy dietary behaviors and unhealthy dietary behaviors has also yet to be fully explored.

Assessing the Influence of Food Choice Factors on the Relationship Between Psychosocial Community Characteristics and Healthy and Unhealthy Dietary Behaviors

Another gap in understanding the relationship between psychosocial community characteristics (PCCs) and diet include examining other factors that may account for or moderate this relationship. Specifically, food choice factors (FCFs) is a possible intervening factor in the relationship between PCCs and diet. As previously mentioned, FCFs are conceptualized here as: *the consumption of food prepared away from one's home.* FCFs capture one's intake of food prepared away-from-home food intake, such as meals from

fast-food and sit-down restaurants. Despite limited empirical evidence, prior research suggests there are two potential mechanisms linking PCCs, FCFs, and diet.

One possibility is that FCFs may importantly explain the relationship between PCCs and diet, as PCCs may significantly shape FCFs, which contribute to differences in diet. For example, studies show that neighborhoods with the highest levels of economic hardship have been linked to a disproportionate density of fast-food establishments (Laxy et al., 2015; K. Morland et al., 2002). These FCFs may then directly impact dietary behaviors. For instance, consumption of foods prepared at fast-food and sit-down restaurants which are often high in calories have been previously associated poor diet and increased risk for obesity (Ayala et al., 2008; Bezerra et al., 2012; Bowman et al., 2004; Casey et al., 2008; S A French et al., 2000; Paeratakul et al., 2003; Rosenheck, 2008; Seguin et al., 2016). Thus, one important pathway between PCCs and diet may also be through the indirect link of FCFs.

Another possible mechanism is that FCFs moderate the link between PCCs and diet, such that FCFs may strengthen or diminish the relationship between PCCs and diet. For example, community-level economic hardship may result in worse dietary behaviors among those who get most of their food from fast food places because these restaurant establishments typically do not offer the healthiest food choices. For instance, individuals that consume more meals from restaurants have been previously found to consume more soda (B. T. Nguyen & Powell, 2014; Powell & Nguyen, 2013). However, it appears that no studies to-date have explored the role of FCFs in the relationship between PCCs and dietary behaviors. As such, examining this gap has the potential to provide a more comprehensive understanding of the ways that available food choice options within communities may also contribute to the dietary decision-making process.

Study Purpose

While there is some evidence to suggest that psychosocial community characteristics (PCCs) impact diet, no studies have explicitly and comprehensively investigated the two domains of PCCs (i.e., neighborhood risks and resources, sense of community) within a single study, nor considered how other food choice factors (FCFs) influence the relationship between PCCs and diet. The present study seeks to address these limitations by examining a cross-sectional dataset in the large, racially/ethnically diverse urban population of Los Angeles County. The overall goal is to evaluate the extent to which PCCs shape dietary behaviors and assess the role that FCFs play in this relationship. To accomplish this goal, this study has five main aims:

(1) identify sociodemographic patterns in PCCs;

(2) examine the relationships between PCCs, FCFs, and dietary behaviors;

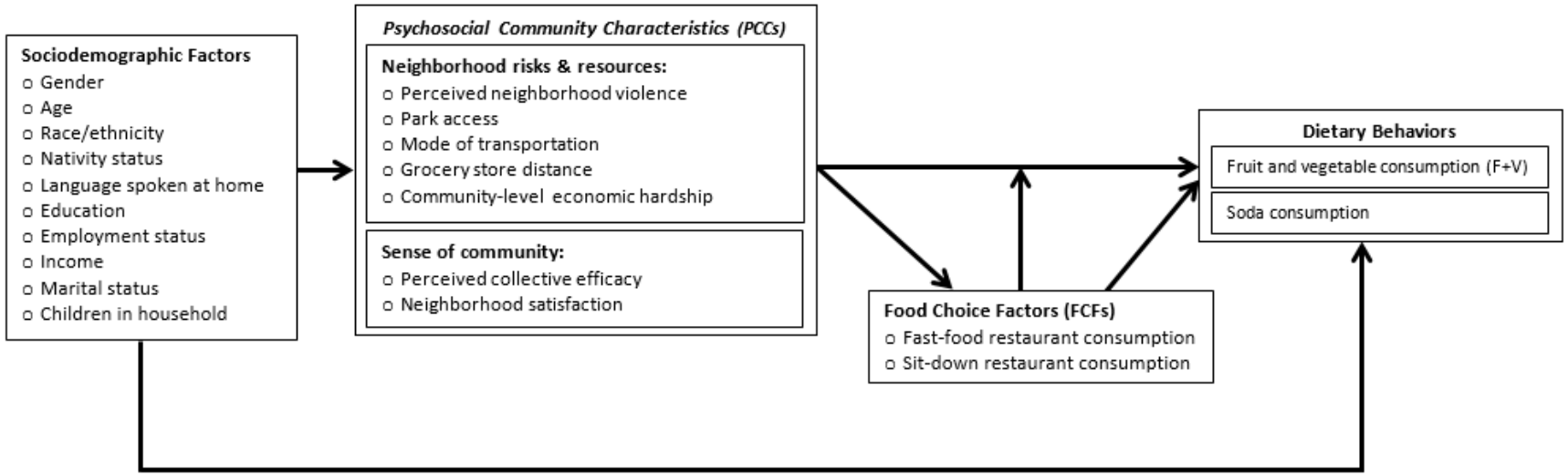
(3) assess whether the relationships between PCCs and FCFs on dietary behaviors persist after accounting for sociodemographics;

(4) evaluate the extent to which FCFs explain the relationships between PCCs and dietary behaviors;

(5) assess whether FCFs moderate the associations between PCCs and dietary behaviors.

Encouraging individuals to eat better may extend beyond merely improving food environments. It is imperative to address other factors that impact target populations' ability to make healthier food selection decisions. Within this context, a better understanding the relationships between PCC factors and dietary behaviors, as well as the impact of other FCFs, may help policymakers and program planners augment current obesity and chronic disease prevention efforts.

Figure 1.1- Study #1: The Relationships Between Psychosocial Community Characteristics and Chronic Disease-Related Dietary Behaviors



*****The present model was informed by the Biopsychosocial Model and Environmental Affordances Model. Solid lines indicate measured relationships.

Study #1 Goal: *To evaluate the extent to which PCCs shape dietary behaviors in a large racially/ethnically diverse urban population.*

Aim 1: *Identify sociodemographic patterns in PCCs among Los Angeles County residents.*

Aim 2: *Examine the relationships between PCCs, FCFs, and DBs among Los Angeles County residents.*

Aim 3: *Assess whether the relationships between PCCs and FCFs on dietary behaviors persist among Los Angeles County residents after accounting for sociodemographics.*

Aim 4: *Evaluate the extent to which FCFs explain the relationships between PCCs and dietary behaviors among Los Angeles County residents.*

Aim 5: *Assess whether FCFs moderate the associations between PCCs and dietary behaviors among Los Angeles County residents.*

METHODS

Data Source

Data for this study were from the 2014 IVPP Survey previously described in the previous section of this dissertation, Data Sources *(page 45).* This survey is a cross-sectional internet panel survey that was commissioned to a California-based firm specializing in internet panel surveys (USamp) by the Los Angeles County Department of Public Health. The IVPP survey was conducted in Fall 2014. Los Angeles County adults were recruited from the selected firm's global proprietary panel of approximately 14 million subscribers. To be enrolled into the panel, the firm required subscribers to complete a questionnaire that it used as part of its standard protocol to screen prospective survey participants for eligibility into various surveys. Out of the global propriety sample, 1599 subscribers were screened eligible and started the 2014 IVPP survey. Prospective panel participants were adult Los Angeles County residents aged 18 years or older, and they had to meet sociodemographic quota targets based on the 2010 U.S. Census estimates for Los Angeles County adults (**Table 1**). Individuals were excluded if they were not Los Angeles County residents, under the age of 18, or tried to enroll after quota criteria had been filled. In total, 1000 people completed the survey (participation rate=~33%). Of these respondents, 967 provided complete information for variables of interest in the present study.

Measures

Dietary Behaviors

Two measures of chronic disease-related dietary behaviors were examined as dependent variables in this study: fruit and vegetable consumption and soda consumption.

Fruit and vegetable consumption: Average daily fruit consumption was assessed as counts with the following question adapted from the validated Diet History Questionnaire used in the Eating at America's Table Study (NIH, 2016): "In an average day, about how many servings of fruit do you eat, counting fresh, canned, dried or frozen fruits?" Daily vegetable consumption was measured by asking participants, "In an average day, about how many servings of vegetables do you eat, counting fresh, canned, dried, and frozen vegetables?" Responses were reported as whole-number values. To increase accuracy of self-reported fruit and vegetable consumption interviewers provided respondents with examples of a fruit and vegetable serving (e.g., a serving of fruit was defined as 1 medium fruit such as an orange, a serving of vegetables was defined as 1 cup of raw leafy vegetables such as lettuce). Fruit and vegetable consumption scores were summed, and implausible values eliminated. In particular, values greater than 16 for fruits and values greater than 23 for vegetables were coded as missing; these thresholds align with previous analyses of fruit and vegetable consumption in the population (Moore & Thompson, 2015). In descriptive analyses, fruit and vegetable consumption was measured categorically: *(0) high consumption* if respondents reported consuming 5 or more servings of fruits and vegetables per day, *(1) intermediate consumption* if respondents reported consuming 3-4 servings of fruits and vegetables per day, and *(2) low consumption* if respondents reported consuming 0-2 servings of fruits and vegetables per day. These cut-points are based on USDA recommendations of 5 or more fruits and vegetables daily for optimal health (Guenther, Dodd, Reedy, & Krebs-Smith, 2006). They have also been used in previous studies (He, Nowson, & MacGregor, 2006). In multivariable analyses, F+V consumption was analyzed as a count.

Soda consumption: Weekly soda consumption was assessed as count by asking respondents the following question used in a prior DPH study (Robles & Kuo, 2017): "In an average week, about how many regular sodas such as Coke or Mountain Dew, do you drink? Do not include diet sodas or sugar-free drinks. Please count a 12-ounce can, bottle or glass as one drink." Responses were reported as whole-number values.

Consistent with prior studies, implausible values of soda consumption (e.g. 22 sodas or more per day) were eliminated (Stolzenberg, D'Alessio, & Flexon, 2014). In descriptive analyses, soda consumption scores were then measured categorically: (0) *high consumption* if respondents reported consuming 0 sodas per week, *(1) intermediate consumption* if respondents reported consuming 1-6 sodas per week, and *(2) low consumption* if respondents reported consuming 7 or more sodas per week (i.e., one or more per day). These cut-points are based on a prior analysis conducted in Los Angeles County (Robles et al., 2015), as well as previous study analyses (Kumar, Pan, Park, Lee-Kwan, & Onufrak, 2014; Vartanian et al., 2007). In multivariable analyses, soda consumption was analyzed as a count variable.

Psychosocial Community Characteristics (PCCs)

Two domains of PCCs were conceptualized and examined in this study: *neighborhood risks and resources* and *sense of community*.

***PCC Domain #1: Neighborhood Risks and Resources*.** Perceived neighborhood violence, park access, grocery store distance, mode of transportation, and community-level economic hardship were used to examine neighborhood risks and resources.

Perceived neighborhood violence— This was measured using a 5-item scale (α=0.92) from the Project on Human Development in Chicago Neighborhoods Community Survey (Earls & Al., 1994). Respondents were asked the frequency of which the following violent acts had occurred in their neighborhood within the last six months: (1) a fight in which a weapon was used; (2) a violent argument between neighbors; (3) gang fights; (4) a sexual assault; (5) a robbery or mugging; and (6) harassment, abuse, or unjustified use of force by police officers. Response options ranged from 4 "often" to 1 "never," and scores were based on the sum of the items. Prior studies using this scale have measured perceived neighborhood violence

continuously, with higher values indicating highest level of perceived neighborhood violence (Sampson et al., 1997). However, in the present study, perceived neighborhood violence was analyzed categorically as 'low violence (referent),' 'intermediate violence,' and 'high violence' to more easily compare risk groups.

Park access— Respondents were asked to indicate "yes" or "no" to the following question: "Is there a park, playground, or open space within walking distance of your home?" Responses were analyzed as a categorical variable with 'yes- has park access' as the referent category. This question was internally developed by the Los Angeles County Department of Public Health.

Grocery store distance— Respondents were asked, "Approximately how far is the place you generally get most of your groceries (in miles)." Response options were reported as whole numbers and were analyzed as a continuous variable in all study analyses. This question was internally developed by the Los Angeles County Department of Public Health.

Mode of transportation— Respondents were asked, "What mode of transportation do you usually take [to get to the place where you usually get most of your groceries]?" Responses were categorized as 'car' (referent category), 'bus,' 'walking', and 'other.' This measure was used in previous studies of the Los Angeles County population (Robles et al., 2017).

Community economic hardship (EH)—EH was assessed using the Los Angeles County 2008-2012 Economic Hardship Index (EHI). The EHI represents a composite score pertaining to the following health indicators: (1) crowded housing (% occupied by housing units with more than 1 person per room); (2) poverty (% of persons living below the federal poverty level); (3) unemployment (% of persons over the age of 16 years who are unemployed); (4) education (% of persons over the age of 25 years without a high school

education); (5) dependency (% of the population under 18 or over 64 years of age); and (6) per capita income. EHI scores were linked to IVPP data using respondents' zip codes to create the EH hardship variable used in the present study.

***PCC Domain #2: Sense of Community*.** The measures *perceived collective efficacy* and *neighborhood satisfaction* were used to examine sense of community.

Perceived collective efficacy—Collective efficacy has been previously defined as "social cohesion among neighbors combined with their willingness to intervene on behalf of the common good" (Sampson, Raudenbush, & Earls, 1997). Essentially, it pertains to both social cohesion and informal social control. In the present study, perceived collective efficacy was measured using a 5-item scale measuring perceived social cohesion (α=0.56), as well as a 5-item scale (α=0.82) measuring perceived informal social control. Both of these scales were previously used in the cross-sectional survey from the Project on Human Development in Chicago Neighborhoods Community Survey (Earls & Al., 1994).

To measure perceived social cohesion, respondents were asked the degree to which they agreed with the following statements about people in their neighborhood: (1) *this is a close-knit or unified neighborhood*; (2) *people around here are willing to help their neighbors*; (3) *people in this neighborhood don't get along with each other*; (4) *people in this neighborhood do not share the same values*; and (5) *people in this neighborhood can be trusted*. Response options ranged from "strongly agree" to "strongly disagree."

To measure perceived informal social control, respondents were asked to report the likelihood of their neighbors addressing signs of disorder in the neighborhood by answering each of the following questions: (1) *if a group of neighborhood children were skipping school and hanging out on a street corner, how likely is it that your neighbors would do something about it?*; (2) *if some children were spray-painting*

graffiti on a local building, how likely is it that your neighbors would do something about it? (3) *if a child was showing disrespect to an adult, how likely is it that people in your neighborhood would scold that child?*; (4) *if there was a fight in front of your house or building and someone was being beaten or threatened, how likely is it that your neighbors would break it up?*; and (5) *suppose that because of budget cuts the fire station closest to your home was going to be closed down by the city… how likely is it that neighborhood residents would organize to try to do something to keep the fire station open?* Response options ranged from "very likely" to "very unlikely."

Then a factor analysis was conducted to examine overlapping constructs of the two scales; results suggested that both scales pertained to similar latent construct. Thus, responses from both scales were summed to create a composite score of the ten measures and then analyzed a continuous variable, with the higher the score indicating highest level of perceived collective efficacy. A previous study also found that both tapped into "the same latent construct," explaining why study authors combined the measures social cohesion and informal social control to create a 'collective efficacy' measure (Sampson et al., 1997).

Neighborhood satisfaction— Using the following question previously used in the Los Angeles Family and Neighborhood Survey (L.A. FANS) (Pebley, Sastry, Peterson, & Yuhas, 2012), respondents were asked to indicate their level of satisfaction with their neighborhood: *All things considered, would you say you are very satisfied, satisfied, dissatisfied, or very dissatisfied with your neighborhood as a place to live?* Responses were dichotomized as 'satisfied' (referent category) and 'unsatisfied.'

Food Choice Factors

The measures fast-food restaurant consumption and sit-down restaurant consumption were used to examine other food choice factors (FCFs).

Fast-food restaurant consumption— Respondents were asked, "In an average week, how many times do you eat any food from a fast-food restaurant like McDonald's, Taco Bell, or Kentucky Fried Chicken or another similar type of place?" Answered were provided as whole numbers and were analyzed as a count. This question was internally developed by the Los Angeles County Department of Public Health and Field Research Corporation as part of a random-digit dial population-based survey whose other measures have been used in previous study analyses (Robles & Kuo, 2017).

Sit-down restaurant consumption— Respondents were asked, "In an average week, how many times do you eat any food from any type of sit-down restaurant, not counting fast-food restaurants? Please include Denny's, Olive Garden, or other similar types of places. Provide your best estimate." Answered were provided as whole numbers and were analyzed as a count. This question was internally developed by the Los Angeles County Department of Public Health and Field Research Corporation as part of a random-digit dial population-based survey whose other measures have been used in previous study analyses (Robles & Kuo, 2017).

Other Covariates

The following sociodemographic characteristics were also included as covariates in study analyses: *gender* (female [referent]; male); *age* (categorically as 18-30 [referent], 31-40, 41-50, 51+ in descriptive analyses and continuous in regression analyses); *race/ethnicity* (Hispanic/Latino [referent], Black/African American, White/Caucasian, Native Hawaiian or Other Pacific Islander, Asian, American Indian/Alaskan Native, and Other); *nativity status* (born in the U.S. [referent], native born but outside of Los Angeles County, and foreign born); *language spoken at home* (English [referent] or Not English); *education* (college graduate/postgraduate [referent], high school education or less, some college); *employment status* (employed full time [referent], employed part-time, unemployed, and other employment status); *income*

(over $100,000 [referent], less than $50,000, and $50,000-$99,000); *marital status* (married [referent], single or never married, divorced/separated/widowed); *children in household* (reported as whole-number values and analyzed as a continuous variable).

Analytic Strategy

All data were cleaned and analyzed using STATA version 14.1 *(StataCorp LP, College Station, Texas)*. Prior to analyses, the univariate distributions of all outcome, predictor, and control variables were examined using histograms, frequency/percentage measures, central tendency measures (e.g., means, median), and dispersion measures (e.g., range, standard deviation). **Table 1.1.** presents results of some of these descriptive statistics. These analyses were also used to inform variable selection and verify appropriateness of statistical procedures (**Figure 1.2 & Figure 1.3)**.

Table 1.1 Sociodemographic characteristics of respondents from the *Los Angeles County Injury and Violence Prevention Survey*, 2014 (n=967)*

Characteristics	Number (%) or *Mean [SD]*
Chronic Disease-Related Dietary Behaviors	
Fruit and Vegetable Consumption	
High consumption (5 or more servings per day)	481 (49.7)
Intermediate consumption (3-4 servings per day)	279 (28.9)
Low consumption (0-2 servings per day)	207 (21.4)
Mean fruit and vegetable consumption	*0.71 [.79]*
Soda Consumption	
High consumption (7 or more sodas per week)	190 (19.7)
Intermediate consumption (1-6 sodas per week)	540 (55.8)
Low consumption (0 sodas per week)	237 (24.5)
Mean soda consumption	*0.95 [0.66]*
Psychosocial Community Characteristics	
Neighborhood risks & resources	
Perceived neighborhood violence	
Low violence	366 (37.9)
Intermediate violence	289 (29.9)
High violence	312 (32.3)
Park access	
Has park access	784 (81.1)
Does not have park access	183 (18.9)
Mode of transportation to nearest grocery store	
Car	786 (81.3)
Bus	38 (3.9)
Walking	124 (12.8)
Other	19 (2.0)
Mean average number of miles traveled to nearest grocery store	*4.1 [6.0]*
Mean community-level economic hardship	*50.4 [17.5]*
Sense of community	
Mean perceived collective efficacy	*33.8 [7.9]*
Neighborhood sense of satisfaction	
Very satisfied/satisfied	864 (89.4)
Very dissatisfied/dissatisfied	103 (10.7)
Food Choice Factors	
Mean weekly fast food restaurant consumption	*2.6 [2.7]*
Mean weekly sit-down restaurant consumption	*1.8 [2.2]*
Sociodemographic Factors	
Gender	
Female	477 (49.3)
Male	490 (50.7)
Age (years)	
18-30	408 (42.2)
31-40	247 (25.5)
41-50	130 (13.4)
51+	182 (18.8)
Race/ethnicity	
Hispanic/Latino	468 (48.4)

Black	88 (9.1)
White	251 (26.0)
Asian/Native Hawaiian/Pacific Islander	147 (15.2)
Other[1]	13 (1.3)
Nativity Status	
Native born (in Los Angeles County)	647 (66.9)
Native born (outside of Los Angeles County)	204 (21.1)
Foreign born	116 (12.0)
Language spoken at home	
English	736 (76.1)
Not English	231 (23.9)
Education	
High school or less	184 (19.0)
Some college	349 (36.1)
College graduate/postgraduate[2]	434 (44.9)
Employment Status	
Employed- full time	535 (55.3)
Employed- part time	116 (12.0)
Unemployed (but looking for work)	106 (11.0)
Other employment status[3]	210 (21.7)
Income	
Under $50,000	443 (45.8)
$50,000-$99,000	299 (30.9)
$100,000 or more	225 (23.3)
Marital Status	
Married	370 (38.3)
Single[4]	519 (53.7)
Divorced/Separated/Widowed[5]	78 (8.1)
Mean number of children in the household	0.8 [1.1]

Note: Number of cases and percentage may not add up to the total or 100%, respectively, due to rounding and missing values.

[1]Category includes respondents who responded "American Indian or Alaskan Native," or "Other" to the question, "Could you please indicate your race or ethnicity?"

[2]Includes respondents who reported "graduated with a four-year degree" or "graduated with a professional degree" when asked, "What is the last grade that you completed in school?"

[3]Includes respondents who reported "Retired," "Student," or "Homemaker" when asked, "In terms of your job status, are you employed, unemployed but looking for work, retired, a student, or a homemaker?"

[4]Includes responses "Not married, but living with partner" and "Single, never married" when asked, "What is your marital status?"

[5]Includes responses "Divorced or separated" and "Widowed" when asked, "What is your marital status?"

Figure 1.2 Daily reported fruit and vegetable consumption

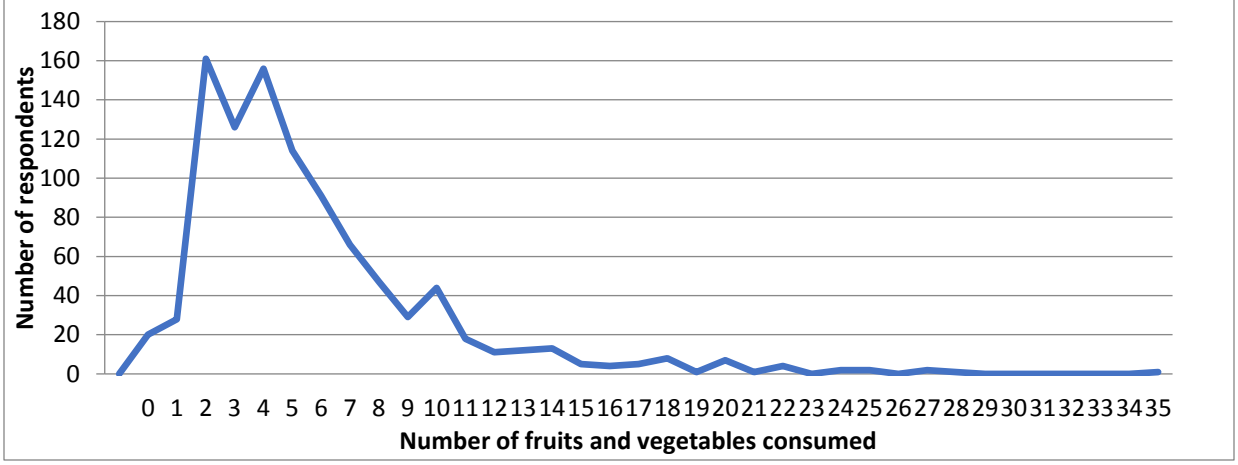
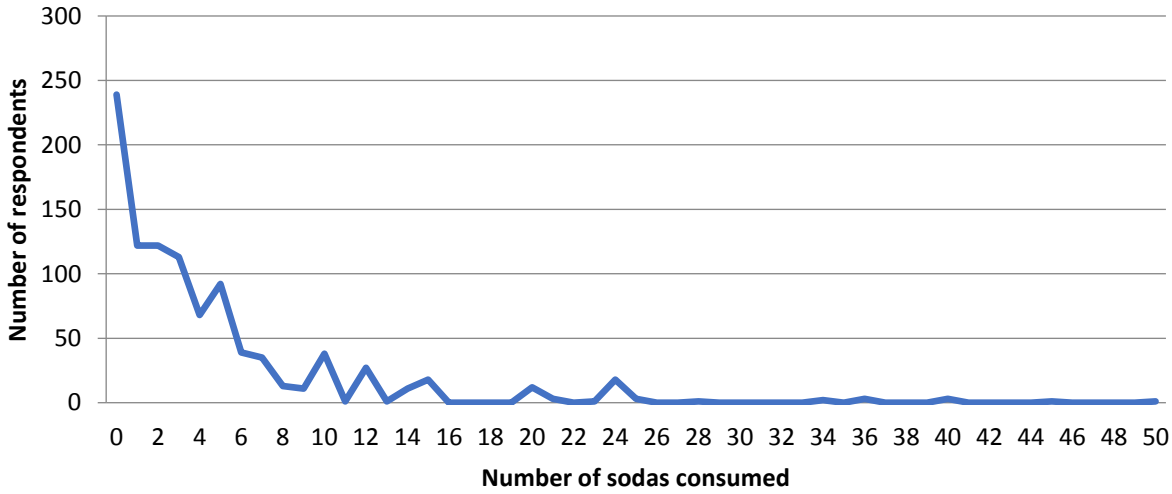


Figure 1.3 Weekly reported soda consumption



The present study used a four-phase analytic approach that was guided by the study aims:

Aim 1: Identify sociodemographic patterns in psychosocial community characteristics (PCCs)

In the first phase of analysis, each PCC variable was individually regressed on all sociodemographic characteristics to identify significant sociodemographic patterns in PCCs. Linear regression was used for continuous PCC variables, logistic regression for dichotomous PCC variables, and multinomial logistic regression for PCCs with more than two categories. These results are presented in **Table 1.**

Table 1.2: Coefficients and 95% confidence intervals (95% CI) for sociodemographic patterns in psychosocial community characteristics (PCCs), 2014 Los Angeles County Injury and Violence Prevention Survey (n=967)

	Domain 1: Neighborhood Risks and Resources					**Domain 2: Sense of Community**	
	Model:	***Model:***	***Model 3:***	***Model 4:***	***Model 5:***	***Model 6:***	***Model 7:***
	Perceived Neighborhood Violence[1] *(base outcome= low violence)*	**Perceived Park Access[2]** *(ref= perceived access)*	**Transportation to nearest grocery store[1]** *(base outcome= car)*	**Distance (miles) traveled to nearest grocery store[3]**	**Community-level economic hardship[3]**	**Perceived collective efficacy[3]**	**Neighborhood satisfaction[2]** (*ref= very satisfied/satisfied*)
Gender *(ref=female)*	Intermediate Violence NS High Violence ***Male:*** 0.65 (0.46, 0.91)*	NS	Bus NS Walking NS Other NS	NS	NS	***Male:*** 1.10 (0.07, 2.13)*	***Male:*** 0.48 (0.31, 0.76)**
Age *(ref=18-30 years)*	Intermediate Violence NS High Violence ***51+:*** 0.54 (0.3, 0.95)*	NS	Bus NS Walking NS Other NS	***41-50:*** -1.70 (-0.21, 1.87)** ***51+:*** -1.76 (-3.07, -0.45)**	***41-50:*** -5.96 (-9.44, -2.48)** ***51+:*** -7.54 (-11.16, -3.92)***	NS	NS
Race/ethnicity *(ref=Hispanic)*	Intermediate Violence NS High Violence NS	NS	Bus ***White:*** 0.27 (0.08, 0.95)* Walking NS Other ***White:*** 7.15 (1.85, 27.60)** ***Other:*** 41.57 (2.50, 691.41)**	NS	***White:*** -5.74 (-9.75, -2.73)*** ***Asian:*** -6.96 (-10.22, -3.70)***	NS	NS
Nativity status *(ref=born in LAC)*	Intermediate Violence NS High Violence NS	Does not perceive access: ***Foreign born:*** 1.78 (1.02, 2.97)*	Bus NS Walking NS	NS	NS	NS	NS

			<u>Other</u> NS				
Language spoken at home *(ref=English)*	<u>Intermediate Violence</u> ***Not English:*** 1.55 (1.0, 2.37)* <u>High Violence</u> ***Not English:*** 1.76 (1.16, 2.64)**	NS	<u>Bus</u> NS <u>Walking</u> NS <u>Other</u> NS	NS	NS	NS	NS
Education *(ref=college graduate/post-graduate)*	<u>Intermediate Violence</u> NS <u>High Violence</u> ***HS or less:*** 1.82 (1.11, 2.99)*	NS	<u>Bus</u> NS <u>Walking</u> NS <u>Other</u> ***Some college:*** 0.06 (0.01, 0.57)*	NS	***HS or less:*** 4.88 (1.64, 8.12)** ***Some college:*** 3.77 (1.19, 6.35)**	***HS or less:*** -1.56 (-3.09, -0.04)*	NS
Employment status *(ref=employed full-time)*	<u>Intermediate Violence</u> ***Employed part-time:*** 0.55 (0.32, 0.97)* <u>High Violence</u> ***Other employment:*** 0.55 (0.34, 0.88)*	NS	<u>Bus</u> ***Unemployed:*** 4.78 (1.64, 13.91)** ***Other employment:*** 3.56 (1.31, 9.70)* <u>Walking</u> NS <u>Other</u> ***Unemployed:*** 9.85 (1.61, 60.14)*	NS	NS	NS	NS
Income *(ref=over $100k)*	<u>Intermediate Violence</u> ***<$50K:*** 1.73 (1.06-2.80)* <u>High Violence</u> ***<$50K:*** 2.25 (1.36, 3.71)**	NS	<u>Bus</u> NS <u>Walking</u> NS <u>Other</u> NS	***$50K-$99K:*** 1.49 (0.39, 2.59)**	***<$50K:*** 3.89 (0.67, 7.10)*	***<$50K:*** -2.39 (-3.91, -0.88)**	***<$50K:*** 2.36 (1.12, 4.96)*
Marital status *(ref=married)*	<u>Intermediate Violence</u> NS <u>High Violence</u> NS	NS	<u>Bus</u> NS <u>Walking</u> ***Single:*** 1.80 (1.05, 3.09)*	NS	NS	NS	NS

			Other NS				
Children in household	Intermediate Violence NS High Violence NS	Does not perceive access: ***# Children:*** 0.80 (0.66-0.97)*	Bus NS Walking NS Other NS	NS	NS	NS	NS
Note: only coefficients for significant variables (p<0.05) presented; NS=not significant. 1multinomial logistic regression model 2logistic regression model 3linear regression model *p<0.05 **p<0.01 ***p<0.001							

Aim 2: Examine the relationships between PCCs, food choice factors (FCFs), and dietary behaviors; Aim 3: Assess whether the relationships between PCCs and FCFs on dietary behaviors persist after accounting for sociodemographics

Aims 2 and 3 were addressed in the second phase of analysis, where a step-wise modeling approach was used to examine the extent to which PCCs and FCFs shaped each dietary outcome (**Table 1.3)**. Negative binomial was selected as a modeling strategy since both dietary outcomes are overdispersed count outcomes (**Figures 1.2 & 1.3)**. In Model 1, the relationship between PCCs and fruit and vegetable (F+V) consumption was examined and incidence rate ratios are shown. Model 2 adds FCFs to the model, and the full model with PCCs, FCFs, and sociodemographic characteristics are examined in Model 3. The same strategy is used in Models 4, 5, and 6, where SSB consumption is the dependent variable.

Aim 4: Evaluate the extent to which FCFs explain the relationships between PCCs and dietary behaviors

In the third phase of the analysis, differences in each PCC coefficient (effect size) in the step-wise negative binomial modeling approach described in Aims 2 & 3 was used to determine the extent to which FCFs explain the relationships between PCCs and the dietary behaviors (see **Figure 1.4).** For each outcome, changes in effect sizes of PCC coefficients in Model 1 and Model 2 were evaluated for F+V consumption; changes in PCC coefficients in Models 4 and 5 were examined for soda consumption (**Table 1.3**).

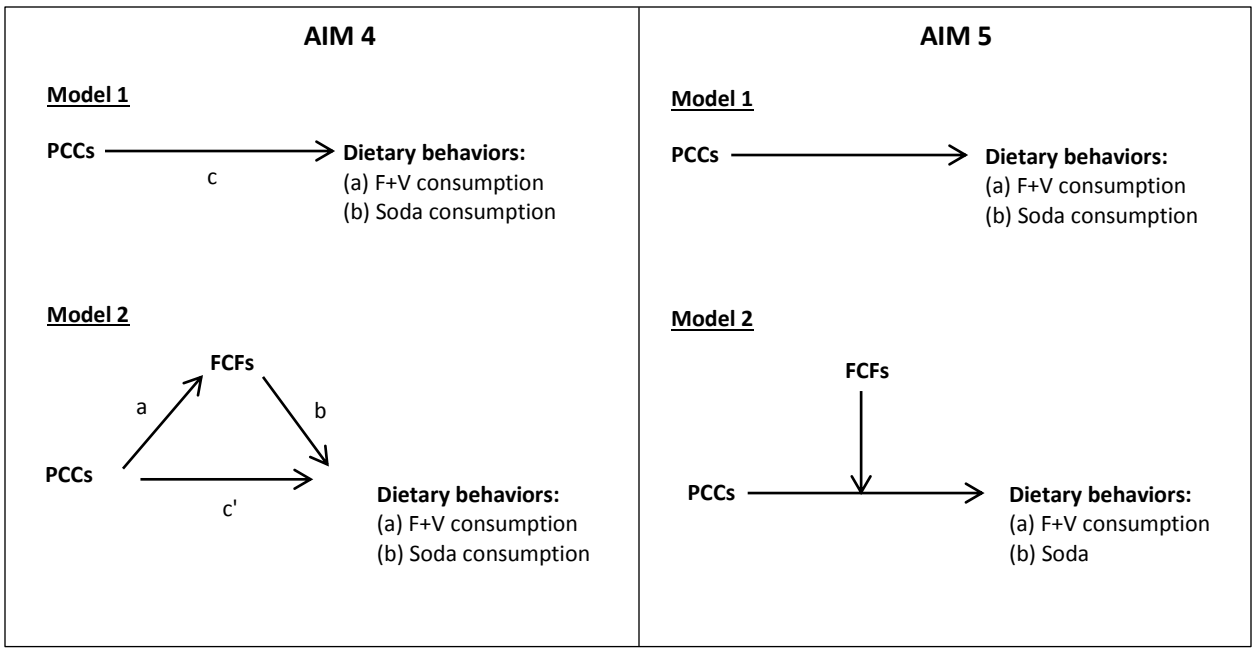


Figure 1.4 Examining the Mechanisms Linking Psychosocial Community Characteristics (PCCs), Other Food Choice Factors (FCFs), and the Dietary Behaviors Fruit and Vegetable (F+V) and Soda Consumption

Table 1.3. Psychosocial community characteristics (PCCs) and other food choice factor (FCF) predictors of self-reported dietary behaviors: Results from the Los Angeles County Injury and Violence Prevention Survey, 2014 (n=967)

	Fruit and Vegetable Consumption			Soda Consumption		
	Model 1: PCCs[a]	**Model 2:** FCFs[b]	**Model 3:** Full Model[c€]	**Model 4:** PCCs[d]	**Model 5:** FCFs[e]	**Model 6:** Full Model[f€]
	IRR[¥] (95% CI)	IRR[¥] (95% CI)	IRR[¥] (95% CI)	IRR[¥] (95% CI)	IRR[¥] (95% CI)	IRR[¥] (95% CI)
Neighborhood Risks and Resources						
Perceived neighborhood violence (ref: low violence)						
Intermediate violence	1.10 (0.98-1.23)	1.09 (0.98-1.22)	1.08 (0.97-1.20)	1.07 (0.86-1.32)	1.05 (0.85-1.30)	1.00 (0.81-1.22)
High violence	1.26 (1.13-1.42)***	1.19 (1.07-1.33)**	1.18 (1.05-1.31)**	1.42 (1.14-1.76)**	1.18 (0.95-1.47)	1.07 (0.87-1.31)
Park access (ref: has park access)						
Does not have park access	0.94 (0.83-1.06)	0.96 (0.85-1.08)	0.94 (0.84-1.06)	0.88 (0.71-1.09)	0.91 (0.74-1.12)	0.89 (0.73-1.08)
Mode of transportation (ref: Car)						
Bus	1.18 (0.91-1.52)	1.15 (0.90-1.47)	1.19 (0.93-1.53)	1.48 (0.99-2.23)	1.11 (0.75-1.65)	1.21 (0.75-1.97)
Walking	1.02 (0.88-1.18)	1.00 (0.88-1.14)	1.04 (0.92-1.18)	0.98 (0.76-1.27)	0.97 (0.74-1.28)	0.89 (0.69-1.14)
Other	1.38 (0.97-1.99)	1.12 (0.87-1.44)	1.12 (0.86-1.46)	1.17 (0.80-1.72)	1.06 (0.67-1.69)	1.08 (0.68-1.69)
Grocery store distance	1.01 (1.00-1.02)**	1.00 (0.99-1.01)	1.00 (0.99-1.01)	1.02 (1.01-1.03)**	1.00 (0.99-1.01)	0.99 (0.99-1.00)
Community-level economic hardship	1.00 (1.00-1.00)	1.00 (1.00-1.00)	1.00 (1.00-1.00)	1.00 (1.00-1.01)	1.00 (1.00-1.01)	1.00 (1.00-1.02)
Sense of Community						
Collective efficacy	1.02 (1.01-1.02)***	1.01 (1.00-1.02)**	1.01 (1.00-1.02)**	1.01 (1.00-1.02)	1.00 (0.99-1.02)	1.00 (0.99-1.02)
Neighborhood satisfaction (ref: very satisfied/satisfied)						
Very dissatisfied/dissatisfied	0.87 (0.75-1.01)	0.93 (0.80-1.08)	0.93 (0.81-1.08)	0.93 (0.69-1.27)	1.12 (0.80-1.56)	1.09 (0.80-1.50)
Food Choice Factors						
Fast food consumption	--	1.01 (0.99-1.03)	1.01 (0.99-1.02)	--	1.18 (1.14-1.23)***	1.16 (1.12-1.20)***
Sit-down restaurant consumption	--	1.09 (1.06-1.12)***	1.09 (1.06-1.12)***	--	0.98 (0.94-1.03)	1.00 (0.96-1.04)

*p <0.05
**p <0.01
*** p<0.001
€Adjusts for sociodemographic characteristics (data not shown).
¥ Incidence rate ratio
[a]**Model 1:** sample n=967 (LR chi^2_{10}=51.44, p=0.0000, pseudo r^2=0.0130).
[b]**Model 2:** sample n=967 (LR chi^2_{12}=167.21, p=0.0000, pseudo r^2=0.0341).
[c]**Model 3:** sample n=967 (LR chi^2_{33}=271.75, p=0.0000, pseudo r^2=0.0430); significant sociodemographic characteristics include: age (31-40, 41-50), race (African American), nativity status (native born but born outside LAC, foreign born).
[d]**Model 4:** sample n=967 (LR chi^2_{10}=29.68, p=0.0010, pseudo r^2=0.0061).
[e]**Model 5:** sample n=967 (LR chi^2_{12}=121.21, p=0.0000, pseudo r^2=0.0305).
[f]**Model 6:** sample n=967 (LR chi^2_{33}=259.81, p=0.0000, pseudo r^2=0.0469); significant sociodemographic characteristics include: race/ethnicity (White, Asian).

Aim 5: Assess whether FCFs moderate the association between PCCs and dietary behaviors

In the last phase of the analysis, the extent to which FCFs moderate the relationships between PCCs and dietary behaviors was tested by adding a PCC x FCF interaction term to the full model for each outcome (**Table 1.4**). This analytic approach is depicted in **Figure 1.4.** Significant interactions terms suggest that the relationship between the PCCs and each dietary outcome is conditional on the FCF of interest. For significant interactions, predicted probabilities were estimated and the results are shown in **Figures 1.5-1.11.**

Table 1.4. Examining the moderating role of food choice factors (FCFs) in the relationships between psychosocial community characteristics (PCCs) and dietary behaviors, Los Angeles County Injury and Violence Prevention Survey, 2014 (n=967)[a]

	Interaction Results	**Fruit and Vegetable Consumption**		**Soda Consumption**	
		Fast-food consumption	*Sit-down restaurant consumption*	*Fast-food consumption*	*Sit-down restaurant consumption*
	Neighborhood Risks and Resources	**IRR¥ (95% CI)**	**IRR¥ (95% CI)**	**IRR¥ (95% CI)**	**IRR¥ (95% CI)**
PSYCHOSOCIAL COMMUNITY CHARACTERISTICS	*Perceived neighborhood violence (ref: low violence)*				
	Intermediate violence	NS	NS	NS	NS
	High violence	NS	NS	NS	NS
	Park access (ref: has park access)				
	Does not have park access	1.05 (1.02-1.09)**	1.05 (1.01-1.10)*	NS	NS
	Mode of transportation (ref: Car)				
	Bus	NS	NS	NS	0.85 (0.73-0.99)*
	Walking	NS	NS	NS	NS
	Other	NS	1.10 (1.03-1.18)**	NS	NS
	Grocery store distance	NS	NS	NS	NS
	Community-level economic hardship	1.00 (1.00-1.00)*	1.00 (1.00-1.00)***	NS	NS
	Sense of Community				
	Collective efficacy	NS	NS	NS	NS
	Neighborhood satisfaction (ref: very satisfied/satisfied)				
	Very dissatisfied/dissatisfied	NS	NS	0.90 (0.84-0.96)**	NS

Note: Other covariates included in the models include sociodemographics (gender, race/ethnicity, nativity status, language, education, employment status, income status, marital status, number of children in household), as well as other PCCs (e.g., perceived neighborhood violence, park access, mode of transportation and distance travelled to nearest grocery store, community-level economic hardship, collective efficacy, neighborhood satisfaction) and FCFs (e.g., fast-food restaurant consumption, sit-down restaurant consumption) not captured in the interaction terms; NS=interaction not significant

*p <0.05

**p <0.01

*** p<0.001

¥ Incidence rate ratio

Figure 1.5. The relationship between park access and fruit and vegetable consumption as moderated by fast food restaurant consumption

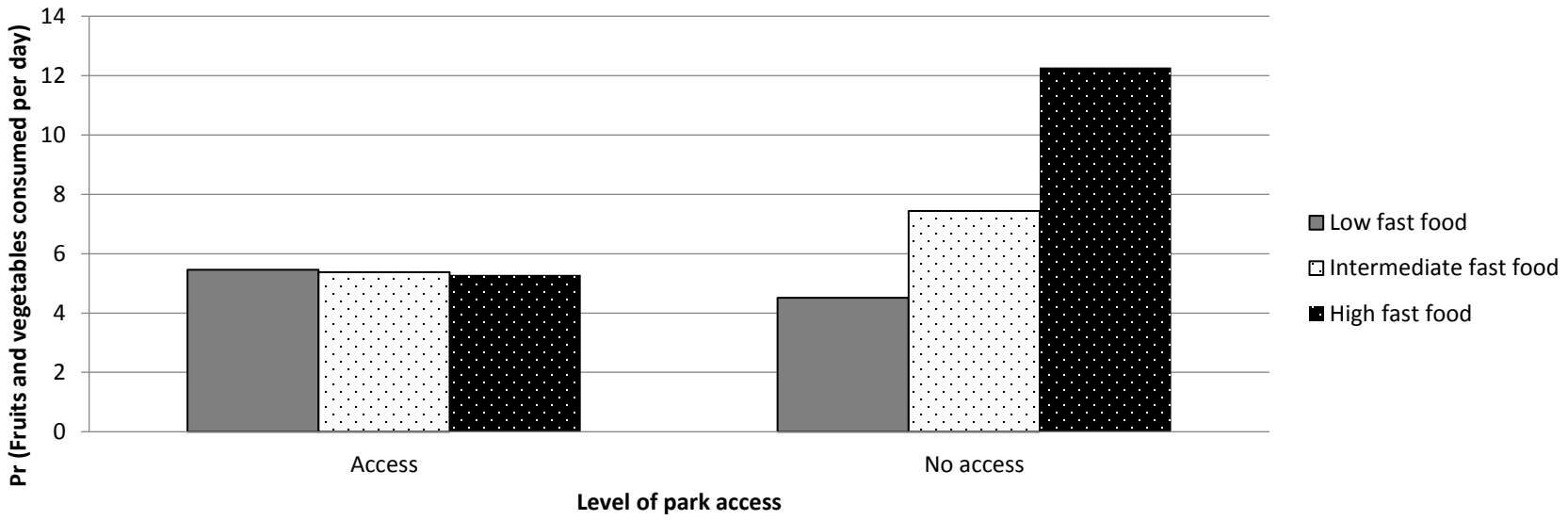


Figure 1.6. The relationship between community-level economic hardship (EHI) and fruit and vegetable consumption as moderated by fast food restaurant consumption

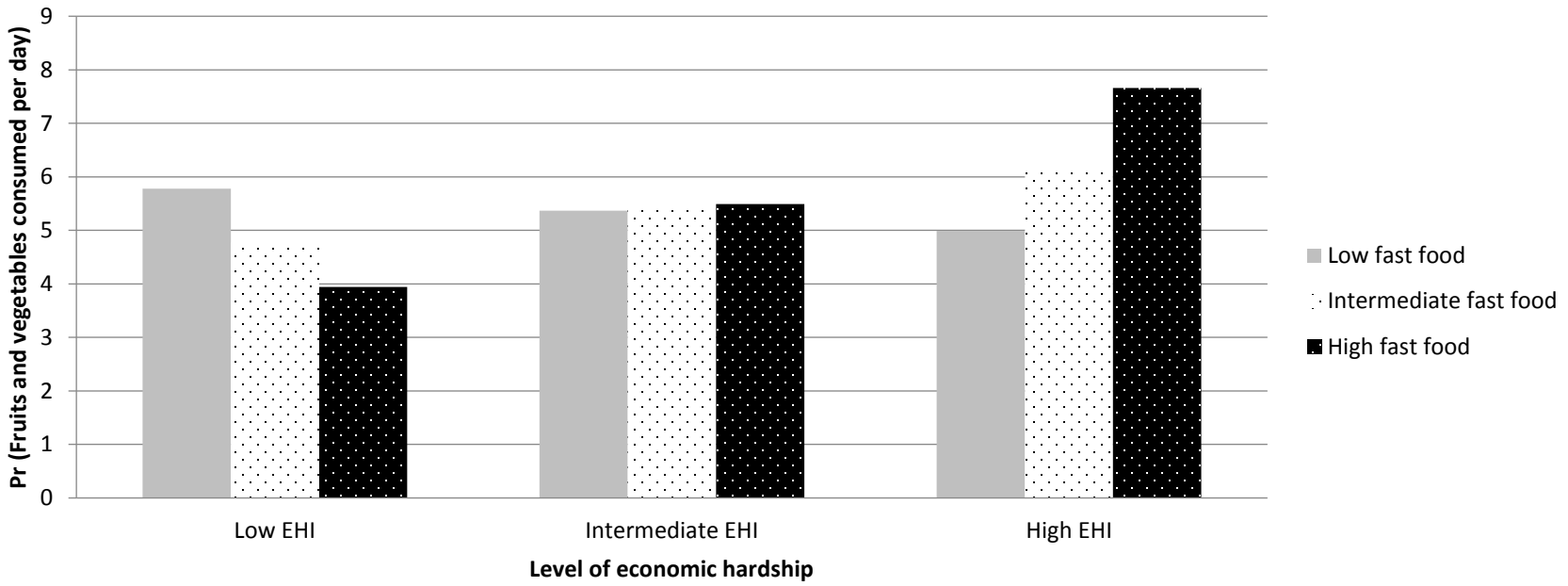


Figure 1.7. The relationship between park access and fruit and vegetable consumption as moderated by sit-down restaurant consumption

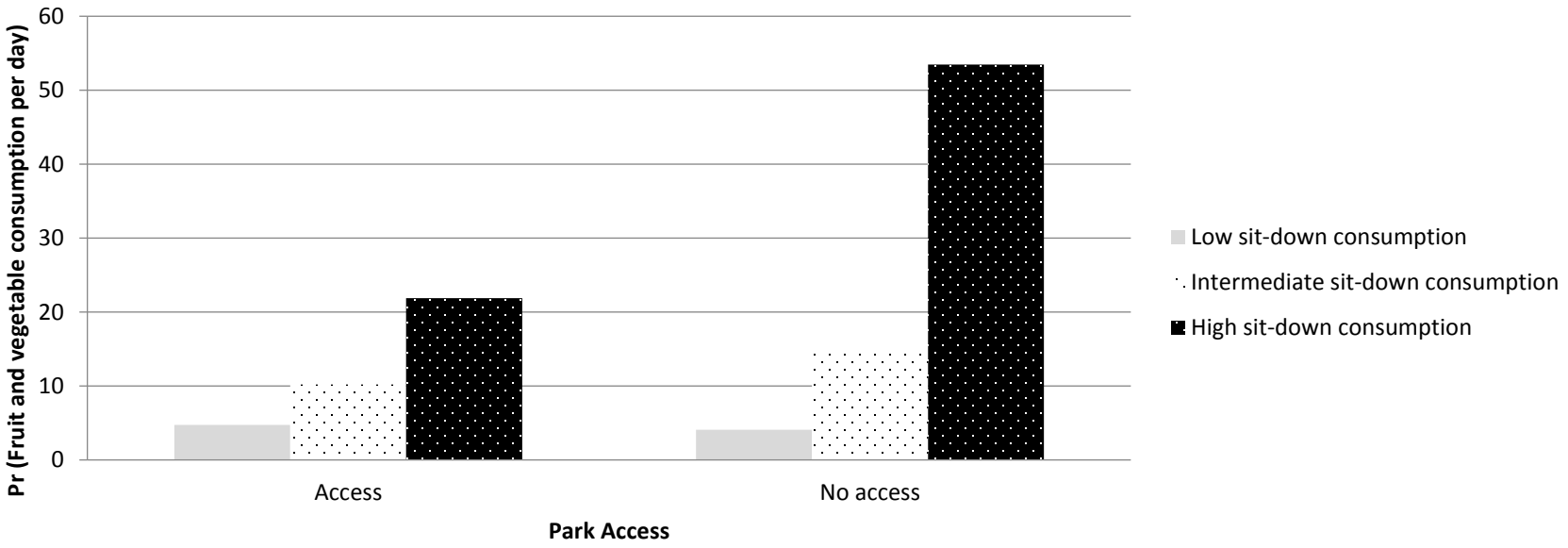


Figure 1.8. The relationship between mode of transportation to the nearest grocery store and fruit and vegetable consumption as moderated by sit-down restaurant consumption

Figure 1.9. The relationship between community-level economic hardship (EHI) and fruit and vegetable consumption as moderated by sit-down restaurant consumption

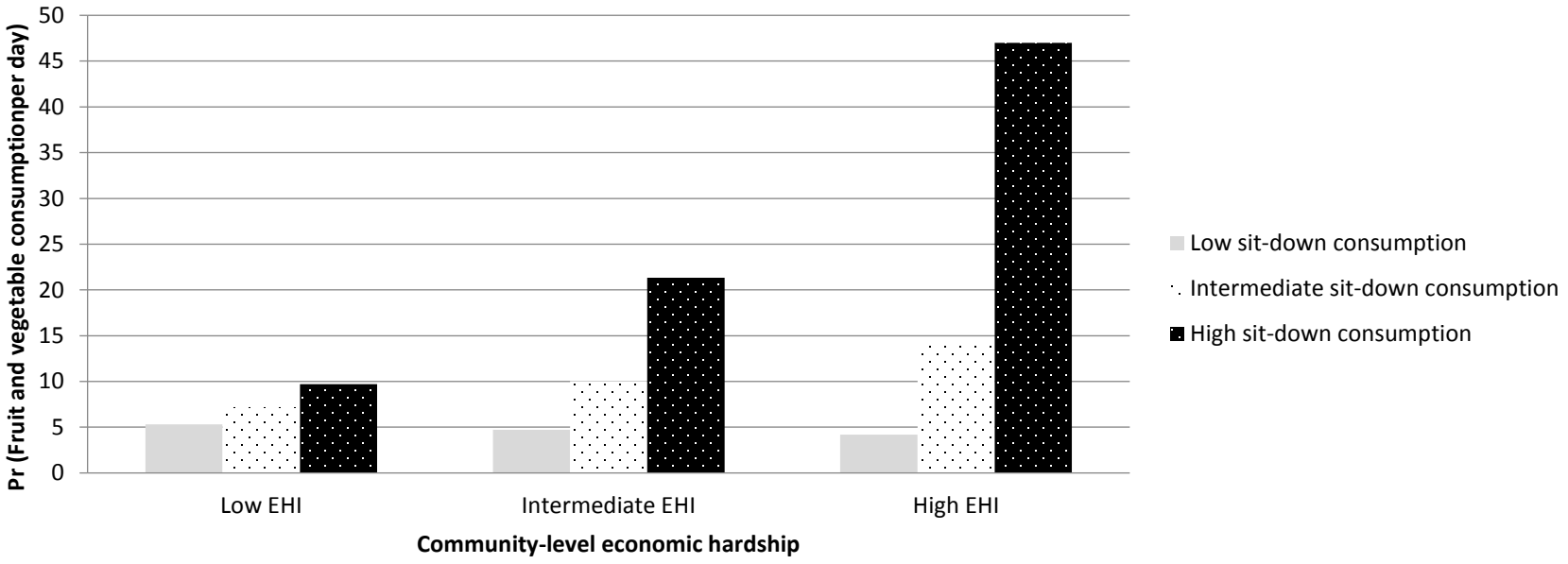


Figure 1.10. The relationship between neighborhood satisfaction and soda consumption as moderated by fast food restaurant consumption

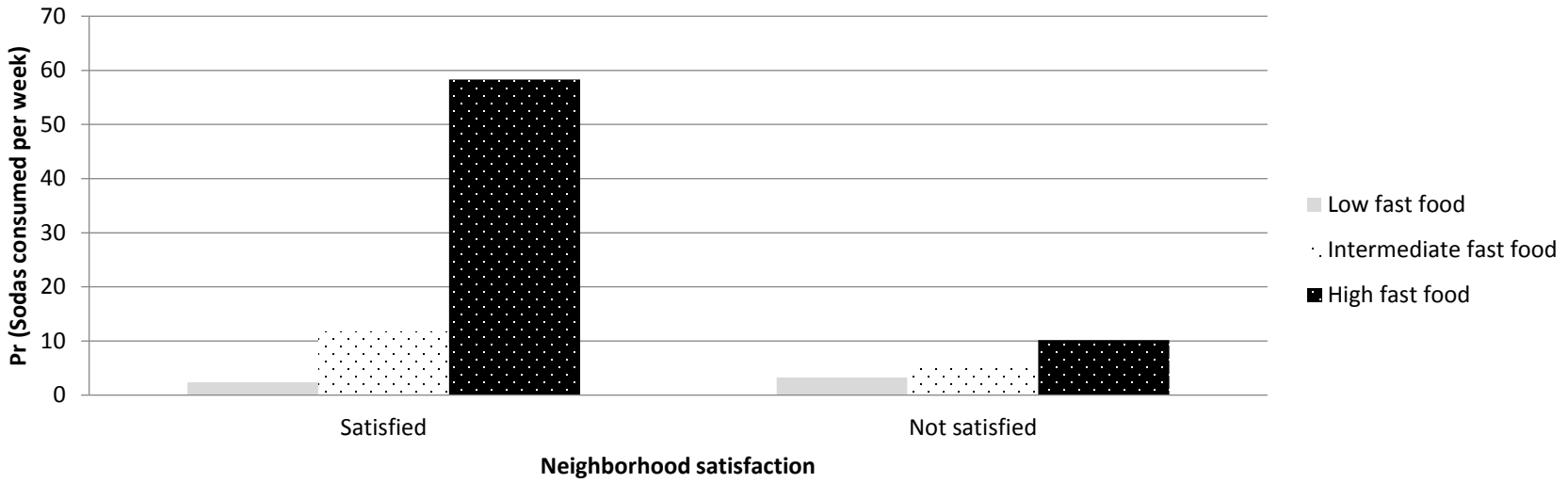
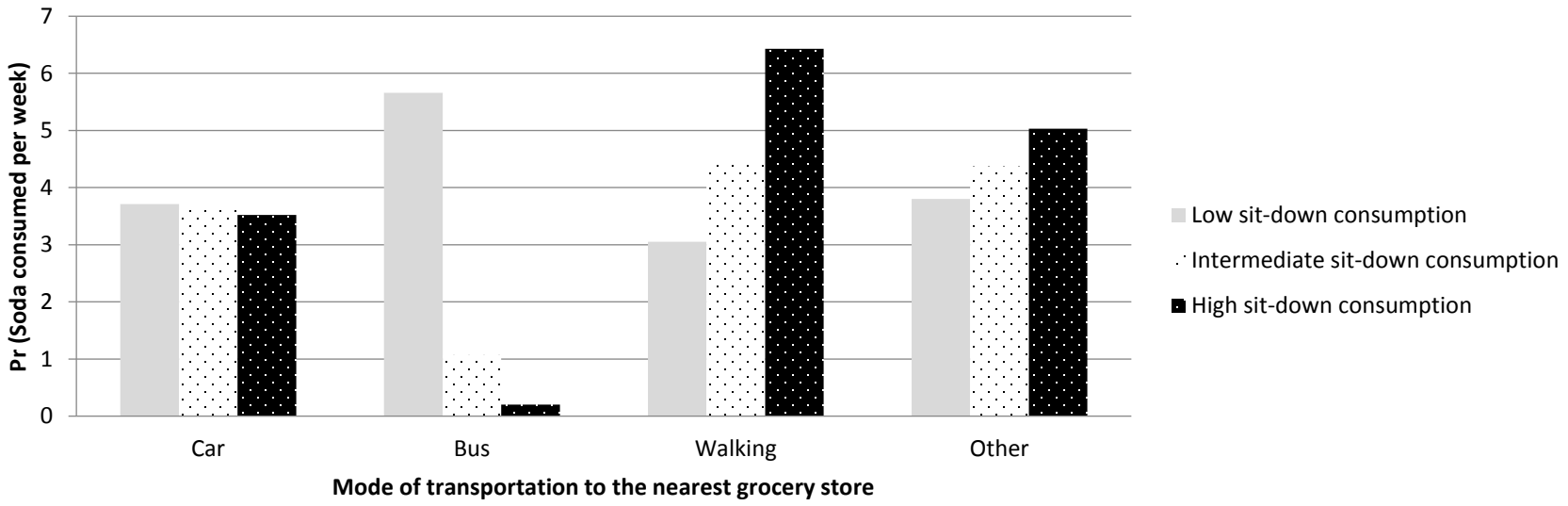


Figure 1.11. The relationship between mode of transportation and soda consumption as moderated by sit-down restaurant consumption



RESULTS

Table 1.1 presents the distribution of all variables examined in this study. The mean level of consumption of fruit and vegetable (F+V) consumption was 0.71 servings per day (*range: 0 to 35 servings of F+V per day*), while the mean level of soda consumption was 0.95 sodas per week (*range: 0 to 50 sodas per week*). This indicates that most reported consuming less than one full serving of fruits and vegetables daily but about one soda per week. Overall, the majority of respondents were male (50.7%), Hispanic/Latino (48.4%), born in Los Angeles County (66.9%), spoke English as the primary language spoken at home (76.1%), graduated from college/have a postgraduate degree (44.9%), employed full-time (55.3%), reported an income under $50,000, and were single (53.7%). The mean number of children in the household was 0.82 (*range: 0 to 8 children*).

Within the domain of *neighborhood risks and resources*, over a third of respondents perceived low levels of community violence (37.9%), while the majority reported having access to a park nearby (81.1%) and using a car to get to the nearest grocery store (81.3%). The mean average of miles traveled to a grocery store was 4.1 miles (*range: 0-65 miles)*, whereas the mean level of community economic hardship was 50.4 (*range: 13.2-82.5 hardship units)*. Examining the domain of *sense of community,* the mean level of perceived collective efficacy was 33.8 (*range: 10 to 50 units)* and the majority of respondents reported being very satisfied/satisfied in their neighborhood (89.4%). Furthermore, in terms of food choice factors, the mean number of times per week respondents consumed meals from a fast-food restaurant was 2.6 times (*range: 0 to 20 meals)*, whereas the mean number of times per week respondents consumed meals from a sit-down was 1.8 times (*range: 0 to 20 meals)*.

Aim 1: Sociodemographic patterns in psychosocial community characteristics (PCCs)

Table 1.2. highlights the links between sociodemographic characteristics and PCCs. The sociodemographic characteristic that had the greatest number of associations with PCCs was income, as it was significantly associated with perceived neighborhood violence, grocery store. For example, those with incomes under $50,000 per year reported greater perceived violence and had higher community-level economic hardship. Gender, age, and education were also strongly related to PCCs. For example, males were found to have lower perceived neighborhood violence, higher perceived neighborhood collective efficacy, and lower neighborhood satisfaction. In addition, respondents aged 51 years or older perceived lower levels of neighborhood violence. Education also mattered in terms of perceived neighborhood violence, transportation to the nearest grocery store, community-level economic hardship, and perceived collective efficacy. Sociodemographics that were least associated with the PCCs included race/ethnicity, nativity status, marital status, and children in the household. Overall, results indicated that certain sociodemographic characteristics, including income and education, are highly associated with PCCs.

Aim 2: Examine the relationships between PCPs, food choice factors (FCFs), and dietary behaviors

Results of the negative binomial regression analyses examining the relationships between PCCs, FCFs, and dietary behaviors are presented in **Table 1.3**. Model 1 included only PCCs, whereas Model 2 included both PCCs and FCFs. It is important to point out that similar results were observed in sensitivity analyses, which were conducted using multinomial logistic regression and generalized logistic regression *(data not shown)*.

Outcome 1: Fruit and Vegetable (F+V) Consumption

Model 1 examined the relationships between PCCs and F+V consumption. Perceived neighborhood violence and perceived neighborhood collective efficacy were significantly associated with F+V

consumption. In particular, respondents who reported high perceived neighborhood violence, holding other variables in the model constant, had a 1.26 times greater rate of fruit and vegetable consumption (IRR=1.26, 95% CI: 1.13-1.42). A one-unit increase in perceived collective efficacy was associated with a 2% increase in fruit and vegetable consumption, all else equal (IRR=1.02, 95% CI=1.01-1.02). In summary, results indicate that perceived neighborhood violence and perceived collective efficacy are associated with greater F+V consumption.

Model 2 examined the impact of PCCs and FCFs on F+V consumption. Aligning with results from Model 1, high perceived neighborhood violence and increasing levels of collective efficacy were positively associated with F+V consumption. The relationship between sit-down restaurant consumption and PCCs was also significant. Every additional meal consumed from a sit-down restaurant was associated with a 9% increase in fruit and vegetable consumption, holding all other variables in the model constant (IRR=1.09, 95% CI=1.06-1.12). Taken together, these results indicate that perceived neighborhood violence, perceived collective efficacy, as well as sit-down restaurant consumption are all associated with greater F+V consumption.

Outcome 2: Soda Consumption

Model 4 examined the relationships between PCCs and soda consumption. Respondents who reported high perceived neighborhood violence, holding other variables in the model constant, had a 1.42 times greater rate of soda consumption (IRR=1.42 95% CI=1.14-1.76). Grocery store distance was significantly associated with a 2% increase in soda consumption (IRR=1.02 95% CI=1.01-1.03). Results indicate that the neighborhood risks, higher perceived neighborhood violence and further distance travelled to the nearest grocery store, are associated with increased soda consumption.

Model 5 examined the impact of PCCs and FCFs on soda consumption. Only fast-food consumption was found to be statistically significant. In particular, every additional meal consumed from a fast-food restaurant was associated with an 18% increase in soda consumption, holding all other variables in the model constant (IRR=1.18, 95% CI=1.14-1.23). Essentially, after accounting for FCFs, the relationship between PCCs on dietary behaviors became non-significant and only fast-food restaurant consumption was positively associated with soda consumption.

Aim 3: Assess whether of the relationships between PCCs and FCFs on dietary behaviors persist after accounting for sociodemographics

Outcome 1: Fruit and Vegetable (F+V) Consumption

Results of negative binomial regression analyses examining the relationships between PCCs, FCFs, and F+V consumption— after *controlling* for sociodemographic characteristics— are presented in Model 3 of **Table 1.3**. Aligning with results found in Aim 2 (*Model 2 of Table 1.3*), there was a positive linear association between high perceived neighborhood violence and F+V consumption, as well as between perceived collective efficacy and F+V consumption. Results indicate that the links between these two PCCs were consistent even after controlling for sociodemographic characteristics.

Outcome 2: Soda Consumption

Results of negative binomial regression analyses examining the relationships between PCCs, FCFs, and soda consumption— after *controlling* for sociodemographic characteristics— are presented in Model 6 of **Table 1.3**. Results aligned with those from Aim 2 (***Model 5 of Table 1.3***), where fast-food restaurant consumption was associated with increased soda consumption. Every additional meal consumed from a fast-food restaurant was associated with a 16% increase in soda consumption, holding all other variables

in the model constant (IRR=1.18, 95% CI=1.14-1.23). Similar to F+V consumption, these relationships remained consistent even after accounting for sociodemographic patterns.

Aim 4: Evaluate the extent to which FCFs explain the relationships between PCCs and dietary behaviors

Results of the negative binomial regression analyses examining the extent to which FCFs explain the relationship between PCCs and dietary behaviors are presented in Models 1-6 of **Table 1.3**. Model 1-3 correspond to the F+V outcome, whereas Models 4-6 correspond to the soda consumption outcome. As previously mentioned, sensitivity analyses conducted using multinomial logistic regression and generalized logistic regression demonstrated similar results (*data not shown*).

Outcome 1: Fruit and Vegetable (F+V) Consumption Differences

Differences in PCC coefficients (effect size) from Model 1 to 2 (**Table 1.3**) were used to determine the extent to which FCFs explain the relationships between PCCs and F+V consumption. In Model 1, PCCs that were significant included high violence, grocery store distance, and perceived collective efficacy. After adding FCFs to the model (Model 2), the relationship between grocery store distance and F+V consumption was reduced to non-significance and there was an almost 6% reduction in the magnitude of impact of high perceived violence on F+V consumption. In contrast, the magnitude of impact of perceived collective efficacy on F+V consumption changed by less than 1%. The significance of PCCs coefficients observed in Model 2 were consistent in Model 3, which also accounted for sociodemographic characteristics. Overall, these results indicate that FCFs may partially explain or account for the relationship between PCCs and F+V consumption.

Outcome 2: Soda Consumption

Differences in PCC coefficients (effect size) from Model 4 to Model 5 (**Table 1.3**) were used to determine the extent to which FCFs explain the relationships between PCCs and soda consumption. In Model 4, PCCs that were significant included high violence and grocery store distance. After adding FCFs to the model (Model 5), the association between these PCCs and soda consumption were reduced to non-significance, indicating that FCFs may partially explain the relationship between PCCs and soda consumption.

Aim 5: Assess whether FCFs moderate the associations between PCCs and dietary behaviors after accounting for sociodemographic factors

Table 1.4 presents significant interactions FCFs in the relationship between PCCs and each dietary outcome.

Outcome 1: Fruit and Vegetable (F+V) Consumption

For F+V consumption, there were two significant interactions between PCCs and fast-food restaurant consumption, and three between PCCs and sit-down restaurant consumption. Results showed that *fast-food consumption* significantly conditions the influence of park access (**Figure 1.4**) and community-level economic hardship (**Figure 1.5**). Similarly, *sit-down restaurant consumption* significantly interacted with park access (**Figure 1.6**), mode of transportation (**Figure 1.7**), and community-level economic hardship (**Figure 1.8**). The nature of these relationships are detailed in **Table 1.4.** In summary, results indicate that the relationships between some neighborhood risks and resources (i.e., park access and community-level economic hardship) and F+V consumption are moderated by both fast-food and sit-down restaurant consumption. In contrast, the relationship between other neighborhood risks and resources (i.e., mode of transportation) were moderated by sit-down restaurant consumption only.

Outcome 2: Soda Consumption

For soda consumption, there was one significant interaction between PCCs and fast-food consumption and one significant interaction between PCCs and sit-down restaurant consumption. Results showed that *fast-food consumption* significantly conditions the influence of neighborhood satisfaction (**Figure 1.9**). The PCC that significant interacted with *sit-down restaurant consumption* was mode of transportation (**Figure 1.10**). To summarize, results indicate that both fast-food and sit-down restaurant consumption strengthened the relationship between the park access and community-level economic hardship PCCs and diet. In terms of soda consumption, result indicate that only sit-down restaurant consumption weakened the relationship between this dietary behavior and the PCC, transportation to the nearest grocery store.

DISCUSSION

Due to the absence of studies that have comprehensively examined how social and psychological community dynamics shape individuals' dietary decision-making behaviors, the overall goal of the present study was to better understand the relationships between psychosocial community characteristics (PCCs) and dietary behaviors in a racially/ethnically diverse urban population. While there is evidence to suggest that may PCCs impact diet, most studies have only considered the ways in which structural, physical built-environments shape such decisions. These environmental factors have an undeniable impact on what people eat. However, examining the ways that individuals perceive and experience their community is also a critically important component of individuals' decision-making process. A major contribution of the present study is that it is the first to conceptualize multiple psychosocial community factors within a single study; it is also one of few to examine the relationships between diet and two domains of PCCs: neighborhood risks and resources and sense of community. The main objectives of this were to: (a) identify sociodemographic patterns in PCCs; (b) examine the relationships between PCCs, FCFs, and diet;

and (c) evaluate the extent to which other food choice factors explain or moderate these relationships. Based on these aims there were several notable study findings.

Key Finding #1:

The first major finding was that certain PCCs are predictive of dietary behaviors. However, PCCs were only associated with healthy dietary behaviors. Specifically, perceived neighborhood violence and perceived collective efficacy, each representing a distinct PCC domain, were associated with fruit and vegetable (F+V) consumption. This relationship persisted even after taking into account respondent sociodemographic characteristics. In contrast, there was no relationship between PCCs and soda consumption, an unhealthy dietary behavior. That perceived neighborhood violence (representing the domain *neighborhood risk and resources*) and perceived collective efficacy (representing the domain *sense of community*) were associated with F+V consumption was not surprising. It was originally hypothesized that both of these PCC domains would be linked to a healthier diet (i.e., higher F+V consumption). Yet, the finding that soda consumption was not influenced by PCCs challenged the proposed study hypothesis that neighborhood risks such as high violence contribute to poor dietary behaviors. A possible explanation for this null association between PCCs and soda consumption could be due to the overall high levels of soda consumption. Over two-thirds (75.5%) of sample respondents reported consuming one or more sodas per week, and about a third consume one or more sodas per day. Other data examinations have found similar prevalence estimates for soda consumption in Los Angeles County (LACDPH, 2017a). However, more research is needed to better understand why PCCs differentially impact healthy and unhealthy dietary behaviors.

There are also other important nuances to point out in terms of the first key finding. The PCCs associated with higher F+V consumption were high violence and perceived collective efficacy. While it

makes sense that there is a positive linear relationship between perceived collective efficacy and F+V consumption, less intuitive is why high violence was also associated with higher F+V consumption. In other words, result support the original study hypothesis that positive PCCs such as collective efficacy are positively associated with healthier dietary behaviors, but disprove the hypothesis that negative PCCs such as high perceived neighborhood violence are associated with unhealthy dietary behaviors. A sub-analysis was carried out to better understand why high violence was linked to higher F+V consumption. This analysis and related findings are discussed in further detail below.

Key Finding #2:

Another major study finding was that effect of PCCs on dietary behaviors changed when other food choice factors (FCFs) were accounted for. The significance of grocery store distance, representing the PCC domain *neighborhood risks and resources*, became insignificant after accounting for FCFs in the model. This result provides evidence that FCFs to some extent explain the relationship between healthy dietary behaviors and grocery store distance. In terms of unhealthy dietary behaviors, results also indicate that the relationship between each domain of PCCs and soda consumption are explained by FCFs. In particular, high perceived neighborhood violence within the *neighborhood risks and resources* domain became insignificant after accounting for FCFs in the model. Similarly, grocery store distance representing the *sense of community* PCC domain became insignificant after accounting for FCFs in the model. Taken together, these results suggest that the frequency in which individuals eat away from home account for some of the impact of community perception of neighborhood violence and grocery store distance on both healthy and unhealthy dietary choices. Due to a paucity of studies on this topic, however, it remains unclear how these results compare to other studies. Future research should investigate how FCFs explain the relationship between different types of PCCs and dietary behaviors.

Key Finding #3:

A third major study finding is that some FCFs moderate the relationship between some PCCs and dietary behaviors. This observation is based on several significant interactions indicating that the relationship between community perceptions and diet choices are dependent on the frequency in which individuals consume food prepared away-from-home. Within this context, there were several key relationships. First, fast-food restaurant consumption was found to condition the relationship between two PCCs (i.e., park access, community-level economic hardship) and healthy dietary behaviors. For park access, results suggest that individuals with higher fast-food restaurant meal consumption consume more F+V than when they have less park access. F+V consumption was also amplified among those with high community-level economic hardship and who consumed more fast food meals, but reduced among those with low community-level economic hardship and high fast food meal consumption. Second, sit-down restaurant consumption was found to condition the relationship between some PCCs (i.e., park access, mode of transportation, and community-level economic hardship). Sit-down restaurant consumption had a similar moderating impact on the relationship between F+V consumption and the PCCs park access and community-level economic hardship. In terms of mode of transportation, results point out that individuals who consume more sit-down restaurant meals consume a higher quantity of F+V when they use other modes of public transportation, including biking. Altogether, these results suggest that both fast-food and sit-down restaurant consumption may increase the strength of the relationship between some PCCs and F+V consumption. However, it remains to be further explored how the interaction of the FCFs in the relationship between the aforementioned PCCs and healthy dietary behaviors work different across diverse communities.

Along these lines, it also appears that FCFs moderate the relationship between some PCCs and soda consumption, an unhealthy dietary behavior. In particular, individuals with who reported high

neighborhood satisfaction and fast-food consumption appear to consume a greater quantity of soda. Moreover, sit-down restaurant consumption appears to moderate the relationship between mode of transportation and soda consumption. Relationships that stand out are that soda consumption is lowest among those that take the bus and report low sit-down restaurant consumption. In contrast, soda consumption appears to be highest among those who walk or use other forms of transportation and who consume high levels of sit-down restaurant meals. Yet, no studies to-date have examined these patterns, making these findings difficult to compare. This underscores the need to further investigate the moderating impact of FCFs on the relationship between PCCs and dietary behaviors across racially/ethnically diverse communities.

Key Finding #4:

Another major finding is that sociodemographic differences in PCCs appear to exist among Los Angeles County residents. Being of lower socio-economic status (SES) was associated with greater perceived neighborhood risks. Lower SES status was also associated with less perceived access to neighborhood resources and lower sense of community. Income and education were the SES factors that were most associated with PCCs. Income had the greatest number of associations. In particular, lower income was statistically associated with the three neighborhood risk factors (i.e., perceived neighborhood violence, community-level economic hardship, and distanced traveled to the nearest grocery store) and both sense of community factors (i.e., perceived collective efficacy and neighborhood satisfaction). These results suggest that economic disadvantage may increase individuals' exposure to violence, having to travel a further distance to get to the nearest grocery store, and their likelihood of residing in communities characterized as high in economic hardship and low in collective efficacy.

Surprisingly, however, the present study also provides evidence that economically disadvantaged individuals also tend to have higher neighborhood satisfaction. Education was the second sociodemographic most associated with PCCs. It was linked with two neighborhood risks (i.e., perceived neighborhood violence and community-level economic hardship), one neighborhood resource (i.e., mode of transportation to the nearest grocery store), and one sense of community factor (i.e., perceived collective efficacy). These results suggest that less educated individuals perceive higher levels of neighborhood violence, as well as reside in communities that having higher levels of economic hardship communities and lower levels of collective efficacy. Having some college educational attainment also appears to be linked to using other modes of transportation (e.g., bikes) to get to the nearest grocery store. In combination, these findings underscore how SES-related factors, income and education, importantly shape individuals' perceptions of their communities. That is, individuals with higher education and higher incomes are less likely to perceive neighborhood risks, are more likely to perceive greater neighborhood resources, and are generally perceive a stronger sense of community compared to their lower SES counterparts.

These results are not surprising as they align with those from previous studies. Prior studies have noted group differences in perceptions of structural neighborhood factors. For example, a study conducted by Alamilla and colleagues (2016) identified racial/ethnic differences in how individuals perceived and reacted to discrimination (Alamilla, Scott, & Hughes, 2016). Giles-Corti & Donovan (2002) also previously found that socially disadvantaged individuals (i.e., those with lower incomes and educational status) perceive lower access to health resources, which ultimately impacts their health decisions and behaviors (Giles-Corti & Donovan, 2002). Moreover, Mair and colleagues (2010) have also noted how different groups perceive structural factors of communities differently (Mair, Diez Roux, Osypuk, et al., 2010). Ultimately, although there is some prior evidence that SES factors such as those related to income and education matter for social and psychological community-based health, the present

study is the first to study these factors in conjunction with other sociodemographic characteristics and within the context of other psychosocial community factors that can potentially contribute to differential dietary-related health behaviors. Based on these findings, public health efforts should seek to address underlying income and educational health disparities.

Sub-Analysis Key Findings:

As previously mentioned, a major unexpected finding was that high violence seems to increase F+V consumption. This finding was counterintuitive and challenges the hypothesis that negative PCCs discourage individuals from eating healthy. To better make sense of this finding, a sub-analysis examining the intervening impact of race/ethnicity on the relationship between PCCs and dietary behaviors was carried out (***see Appendix,*** *Table S1.1 and Figure S1.1-S1.3*). This sub-analysis provides a richer explanation as to why high violence may encourage individuals to consume more F+V. It found that when exposed to high levels of violence, Whites and Asians consumed less F+V compared to Hispanics; in contrast, there were no differences in F+V consumption between African Americans and Hispanics.

There are several possible explanations for why high perceived neighborhood violence negatively impacts F+V consumption patterns of Whites and Asians but not that of African Americans and Latinos. First, it could be that Africans Americans and Hispanics— who tend to live in less affluent areas of Los Angeles County— experience higher levels of violence than Whites and Asians, and are more accustomed to living with violence on a daily basis.

A second explanation could be that African Americans and Hispanics may perceive higher levels of violence, and thus, use food as a coping strategy for stress. This includes eating all types of food, both healthy and unhealthy foods. Theoretically, the Environmental Affordances Model bolsters this

explanation. It suggests that living in disadvantaged communities exacerbate exposure to stress, which may lead individuals to engage in maladaptive coping skills that result in negative health consequences. While the Environmental Affordances Model does not explicitly focus on diet, it does afford that possibility for maladaptive coping skills include consumption of unhealthy foods, as well as overconsumption of all foods (i.e., both healthy and unhealthy). Previous study findings also support this second hypothesis. For example, trauma exposure and distress have been found to increase susceptibility to binge eating among African American trauma survivors (Harrington, Crowther, & Shipherd, 2010). Similarly, African American men have also been found to respond to stress by engaging in both healthy and unhealthy coping behaviors (Ellis, Griffith, Allen, Thorpe, & Bruce, 2015). In general, exposure to stress (both perceived and measured) has been associated with greater drive to eat (Groesz et al., 2012). This could also explain why African Americans and Hispanics may generally consume larger portions of food (J. O. Fisher, Arreola, Birch, & Rolls, 2007).

A third explanation could be related to cultural specific dietary preferences of Hispanics and African Americans, whose traditional cuisine includes a variety of fruit and vegetable options (Kulkarni, 2004). In particular, there is evidence that African Americans and Hispanics have cultural-specific preferences for fruits and vegetables (Grigsby-Toussaint, Zenk, Odoms-Young, Ruggiero, & Moise, 2010). A fourth possible explanation for why race/ethnicity matter in the relationship between violence and F+V consumption could be related to acculturation. Studies have found that first generation populations maintain healthier diets than second and third generations (Allen et al., 2007; Fitzgerald, 2010; Neuhouser, Thompson, Coronado, & Solomon, 2004; Pérez-Escamilla, 2009; Salinas, 2013). In contrast, among African American acculturated has also been attributed to differences in F+V consumption—although acculturation appears to benefit this group (Ard, Skinner, Chen, Aickin, & Svetkey, 2005).

Finally, recent investments to combat obesity in Los Angeles County, those that have primarily targeted low-income Hispanic and African American communities, may also explain the aforementioned counterintuitive finding. During the time that the survey used in the present study was collected an array of obesity-prevention interventions promoting F+V consumption were taking place. These ranged from corner store conversions (DeFosset, Gase, Webber, & Kuo, 2017) to improving access to farmers' markets accepting Electronic Benefit Transfer (Robles et al., 2017) to implementation of healthy food procurement policies within organizational structures (Robles, Wood, Kimmons, & Kuo, 2013). However, it is important to point out that these are just some possible explanations that should be further explored.

Study Limitations

The present study is subject to a few limitations. First, the study design was cross-sectional and web-based, which may have limited generalizability to the target population. To address this issue, U.S. Census-based quota criteria were applied to as closely as possible collect a survey sample representative of the Los Angeles County population. Second, due to the originality of some survey questions not all measures were validated, and third, the survey was only administered in English, which may have reduced representativeness of the study sample. To mitigate these issues, validated measures were used whenever possible. Finally, given the nature of internet panel surveys it was difficult to calculate response rate. Instead, participation rate was calculated which was about 33%, comparable to other cross-sectional studies conducted in Los Angeles County (Simon, Wold, Cousineau, & Fielding, 2001). Future population-based studies— those that include obtaining a more robust response rate and using validated survey measures available in multiple languages— should be conducted to address these study limitations.

Conclusions

Despite millions of dollars invested to combat excess adiposity and related risk of chronic conditions, these public health threats remain unabated. A possible reason could be that recent efforts have mainly focused on one major factor related to diet: structural, physical environmental factors. Yet it is also imperative to understand how the social and psychological dynamics of communities also contributes to growing obesity and chronic disease burden in the population, especially within the context of other food choice factors. This study bolsters our understanding of the factors that are typically not examined within the context of diet. It appears to be the first to fill the gaps in evidence and practice by examining how psychosocial community factors— as well as other food choice factors— shape the dietary behaviors of a racially/ethnically diverse population targeted by structural efforts to improve access to healthy food environments in the region. In light of the results from the present study, it is critical that forthcoming programming and policy interventions take into account that various psychosocial community factors and other food choice factors may differentially impact dietary behaviors of the population.

CHAPTER 7

STUDY #2- EXAMINING THE ROLE OF PSYCHOLOGICAL WELL-BEING IN THE RELATIONSHIP BETWEEN PSYCHOSOCIAL COMMUNITY CHARACTERISTICS AND DIETARY BEHAVIORS IN A RACIALLY/ETHNICALLY DIVERSE URBAN POPULATION

INTRODUCTION

There is emerging evidence that the social and psychological dynamics of communities have important implications for individuals' lived experiences and may exert a strong influence on their ability to adopt and maintain healthy lifestyle behaviors. This is evidenced by the first study in the present dissertation, which found that these community factors— conceptualized as *psychosocial community characteristics* (PCCs)— may serve as additional barriers *or* facilitators that are independent of objectively measured food environments. For example, individuals who perceived high levels of violence were found to engage in both healthy and unhealthy dietary behaviors. Racial/ethnic differences were also noted in terms of how groups responded to PCCs such as violence— e.g., African Americans and Hispanics consumed more fruits and vegetables when their perceptions of neighborhood violence were high, whereas Whites or Asians consumed lower levels under these circumstances. Findings from the first study also suggest the frequency in which individuals consume foods prepared away-from-home matters in how individuals perceive and react to actual physical/built environmental structures. However, these other *food choice factors* (FCFs), which pertain to the frequency of consuming food prepared away from one's home, are just one possible intervening factor in the relationship between PCCs and dietary behaviors.

Another potentially important factor in this relationship could also be *psychological well-being* (PWB), a multi-faceted concept generally understood as a psychological state of balance (Dodge et al., 2012). PWB is often assessed by psychological distress, an indicator of negative emotional states and poor

psychological functioning (Veit & Ware, 1983). However, no studies to-date have examined how PWB influences individuals' responses and reactions to psychosocial community environments from a dietary standpoint. This is problematic because not understanding the extent to which PWB might play a role in what individuals eat— especially within the context of other community factors that make be linked to PWB— represents a missed opportunity to strengthen the development and dissemination of current and forthcoming obesity and chronic disease prevention efforts. Addressing these gaps in the evidence-base is especially timely given the current geo-political climate and increasing reports of Americans' heightened psychological distress levels (Greenberg, 2017), as well as increasing prevalence of obesity (Flegal et al., 2016). Thus, the present study seeks to evaluate the ways that PWB shapes the relationship between PCCs and dietary behaviors in a large, racially/ethnically diverse urban population. Building upon findings presented in Study #1, the present study has the potential to inform and strengthen dissemination of current and forthcoming nutrition-focused interventions.

PCCs, Psychological Well-Being, and Diet

There is currently an absence of literature examining the extent to PWB shapes the relationship between PCCs and diet. However, it is possible that PCCs— whether positive or negative—importantly shape PWB and health behaviors. This hypothesis is based on the Biopsychosocial Model and Environmental Affordances Model (Mezuk et al., 2013), which were described in more detail on pages 25-30 of this dissertation. Essentially, the first model points out that there are underlying drivers (i.e., biological, psychological, and societal factors) that individually and collectively influence disease development (Natale-Pereira et al., 2011; Seeman & Crimmins, 2001); the latter model explains how individuals within disadvantaged communities often draw on available coping resources that may benefit psychological health while undermining physical well-being. This model underscores the significance of

social stressors within environmental contexts and bolsters evidence that PWB is an important determinant of physical health and health behaviors.

The present study integrates these perspectives to examine the impact of PWB on the relationship between PCCs and diet, and a conceptual model illustrating this approach is presented in ***Figure 2.1.*** Drawing from studies finding that individuals exposed to chronically stressful environments are more likely to engage in unhealthy behaviors (Jackson, Knight, & Rafferty, 2010), this model proposes there are significant linkages between PCCs, such as neighborhood violence, and psychological distress. It also posits that these adverse community contexts may diminish PWB and hinder the ability to engage in healthy dietary decisions. Previous study findings also bolster the idea that positive PCCs can positively impact mental health (Mair et al., 2008; Mair, Diez Roux, & Morenoff, 2010; Reingle et al., 2014; Santaularia et al., 2014) and help individuals to make healthier food selection decisions (LaCaille, Dauner, Krambeer, & Pedersen, 2011; Patrick & Nicklas, 2005)— i.e., behaviors that have a protective effect on one's health (Holt-Lunstad, Smith, & Layton, 2010; Shor, Roelfs, & Yogev, 2013). As such, it is possible that positive PCCs, such as collective efficacy, may enhance PWB, which may then augment individuals' ability to cope with external psychosocial stressors at the community-level and facilitate the ability to make healthier dietary decisions.

Psychological Well-being: Its Influence on the Relationship Between PCCs and Diet

As previously mentioned, there are theoretical underpinnings that PWB may have important consequences in the relationship between PCCs and dietary behaviors. Nevertheless, the specific mechanisms through which PWB may influence this relationship needs to be further disentangled. Prior research suggests there are two possible mechanisms through which PWB shapes the ways that PCCs influence individuals' dietary behaviors. The first potential mechanism is that PWB explains the links

between PCCs and dietary behaviors. In other words, the relationship observed between PCCs and diet stems from PCCs impacting PWB, a mental health factor that subsequently impacts diet.

There is some empirical evidence to support the existence of this first mechanism. For example, Mezuk and colleagues (2017) noted that disadvantageous community environments may expose individuals to psychological stressors that increase their levels of psychological distress (Mezuk et al., 2017). This builds upon research finding that neighborhood stressors such as neighborhood economic hardship, have been found to adversely impact individuals' mental health status (Alamilla et al., 2016; Amato & Zuo, 1992; Cutrona, Russell, Hessling, Brown, & Murry, 2000; Farrell, Aubry, & Coulombe, 2004; Ross, Reynolds, & Geis, 2000; Seaton & Yip, 2009). Conversely, it is also possible that positive community contexts such as having access to parks, community facilities, and other environmental resources that engender a sense of safety, reduce stress, evoke positive emotions, or have a restorative impact on the psyche positively impact individuals' PWB (Abraham, Sommerhalder, & Abel, 2010; Guite, Clark, & Ackrill, 2006). For example, there is accumulating evidence that a greater sense of community and positive interpersonal social relationships have a salutary impact on individuals' mental well-being (Alamilla et al., 2016; Cramm, van Dijk, & Nieboer, 2013; Luttmer, 2005; Mair, Diez Roux, & Galea, 2008). Within this context, PWB may matter for diet, as there is a small but bourgeoning body of evidence that good mental health helps individuals adopt healthier dietary behaviors (LaCaille et al., 2011; Patrick & Nicklas, 2005).

A second potential mechanism is that PWB may moderate the relationship between PCCs and dietary behaviors. In other words, the strength of the relationship between PWB and dietary behaviors may be conditional on one's level of PWB. This means that that individuals' PWB may reduce or strengthen the impact of PCCs on dietary decision-making. For example, psychological distress, which is an indicator of PWB, has the potential to exacerbate or diminish the impact of PCCs on diet. That is, high distress may accentuate the impact of negative PCCs and attenuate the benefits of positive PCCs. Conversely, low

distress levels may diminish the impact of negative PCCs and enable individuals to maintain healthier behaviors. However, there is a paucity of research on this topic.

The Present Study

The goal of the present study is to examine the ways in which PWB shapes the relationships between PCCs and dietary behaviors in a racially/ethnically diverse sample of Los Angeles County residents. A conceptual model informed by the Biopsychosocial Model and Environmental Affordances Model guides all study analyses (**Figure 2.1.)**, as well as the following study aims:

(1) identify *the relationships between PCCs and PWB;*

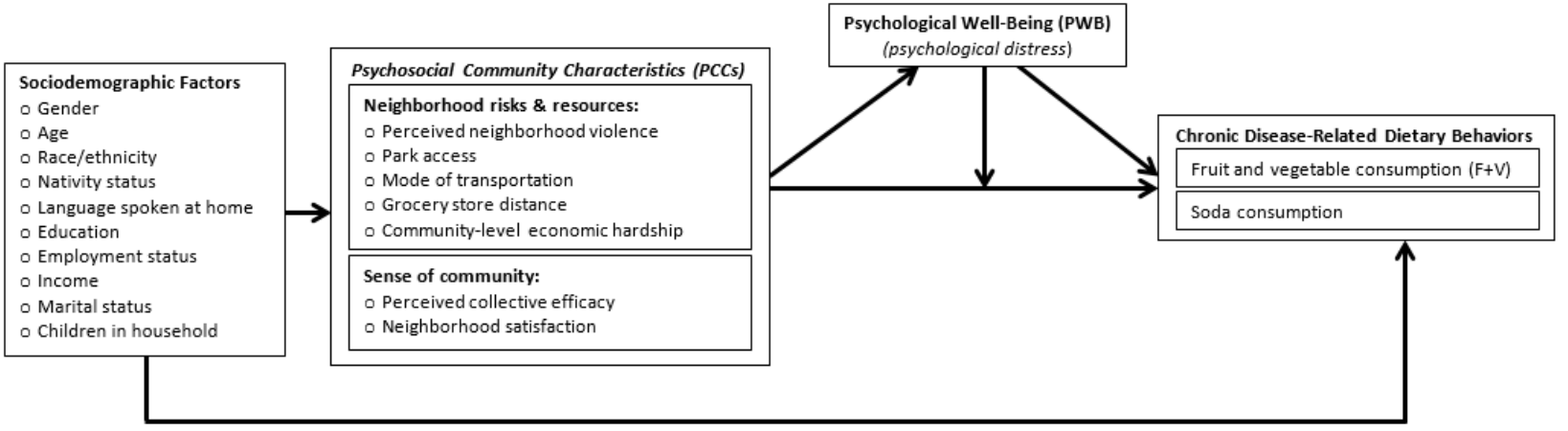
(2) *examine the relationships between PWB and dietary behaviors;*

(3) *evaluate the extent to which PWB explains the relationships between PCCs and dietary behaviors among Los Angeles County residents;*

(4) *assess whether PWB moderates the associations between PCCs and dietary behaviors among LAC residents.*

Evaluating and assessing the extent to which PWB explains and/or moderates the relationship between PCCs and dietary behaviors is important, as it can shed insight on how addressing individuals' mental health can be a point of intervention to help improve dietary behaviors in the population.

Figure 2.1. Study #2: The Impact of Psychological Well-Being on the Relationship between Psychosocial Community Characteristics and Chronic Disease-Related Dietary Behaviors



*****The present model was informed by the Biopsychosocial Model and Environmental Affordances Model. Solid lines indicate measured relationships, whereas dotted lines indicate unmeasured relationships

Paper #2 Goal: *To examine the ways in which PWB shapes the relationship between PCCs and dietary behaviors in a racially/ethnically diverse urban population.*

Aim 1: *Identify the relationships between PCCs and PWB among Los Angeles County residents.*

Aim 2: *Examine the relationships between PWB and dietary behaviors among Los Angeles County residents.*

Aim 3: *Evaluate the extent to which PWB explains the relationships between PCCs and dietary behaviors among Los Angeles County residents.*

Aim 4: *Assess whether PWB moderates the associations between PCCs and dietary among Los Angeles County residents.*

METHODS

Data Source

Data for this study were from the 2014 IVPP Survey previously described in the previous section, Data Sources *(page 45).* This survey is a cross-sectional internet panel survey that was commissioned to a California-based firm specializing in internet panel surveys (USamp) by the Los Angeles County Department of Public Health. The IVPP survey was conducted in Fall 2014. Los Angeles County adults were recruited from the selected firm's global proprietary panel of approximately 14 million subscribers. To be enrolled into the panel, the firm required subscribers to complete a questionnaire that it used as part of its standard protocol to screen prospective survey participants for eligibility into various surveys. Out of the global propriety sample, 1599 subscribers were screened eligible and started the 2014 IVPP survey. Prospective panel participants had to be Los Angeles County residents, at least 18 years old, and meet sociodemographic quota targets based on the 2010 U.S. Census estimates for Los Angeles County adults (**Table 1**). Individuals were excluded if they did not meet these criteria or tried to enroll after quota criteria had been filled. In total, 1000 people completed the survey (participation rate=~33%). Of these respondents, 967 provided complete information for variables of interest in the present study.

Measures

Dependent Variables

The same two dependent variables from Study #1—i.e., *fruit and vegetable consumption* and *soda consumption*— were separately analyzed in multivariable regression analyses. Construction of these variables are described on *pages 66-68.*

Psychosocial Community Characteristics (PCCs)

Three domains of PCCs were examined in this study. Construction of these variables are described on *pages 68-71.*

Neighborhood risks and resources: perceived neighborhood violence; park access; grocery store distance; mode of transportation; and community-level economic hardship.

Sense of community: perceived collective efficacy and neighborhood satisfaction.

Psychological Distress

As previously mentioned, psychological distress is a measure used to examine psychological well-being (Veit & Ware, 1983) (Marchand, Drapeau, & Beaulieu-Prévost, 2012; A. Stewart, Ware, Sherbourne, & Wells, 1992). In the present study, *psychological distress* (α=0.74) was measured using the five-item Mental Health Inventory (MHI-5). The MHI-5 asks respondents to report (in the last month) their level of happiness, level of calm and peace, level of nervousness, level of feeling "downhearted and blue," and level of feeling "so down in the dumps" that nothing could cheer them up (Strand, Dalgard, Tambs, & Rognerud, 2003). Respondents were able to choose from six possible response options assigned scores ranging from 5 to 30 points each. Responses included: 5="none of the time," 10="a little bit of the time," 15="some of the time," 20="a good bit of the time," 25="most of the time," and 30=all of the time." The items were linearly transformed and total scores ranged from 0-100, with higher scores indicating higher levels of psychological distress. In the present study, responses were assessed categorically: *(0) low* (scores 0-40.0, referent category); *(1) intermediate* (scores 40.1-72.9); and *(2) high* (scores 73+). This scoring procedure and similar cut-offs have been previously used (Hoeymans, Garssen, Westert, & Verhaak, 2004; Kelly, Dunstan, Lloyd, & Fone, 2008).

Other Covariates

Additional covariates previously described on pages 72-73 were also included in the study analyses.

Food choice factors: fast-food and sit-down restaurant consumption.

Sociodemographic characteristics: gender; age; race/ethnicity; nativity status; language spoken at home; education; employment status; income; marital status; and number of children in the household.

Analytic Strategy

All data were cleaned and analyzed using STATA version 14.1 *(StataCorp LP, College Station, Texas)*. Prior to analyses, the univariate distributions of all outcome, predictor, and control variables were examined using histograms, frequency/percentage measures, central tendency measures (e.g., means, median), and dispersion measures (e.g., range, standard deviation). **Table 2.1.** presents results of some of these descriptive statistics. These analyses were also used to inform variable selection and verify the appropriateness of statistical procedures (**Figure 2.2)**.

Table 2.1 Sociodemographic characteristics of respondents from the *Los Angeles County Injury and Violence Prevention Survey*, 2014 (n=967)*

Characteristics	Number (%) or *Mean [SD]*
Psychological Well-being	
Low psychological distress	438 (45.3)
Intermediate psychological distress	463 (47.9)
High psychological distress	66 (6.8)
Chronic Disease-Related Dietary Behaviors	
Fruit and Vegetable Consumption	
High consumption (5 or more servings per day)	481 (49.7)
Intermediate consumption (3-4 servings per day)	279 (28.9)
Low consumption (0-2 servings per day)	207 (21.4)
Mean fruit and vegetable consumption	*0.71 [.79]*
Soda Consumption	
High consumption (7 or more sodas per week)	190 (19.7)
Intermediate consumption (1-6 sodas per week)	540 (55.8)
Low consumption (0 sodas per week)	237 (24.5)
Mean soda consumption	*0.95 [0.66]*
Psychosocial Community Characteristics	
Neighborhood risks & resources	
Perceived neighborhood violence	
Low violence	366 (37.9)
Intermediate violence	289 (29.9)
High violence	312 (32.3)
Park access	
Has park access	784 (81.1)
Does not have park access	183 (18.9)
Mode of transportation to nearest grocery store	
Car	786 (81.3)
Bus	38 (3.9)
Walking	124 (12.8)
Other	19 (2.0)
Mean average number of miles traveled to nearest grocery store	*4.1 [6.0]*
Mean community-level economic hardship	*50.4 [17.5]*
Sense of community	
Mean perceived collective efficacy	*33.8 [7.9]*
Neighborhood sense of satisfaction	
Very satisfied/satisfied	864 (89.4)
Very dissatisfied/dissatisfied	103 (10.7)
Food Choice Factors	
Mean weekly fast food restaurant consumption	*2.6 [2.7]*
Mean weekly sit-down restaurant consumption	*1.8 [2.2]*
Sociodemographic Factors	
Gender	
Female	477 (49.3)
Male	490 (50.7)
Age (years)	
18-30	408 (42.2)

31-40	247 (25.5)
41-50	130 (13.4)
51+	182 (18.8)
Race/ethnicity	
Hispanic/Latino	468 (48.4)
Black	88 (9.1)
White	251 (26.0)
Asian/Native Hawaiian/Pacific Islander	147 (15.2)
Other[1]	13 (1.3)
Nativity Status	
Native born (in Los Angeles County)	647 (66.9)
Native born (outside of Los Angeles County)	204 (21.1)
Foreign born	116 (12.0)
Language spoken at home	
English	736 (76.1)
Not English	231 (23.9)
Education	
High school or less	184 (19.0)
Some college	349 (36.1)
College graduate/postgraduate[2]	434 (44.9)
Employment Status	
Employed- full time	535 (55.3)
Employed- part time	116 (12.0)
Unemployed (but looking for work)	106 (11.0)
Other employment status[3]	210 (21.7)
Income	
Under $50,000	443 (45.8)
$50,000-$99,000	299 (30.9)
$100,000 or more	225 (23.3)
Marital Status	
Married	370 (38.3)
Single[4]	519 (53.7)
Divorced/Separated/Widowed[5]	78 (8.1)
Mean number of children in the household	0.8 [1.1]

Note: Number of cases and percentage may not add up to the total or 100%, respectively, due to rounding and missing values.

[1]Category includes respondents who responded "American Indian or Alaskan Native," or "Other" to the question, "Could you please indicate your race or ethnicity?"

[2]Includes respondents who reported "graduated with a four-year degree" or "graduated with a professional degree" when asked, "What is the last grade that you completed in school?"

[3]Includes respondents who reported "Retired," "Student," or "Homemaker" when asked, "In terms of your job status, are you employed, unemployed but looking for work, retired, a student, or a homemaker?"

[4]Includes responses "Not married, but living with partner" and "Single, never married" when asked, "What is your marital status?"

[5]Includes responses "Divorced or separated" and "Widowed" when asked, "What is your marital status?"

The present study used a four-phase analytic approach that was guided by the study aims:

Aim 1: Identify the relationships between PCCs and PWB

In the first phase of analysis, the extent to which PCCs were associated with PWB was examined using multinomial logistic regression. This approach was employed because the dependent variable, PWB, was a categorical variable with three levels: *low psychological distress, intermediate psychological distress,* and *high psychological distress.* Multinomial logistic regression was determined to be a more appropriate strategy than ordinal logistic regression based on preliminary sub-analyses, which found violations to the proportional odds assumption. Moreover, the three levels of psychological distress were assumed to be independent of each other and analyzed as a categorical outcome, with 'low risk' as the reference category. These results are presented in **Table 2.2.**

Table 2.2. Adjusted relative risk ratios (RRR) of psychosocial community characteristics by levels of psychological distress, with 'low psychological distress' as the reference group, 2014 Los Angeles County Injury and Violence Prevention Survey (n=967)

	Intermediate Psychological Distress	**High Psychological Distress**
	RRR[¥] (95% CI)	RRR[¥] (95% CI)
Neighborhood Risks and Resources		
Perceived neighborhood violence (ref: low violence)		
Intermediate violence	1.56 (1.12-2.17)**	2.26 (1.06-4.82)*
High violence	2.91 (2.04-4.16)***	3.82 (1.79-8.16)**
Park access (ref: has park access)		
Does not have park access	1.16 (0.81-1.64)	0.89 (0.44-1.80)
Mode of transportation (ref: Car)		
Bus	1.85 (0.89-3.87)	1.30 (0.33-5.02)
Walking	1.61 (1.06-2.47)*	1.88 (0.90-3.94)
Other	2.26 (0.81-6.25)	0.00 (0.00-0.00)
Grocery store distance	1.03 (1.00-1.06)*	1.03 (0.99-1.08)
Community-level economic hardship	1.00 (1.00-1.06)	1.00 (0.98-1.01)
Sense of Community		
Collective efficacy	0.98 (0.96-1.00)*	0.94 (0.91-0.98)**
Neighborhood satisfaction (ref: very satisfied/satisfied)		
Very dissatisfied/dissatisfied	0.72 (0.43-1.19)	1.35 (0.62-2.90)

Note: sample n=967 (LR chi^2_{20}=99.45, p=0.0000, pseudo r^2=0.0575).
[¥]Relative Risk Ratio
*p <0.05
**p <0.01
*** p<0.001

Aim 2: Examine the relationships between PWB and dietary behaviors

In the second phase of analysis, a negative binomial modeling strategy was used since both dietary outcomes are overdispersed count outcomes (**Figures 1.2 & 1.3, presented in Study #1 on page 76)**. Each dietary outcome (i.e., F+V and soda consumption) was examined using a step-wise modeling approach. First, the relationship between PWB and fruit and vegetable consumption was examined and incidence rate ratios are shown (***Model 1, Table 2.3***). Similarly, then the relationship between PWB and soda consumption was examined. ***Table 2.3 (Model 3)*** shows the incidence rate ratios of the two dietary outcomes.

Table 2.3. Psychosocial community characteristic (PCCs), other food choice factors (FCFs), and psychological well-being (PWB) predictors of self-reported dietary behaviors: Results from the Los Angeles County Injury and Violence Prevention Survey, 2014 (n=967)

	Fruit and Vegetable Consumption			**Soda Consumption**		
	Model 1: PWB[e]	**Model 2:** PCCs[a€]	**Model 3:** Full Model[c€]	**Model 4:** PWB[e]	**Model 5:** PCCs[d]	**Model 6:** Full Model[f€]
	IRR[¥] (95% CI)	IRR[¥] (95% CI)	IRR[¥] (95% CI)	IRR[¥] (95% CI)	IRR[¥] (95% CI)	IRR[¥] (95% CI)
Neighborhood Risks and Resources						
Perceived neighborhood violence (ref: low violence)						
Intermediate violence	--	1.08 (0.97-1.20)	1.06 (0.96-1.18)	--	1.00 (0.82-1.22)	1.01 (0.82-1.24)
High violence	--	1.18 (1.05-1.31)**	1.16 (1.04-1.30)**	--	1.07 (0.87-1.31)	1.09 (0.89-1.34)
Park access (ref: has park access)						
Does not have park access	--	0.94 (0.84-1.06)	0.95 (0.85-1.06)	--	0.89 (0.73-1.08)	0.89 (0.73-1.09)
Mode of transportation (ref: Car)						
Bus	--	1.19 (0.93-1.53)	1.20 (0.93-1.54)	--	1.21 (0.75-1.97)	1.21 (0.76-1.94)
Walking	--	1.04 (0.92-1.18)	1.03 (0.91-1.17)	--	0.89 (0.69-1.14)	0.90 (0.70-1.15)
Other	--	1.12 (0.86-1.46)	1.13 (0.87-1.47)	--	1.08 (0.69-1.69)	1.06 (0.68-1.65)
Grocery store distance	--	1.00 (0.99-1.01)	1.00 (0.99-1.01)	--	0.99 (0.99-1.01)	1.00 (0.99-1.00)
Community-level economic hardship	--	1.00 (1.00-1.00)	1.00 (1.00-1.00)	--	1.00 (1.00-1.01)	1.00 (1.00-1.01)
Sense of Community						
Collective efficacy	--	1.01 (1.00-1.02)**	1.01 (1.01-1.02)***	--	1.00 (0.99-1.02)	1.00 (0.99-1.02)
Neighborhood satisfaction (ref: very satisfied/satisfied)						
Very dissatisfied/dissatisfied	--	0.93 (0.81-1.08)	0.92 (0.80-1.06)	--	1.09 (0.80-1.50)	1.11 (0.81-1.53)
Food Choice Factors						
Fast food consumption	--	1.00 (0.99-1.02)	1.01 (0.99-1.02)	--	1.16 (1.12-1.20)***	1.16 (1.12-1.20)***
Sit-down restaurant consumption	--	1.09 (1.06-1.12)***	1.09 (1.06-1.12)***	--	1.00 (0.96-1.04)	1.00 (0.96-1.04)
Psychological Well-being						
Psychological distress (ref: low distress)						
Intermediate distress	1.15 (1.05-1.27)**	--	1.02 (0.93-1.11)	1.19 (0.99-1.42)	--	0.94 (0.79-1.13)
High distress	1.28 (1.04-1.58)*	--	1.27 (1.06-1.53)*	0.78 (0.56-1.10)	--	0.70 (0.48-1.01)

Note: PWB=psychological well-being; PCCs=psychosocial community characteristics.

*p <0.05

**p <0.01

*** p<0.001

€Adjusts for sociodemographic characteristics (data not shown).

¥ Incidence rate ratio

[a]**Model 1:** sample n=967 (Wald chi^2_2=11.23, p=0.0036, pseudo r^2=0.0027).

[b]**Model 2:** sample n=967 (Wald chi^2_{33}=271.75, p=0.0000, pseudo r^2=0.0430); significant sociodemographic characteristics include: age (31-40, 41-50), race (African American), and nativity status (native born but born outside of LAC, foreign born).

[c]**Model 3:** sample n=967 (Wald chi^2_{35}=278.22, p=0.0000, pseudo r^2=0.0447); significant sociodemographic characteristics include: age (31-40, 41-50), race (African American), nativity status (native born but born outside of LAC).

[d]**Model 4:** sample n=967 (Wald chi^2_2=8.00, p=0.0183, pseudo r^2=0.0016).

[d]**Model 5:** sample n=967 (Wald chi^2_{33}=259.81, p=0.0000, pseudo r^2=0.0469); significant sociodemographic characteristics include: race (White, Asian).

[e]**Model 6:** sample n=967 (Wald chi^2_{35}=266.55, p=0.0000, pseudo r^2=0.0479); significant sociodemographic characteristics include :age (50+ years), race/ethnicity (White, Asian).

Aim 3: Evaluate the extent to which PWB explains the relationships between PCCs and dietary behaviors

In the third phase of the analysis, the extent to which PWB might account for the PCC-dietary behavior linkages were examined. For F+V consumption, the effect sizes of PCC coefficients in Model 2 were compared to those in Model 3 were evaluated; similarly, changes in PCC coefficients in Models 5 and 6 were examined for soda consumption (**Table 2.3**). Significant reductions in the effect sizes suggested that diminished effects of PWB might be partially due to accounting for PWB in the second set of models.

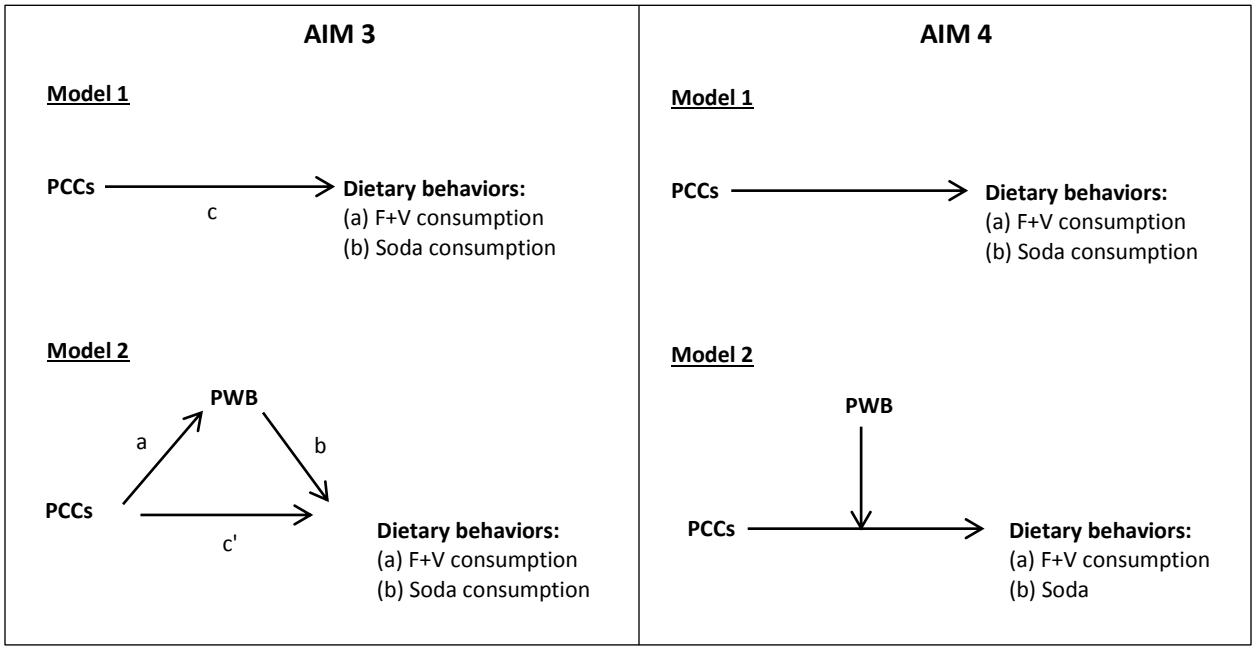
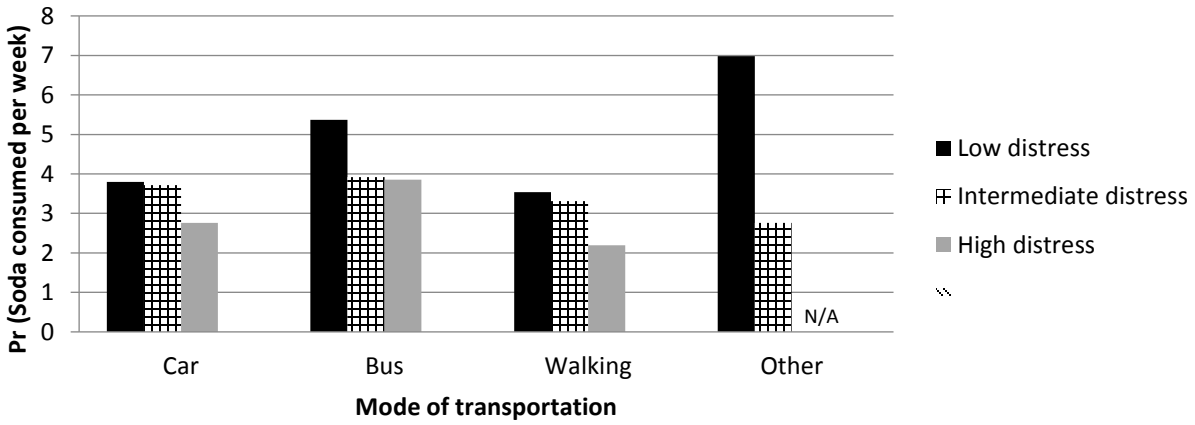


Figure 2.2 Examining the Mechanisms Linking Psychosocial Community Characteristics (PCCs), Psychological Well-being (PWB), and the Dietary Behaviors Fruit and Vegetable (F+V) and Soda Consumption

Aim 4: Assess the extent to which PWB moderates the associations between PCCs and dietary behaviors

In the last phase of the analysis, the extent to which PWB moderates the relationships between PCCs and dietary behaviors was tested by adding a PCC x PWB interaction term to the full model for each outcome. This analytic approach is depicted in **Figure 2.2.** Significant interactions terms suggest that the relationship between the PCCs and each dietary outcome is conditional on PWB. For significant interactions, predicted probabilities were estimated and the results are illustrated in **Figure 2.3.**

Figure 2.3. The relationship between mode of transportation to the nearest grocery store and soda consumption as moderated by psychological well-being



RESULTS

Table 2.1 presents the distribution of all variables examined in this study. Nearly half of respondents had intermediate levels of psychological distress (47.9%). The mean level of consumption of fruit and vegetable (F+V) consumption was 0.71 servings per day (*range: 0 to 35 servings of F+V per day*), while the mean level of soda consumption was 0.95 sodas per week (*range: 0 to 50 sodas per week*). This indicates that most reported consuming less than one full serving of fruits and vegetables (F+V) daily but about one soda per week. Overall, most respondents were male (50.7%), Hispanic/Latino (48.4%), born in Los Angeles County (66.9%), spoke English as the primary language spoken at home (76.1%), graduated from college/have a postgraduate degree (44.9%), employed full-time (55.3%), reported an income under $50,000, and were single (53.7%). The mean number of children in the household was 0.82 (*range: 0 to 8 children*).

Aim 1: Identify the relationships between PCCs and PWB

Results from the multinomial model examining the relative risk ratios of PCCs by level of PWB, using 'low psychological distress' as the referent group, are presented in **Table 2.2**. Respondents who perceived intermediate levels of neighborhood violence compared to those who perceived low level of violence appear to have a 56% increase in the relative probability of having 'intermediate psychological distress' than 'low psychological distress' (RRR=1.56, 95% CI=1.12-2.17). Likewise, it appears that perceiving high levels of neighborhood violence is also significantly associated with an increased probability of having 'intermediate psychological distress' (RRR=2.91, 95% CI=2.04-2.16). Perceived neighborhood violence was also statistically significant among respondents classified as having 'high psychological distress' . Perceiving intermediate neighborhood violence was associated with more than double the probability of having high psychological distress (RRR=2.26, 95% CI=1.06-4.82), whereas perceiving high neighborhood

violence was associated with nearly four times greater probability of having high psychological distress (RRR=3.82, CI=1.79-8.16).

Mode of transportation to the nearest grocery store and distance travelled were found to matter among respondents with intermediate psychological distress, but not among those with high levels of distress. In particular, respondents that reported walking to the nearest grocery store compared to those who drove had a 61% increase in the relative probability of having 'intermediate psychological distress' (RRR=1.61, 95% CI=1.06-2.47). Additionally, for each mile increase in distance travelled to the nearest grocery store, the relative probability of being in the 'intermediate psychological distress' category increased by 3% (RRR=1.03, 95% CI=1.00-1.06).

Perceived collective efficacy also appears as a protective factor for both intermediate and high levels of psychological distress. For each unit increase in collective efficacy, the relative probability of being in the 'intermediate psychological distress' category appears to decrease by 2% (RRR=0.98, 95% CI=0.96-1.00). Similarly, for each unit increase in collective efficacy, the relative probability of being in the 'high psychological distress' category appears to decrease by 6% (RRR=0.94, 95% CI=0.91-0.98).

Aim 2: Examine the relationships between PWB and dietary behaviors

Results of the negative binomial regression analyses examining the relationships between PWB and dietary behaviors are presented in **Table 2.3**. Model 1 shows the relationships between PWB and F+V consumption. It was found that respondents who had intermediate psychological distress levels had a 15% greater rate of F+V consumption (IRR=1.15, 95% CI=1.05-1.27), and 28% greater rate among respondents with high psychological distress (IRR=1.28, 95% CI=1.04-1.58). Model 4 shows the relationship between PWB and soda consumption. Psychological distress was not significantly associated with soda consumption. It is important to point out that similar results were observed in sensitivity

analyses, which were conducted using multinomial logistic regression and generalized logistic regression *(data not shown)*.

Aim 3: Evaluate the extent to which PWB explains the relationships between PCCs and dietary behaviors

Results of the negative binomial regression analyses examining the extent to which PWB explains the relationship between PCCs and dietary behaviors are presented in Models 1-6 of **Table 2.3**. Model 1-3 correspond to the F+V outcome, whereas Models 4-6 correspond to the soda consumption outcome. As previously mentioned, sensitivity analyses conducted using multinomial logistic regression and generalized logistic regression demonstrated similar results (*data not shown*).

Outcome 1: Fruit and Vegetable (F+V) Consumption Differences

Differences in PCC coefficients (effect size) from Model 2 to 3 (**Table 2.3**) were used to determine the extent to which PWB explain the relationships between PCCs and F+V consumption. In Model 2, PCCs and FCFs that were significant included high violence, perceived collective efficacy, and sit-down restaurant consumption. After adding PWB to the model (Model 3), these relationships either stayed the same or were strengthened. Relationships that stayed the same included high violence and sit-down restaurant consumption. Perceived collective efficacy, on the other hand, changed from a significance level of $p<0.001$ to $p<0.000$. Overall, these results indicate that PWB may partially explain or account for the relationship between some PCCs and F+V consumption.

Outcome 2: Soda Consumption

Differences in PCC coefficients (effect size) from Model 5 to Model 6 (**Table 2.3**) were used to determine the extent to which PWB explains the relationships between PCCs and soda consumption. In Model 5, no PCCs were significant. Only fast-food restaurant consumption was significantly associated (IRR=1.16, 95%

CI=1.12-1.20). After adding PWB to the model (Model 6), the association between this FCF and soda consumption did not change, indicating that PWB not explain the relationship between PCCs and unhealthy dietary behaviors such as soda consumption.

Aim 4: Assess the extent to which PWB moderates the associations between PCCs and dietary behaviors

For F+V consumption, there were no significant interactions between PCCs and PWB (*data not shown).* These results indicate that individuals' fruit and vegetable consumption levels do not depend on their levels of PWB. For soda consumption, results showed that PWB significantly conditions the influence of mode of transportation to the nearest grocery store (**Figure 2.4**)

DISCUSSION

Given the ever-increasing prevalence of obesity and related chronic diseases, as well as millions of federal U.S. dollars spent on efforts seeking to improve community environments as a strategy to encourage healthier dietary behaviors in diverse populations (Bunnell et al., 2012; CDC, 2016a; Lyn et al., 2013), it is imperative to comprehensively investigate what drives individuals' food decisions. To-date, research and practice has mostly focused on examining and addressing structural or access barriers to healthy eating. Although ensuring that individuals have access to healthy food environments is critically important for improving population-level dietary behaviors (Lovasi et al., 2009; Morland & Evenson, 2009; Story et al., 2008), this represents only one piece of a complex puzzle focused on explaining why people do or do not eat healthy. This is because increasing access does not guarantee that individuals will make healthier foods decisions. Environments that can promote or hinder individuals' mental well-being represents another dimension of the community environment that can reduce individuals' ability to make healthy decisions. Within this context, the overall goal of the present study was fill these gaps in the literature and

understand these processes within a racially/ethnically diverse urban population. A major contribution of the present study is that it is the first to examine how PWB shapes individuals' dietary decision-making behaviors within the context of the social and psychological community environments in which they live. The main objectives were to: (a) identify the relationships between PCCs and PWB; (b) examine the relationships between PWB and dietary behaviors; (c) evaluate the extent to which PWB explains the relationships between PCCs and dietary behaviors; and (d) assess whether PWB moderates the associations between PCCs and dietary behaviors. Based on these aims there were several notable study findings.

Key Finding #1:

The first major finding was that community environments have the potential to induce psychological distress. This is based on the finding that the PCCs perceived neighborhood violence, mode of transportation to the nearest grocery store, and collective efficacy were associated with intermediate and/or high levels of psychological distress. For instance, findings suggest that perceived neighborhood violence is linked to both intermediate and high levels psychological distress, and that high perceived violence has an even stronger impact on these distress levels. For mode of transportation, findings suggest that individuals who walk to get to the nearest grocery store tend to experience intermediate levels of distress compared to those who use a car. Similarly, driving a longer distance to get to the nearest grocery store was also predictive of intermediate levels of psychological distress.

Collectively, these findings make sense, as a key hypothesis guiding present study analyses was that negative PCCs such as perceived neighborhood violence would be associated with lower levels of psychological well-being (i.e., higher levels of psychological distress). The premise of this hypothesis was that poor neighborhood conditions may undermine psychological well-being. It is one informed by

previous studies finding that adverse community conditions can be detrimental for mental health (Mair et al., 2008; Mair, Diez Roux, & Morenoff, 2010; Reingle et al., 2014; Santaularia et al., 2014). Conversely, the study hypothesis that positive PCCs would be linked with higher levels of psychological well-being was also supported. In particular, it was found that perceived collective efficacy— a construct which captures the social cohesiveness of a neighborhood and willingness among neighbors to take action in their neighborhoods— had a protective effect against psychological distress. This finding aligns with previous studies, such as those finding that resources at the community-level that engender a sense of safety, reduce stress, evoke positive emotions, or have a restorative impact on individuals' psyche are positively associated with mental well-being and health (Abraham et al., 2010; Guite et al., 2006). It also aligns with accumulating evidence that one's sense of community and interpersonal social relationships have a salutary or deleterious impact on individuals' mental well-being (Alamilla et al., 2016; Cramm et al., 2013; Diez Roux & Mair, 2010; Luttmer, 2005; Mair et al., 2008). In combination, these findings bolster support that community environments have the potential to shape mental health outcomes of the population.

Key Finding #2:

Although psychological well-being was only associated with healthy dietary decision-making behaviors (i.e., fruit and vegetable consumption) and not unhealthy dietary behaviors (i.e., soda consumption), a second key finding is that psychological distress has the potential shape individuals' dietary selection decisions. Surprisingly, both intermediate and high levels of psychological distress were linked to higher levels of fruit and vegetable consumption. This finding challenges previous study findings suggesting that psychological distress is detrimental to dietary outcomes (Hinote, Cockerham, & Abbott, 2009)(Hwang, Lee, Kim, Chung, & Kim, 2010) (Hodge, Almeida, English, Giles, & Flicker, 2013). However, supplemental analyses *(not shown)* revealed that this pattern of high fruit and vegetable consumption

was only significant among Hispanics, who represented about half of the current study's sample. In particular, Hispanics who had intermediate levels of psychological distress had a 1.16 times greater rate of fruit and vegetable consumption (IRR=1.16, 95% CI: 1.00-1.34). Based on previous studies, potential reasons for why Hispanics may consume more fruits and vegetables when distressed could be that in general Hispanics consume larger portions of food (J. O. Fisher et al., 2007), succumb to binge eating behaviors due to stress (Adamus-Leach et al., 2013), and/or in general have a higher preference for fruits and vegetables (Grigsby-Toussaint et al., 2010). However, disentangling the patterns observed in the present study warrants further investigation.

As previously mentioned, there was no relationship between psychological well-being and soda consumption. This finding also was counterintuitive, as there is evidence that psychological distress is linked to consumption of obesegenic foods such as those that are high in fat and sugar (Torres & Nowson, 2007). Supplemental analyses were also carried out within each racial/ethnic group to better make sense of this finding (*data not shown*). Study 1 of the present dissertation found that other food choice factors (FCFs) such as fast-food and sit-down restaurant consumption interact in the relationship between PCCs and dietary behaviors. Thus, similar analyses were carried out examining racial/ethnic differences in terms FCF interactions with distress shape dietary behaviors. There were several key findings from these sub-analyses. Interestingly, increased fast-food consumption was linked to significantly lower soda consumption among Whites with high psychological distress (IRR=0.66, 95% CI=0.45-0.98). In contrast, increased fast-food consumption was linked to significantly higher soda consumption among Asians with high psychological distress (IRR=4.32, 95% CI=2.06-9.06). There were also a few distinct patterns in terms of sit-down restaurant consumption. Among African Americans, increased sit-down restaurant consumption was associated with higher soda consumption among those with high psychological distress (IRR=5.06, 95% CI=2.47-10.41), but yet lower soda consumption among Whites with intermediate levels

of distress (IRR=0.86, 95% CI=0.75-0.98). Together, these additional analyses underscore the importance of considering the ways in which these other food choice factors or ways in which individuals get their food interact with distress to differentially shape individuals' dietary decisions. Future research is needed to better understand what may contribute to these divergent processes across racial/ethnic groups.

Key Finding #3:

A third major study finding was that the effect of perceived collective efficacy on fruit and vegetable consumption changed when psychological well-being (PWB) was accounted for. In particular, the statistical significance of perceived collective efficacy on this healthy dietary become stronger when PWB was taken into account. This finding suggests that collective efficacy may be protective against distress, which may then be beneficial for fruit and vegetable consumption and potentially other healthy dietary behaviors. PWB did not appear to effect the relationship between other PCC or FCFs, for either healthy or unhealthy dietary behaviors. Future research should investigate how PWB explains the relationship between different types of PCCs and dietary behaviors. As mentioned in the previous study finding, the interrelationships between PCCs, PWB, FCFs, and dietary behaviors are complex and warrant additional sub-analyses investigating potential racial/ethnic differences.

Key Finding #4:

Finally, the last major study finding is that PWB moderates the relationship between one PCC--mode of transportation to the nearest grocery store—and dietary behaviors. This observation is based on a significant interaction indicating that the relationship between mode of transportation and soda consumption is dependent on individuals' psychological distress levels. For example, **Figure 2.4** depicted

how among those who reported using a car to get to the nearest grocery store, soda consumption became lower as psychological distress increased. Similar patterns were observed within each of the other modes of transportation— i.e., as distress increased soda consumption also decreased. While this result challenges original study hypotheses, it is possible racial/ethnic differences are at play that should be further investigated.

Study Limitations

The present study is subject to a few limitations. First, the study design was cross-sectional and web-based, which may have limited generalizability to the target population. To address this issue, U.S. Census-based quota criteria were applied to as closely as possible collect a survey sample representative of the Los Angeles County population. Second, due to the originality of some survey questions not all measures were validated, and third, the survey was only administered in English, which may have reduced representativeness of the study sample. To mitigate these issues, validated measures were used whenever possible. Third, given the nature of internet panel surveys it was difficult to calculate response rate. Instead, participation rate was calculated which was about 33%, comparable to other cross-sectional studies conducted in Los Angeles County (Simon et al., 2001). A final limitation is that only one measure of psychological well-being was used— i.e., psychological distress. Future population-based studies should expand on this definition of mental health to capture more dimensions, including depression, anxiety, substance abuse and other mental health issues. Studies that have a more robust response rate and that use validated survey measures available in multiple languages should also be conducted to address the above-mentioned study limitations.

Conclusions

The present study highlighted the potential drivers of dietary decision-making behaviors that extend beyond the structural built environment. Based on these findings, it appears that the social and psychological dynamics of communities, as well as mental health status, may be important to address in obesity and chronic disease preventions efforts. Unfortunately, they are commonly overlooked in practice. Most recent federally-funded obesity and chronic disease-prevention efforts have primarily focused on making healthy eating the easy choice by removing the structural barriers that often impede individuals from making healthy dietary decisions (Bunnell et al., 2012; LADPH, 2014). Therefore, PCCs should be considered in the potential role they play in shaping diet, as well as the modifying impact that PWB has on this relationship. Although the relationships between PCCs, PWB, and dietary behaviors is an emerging topic, it is an important topic that should be further explored and addressed in research and practice.

CHAPTER 8

STUDY #3- A GEO-SPATIAL ASSESSMENT OF COMMUNITY-BASED PSYCHOSOCIAL RISK FACTORS ASSOCIATED WITH CHRONIC DISEASE-RELATED DIETARY BEHAVIORS IN LOS ANGELES COUNTY

INTRODUCTION

The social and psychological dynamics of communities that shape individuals' lived experiences may exert an important influence on dietary decision-making behaviors. Prior research suggests that improving what people eat, and ultimately reducing the population's chronic disease burden, requires consideration of factors that extend beyond individuals' access to food and related issues within the structural built-environment. Specifically, psychosocial factors such as perceived risks, resources, and social connections within communities may importantly influence the choices that individuals' make within their neighborhood environment. Moreover, there is emerging evidence that other food choice factors, such as the frequency with which individuals consume meals prepared away-from-home, matter for how they respond to the social and psychological aspects of the environments in which they live. Such food choice factors can also be *structural* based, such as the availability of the number of fast-food and sit-down restaurants in a community.

Psychological well-being also represents an important intervening factor linking these psychosocial community factors and dietary decision-making behaviors. Therefore, enhancing individuals' mental health— especially those in under-resourced neighborhoods who are exposed to greater structural and psychosocial deterrents of healthy eating— may be an effective strategy to help individuals maintain healthy lifestyles, even when faced with adverse community conditions. One way to do so would be to ensure that high-risk communities have equitable access to resources and supports that promote

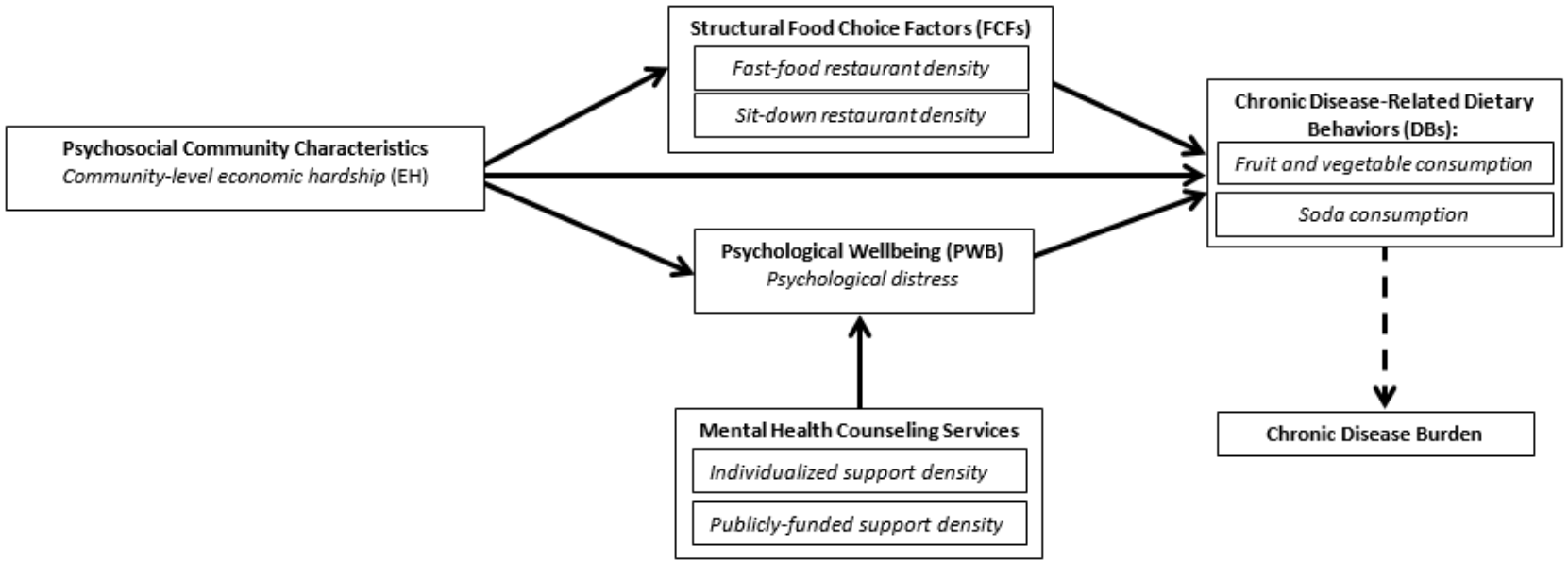
good mental health. Therapy or counseling, for example, are evidence-based resources that have been demonstrated to help individuals deal with a range of mental health issues. In summary, given emerging evidence that both *structural* and *psychosocial* community factors have the potential to influence what individuals eat, efforts to improve eating habits within communities should address these issues simultaneously when developing interventions and policies to achieve sustainability and reduce chronic disease-related health disparities.

A necessary starting point to address current limitation in obesity and chronic disease prevention research and practice is to conduct a landscape analysis identifying areas burdened with both structural and psychosocial chronic disease risk factors. These risk factors include individual-level factors such dietary behaviors (e.g., fruit and vegetable consumption, soda consumption) and psychological distress levels, psychosocial community-level factors such as economic hardship, and structural factors such as density of restaurant retail outlets or availability of mental health counseling services. To my knowledge, no studies to-date have conducted a geospatial landscape analysis examining the geographic distribution and overlap between these aforementioned factors anywhere in the United States. This information may be a valuable as it can be used to identify gaps in services, and consequently, guide dissemination of resources in areas that needs them most. Filling these gaps in the evidence-base is critically important to inform current and forthcoming obesity and chronic disease-related program planning efforts.

Thus, the present study addresses these limitations by conducting a geospatial needs assessment that examines the distribution of and relationships between dietary behaviors, community-level economic hardship, density of restaurant retail food establishments, psychological well-being, and density of available of mental health counseling services. These analyses are carried out in Los Angeles County**,** a large racially/ethnically diverse urban jurisdiction targeted by an array of obesity and chronic disease-

prevention efforts in recent years. This descriptive study is informed by a conceptual model (**Figure 3.1**) based on the Environmental Affordances Model and existing literature described in the next section.

Figure 3.1— Study #3: Relationships Between Chronic Disease-Related Dietary Behaviors, Psychosocial Community Characteristics, Other Food Choice Factors, Psychological Well-Being, and Availability of Mental Health Counseling Services*



*This model was informed by the Environmental Affordances Model. Solid lines indicate measured constructs in descriptive analyses, whereas dotted lines indicate unmeasured constructs in descriptive analyses.

Paper #3 Goal: *To inform chronic disease-related program planning efforts by conducting a geospatial landscape analysis looking at the distribution of and relationships between dietary behaviors (DBs), community-level economic hardship (EH), density of structural food choice factors (FCFs), psychological well-being (PWB), and density of available mental health counseling services by Service Planning Area (SPA) in a large racially/ethnically diverse urban jurisdiction in Los Angeles County.*

Aim 1: *Identify health risks of Los Angeles County residents by mapping the geospatial distribution of DBs, EH, structural FCFs, PWB, and density of available mental health counseling services.*

Aim 2: *Determine whether the geographic distribution of PWB, structural FCFs, availability of mental health counseling services, and DBs varies by EH.*

Aim 3: *Compare the geographic distribution of PWB with density of available mental health counseling services.*

Aim 4: *Explore racial/ethnic disparities in DBs, EH, structural FCFs, PWB, and availability of mental health counseling services.*

Psychosocial Community Characteristics and Diet

Prior studies have speculated about the potential mechanisms through which community contexts may contribute to poor dietary decisions (Mezuk et al., 2013, 2017). There is also growing evidence that individuals exposed to chronically stressful community environments are more likely to engage in unhealthy behaviors that contribute to chronic disease-related morbidity and mortality risk over the life course (Jackson et al., 2010). In the first study of this dissertation, these factors were conceptualized as *psychosocial community characteristics* (PCCs). These constructs describe additional barriers *or* facilitators that are independent of objectively measured food environments and impact individuals' perceptions and reactions to actual physical/built environmental structures.

One of the seven PCCs identified was community-level economic hardship, which broadly refers to the strain of living in a community with few economic resources. In Los Angeles County, community-level economic hardship has been previously associated with high prevalence of childhood obesity (Shih et al., 2013), likely because economic hardship is common within poor food environments (Laxy et al., 2015). Therefore, mapping the distribution of economic hardship at the community-level, as well as comparing the distribution with other potential barriers related to healthy eating, can help policy makers and public health practitioners identify geographic areas that may be at highest risk for poor dietary behaviors.

Structural Food Choice Factors and Diet

Based on the first study of this dissertation, one important mechanism in the relationship between PCCs and diet is other food choice factors (FCFs). These factors were conceptualized as: *individuals' consumption of meals prepared away-from-home, such as those from fast-food and sit-down restaurants*. In the present study, FCFs pertain to *structural-level* access to fast-food and sit-down restaurants, with a key indicator being the number (density) of these retail food establishments by zip code. Alongside

mapping and comparing the distribution of PCC indicators such as community-level economic hardship, mapping the density of restaurant retail food establishments that have been demonstrated to influence what individuals eat is also an important tool that can be used by program planners and policy makers to make informed decisions about where to disseminate chronic disease-prevention resources.

Psychological Well-Being and Diet

Psychological well-being (PWB) represents another important mechanism that links psychosocial community characteristics (e.g., economic hardship) and dietary behaviors. PWB is a dimension of mental health that is shaped by one's ability to maintain positive relationships with others, environmental mastery, personal growth and autonomy, and level of purpose and meaning in life, as well as one's level of self-acceptance (Ryff et al., 1995; Ryff & Singer, 2008). Psychological distress is often used as an indicator of PWB (Veit & Ware, 1983). and it has been linked to maladaptive dietary behaviors in the United States (Ashmore et al., 2008; Blodgett Salafia, Gondoli, Corning, McEnery, & Grundy, 2007; Boseck et al., 2007; Colles et al., 2007; Grave et al., 2010; Rein et al., 2007). For example, some studies have found that high distress contributes to poor diet (Ciechanowski, Katon, & Russo, 2000; Lin et al., 2004). There is also evidence that adverse community environments, such as those characterized by high levels of violence, contribute to elevated distress levels (Curry, Latkin, & Davey-Rothwell, 2008; Ross & Mirowsky, 2009). Although studied less often, psychological distress may also diminish individuals' capacity to engage in healthy dietary behaviors (Grave et al., 2010; Hwang et al., 2010; Stansfeld, Fuhrer, Shipley, & Marmot, 2002). The second study in this dissertation sought to build upon this small but bourgeoning area of research. A key finding was that psychological well-being (as indicated by psychological distress) to some extent explains the relationship between psychosocial community factors and dietary decision-making behaviors. Therefore, it is possible that improving individuals' psychological well-being— which may matter in how individuals react to psychosocial aspects of their community— is a critical point of

intervention to improve chronic disease-related dietary behaviors. Similar to community-level economic hardship and structural food choice factors, mapping the distribution of psychological distress at the community level may be a useful policy tool that informs distribution of resources to areas that need them most.

Increasing Access to Mental Health Supports to Improve Dietary Behaviors

In light of the growing evidence that psychological well-being shapes how individuals react to psychosocial community environments within the context of dietary decisions, it is critically important to offer resources that may help alleviate the psychological strain of poor structural and psychosocial community environments. Increasing access to mental health services and supports such as counseling and therapy services may help individuals to better psychologically cope with the environmental and social stressors of their communities, which put them at risk for poor mental health and diminish their ability to make healthy dietary decisions. Given the presence of significant health disparities in Los Angeles County (LACDPH, 2017a), it is especially important that communities have *equitable* access to these resources, especially those that are affordable for historically under-resourced communities. Mental health supports that can help individuals deal with psychosocial stressors include therapy or counseling services. For instance, a type of therapy referred to as Cognitive Behavioral Therapy, has been demonstrated to help individuals have better emotional regulation (Ritchey, Dolcos, Eddington, Strauman, & Cabeza, 2011). Improving emotional regulation matters given it may influence individuals' food selection decisions (Gianini, White, & Masheb, 2013). Ultimately, since psychological well-being may be a driver of diet, understanding the geographic distribution of mental health supports becomes ever more important. In particular, mapping the distribution mental health supports in relation to other dietary influences at the regional level has the potential to provide policy makers and program planners with necessary information to identify risk factors for poor dietary behaviors. Although access alone does not guarantee that

individuals will utilize these services, making these resources available in the community is a first step to do so. Ensuring equitable access to mental health services in Los Angeles County should be a public health priority because, as demonstrated in the first to studies of this dissertation, there is evidence that psychosocial factors related to mental health also has the potential to impact physical health decision-making processes. From the vantage point of health benefits, addressing mental health may also be an avenue to improve physical health outcomes.

A Case of Los Angeles County

As the most populous county in the United States (Bureau, 2015)— and a region characterized by over 4,000 square miles, 88 cities, and more than 10 million residents from an array of socio-demographic and economic backgrounds (LACDPH, 2015)— Los Angeles County represents an important case study to which to map the distribution of and relationships between dietary behaviors, community-level economic hardship, density of restaurant retail food establishments, psychological well-being, and density of available of mental health counseling services. It is a region characterized by disparities in chronic disease-related risk factors and outcomes, including those related to economic hardship (Shih et al., 2013) and availability of healthy food environments (Inagami et al., 2006; Sturm & Hattori, 2015). Poor mental health is also another reason to study Los Angeles County. The most recent (2011) examination of the Angeles County Health Survey, for instance, found that the percent of adults in the region who reported ever being diagnosed with depression rose from 8.8% to 13.6% between 1999 to 2007 (LACDPH, 2011). These estimates align with findings that depression is the most pervasive mental illnesses in the United States and abroad (Baxter et al., 2014; Ferrari et al., 2013; Kessler, Petukhova, Sampson, Zaslavsky, & Wittchen, 2012; Reeves et al., 2011). Another reason to study Los Angeles County is that the region's mental health service delivery system is undergoing a transformation. There are currently efforts to better coordinate care between mental health, physical health, substance abuse,

and other social services (Hong, 2017). Thus, mapping the availability of mental health services is timely and has the potential to strengthen forthcoming integrated mental health service delivery efforts in the region.

Study Purpose

It is important to understand the regional distribution of factors that have the potential to influence chronic disease-related dietary behaviors. This is especially the case within the context of addressing chronic disease-related health disparities, as individuals residing in poor community environments may be at even greater risk for poor physical and mental health outcomes. Unfortunately, there is currently a failure to address the psychosocial correlates of dietary decisions. This represents a missed opportunity to strengthen target population receptivity to structural improvements to the food environment.

The goal of the present study is to inform existing limitations of chronic disease-related program planning efforts by conducting a geospatial landscape analysis examining the distribution of and relationships between both healthy and unhealthy dietary behaviors, community-level economic hardship (i.e., an indicator of PCCs), structural food choice factors (FCFs), psychological well-being (PWB), and availability of mental health counseling services in Los Angeles County across its eight Service Planning Areas (SPAs).

There are four key study aims:

(1) identify health risks of Los Angeles County residents by mapping the geospatial distribution of dietary behaviors (DBs), community-level economic hardship (EH), structural food choice factors (FCFs), psychological well-being (PWB), and density of available mental health counseling services;

(2) determine whether the geographic distribution of PWB, FCFs, mental health services, and DBs varies by PCCs;

(3) compare the geographic distribution of PWB with density of available mental health counseling services; and

(4) explore racial/ethnic disparities in DBs, EH, FCFs, PWB, and availability of mental health counseling services by SPA. Using geographic information system (GIS) mapping techniques to overlay and compare the distribution of these chronic disease risk factors can improve our understanding of the local health and health service delivery landscape, information necessary to better serve the needs of communities at greatest risk for chronic disease.

METHODS

Data Sources

Multiple data sources were used, including the 2014 Los Angeles County Injury and Violence Prevention (IVPP) Survey, the 2014 Duns and Bradstreet database, the 2016 Department of Consumer Affairs Licensee Database, the 2018 Los Angeles County Department of Mental Health Providers Locations, and the 2010 Predominant Population ArcGIS (ESRI) map layer. The construction of the 2014 IVPP Dataset was previously described on *pages 45-48.* This dataset, which was cleaned in STATA was exported as an Excel database containing the following continuous variables: zip code, fruit and vegetable consumption, soda consumption, community-level economic hardship, and psychological distress.

The 2014 Duns and Bradstreet is a database comprised of all commercial business entities, including differentiating between types of businesses. This database was used to obtain the following measures of *structural-level* food choice factors: number (density) of fast-food and sit-down restaurants across Los Angeles County zip codes. As previously mentioned, this measure differs slightly from how other food choice factors (FCFs) were conceptualized in the first two studies of the present dissertation. Previously, FCFs were related to the *psychosocial aspects* of these other food choices and sought to

capture individuals' lack of agency in preparing meals with a healthier nutrient profile. It was measured as the number of weekly meals consumed from fast-food and sit-down restaurant retail food establishments. This study focuses on the structural aspects of FCFs to better understand the intersection between structural and psychosocial factors that shape individuals' dietary decisions and chronic disease risk.

Other datasets used in the present study include the 2016 Department of Consumer Affairs Licensee Database, which is includes the names, addresses, and other pertinent information for over 150 professional license types issues through the Department of Consumer Affairs in Los Angeles County, including mental health counseling services such as psychologists and licensed clinical social workers. This dataset was used to identify individual mental health supports in Los Angeles County. Moreover, the 2018 Los Angeles County Department of Mental Health Providers Locations is an ArcGIS (ESRI) database was used to identify publicly-funded mental health services and supports in Los Angeles County. Finally, the 2010 Predominant Population ESRI map layer was used to illustrate areas heavily dominated by one racial or ethnic group, using the strength of the color to showcase the extent to which a racial or ethnic group dominates over other populations. A summary of data used for key measures in the present study are listed in **Table 3.1**, but variable operationalization is also described in more detail in the next section of this study. Other data sources necessary to conduct GIS analyses are presented in **Table 3.2**.

Table 3.1: Data Used for Key Measures

Variable	Description	Type	Source/ Description
Community-level fruit and vegetable consumption in Los Angeles County	A composite measure of the average number of fruits and vegetables consumed per day across Los Angeles County zip codes.	Point	Tabular data from the 2014 Los Angeles County Injury and Violence Prevention Survey. This data was converted into an aggregate measure of fruit and vegetable consumption and then geocoded by zip code.
Community-level soda consumption in Los Angeles County	A composite measure of the average number of sodas consumed per day across Los Angeles County zip codes.	Point	Tabular data from the 2014 Los Angeles County Injury and Violence Prevention Survey. This data was converted into an aggregate measure of soda consumption and then geocoded by zip code.
Density of fast-food restaurants in Los Angeles County	The number of fast-food restaurant establishments across Los Angeles County zip codes.	Polygon	This was obtained as a shapefile which was previously geocoded by zip code.
Density of sit-down restaurants in Los Angeles County	The number of sit-down restaurant establishments across Los Angeles County zip codes.	Polygon	This was obtained as a shapefile which was previously geocoded by zip code.
Community-level economic hardship in Los Angeles County	A composite measure of the average level of economic hardship across Los Angeles County zip codes; economic hardship is an indicator of psychosocial community characteristics (PCCs), a construct conceptualized in the present dissertation.	Point	Tabular data from the 2014 Los Angeles County Injury and Violence Prevention Survey. This data was geocoded by zip code.
Community-level psychological distress in Los Angeles County	A composite measure of the average level of psychological distress across Los Angeles County zip codes; psychological distress is an indicator of psychological well-being.	Point	Tabular data from the Los Angeles County Injury and Violence Prevention Survey, 2014. This data was converted into an aggregate measure of psychological distress and geocoded by zip code.
Density of availability of mental health counseling services in	*Individual mental health supports:* The number of psychologists, licensed clinical social workers, licensed marriage and family therapists in a zip code.	Point	2016 Department of Consumer Affairs Licensee Dataset. Addresses were cleaned in excel and then geocoded in GIS using the CAMS address locator.

Los Angeles County	*Publicly-funded mental health supports:* The number of publicly-funded mental health service locations in a zip code.	Point	Los Angeles County GIS Data Portal, 2018.
Predominant population	The extent to which certain races or ethnicities predominate by County census tract.	Polygon	This was a shapefile based on 2010 U.S. Census Bureau's SF1 and TIGER data sets; it was downloaded directly from the ArcGIS Online (ESRI).

Table 3.2: Other Data Sources Used in GIS Mapping

Variable	Description	Type	Source
Los Angeles County Boundary	Map of the entire Los Angeles County region.	Polygon	"Los Angeles County Boundary shapefile" from ESRI Data and Maps, 2013.
Los Angeles County Service Planning Areas	Map of eight service planning areas (SPAs) in Los Angeles County.	Polygon	"Los Angeles County Service Planning Areas shapefile" from ESTRI ArcGIS Online Portal, 2016.
State of California County Boundary	Map of all counties in California.	Polygon	"CA Counties shapefile" from ESRI ArcGIS Online Portal, 2015.
LA County Address Locator	This address locator was used to match addresses of individual mental health supports, a composite locator that is a composite locator of CAMS_POINTS and CAMS_STREETS to maximize match success.	Reference file	"LA County CAMS Address Locator" from the Los Angeles County GIS Data Portal, 2015.
Zip Code Boundaries	A map containing zip code boundaries for Los Angeles County parcels.	Reference file	"Zip Code Boundaries" from the Los Angeles County GIS Portal, 2010.

Measures

Chronic disease-related dietary behaviors:

Two measures of chronic disease-related dietary behaviors were mapped in this study: fruit and vegetable consumption (representing healthy dietary behaviors) and soda consumption (representing unhealthy dietary behaviors).

Fruit and vegetable consumption (F+V): This was mapped using data from the 2014 Injury and Violence Prevention Dataset based on the following questions asked to respondents: (1) "In an average day, about how many servings of fruit do you eat, counting fresh, canned, dried or frozen fruits?"; and (2) "In an average day, about how many servings of vegetables do you eat, counting fresh, canned, dried, and frozen vegetables?" Responses were reported as whole-number values. After responses to both questions were combined to create a single *F+V* variable, this variable along with respondent zip codes, were exported as an Excel spreadsheet (i.e., a tabular dataset) that was used to create a GIS shapefile of the average number of F+V consumed per day at the zip code level. This shapefile was created in the following steps: (1) a GIS shapefile of Los Angeles County zip codes was downloaded from the Los Angeles County GIS Portal; (2) via the GIS join feature, the zip code shapefile was merged with the exported tabular IVPP dataset containing the *F+V consumption* and *zip code* variables; and (3) data from the attribute table pertaining to the shapefile described in step 2 (above) was copied into an Excel spreadsheet, which was then imported to and cleaned in STATA. In STATA F+V consumption was categorized as follows: *low consumption (0-2 daily F+V servings), intermediate consumption (3-4 daily F+V servings),* and *high consumption (5 or more daily F+V servings).* Then a tabular dataset containing this three-category F+V variable, alongside with corresponding zip codes, was reimported back into GIS and converted into a final shapefile following step 2 described above.

Soda consumption: The average number of sodas consumed per week at the zip code level was also mapped using data from the 2014 Injury and Violence Prevention Dataset. This variable was based on a question where respondents were asked, "In an average week, about how many regular sodas such as Coke or Mountain Dew, do you drink? Do not include diet sodas or sugar-free drinks. Please count a 12-ounce can, bottle or glass as one drink." Responses were reported as whole-number values. In terms of creating a shapefile of weekly soda consumption, similar mapping procedures used for *F+V consumption* were employed. The main difference is that soda consumption was categorized as follows in STATA: *low consumption (0 sodas per week), intermediate consumption (1-6 sodas per week),* and *high consumption (7 or more sodas per week).*

Psychosocial Community Characteristics (PCCs)

One measure of PCCs were mapped in this study: community-level economic hardship. This was mapped using data from the 2014 Injury and Violence Prevention Dataset based on respondent zip codes that were linked to the Los Angeles County 2008-2012 Economic Hardship Index (EHI). This variable was previously described on pages 69-70 of this dissertation. Similar steps used for *F+V consumption* were used to create a final shapefile of *community-level economic hardship.* There was one main difference— i.e., community-level economic hardship was categorized in tertiles based on the min and max average economic hardship scores from the tabular dataset imported and analyzed in STATA. Categories for community-level economic hardship included: *low economic hardship (13.2-27.5 points)*, *intermediate economic hardship (27.6-55.0 points)*, and *high economic hardship (55.1-82.5 points)*.

Structural Food Choice Factors (FCFs):

Two measures of FCFs were mapped in this study: fast-food restaurant density and sit-down restaurant density in Los Angeles County.

The number of restaurant retail food establishments in a zip code, fast-food and sit-down restaurants, were each mapped using data from the 2014 Duns and Bradstreet data. Fast-food restaurants corresponded to the following retailer type predefined in the dataset: 'fast food, pizza, sandwiches.' In contrast, sit-down restaurants corresponded to 'restaurants.' Similar steps used to construct the *F+V consumption* shapefile were employed to create final shapefiles of each *fast-food restaurant density* and *sit-down restaurant density* variables. The main difference was that these variables were each categorized in tertiles based on the min and max average number of restaurants of the tabular dataset imported and analyzed in STATA. For fast-food restaurant density, this included the following categories: *low density (0-24.9 restaurants), intermediate density (25.0-48.9 restaurants),* and *high density (49.0-72.0 restaurants).* Sit-down restaurant was categorized as follows: *low density (0-62.6 restaurants), intermediate density (62.7-125.3 restaurants),* and *high density (125.4-188.0 restaurants).*

Psychological Well-being (PWB):

One measure of PWB was mapped in this study: psychological distress. It is a was geospatially mapped using a survey measure from the 2014 IVPP Survey which was measured using the five-item Mental Health Inventory (MHI-5) (α=0.74). The MHI-5 asks respondents to report (in the last month) their level of happiness, level of calm and peace, level of nervousness, level of feeling "downhearted and blue," and level of feeling "so down in the dumps" that nothing could cheer them up (Strand et al., 2003). Respondents were able to choose from six possible response options (i.e., "all of the time," "most of the time," "a good bit of the time," "some of the time," "a little bit of the time," and "none of the time").

Respondents were able to choose from six possible response options assigned scores ranging from 5 to 30 points each. Responses included: 5="none of the time," 10="a little bit of the time," 15="some of the time," 20="a good bit of the time," 25="most of the time," and 30=all of the time." The items were linearly transformed and total scores ranged from 0-100, with higher scores indicating higher levels of psychological distress. Similar steps used to construct the *F+V consumption* variable shapefile were used to create the final shapefile of *psychological distress.* The main difference was that psychological distress was categorized in tertiles based on the min and max average level of psychological distress of the tabular dataset imported and analyzed in Stata: *low distress (16.6-25.9 points)*, *intermediate distress (26.0-50.9 points)*, and *high distress (51.0-75.0 points)*.

Density of available mental health counseling services:

Two measures of density of available mental health counseling services were mapped in this study: *individual mental health supports* and *publicly-funded mental health supports.*

Individual Mental Health Supports: This variable corresponds to the number of non-publicly-funded mental health resources across Los Angeles County zip codes that are oftentimes delivered to individuals on a one-on-one basis. These supports were identified using the 2016 Department of Consumer Affairs Licensee Database. This database lists the addresses of a range of license types, from barbers to veterinarians, in Los Angeles County in the year 2016. However, only psychologists, licensed clinical social workers, and licensed marriage and family therapists were included in the operational definition of *individual mental health supports*. These license types and corresponding addresses were converted from a text document to an Excel database. Some fields were not in a proper format suitable to be read into GIS because apartment and suit numbers were included within the address, preventing GIS from

accurately geocoding addresses. Thus, to remedy this issue, each address line was manually fixed in Excel to ensure that addresses followed a standard format suitable for matching addresses in GIS. Once the dataset was cleaned in Excel, it was imported into GIS as a tabular dataset, where addresses were geocoded using the CAMS locator. When necessary, addresses that were not automatically found by the GIS software were manually rematched in GIS. In terms of mapping, similar steps used to create the *F+V consumption* variable shapefile were used to create a final shapefile of *individual mental health supports.* The main difference was that this variable was each categorized in tertiles based on the min and max number of individual mental health providers of the tabular dataset imported and analyzed in STATA: *low density (0-181.9 providers)*, *intermediate density (182.0-362.9 providers)*, and *high density (363.0-543 providers)*.

Publicly-Funded Mental Health Supports: These supports were identified using the 2018 Los Angeles County Department of Mental Health Providers Locations dataset retrieved from the Los Angeles County Department of Public Health GIS portal (Los Angeles County, 2017). The Los Angeles County Department of Mental Health updates this database every six months. The most recent iteration of the database at the time of analysis was used in the present study was downloaded in April 2018. It was available as a GIS shapefile. In terms of additional mapping, similar used to create the *F+V consumption* variable shapefile were also used to create a final shapefile of *publicly-funded mental health supports.* The main difference was that this variable was each categorized in tertiles based on the min and max number of publicly-funded mental health providers of the tabular dataset imported and analyzed in STATA: *low density (0-0.9 providers)*, *intermediate density (1.0-5.9 providers)*, and *high density (6.0-10.0 providers)*.

Racial/Ethnic distribution:

The high proportion of certain racial/ethnic groups was mapped using the 2012 Predominant Population shapefile that was downloaded directly from ArcGIS Online (ESRI). Given it was already a shapefile, no further cleaning was required.

Analytic Strategy

GIS techniques guided by each study aim were used to conduct geospatial analyses of Los Angeles County, first overall in Los Angeles County then by the region's eight Service Planning Areas (SPAs). Due to the large size of Los Angeles County (over 4,000 square miles), sub-dividing the region into eight geographical SPA regions is a practice used by the local health department in Los Angeles County. They are said to "provide more relevant public health and clinical services targeted to the specific health needs of the residents in these different areas" (County of Los Angeles Public Health, 2018). **Table 3.3** provides a brief overview of each SPA, but information related to the sociodemographic and health characteristics in each SPA can be found in the most recent Los Angeles County Department of Public Health *Key Indicators of Health by Service Planning Area* report (LACDPH, 2017a). Analyses carried out were as follows:

(1) Aim #1: Identify health risks of Los Angeles County residents by mapping the geospatial distribution of dietary behaviors (DBs), community-level economic hardship (EH), structural food choice factors (FCFs), psychological well-being (PWB), and density of available mental health counseling services.

Shapefiles for each variable were created using the techniques described in the Methods section of this study (pages 148-153). Across all variables, contrasting colors for the three levels (i.e., low, intermediate, and higher) were selected to highlight differences in the distribution of each variable.

(2) **Aim #2: Determine whether the geographic distribution of PWB, FCFs, availability of mental health counseling services, and DBs varies by EH; Aim #3: Compare the geographic distribution of PWB with density of available mental health counseling services.**

Two-by-two choropleth maps were created to compare the geographic distributions of between each two-variable combinations of interest. To create these choropleth maps, the data found in the attribute table of each variable's shapefile was first copied and pasted into separate Excel tabs. Only the zip code and individual responses for each variable were kept; responses for each variable were categorized as tertiles in Stata as previously described. After all variables had responses corresponding to tertiles (i.e., low, intermediate, and high), they were all combined into a master Excel sheet. In this master sheet, a coding scheme was created assigning each combination of variables a number. For example, to compare psychological distress and community-level hardship, a score of *low* for psychological distress and a score of *low* for community-level economic hardship was assigned the number 1. A score of *low* for distress and a score of *intermediate* for hardship was assigned a score of 2, and so forth. In total there were nine possible combinations of numbers assigned. These numbers were then color-coded in ArcMap GIS. Color selection was informed by a color scheme generator (Penn State, 2018), a tool used to display guide color choices better distinguishing patterns. A SPA layer was overlaid to easily identify differences by the eight Los Angeles County planning regions.

(3) Aim #4: Explore racial/ethnic disparities in DBs, EH, FCFs, PWB, and availability of mental health counseling services.

A map depicting the highest concentration of a particular race or ethnicity was mapped using the ArcGIS 2010 Predominant Population layer. This is a ready to use downloadable shapefile from ArcGIS Online. A SPA layer was also overlaid to easily identify differences by the eight planning

regions. The end product was a single map showing by strength of color the extent to which a racial or ethnic group dominates over the next. This map was then visually compared to the maps described in the section above as way to identify disparities across all variables of interest.

Software

In this study the geographic information system (GIS) was used to create all maps and corresponding analyses. In particular, ArcMap 10.3.1 was the primary GIS application used. Data were also cleaned and analyzed using STATA version 14.1 *(StataCorp LP, College Station, Texas)*.

Table 3.3. Overview of Service Planning Areas (SPAs) in Los Angeles County

SPA	SPA Name	Communities Served[1]	Characteristics[2]
1	Antelope Valley	Acton, Agua Dulce, Gorman, Lake Hughes, Lake Los Angeles, Lancaster, Littlerock, Palmdale, Quartz Hill, and others.	<u>Racial/ethnic Distribution</u> • Latino (44.8%); white (34.6%); African American (16.2%); Asian (3.8%); Native Hawaiian or Other Pacific Islander (0.2%); American Indian/Alaskan Native (0.4%) <u>Chronic Disease Status</u> • Adults who are obese (29.6%) • Adults who are overweight (37.0%) <u>Mental Health Status</u> • Adults with current depression (12.5%) • Adults at risk for major depression (13.4%) <u>Access to Mental Health Care</u> • Adults who reported seeking mental health care in the last year (10.1%)
2	San Fernando Valley	Burbank, Calabasas, Canoga Park, Canyon Country, Encino, Glendale, La Cañada-Flintridge, San Fernando, Sherman Oaks, Sun Valley, Van Nuys, Woodland Hills, and others.	<u>Racial/ethnic Distribution</u> • Latino (40.2%); white (44.6%); African American (3.5%); Asian (11.5%); Native Hawaiian or Other Pacific Islander (0.1%); American Indian/Alaskan Native (0.2%) <u>Chronic Disease Status</u> • Adults who are obese (19.8%) • Adults who are overweight (37.0%) <u>Mental Health Status</u> • Adults with current depression (8.0%) • Adults at risk for major depression (10.1%) <u>Access to Mental Health Care</u> • Adults who reported seeking mental health care in the last year (7.0%)

3	San Gabriel Valley	Alhambra, Altadena, Arcadia, Azusa, Baldwin Park, Claremont, Covina, Diamond Bar, Duarte, El Monte, Glendora, Irwindale, Monrovia, Monterey Park, Pasadena, Pomona, San Dimas, San Gabriel, San Marino, Temple City, Walnut, West Covina, and others.	Racial/ethnic Distribution • Latino (46.3%); white (21.2%); African American (3.7%); Asian (28.6%); Native Hawaiian or Other Pacific Islander (0.1%); American Indian/Alaskan Native (0.2%) Chronic Disease Status • Adults who are obese (23.8%) • Adults who are overweight (35.0%) Mental Health Status • Adults with current depression (6.4%) • Adults at risk for major depression (11.0%) Access to Mental Health Care • Adults who reported seeking mental health care in the last year (5.4%)
4	Metro Los Angeles	Boyle Heights, Central City, Downtown LA, Echo Park, El Sereno, Hollywood, Mid-City Wilshire, Monterey Hills, Mount Washington, Silverlake, West Hollywood, and Westlake.	Racial/ethnic Distribution • Latino (51.8%); white (24.8%); African American (5.2%); Asian (17.9%); Native Hawaiian or Other Pacific Islander (0.1%); American Indian/Alaskan Native (0.2%) Chronic Disease Status • Adults who are obese (22.1%) • Adults who are overweight (34.4%) Mental Health Status • Adults with current depression (10.8%) • Adults at risk for major depression (15.7%) Access to Mental Health Care • Adults who reported seeking mental health care in the last year (12.3%)

5	West	Beverly Hills, Brentwood, Culver City, Malibu, Pacific Palisades, Playa del Rey, Santa Monica, and Venice.	Racial/ethnic Distribution • Latino (16.0%); white (64.0%); African American (5.7%); Asian (14.0%); Native Hawaiian or Other Pacific Islander (0.1%); American Indian/Alaskan Native (0.2%) Chronic Disease Status • Adults who are obese (10.3%) • Adults who are overweight (31.1%) Mental Health Status • Adults with current depression (11.1%) • Adults at risk for major depression (6.8%) Access to Mental Health Care • Adults who reported seeking mental health care in the last year (14.2%)
6	South	Athens, Compton, Crenshaw, Florence, Hyde Park, Lynwood, Paramount, and Watts.	Racial/ethnic Distribution • Latino (68.2%); white (2.4%); African American (27.4%); Asian (1.7%); Native Hawaiian or Other Pacific Islander (0.2%); American Indian/Alaskan Native (0.1%) Chronic Disease Status • Adults who are obese (34.1%) • Adults who are overweight (33.4%) Mental Health Status • Adults with current depression (8.4%) • Adults at risk for major depression (16.8%) Access to Mental Health Care • Adults who reported seeking mental health care in the last year (8.1%)

7	East	Artesia, Bell, Bellflower, Bell Gardens, Cerritos, City of Commerce, City Terrace, Cudahy, Downey, East Los Angeles, Hawaiian Gardens, Huntington Park, La Habra Heights, Lakewood, La Mirada, Los Nietos, Maywood, Montebello, Norwalk, Pico Rivera, Santa Fe Springs, Signal Hill, South Gate, Vernon, Walnut Park, Whittier, and others.	<u>Racial/ethnic Distribution</u> • Latino (73.5%); white (14.0%); African American (3.0%); Asian (9.0%); Native Hawaiian or Other Pacific Islander (0.2%); American Indian/Alaskan Native (0.2%) <u>Chronic Disease Status</u> • Adults who are obese (28.0%) • Adults who are overweight (39.1%) <u>Mental Health Status</u> • Adults with current depression (8.3%) • Adults at risk for major depression (11.7%) <u>Access to Mental Health Care</u> • Adults who reported seeking mental health care in the last year (7.9%)
8	South Bay	Athens, Avalon, Carson, Catalina Island, El Segundo, Gardena, Harbor City, Hawthorne, Inglewood, Lawndale, Lennox, Long Beach*, Hermosa Beach, Manhattan Beach, Palos Verdes Estates, Rancho Dominguez, Rancho Palos Verdes, Redondo Beach, Rolling Hills, Rolling Hills Estates, San Pedro, Wilmington, and others.	<u>Racial/ethnic Distribution</u> • Latino (40.4%); white (28.4%); African American (14.8%); Asian (15.4%); Native Hawaiian or Other Pacific Islander (0.9%); American Indian/Alaskan Native (0.2%) <u>Chronic Disease Status</u> • Adults who are obese (24.1%) • Adults who are overweight (37.2%) <u>Mental Health Status</u> • Adults with current depression (12.5%) • Adults at risk for major depression (13.4%) <u>Access to Mental Health Care</u> • Adults who reported seeking mental health care in the last year (9.3%)

[1](County of Los Angeles Public Health, 2018)
[2](LACDPH, 2017a)

RESULTS

Maps corresponding to each study aim are presented in **Figures 3.2-3.19.**

Aim 1: Identify health risks of Los Angeles County residents by mapping the geospatial distribution of dietary behaviors, community-level economic hardship, structural food choice factors, psychological well-being, and density of available mental health counseling services.

The maps in **Figures 3.2-3.9** show the distribution of DBs, EH, structural FCFs, and psychological well-being, and density of across Los Angeles County across the eight Service Planning Areas (SPAs). The blue areas correspond with communities with the lowest levels corresponding to each of these variables, orange areas with intermediate levels, and red with the highest levels. The first map in this analysis (***Figure 3.2***) shows the average distribution of daily fruit and vegetable (F+V). Results indicate that a large portion of the region is characterized by high F+V consumption, albeit there are some pockets of low consumption. The distribution of average weekly soda consumption behaviors is depicted in **Figure 3.3**. This map illustrates that the majority of Los Angeles County is characterized by intermediate levels of soda consumption. In sub-analyses (*data not shown*), about 71% of zip codes were assessed as having intermediate levels of soda consumption, compared to only about 12% of zip codes with low levels and about 16% with high levels. On average, each SPAs had about four zip codes characterized as having high levels of soda consumption. Overall, the maps indicate that Los Angeles County residents are engaging in both healthy and unhealthy dietary behaviors.

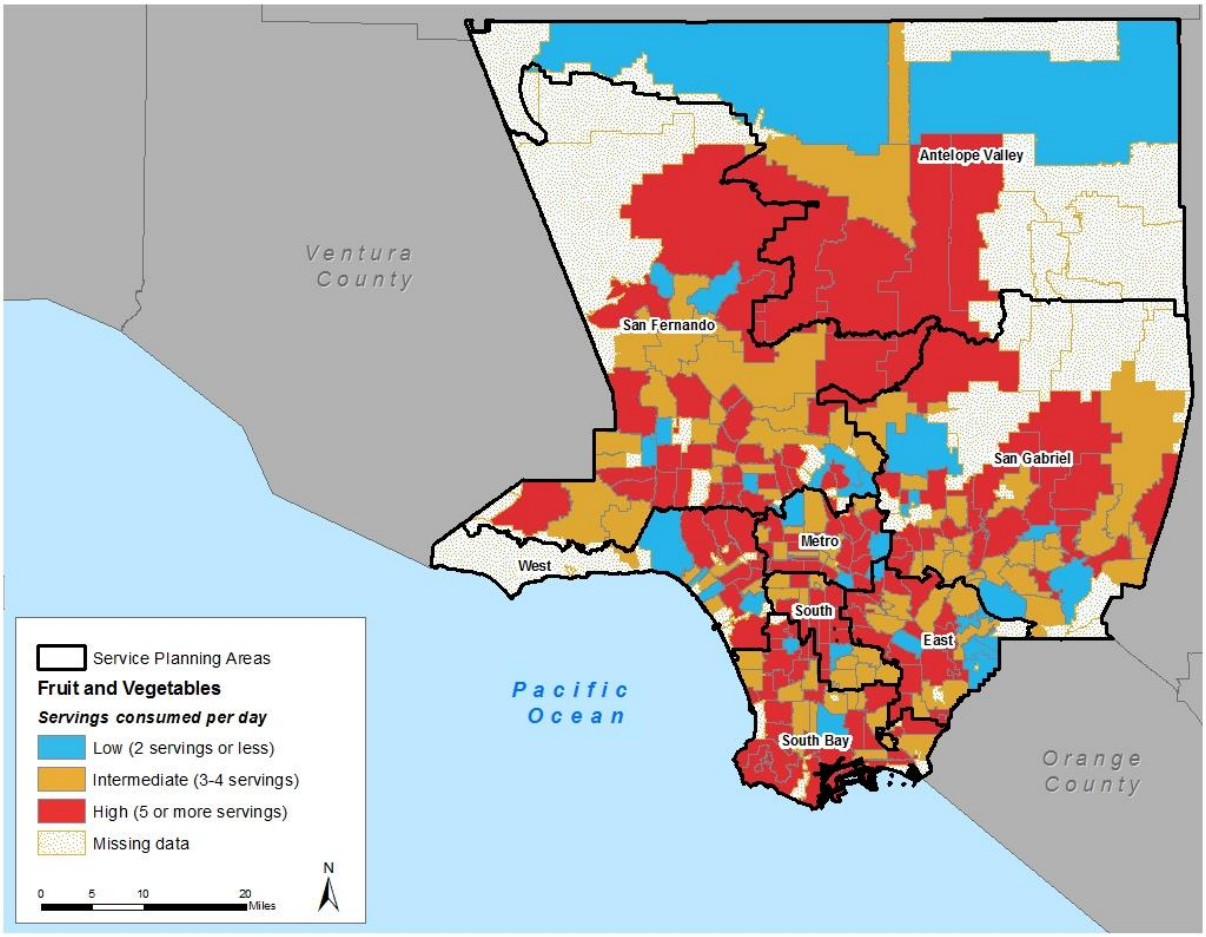


Figure 3.2. *Fruit and vegetable consumption across Los Angeles County by Service Planning Areas*

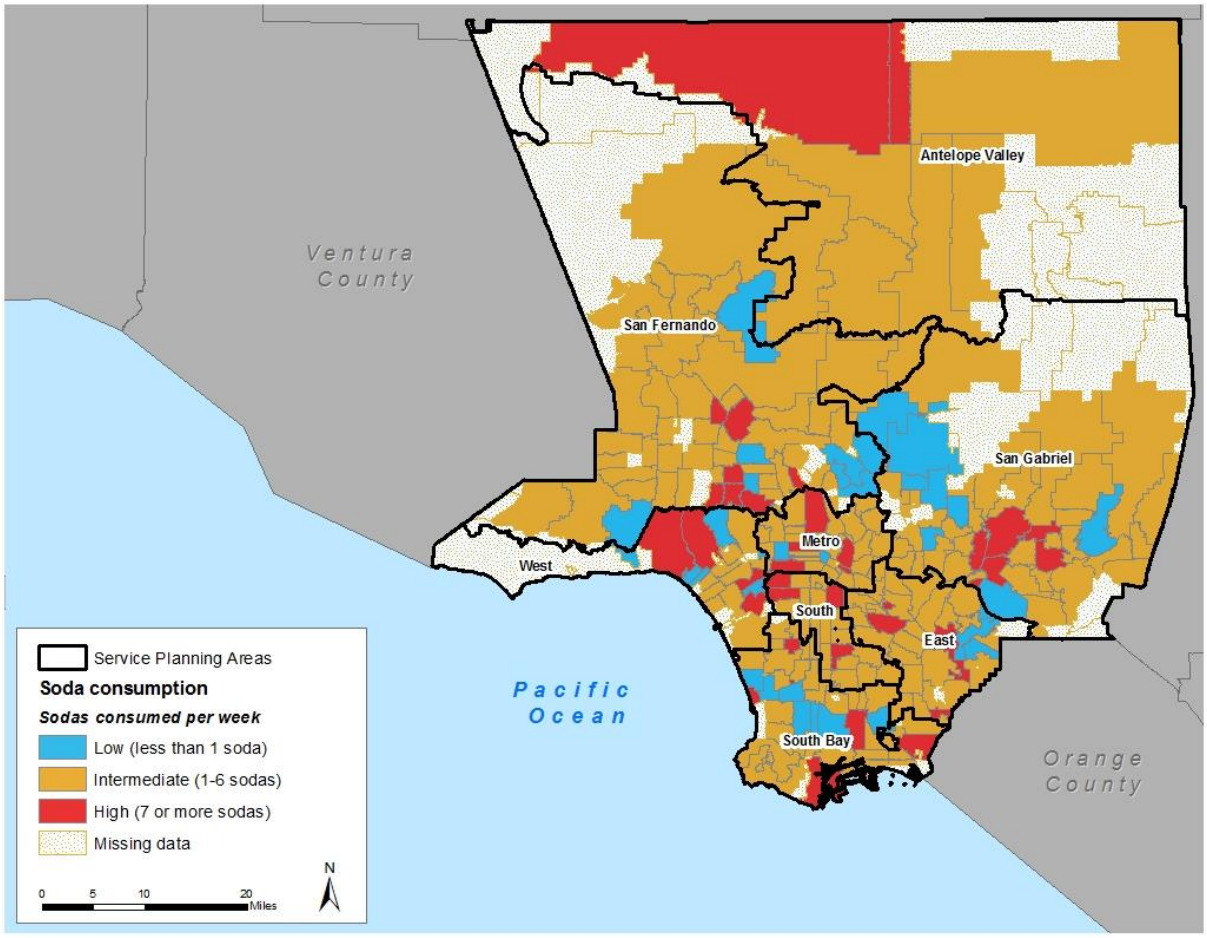


Figure 3.3. *Soda consumption across Los Angeles County by Service Planning Areas*

The map showing the distribution of community-level economic hardship is presented in **Figure 3.4**. It indicates that economic hardship is lowest among the coastal areas of the region, particularly in the West SPA and two coastal areas of the South Bay SPA. In contrast, hardship appears to be concentrated in the central area of Los Angeles County, primarily in the South SPA and portions of the Metro and San Fernando, and Antelope Valley SPAs.

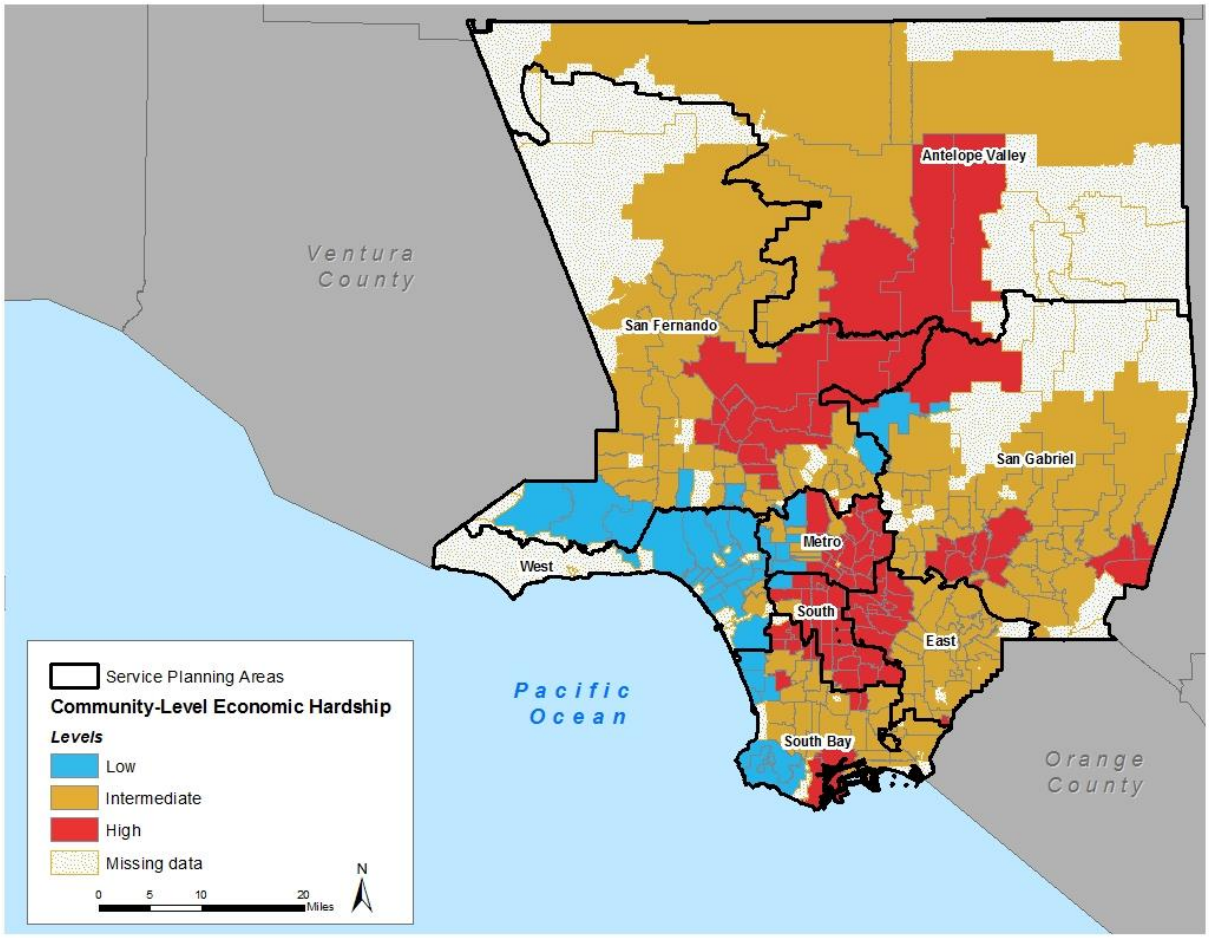


Figure 3.4. *Distribution of community-level economic hardship across Los Angeles County by Service Planning Areas*

Maps of structural-level food choice factors (FCFs) were also created. The map presented in **Figure 3.5** illustrates that a majority of the region has a low density of fast-food restaurant retail establishments. Sub-analyses (*data not* shown) found that about 61% of all zip codes had low density of fast food restaurants, whereas only about 4% had a high density. Small pockets of high fast-food restaurants density were found across all SPAs, except for the San Gabriel and South SPAs. In terms of sit-down restaurant density (**Figure 3.6**), the Metro SPA had the highest concentration of sit-down restaurants in the region. In contrast, the South and Antelope Valley SPAs had the lowest density of sit-down restaurants; only two zip codes in each of these SPAs had intermediate density of sit-down restaurants.

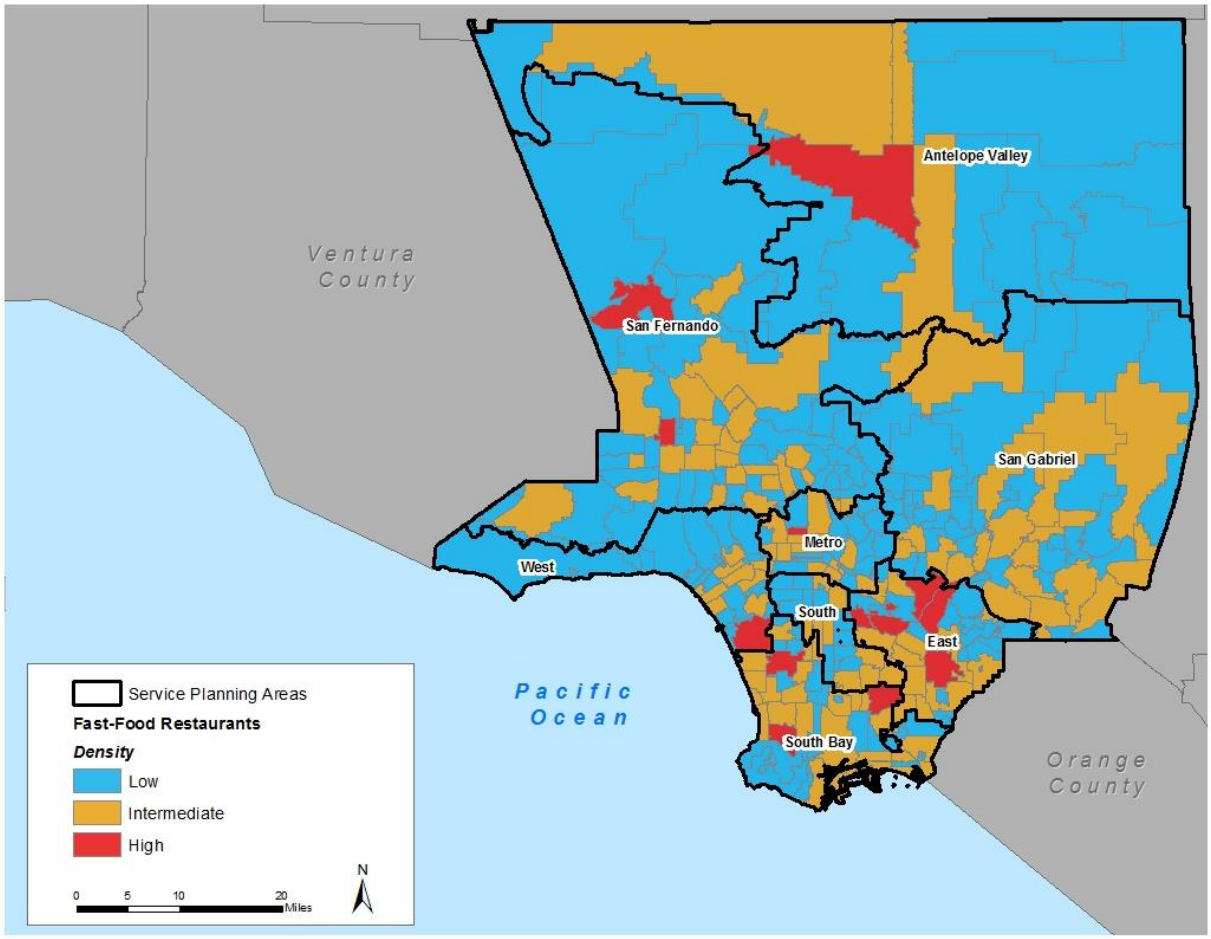


Figure 3.5. Density of fast-food restaurants across Los Angeles County by Service Planning Areas

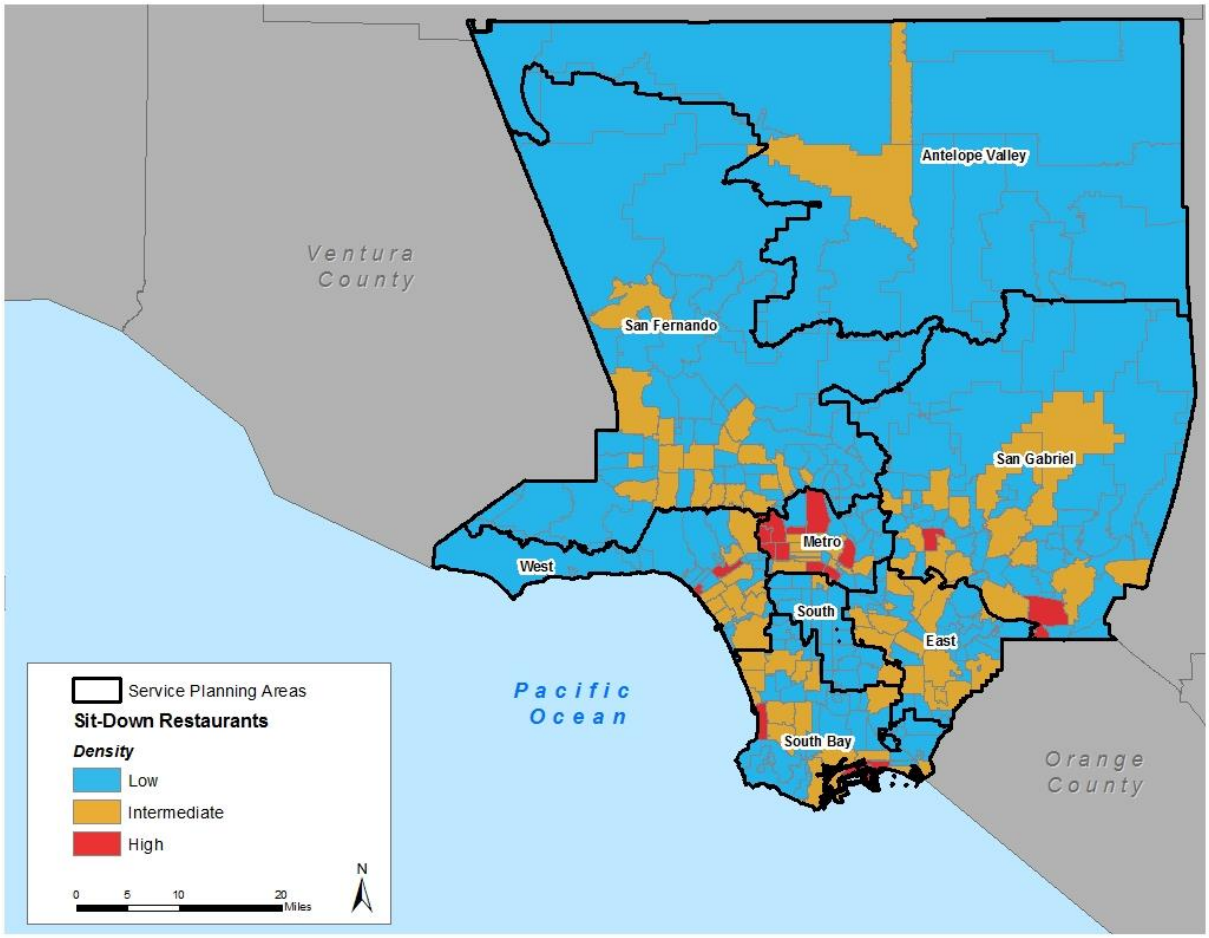


Figure 3.6. *Density of sit-down restaurants across Los Angeles County by Service Planning Areas*

Moreover, in terms of psychological distress, the map showing the distribution of psychological distress levels in the region (**Figure 3.7**) indicates that a majority of the population in Los Angeles County has intermediate levels of psychological distress. Descriptive sub-analyses (*data not shown)* found that about 71% of all Los Angeles County zip codes had intermediate level of distress. In contrast, about 25% and less than 4% of all zip codes had intermediate and low levels of distress, respectively. Only the following zip codes by SPA were found to be characterized by low levels of distress across each SPA: South Bay (90274, 90501); South (90037); Metro (90211); East (90240); San Gabriel (91723, 91106). The West, San Fernando, and Antelope Valley SPAs did not have any zip codes characterized by low levels of psychological distress.

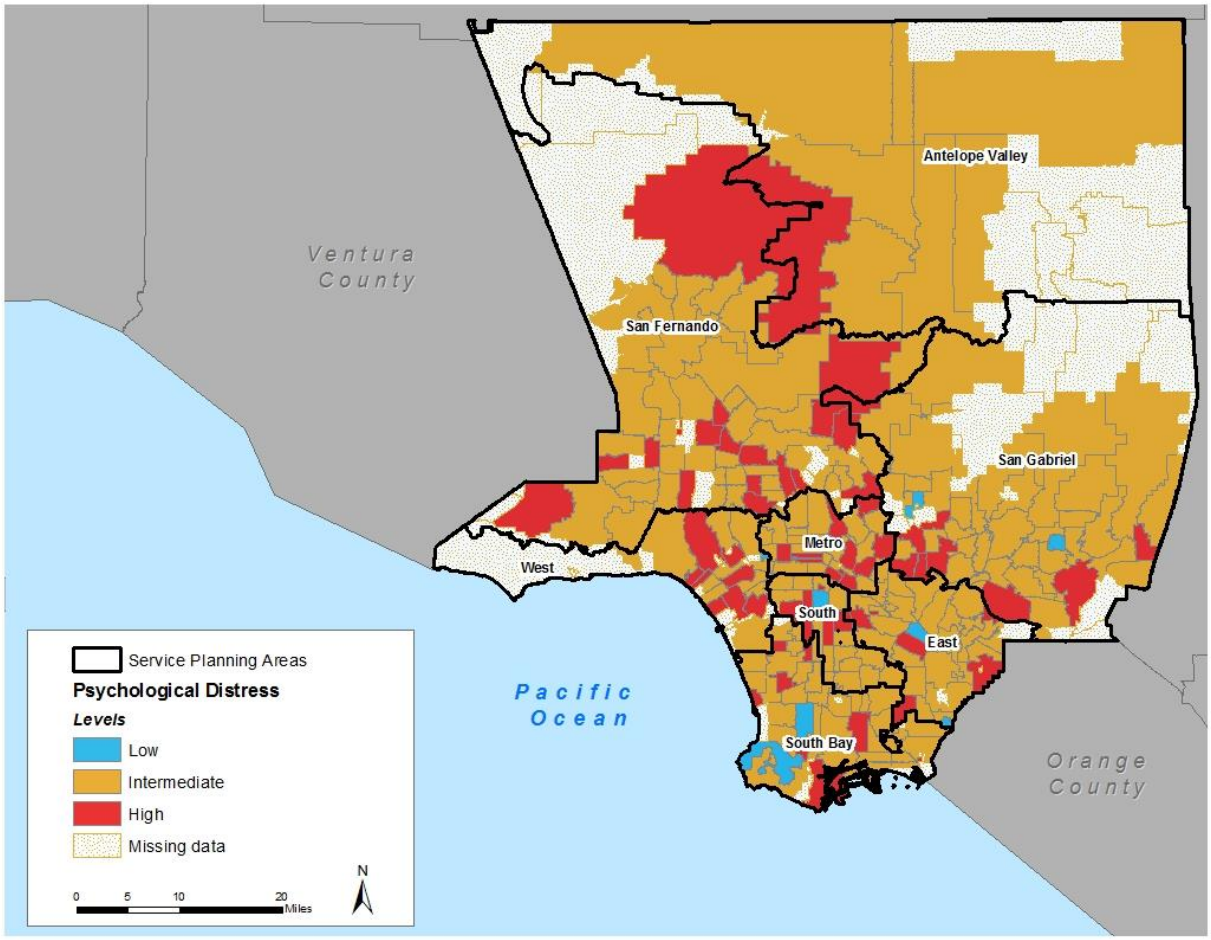


Figure 3.7. *Distribution of psychological distress across Los Angeles County by Service Planning Areas*

Finally, there were two maps to show the distribution of available mental health supports across the region. The map presented in **Figure 3.8** indicates that the West SPA has highest concentration of individual mental health services. The South, Antelope Valley, and East SPAs did not have any zip codes characterized as having intermediate or high density of individual mental health providers. In contrast, **Figure 3.9** paints a slightly different story. It appears that publicly-funded mental health providers are almost equally distributed across the region, with the South SPA having the highest concentration of these providers, followed by the East and Metro SPAs.

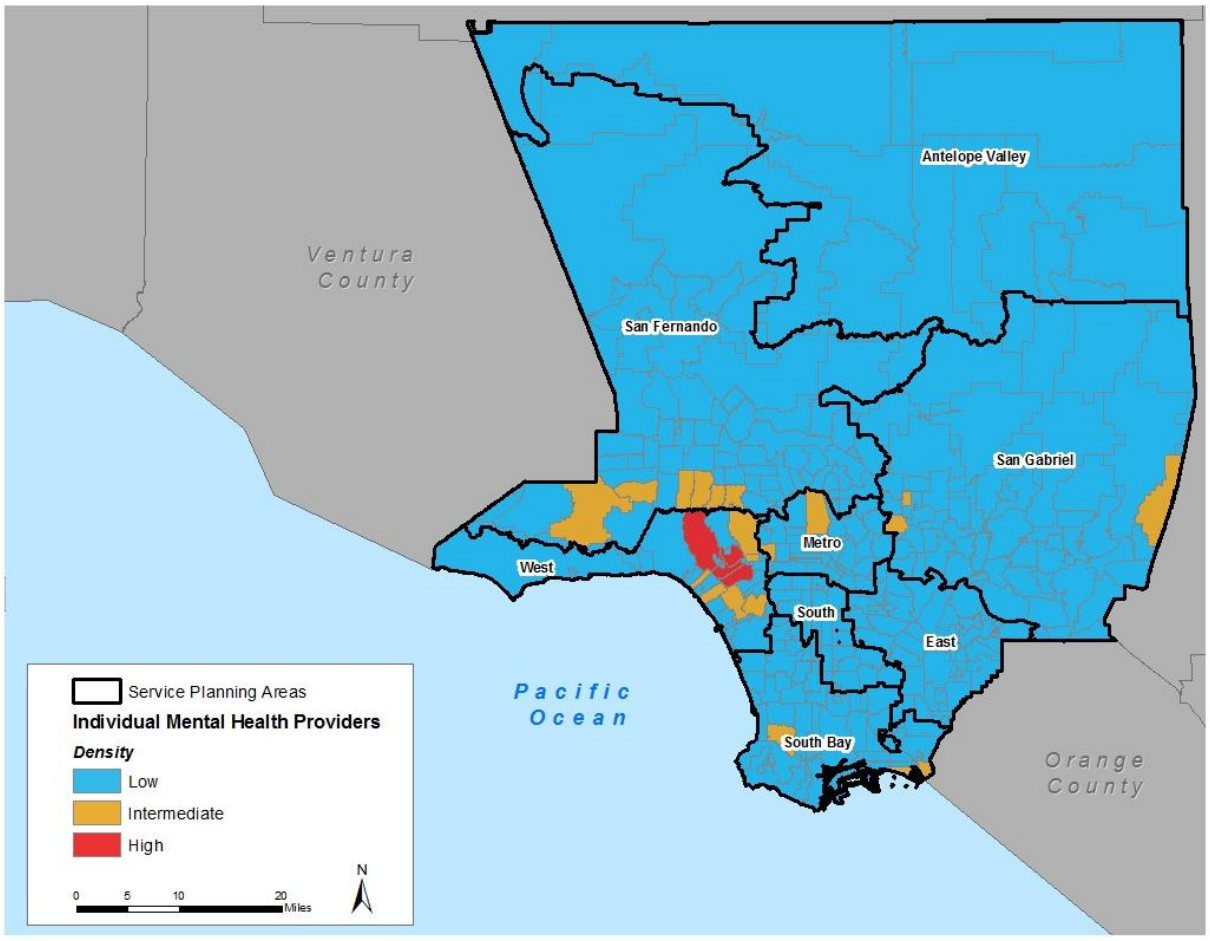


Figure 3.8. *Density of individual mental health providers across Los Angeles County by Service Planning Areas*

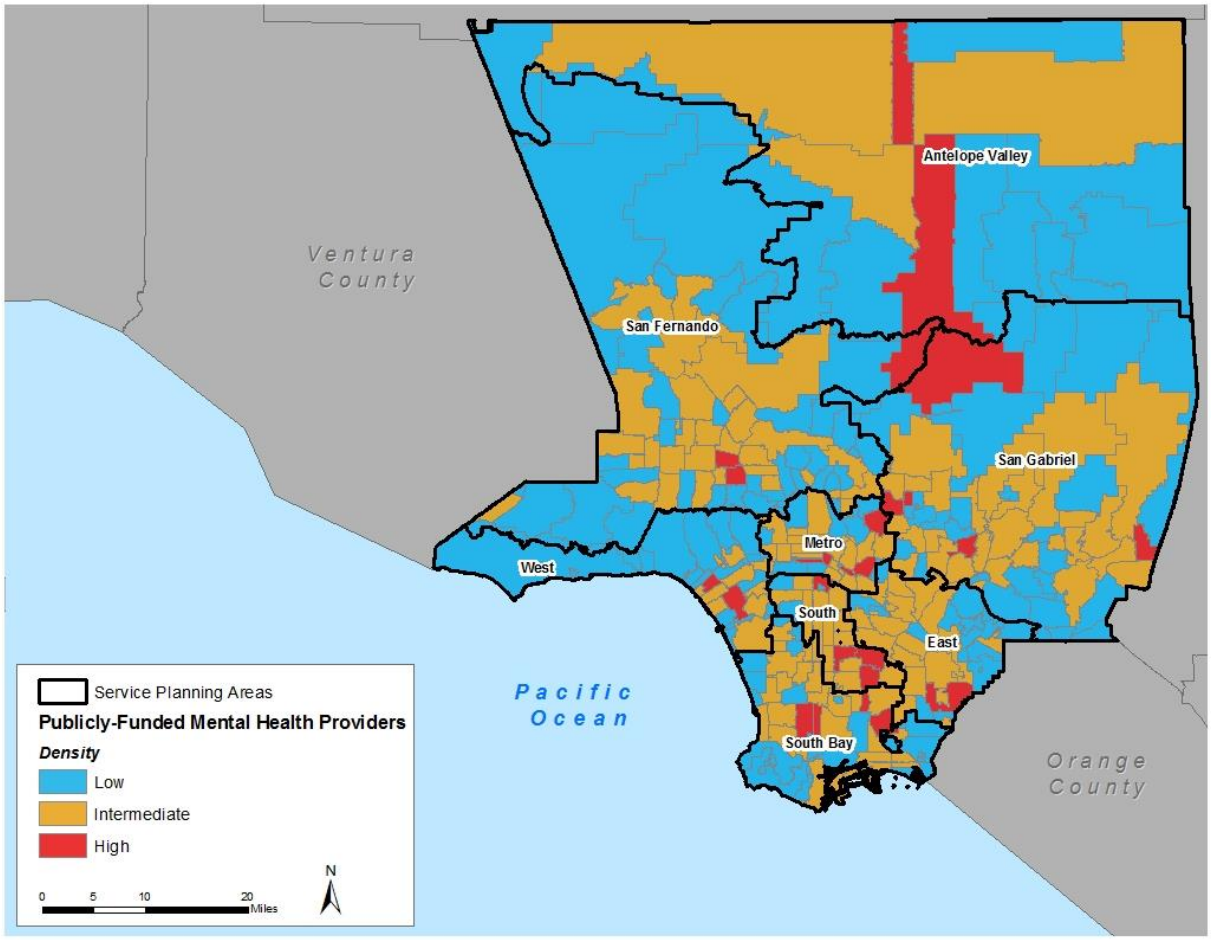


Figure 3.9. *Density of publicly-funded mental health providers across Los Angeles County by Service Planning Areas*

Aim 2: Determine whether the geographic distribution of psychological well-being, structural-level food choice factors, availability of mental health counseling services, and dietary behaviors varies by community-level economic hardship

Choropleth maps comparing the distribution community-level economic hardship with psychological well-being, structural-level food choice factors (i.e., fast-food and sit-down restaurant density), availability of mental health counseling services, and dietary behaviors are presented in **Figure 3.10-3.16.** The orange shades correspond with communities with lowest levels of the variable of interest, the green shades with intermediate levels, and blue shades with highest levels. The increasing intensity of each color corresponds to increasing levels of economic hardship by the different levels of the variable of interest. For example, the map comparing community-level economic hardship with psychological distress (**Figure 3.10**), the lighter shade of orange indicates the overlap between low psychological distress and low economic hardship. The next darker shade of orange indicates low psychological distress but intermediate levels of economic hardship. The darkest shade of orange indicates low psychological distress but high economic hardship. In this map, it appears that the South SPA is characterized by intermediate levels of psychological distress and high levels of economic hardship. There is only one zip code, 90037, in the central portion of the South SPA that has both high distress and high levels of economic hardship. This zip code is situated in South Los Angeles, particularly in the vicinity of the Natural History Museum of Los Angeles County. In contrast, the Metro SPA is characterized by low levels of economic hardship yet intermediate to high levels of distress. The South Bay SPA that appears to have the greatest diversity in terms of overlap between economic hardship and psychological distress.

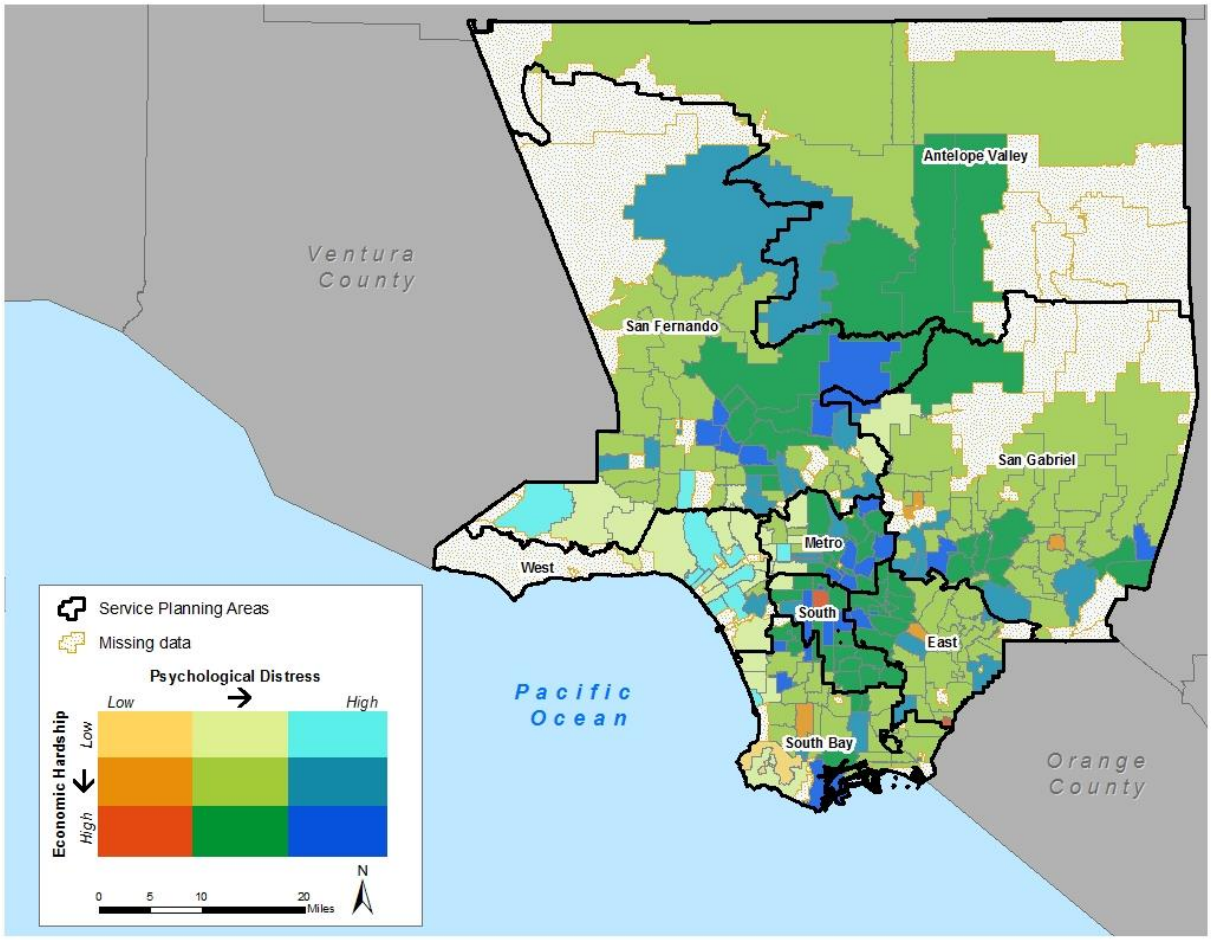


Figure 3.10. *Comparison of community-level economic hardship and psychological distress across Los Angeles County by Service Planning Areas*

The map shown in **Figure 3.11** compares the levels of economic hardship and fast-food restaurant density in Los Angeles County across SPAs. It shows that the South SPA has predominately high levels of community-level economic hardship, yet low to intermediate density of fast-food restaurants. In contrast, the West SPA has low economic hardship and low to intermediate levels of fast-food density. It appears that only one zip code has high fast-food restaurant density in the West SPA. This zip code, 90045, represents the area near the Los Angeles airport. Other than the results presented for the South and West SPAs, there appear to be no discernable patterns in the overlap between levels of economic hardship and fast food restaurant density.

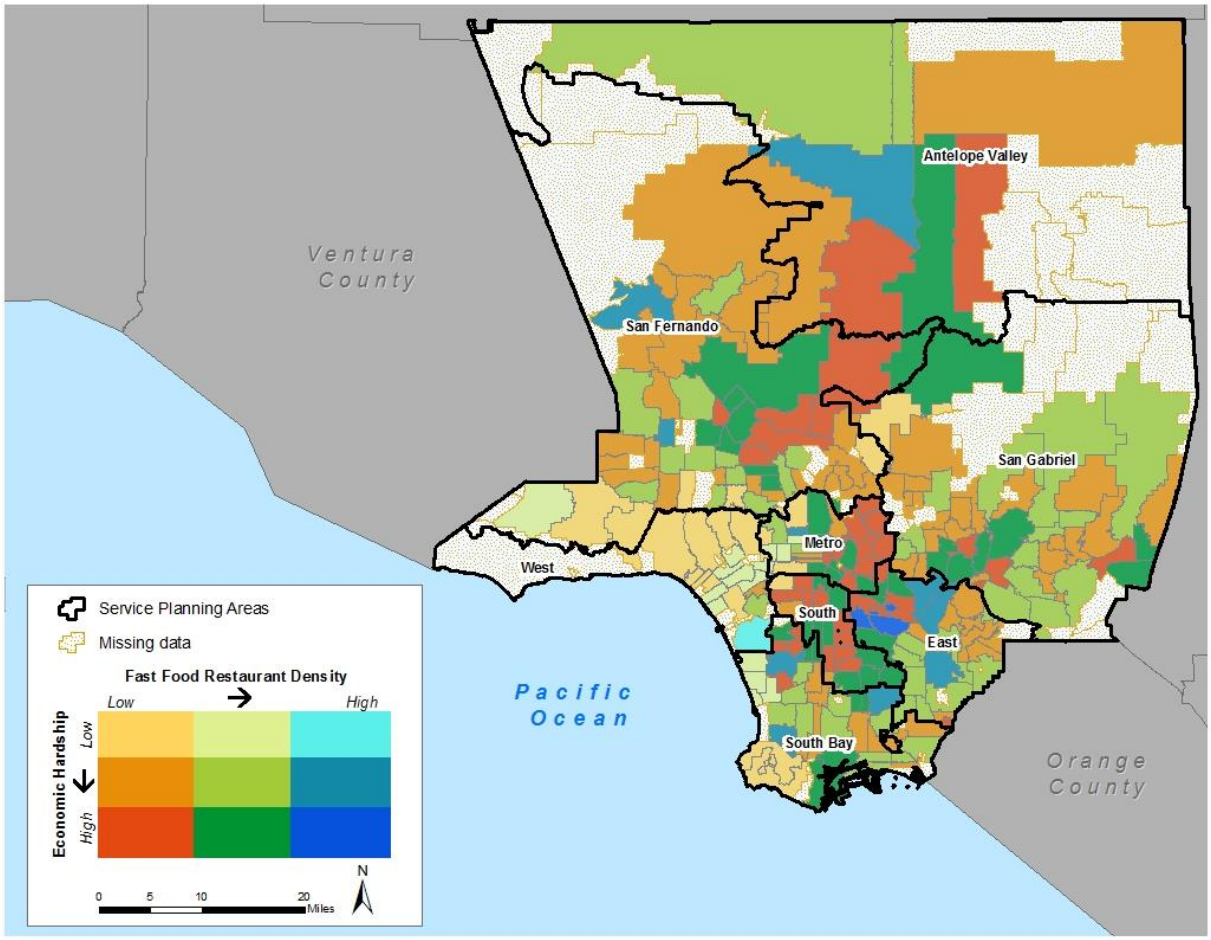


Figure 3.11. *Comparison of community-level economic hardship and fast-food restaurant density across Los Angeles County by Service Planning Areas*

This map in **Figure 3.12** compares the levels of economic hardship to the density of sit-down restaurants across Los Angeles County SPAs. The most notable result is that the South SPA has the highest level of economic hardship yet lowest level of sit-down restaurant density. Only one zip code has low economic hardship and low sit-down restaurant density: 90016. This zip code represents the area adjacent to Baldwin Hills. Only one zip code in the South SPA appears to have high hardship and intermediate density of sit-down restaurants: 90723. This area is known as East Compton. Another notable result is that the overlap between economic hardship and density of sit-down restaurants is very diverse in the

Metro SPA. For example, there are certain zip codes that have both high levels of economic hardship and density of sit-down restaurants (e.g., 90027 representing Los Feliz, 90012 representing Chinatown, 90006 representing Pico Union, and 90015 representing Downtown Los Angeles). In contrast, there are other zip codes that have low hardship but a high density of sit-down restaurants (e.g., 90069 representing West Hollywood, 90048 representing Mid-City), and 90036 representing the Miracle Mile corridor of Los Angeles). Furthermore, another notable finding is that the West SPA is characterized primarily by both low levels of economic hardship and density of sit-down restaurants. It appears there are no other discernable patterns in the other SPAs.

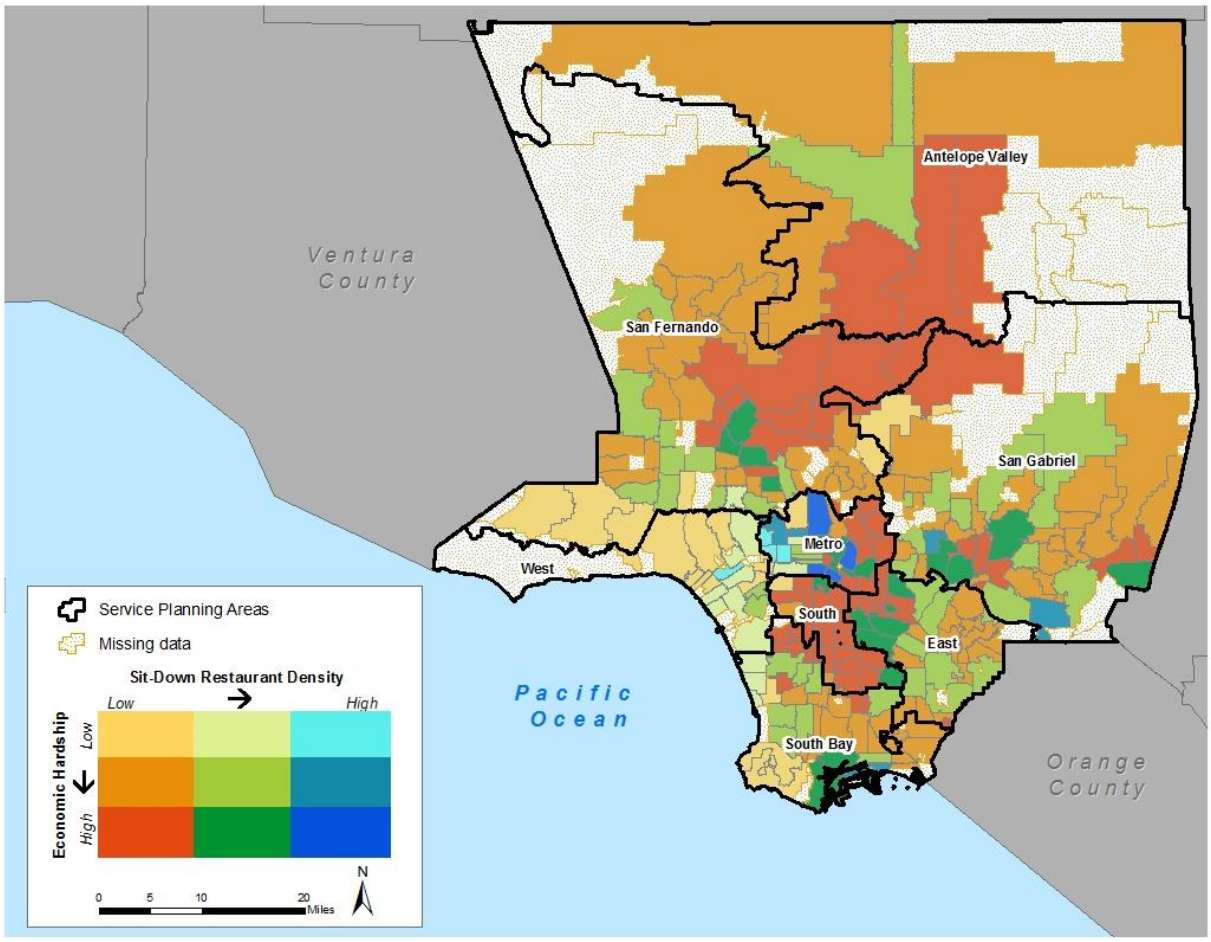


Figure 3.12. Comparison of community-level economic hardship and availability of sit-down restaurant density across Los Angeles County by Service Planning Areas

The maps presented in **Figures 3.13 & 3.14** compare the distribution of community-level economic hardship with density of available mental health supports. In particular, the map comparing economic hardship to individual mental health service providers shows that the majority of the region has high hardship, yet a low density individual mental health service providers. Only the West SPA has a high density of individual mental health service providers, although they are located in zip codes characterized with low levels of economic hardship. Another SPA that stands out is the South SPA, which has high levels of economic hardship yet a low density of individual mental health providers. However, examination of the overlap between community-level economic hardship and density of publicly-funded mental health providers shows a different pattern. Results indicate that the South SPA, which is characterized by high levels of hardship, has intermediate to high levels of publicly-funded mental health services. The West SPA, which is characterized by lower levels of hardship, has low density of these mental health services. There are only two West SPA zip codes that have low hardship yet high density of publicly-funded mental health providers: 90066 and 90404, corresponding to Marina Del Rey and Santa Monica, respectively. Patterns in the distribution of hardship and density of publicly-funded mental health services are less apparent in the other SPAs.

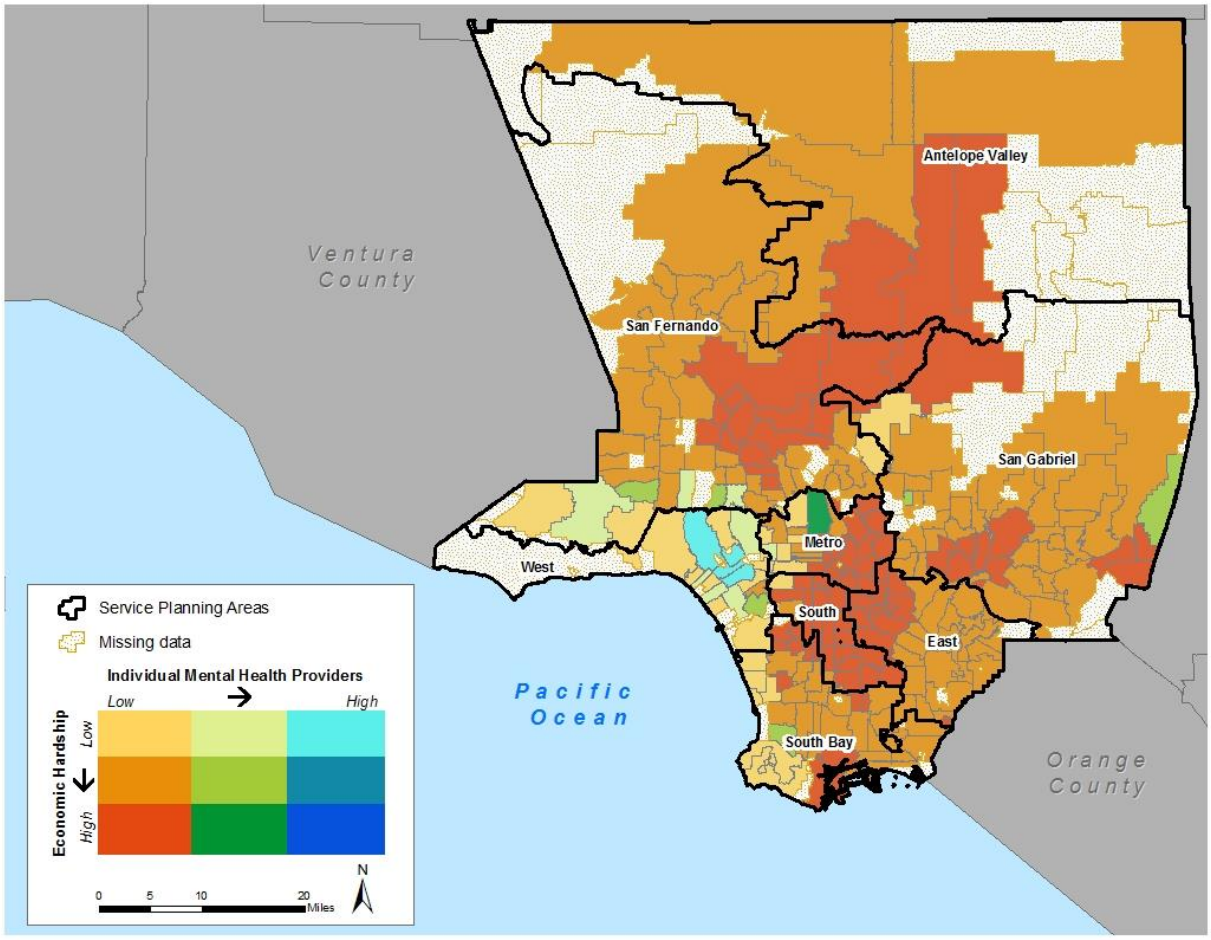


Figure 3.13. *Comparison of community-level economic hardship and individual mental health provider density across Los Angeles County by Service Planning Areas*

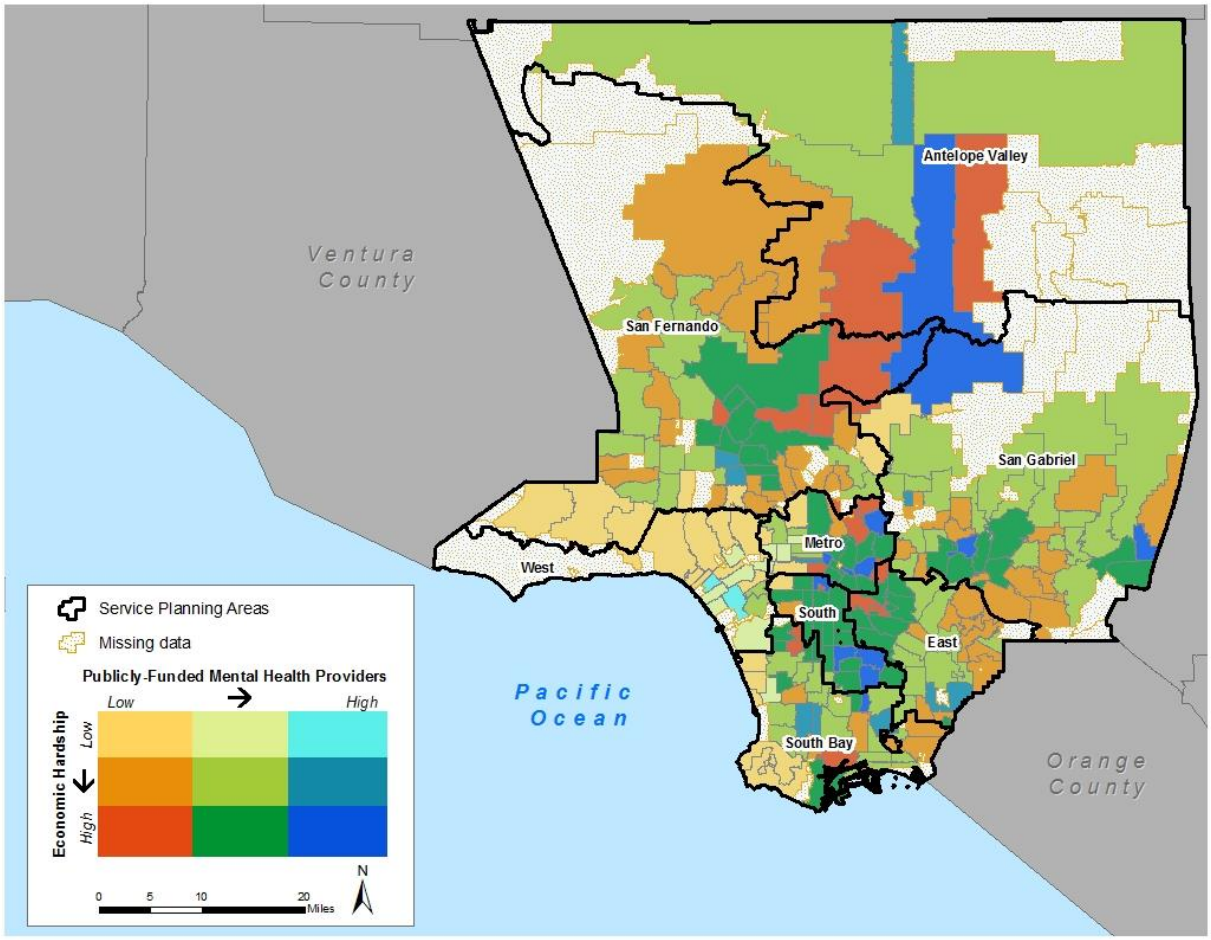


Figure 3.14. *Comparison of community-level economic hardship and publicly-funded mental health provider density across Los Angeles County by Service Planning Areas*

The maps in **Figure 3.15 & 3.16** showcase the distribution of healthy and unhealthy dietary by levels of community-level economic hardship. For healthy dietary behaviors, **Figure 3.15** shows that that despite having high hardship, the South SPA still has intermediate to high consumption of fruits and vegetables. Less surprising is that the West SPA has high consumption in light of low hardship. Across all SPAs, only a few zip codes appear to have high economic hardship and low fruit and vegetable consumption. These include: 90303 representing the city of Lennox located within the South Bay SPA); 90059 representing the Willowbrook area in the South Bay SPA); 90032 representing the Montecito Heights area in the Metro SPA; 90021 representing Boyle Heights in the Metro SPA; and 90063 representing the City Terrace area

near Boyle Heights in the Metro SPA). In terms of unhealthy dietary behaviors, the overlap between community-level economic hardship and soda consumption are depicted in **Figure 3.16.** Results indicate that high hardship overlaps with intermediate levels of soda consumption. Surprisingly, only a few zip codes had low hardship but high levels of soda consumption: 90272 representing Pacific Palisades in the West SPA; 90049 representing the area representing the areas near the Skirball Cultural Center, the Getty, and Brentwood in the West SPA; 90034 representing the Palms area in the West SPA; 90016 representing the area adjacent to Baldwin Hills in the South SPA; and 90019 the Mid-Wilshire area of the Metro SPA). Aside from these observations, the majority of the region appears to have intermediate economic hardship levels corresponding to weekly soda consumption levels.

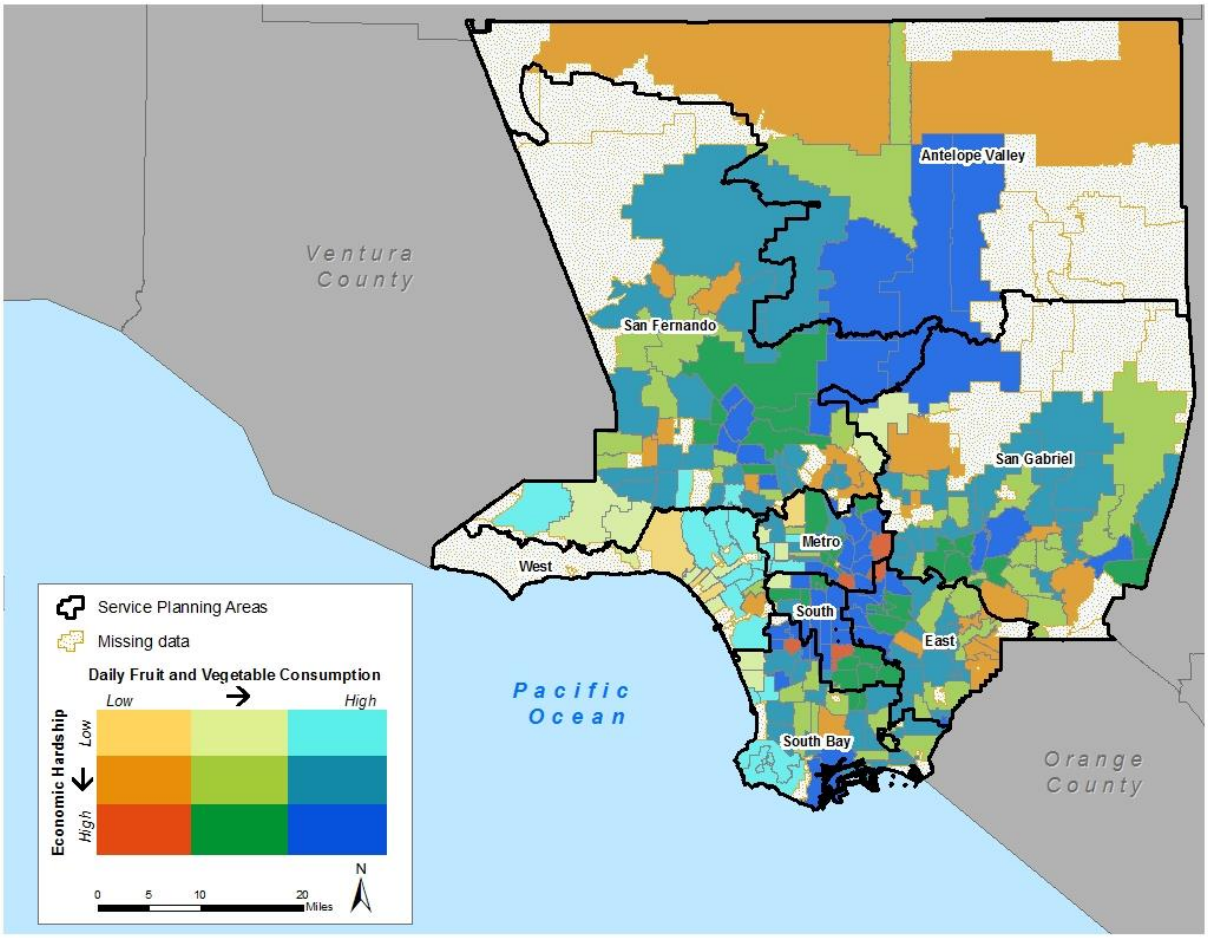


Figure 3.15. Comparison of community-level economic hardship and daily fruit and vegetable consumption across Los Angeles County by Service Planning Areas

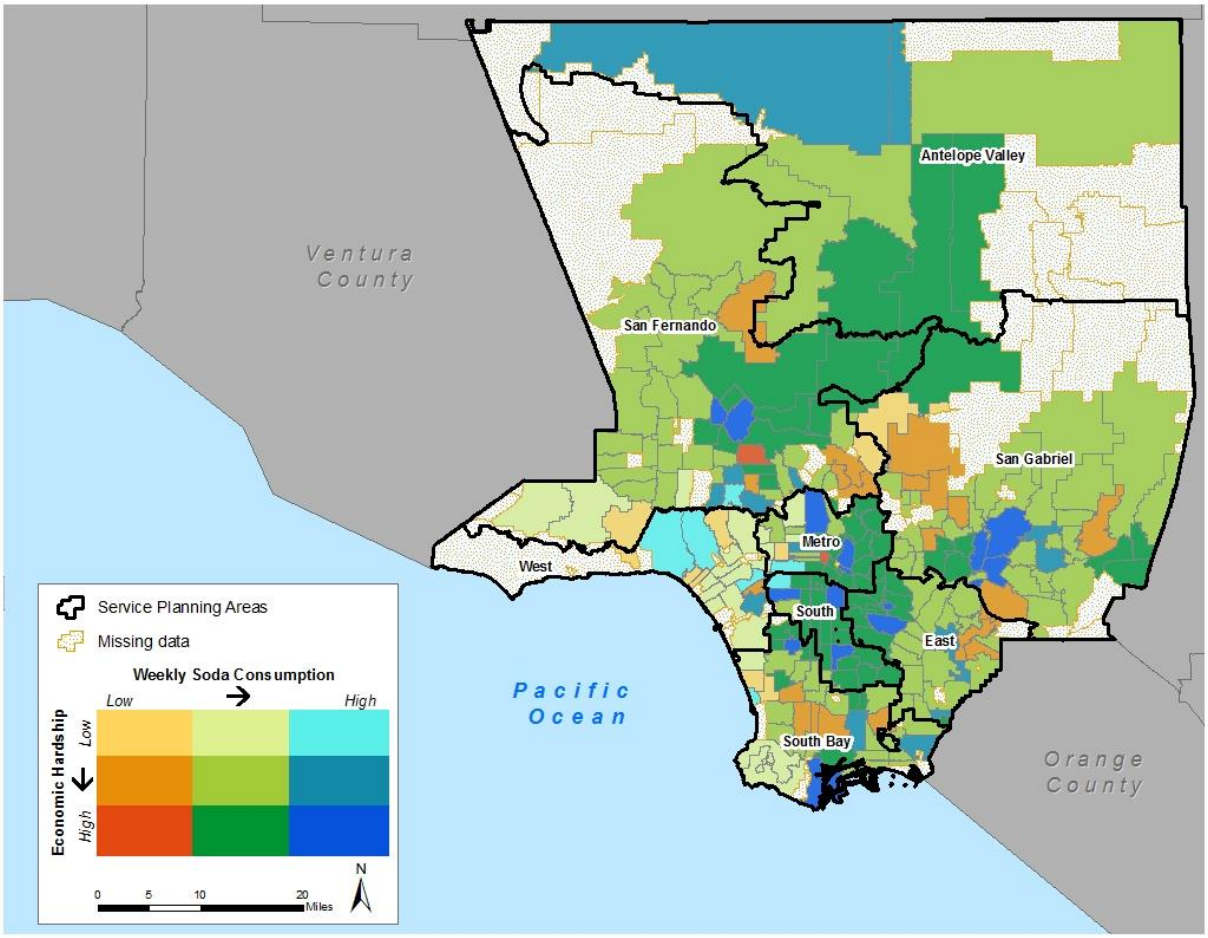


Figure 3.16. *Comparison of community-level economic hardship and weekly soda consumption across Los Angeles County by Service Planning Areas*

Aim 3: Compare the geographic distribution of PWB with density of available mental health counseling services.

Choropleth maps comparing the distribution psychological well-being with the availability of mental health counseling services are presented in **Figure 3.17 & 3.18.** The orange shades correspond with communities with lowest density of mental health supports, the green shades with intermediate density, and blue shades with highest density. The increasing intensity of each color corresponds to increasing levels of psychological distress by the different density of mental health supports. In particular, **Figure**

3.17 shows the distribution of psychological distress by density of individual mental health providers. The lighter shade of orange indicates the overlap between low density of individual mental health service providers and low levels of psychological distress. The next darker shade of orange indicates low density of individual mental health providers but intermediate levels of distress. The darkest shade of orange indicates low density of individual mental health providers but high psychological distress. Results indicate that areas that need individual mental health services do not have them, except for a few zip codes in the West SPA. The same color scheme was used to showcase the overlap between psychological distress and density of publicly-funded mental health providers (**Figure 3.18**). The map shows that there is a lot of variation in the overlap between psychological distress and density of publicly-funded mental health providers. However, it does appear that there is a discordance in terms of where these services are in relation to psychological distress.

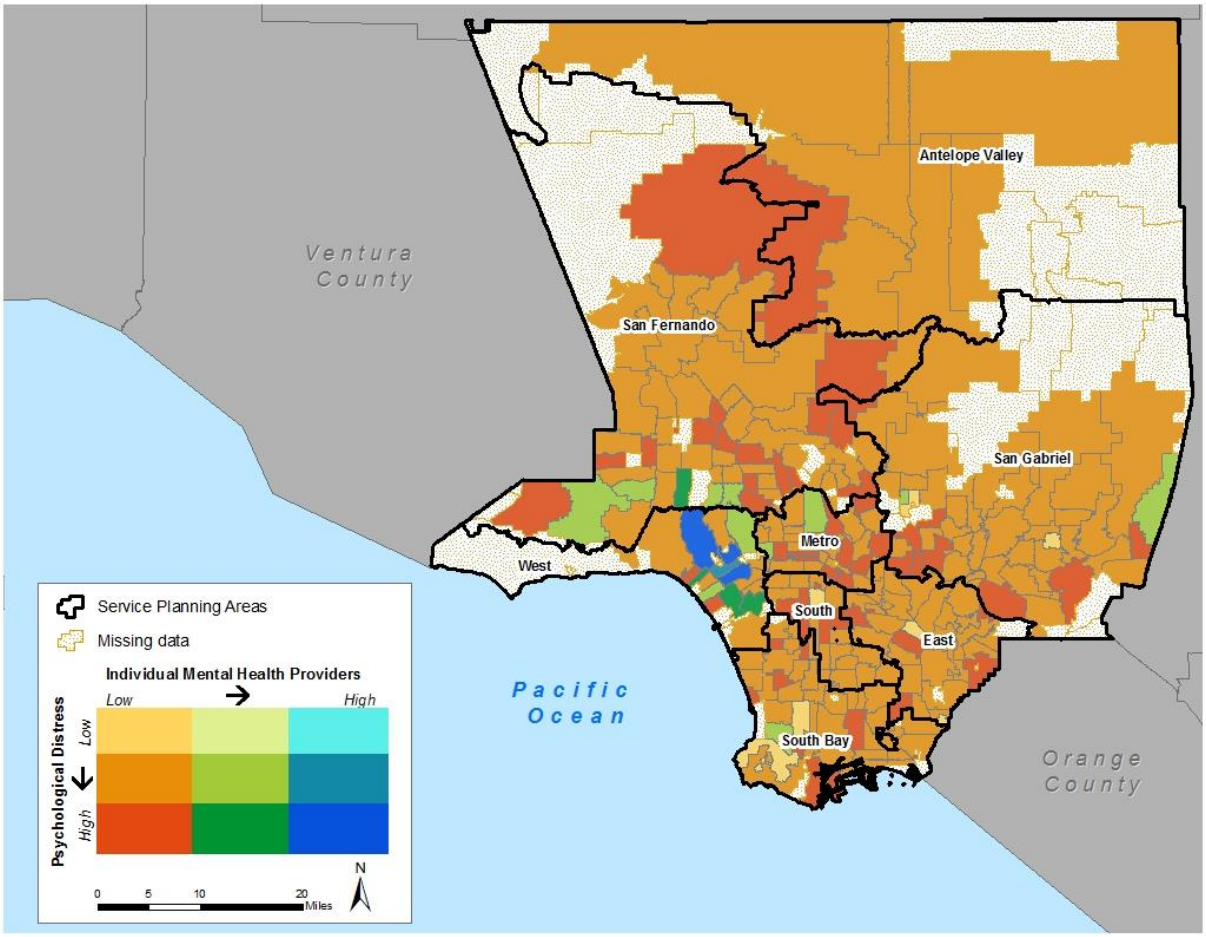


Figure 3.17. Comparison of psychological distress and individual mental health providers across Los Angeles County by Service Planning Areas

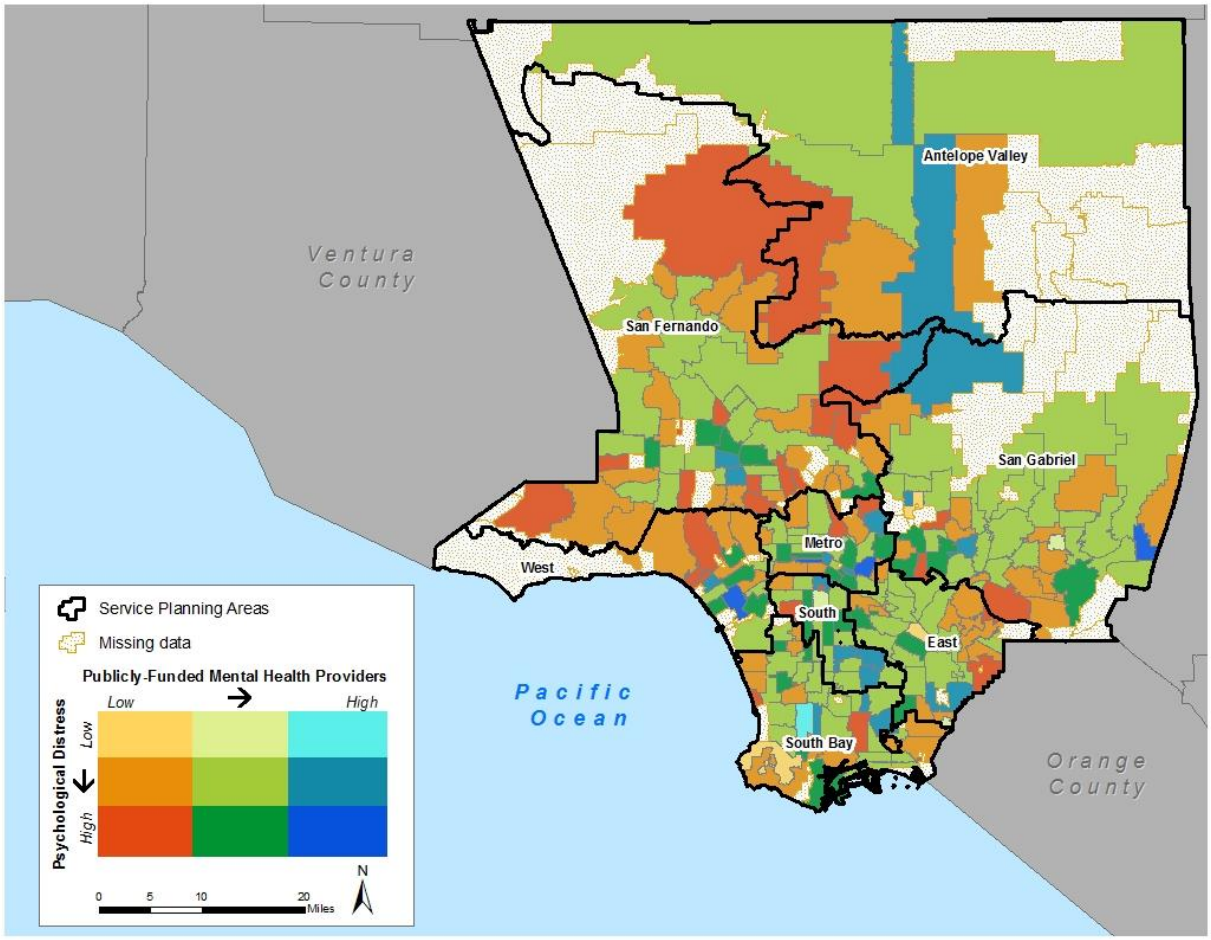


Figure 3.18. Comparison of psychological distress and individual mental health providers across Los Angeles County by Service Planning Areas

Aim 4: Explore racial/ethnic disparities in dietary behaviors, community-level economic hardship, structural-level food choice factors, psychological well-being, and availability of mental health counseling services.

The map in **Figure 3.19** shows the racial/ethnic distribution across the eight Service Planning Areas (SPAs) in Los Angeles County. The green areas correspond with census tracts that have a high predominant concentration of Hispanics, the red areas with a predominant area of African Americans, the grey area with a predominant population of Whites, the purple areas with a predominant population of Asians, and the blue with a predominant population of Pacific Islanders. For colors corresponding to each racial/ethnic group, a high color intensity indicates the largest concentration of the group whereas a low intensity a smaller concentration. Based on this map, results suggest that there are high concentrations of Hispanics in the majority of the East SPA, the eastern portion of the South SPA, the central areas of the San Fernando and Antelope Valley SPAs. African Americans only make up a high concentration on the border of the South and South Bay SPAs. In contrast, it appears there are two distinct pockets of high Asian concentration in the San Gabriel Valley SPA. Other areas including the majority of the West SPA comprises high concentration of Whites. Overall, the map indicates that segregation exists in the region.

Comparison of the racial/ethnic distribution with the dietary outcome maps (**Figures 3.2 & 3.3)** do not show distinct racial/ethnic differences in F+V consumption and soda consumption. There are also no visible patterns of racial/ethnic disparities in terms of structural-level food choice factors and psychological distress. There do appear to be racial/ethnic differences in terms of community-level economic hardship (**Figure 3.4**). In particular, the South SPA and portions of the Metro SPA, which are characterized by high economic hardship levels, also have a high concentration of Hispanics; and in the South SPA a smaller yet high concentration of African Americans. In contrast, the West SPA which has a high concentration of Whites is characterized by low economic hardship. In other SPAs, the most evident

pattern is that high concentration of Hispanics are located in areas characterized by high economic hardship. There are a few exceptions, however. In some sections of the Antelope Valley SPA, high concentrations of Whites appear to reside in areas characterized by high levels of economic hardship. In terms of racial/ethnic disparity patterns related to density of individual mental health providers (**Figure 3.8**), the West SPA which is characterized by low economic hardship also has the greatest density of these providers is comprised of a White majority. These individual mental health providers do not appear to be available in areas with higher concentrations of Hispanics, African Americans, and Asians. Rather, it appears that there is a high density of publicly-funded mental health providers in these areas. For example, there is an intermediate to high density of publicly-funded mental health providers in the South SPA (**Figure 3.9**), an area comprised of a large Hispanic and African American majority. Similar patterns are observed across the other SPAs.

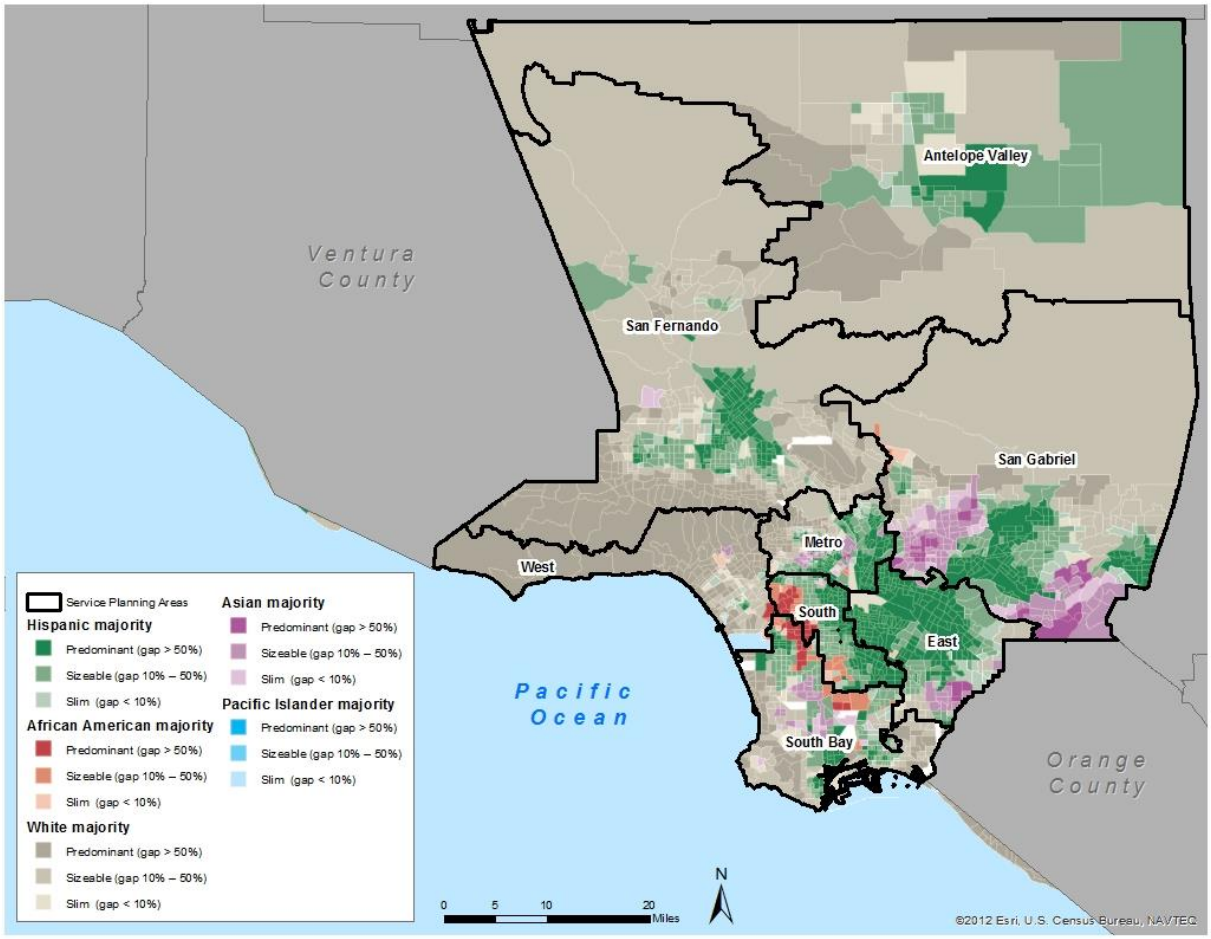


Figure 3.19. Predominant racial/ethnic populations across Los Angeles County by Service Planning Areas

DISCUSSION

In light of the growing prevalence of obesity and chronic diseases in the United States, there has been a strong focus to improve dietary behaviors in the population (Malhotra et al., 2015). A key approach of recent federal efforts has been to improve access to healthy food environments in lower socio-economic status communities. Healthy food environments are those that encourage the consumption of healthy foods such as fruits and vegetables (F+V) while discouraging the consumption of unhealthy foods and beverages such as soda. Strategic interventions from recent federal obesity-prevention efforts have primarily sought to create healthier food environments via structural improvements to the physical/built environment. Examples include increasing access to healthy corner stores or community gardens focused on increasing individuals' access to fresh produce in areas with limited access to fresh and affordable produce or implementation of behavioral economic strategies (e.g., placing water at eye-level) (Bunnell et al., 2012). These efforts have been informed by research highlighting the ways that broader structural environmental factors play an important role in shaping individual-level dietary behaviors (Feng et al., 2010; Kamphuis et al., 2006; Lovasi et al., 2009; Morland & Evenson, 2009; Story et al., 2008), as well as studies finding that living in neighborhoods with limited socioeconomic resources is a risk factor for obesity (Gordon-Larsen et al., 2006; Reidpath et al., 2002) and overall poor health (Diez Roux & Mair, 2010).

Retail restaurant food establishments, including the availability of fast-food and sit-down restaurants, is another important structural aspect commonly attributed to the obesity epidemic and the focus of recent public health interventions. For example, in Los Angeles County, the Voluntary Restaurant Recognition Program sought to help individuals make healthier dietary decisions at restaurants (Gase, Barragan, Robles, Leighs, & Kuo, 2015; Gase, Montes, Robles, Tyree, & Kuo, 2016). However, such efforts have failed to take into account how food decisions play out within the context of other psychosocial community factors, both at the community and individual level. The first two studies of the present

dissertation sought to address these gaps in research and found evidence that the social and psychological dynamics of communities have the potential to shape what individuals eat; likewise, the present findings indicate that individuals' psychological well-being status may impact how individuals respond to psychosocial community environments that have the potential to shape their dietary decisions.

Given emerging evidence that psychosocial community environments and individual-level factors may have ramifications for individuals' chronic disease-related dietary decisions, it is important to examine the geographic distribution of these factors in combination with structural-level factors that have been demonstrated to shape diet. However, no studies to-date have carried out such an analysis. Thus, to fill this gap in research and practice, the goal of the present research was to examine the distribution of structural and psychosocial factors to identify geographic areas where individuals are at the greatest risk for diet-related chronic diseases.

The present study is the first the map the geospatial distribution of and relationships between dietary behaviors, community-level economic hardship, density of restaurant retail food establishments, psychological well-being, and density of available of mental health counseling services. These analyses were carried out in Los Angeles County**:** a large, racially/ethnically diverse urban jurisdiction targeted by an array of obesity and chronic disease-prevention efforts in recent years. The results of the present study have the potential to inform existing limitations of chronic disease-related program planning, particularly structural and psychosocial drivers of dietary decisions at the individual and community-level. This information is useful to inform equitable distribution of resources across populations that need them most. There were several important study findings:

Key Finding #1:

The first key finding is that Los Angeles County residents are eating both healthy and unhealthy foods. For example, the majority of Los Angeles residents across SPAs appeared to achieve the

recommended 5 or more servings of F+V per day. The finding that F+V consumption is high in the population aligns with available findings from the California Health Interview Survey, which previously estimated that about 50% of the Los Angeles County adults consume five or more servings of fruits and vegetables per day (UCLA Center for Health Policy Research, 2001). Nationally, the state of California has the highest proportion of residents meeting F+V intake recommendations (Moore & Thompson, 2015). This could be due to regional preferences for healthier foods. This may very well be the case in Los Angeles County. Yet, at the same time, results suggest that Los Angeles County residents also have unhealthy dietary behaviors such as soda consumption. Consumption of this sugary beverage provides no nutritional value and has been implicated with increasing individuals' risk for chronic disease (Vartanian, Schwartz, & Brownell, 2007).

These results have important policy implications, as knowing areas which areas are at risk for greatest soda consumption can be better targeted with essential resources. Prior studies have also found that soda consumption is high among Los Angeles County residents. For example, a previous local assessment found that about a third of L.A. residents drink at least one soda or sugary beverage per day (LACDPH, 2017a). As a result, efforts have been made to curb soda consumption in Los Angeles County. Between 2010-2012, for instance, the Los Angeles County Department of Public Health disseminated a mass-media campaign known as the 'Sugar Pack' Campaign to educate Los Angeles County residents about the high quantity of sugar in soda and other sugar beverages, as well as corresponding negative health consequences (Barragan et al., 2014). An evaluation of the 'Sugar-Pack' campaign found that exposure to it led to significant reductions in soda consumption among moderate consumers of soda, but not high consumers (Robles et al., 2015). What the present study suggests is that high consumers of soda require dissemination of tailored public health messaging and resources to encourage them to reduce their consumption of these unhealthy beverages. This information can be a useful tool to identify where dissemination of those resources are needed most.

Key Finding #2

The second key finding is that some risks for poor dietary behaviors are not equally distributed across the Los Angeles County population and may contribute to racial/ethnic health disparities. Analyses suggest that SPAs differ in their distribution of structural and psychosocial factors that may help or hinder individuals from making healthy dietary selection decisions. Specifically, factors that were disproportionately distributed were community-level economic hardship, food choice factors as indicated by the availability of restaurants, and individual mental health providers. Community-level economic hardship was evidently much lower in the coastal areas of Los Angeles County primarily found in the West SPA, and more heavily concentrated in the central areas. The South SPA stood out as having the highest burden of economic hardship. These findings make sense, as the South SPA has a population that is predominately Hispanic (68.5%) and African American (27.8%), with more than a third (34%) of the population having a household income of less than 100% of the Federal Poverty Level (LACDPH, 2017a). In contrast, the West SPA is predominately White (64.0%) and Asian (14.0%), with only about 12% of the population having a household income of less than 100% of the Federal Poverty Level (LACDPH, 2017a). These findings align with literature which has pointed out that significant disparities in social and economic status exist across racial/ethnic lines (Oliver & Shapiro, 2006). For example, DeSilva and Elmelech (2012) identified that the distribution of home ownership—an indicator of economic well-being—is unequal as Whites and Asians have higher levels of homeownership than other racial/ethnic groups (DeSilva & Elmelech, 2012).

In terms of structural food choice factors, a more surprising finding is that South SPA did not have a high concentration of fast-food and sit-down restaurants; portions of the West and Metro SPAs actually had a higher distribution of these retail restaurant food establishments. This finding challenges the premise of obesity prevention efforts in the area. For example, South Los Angeles— an area which predominately encompasses the South SPA— was targeted by a 2008 ordinance prohibiting fast food

restaurants from expanding in the region (Sturm & Cohen, 2009). A key underlying assumption was this this area had excess restaurant retail establishments which contributed to residents' poor dietary behaviors and consequently increased obesity status. However, as findings from the present study indicate, these efforts may be misguided. This assertion is supported by a previous study examining the impact of the 2008 fast-food ban. This study also found that the South Los Angeles area is characterized by fewer fast-food chains per capita compared to other areas in Los Angeles County (Sturm & Cohen, 2009). In fact, it was found that South Los Angeles only had 19 fast-food chains, compared with 29 in West Los Angeles which falls within the West SPA. Most importantly, the more recent study found that this ban, which targeted Hispanic and African American residents, had no impact on curbing obesity in the area; instead, obesity prevalence actually increased after the ban (Sturm & Hattori, 2015).

Supporting the hypotheses of the present dissertation, these findings suggest that obesity is not just about structural factors such as exposure to retail food establishments, which have been previously linked to the obesity epidemic. Echoing previous study findings (Sturm & Cohen, 2009; Sturm & Hattori, 2015), it is ill-informed to ban restaurant chains in this area just because it is a region characterized by high obesity. It is also important to point out that it could possibly be discriminatory that individuals in the South SPA (i.e., areas with a high concentration of Hispanics and African Americans) do not have access to the same food establishments that residents in the West and Metro SPAs, those characterized by predominately White populations. This matters, as the first study of the present dissertation found evidence that sit-down restaurant consumption may actually be linked to more F+V consumption, a healthy dietary behavior. Instead, as evidenced by results from the first two studies of the present dissertation, psychosocial factors at the individual and community level should be addressed to help individuals make healthier dietary decisions and thus, reduce their risk for chronic disease.

In terms of additional structural factors, it was also found that disparities exist in terms of distribution of mental health providers. While publicly-funded mental health providers were available in

low-income, racially/ethnically diverse areas, availability of individual mental health providers were not. It was strikingly clear that a portion of the West SPA—a predominately White and affluent area—had the highest concentration of individual mental health providers. This also matters, as the quality of individual therapy and counseling services may be a higher quality than those that are publicly-funded. Having the opportunity to receive services from individual mental health service providers may also be easier than going through public channels which are characterized by high wait times and bureaucratic delays in receiving services. It could be that the populations that are disproportionately impacted and need the resources are predominately historically marginalized populations such as Hispanics, African Americans, Asians, and Pacific Islanders.

To summarize this second set of findings, there is a common perception that structural factors such as restaurant food consumption are a main contributor of obesity. However, as illustrated by the distribution of resources in the South SPA, it may actually be the case that some communities have a lack of access to any resources, period.

Key Finding #3:

The third key finding is that psychological distress is a problem in the region. This finding supports program planning efforts to streamline comprehensive healthcare and mental health service delivery for Los Angeles County residents (Board of Supervisors, 2015). Other initiatives seeking to improve the mental health service delivery landscape also includes the 2014 Health Neighborhood Initiative, one seeking to augment mental health service delivery and make access to treatment more easily accessible for Los Angeles County residents (Center for Health Services and Society, 2016). While it appears that Los Angeles County as a whole is characterized by intermediate to high levels of distress, future studies should more comprehensively examine potential disparities across racial/ethnic lines or in terms of availability of

access to mental health resources in areas that need them most. Furthermore, future research should explore if individuals actually use these services.

Study Limitations

The present study is subject to a few limitations. First, some of the variables used in mapping analyses came from a cross-sectional and web-based dataset which may have had limited generalizability to the target population. However, efforts were made to mitigate this potential source of bias by applying U.S. Census-based quota criteria as closely as possible to collect a survey sample representative of the Los Angeles County population. Second, since data points were collected at different time points, there may be temporal bias. When possible, data sources were used as closely as possible fall within the same study period. Third, some measures such as F+V consumption and soda consumption were based on self-reports and may have introduced reporting bias. Future studies should use more rigorous measures of F+V consumption to capture consumption levels. Finally, the present study only examined availability of mental health services, not actual usage of these services or the quality of these services. This is a gap that should be further explored. However, despite these limitations, given this is the first study to examine the geospatial distribution of structural and psychosocial diet-related factors, this study represents a novel contribution to public health research and practice.

Conclusion

The burden of chronic diseases in the United States is exorbitant. About half of all U.S. adults experience one or more chronic diseases (B. W. Ward et al., 2014)—conditions that are the main drivers of morbidity, mortality, and health care costs (Bauer et al., 2014; Heidenreich et al., 2011; Murray et al., 2012; Steiner & Friedman, 2013). Often preventable and manageable, these conditions increase individuals' risk for

death and disability (Bauer et al., 2014; Murray et al., 2012) and have significant ramifications for their quality of life (Rothrock et al., 2010; US Department of Health and Human Services, 2010). Fruit and vegetable (F+V) consumption is a dietary behavior strongly linked to obesity and chronic disease behaviors (Boeing et al., 2012; Hung et al., 2004; Liu, 2003; Ness & Powles, 1997). Conversely, there is also strong empirical evidence that other dietary behaviors—such as consuming excess soda and other sugar-sweetened beverages (SSBs)—also increase risk for obesity and related chronic diseases (Hu & Malik, 2010; Malik et al., 2013; Malik, Popkin, Bray, Després, & Hu, 2010b; Malik et al., 2006; Ouyang et al., 2008).

Within this context, a potentially important point of intervention that is often not considered in current obesity and chronic disease-prevention efforts is to address underlying psychosocial drivers of food choice in the population. In light of emerging evidence that structural and psychosocial factors *both* may influence what people eat, it is important to ensure that individuals have equitable access to all resources, which may help individuals maintain healthy lifestyles in the midst of adversity. Improving access to these resources requires identifying disparities in access at the community-level. For instance, getting this snapshot of the local mental health landscape in conjunction with other risk factors for chronic disease is a critical first step for program planning and delivery of chronic disease prevention interventions. This information has the potential to increase policy makers' and public health practitioners' understanding of gaps in services and opportunities to better promote good mental health in the population, as well as reduce chronic disease risk.

CHAPTER 9: CONCLUSION

The present dissertation sought to comprehensively investigate how diet—a key determinant of chronic disease risk—is impacted by the social and psychological dynamics of communities, conceptualized as *psychosocial community characteristics* (PCCs). This research also examined the ways that food choice factors and mental health status shape individuals' dietary responses to these psychosocial community dynamics. The overarching goal of the three dissertation studies was *to conduct a case study of potential community- and individual-level psychosocial factors that can be addressed to reduce the burden of chronic disease in a large racially/ethnically diverse urban jurisdiction undergoing major transformations in how physical and mental health services are delivered locally.* Within this context, the first study examined the ways in which other food choice factors (i.e., frequency of consuming meals prepared away from one's home) shapes the relationships between PCCs and dietary behaviors. Similarly, the second study investigated the ways in which psychological well-being (i.e., a measure of mental health status) intervenes in this relationship. The third study sought to inform chronic disease-related program planning efforts by conducting a geospatial needs assessment looking at the distribution of and relationships between dietary behaviors, community-level economic hardship, structural food choice factors, and availability of mental health counseling services.

Collectively, the key takeaway from all dissertation analyses is that the role that individual- and community-level psychosocial factors play on diet should be considered in current and forthcoming diet-related chronic disease prevention efforts. This assertion is based on the following lessons learned across the three dissertation studies.

First, there is evidence that psychosocial community environments may play a significant role in what individuals eat, although they may differentially impact racial/ethnic sub-groups. Results suggest that some PCCs may influence individuals' ability to adopt and maintain healthy dietary behaviors,

possibly because they impact how individuals perceive and experience their surroundings within the built environment. For example, high perceived violence was associated with higher consumption of fruits and vegetables (F+V), but only among Hispanics and African Americans. Whites and Asians were appeared to consume less of these healthy foods under high perceived levels of neighborhood violence. In terms of the positive impact of PCCs, perceived collective efficacy mattered for F+V consumption (i.e., a healthy dietary behavior), but not soda consumption (i.e., an unhealthy dietary behavior). What these findings suggest is that program planning efforts should tailor their efforts to the needs of their target population, carefully considering that racial/ethnic groups differentially experience their communities and thus, may respond to their community environments in different ways. Taking this into account, along with the ways these perceptions may interact with built environment structures, may help individuals eat better and reduce the ever-growing burden of obesity and chronic disease in the population.

A second lesson learned is that other food choice factors (FCFs), such as frequency in which individuals consume away-from-home food, can promote both healthy and unhealthy dietary behaviors, an intervening factor in the relationship between PCCs and diet. FCFs may be a potentially important intervening factor in the relationship between PCCs and dietary behaviors because they represent an individuals' lack of agency in preparing meals with a healthier nutrient profile, as well as increased temptation to highly palatable foods that are typically unhealthier (Garber & Lustig, 2011). They also capture additional constraints of individuals in being able to make healthy food selection decisions, which may contribute to inequalities. Within this context, there is evidence that FCFs explain the relationship between PCCs and diet— i.e., PCCs impact individuals' decisions to eat out, which then has important ramifications to their diet behaviors. In particular, the relationship between two PCCs (i.e., perceived neighborhood violence and grocery store distance) and both dietary outcomes appeared to be explained by FCFs. In other words, a potential reason for why PCCs mattered for diet can be explained by the frequency in which individuals consume food prepared away from home. A key takeaway from this finding

is that the perceptions of communities and consequences of those perceptions matter in part of how much people eat out.

The present dissertation also found evidence that FCFs play a moderating role in the relationship between PCCs and diet. For example, among those with no park access, individuals who consumed more fast-food also consumed more fruits and vegetables; in contrast, fast-food consumption frequency did not appear to have a differential impact on F+V consumption among those with park access. Interestingly, fast-food consumption also appeared to modify the relationship between community-level economic hardship and diet. On one hand, high fast food consumption was associated with lower F+V consumption among individuals with low economic hardship, while high fast-food consumption was associated with higher F+V consumption among respondents faced with high economic hardship. However, it is important to note that the moderating role of fast-food consumption was only observed for healthy dietary behaviors, and not unhealthy ones such as soda consumption. Sit-down restaurant consumption had a moderating impact on the relationship F+V consumption and the PCCs park access, transportation to the nearest grocery store, and community-level economic hardship. Unlike fast-food, it actually also appeared to moderate the relationship between soda consumption and the PCCs neighborhood satisfaction and mode of transportation to the nearest grocery store. In combination, what these results suggest is that eating out at restaurant retail establishments, which is often considered an unhealthy behavior in public health, may actually help some group adopt healthy dietary behaviors such as F+V consumption, although they also may promote unhealthy dietary behaviors such as soda consumption. Essentially, it is an oversimplified approach to condemn eating out will help individuals make healthier decisions. Future public health efforts should take into account the ways in which different FCFs interact with psychosocial community environments to shape what people eat.

A third lesson learned is that individuals' mental health status may matter for individuals' food decision behaviors, as it can to some extent explain the relationship between certain PCCs and diet or

strengthen/reduce the magnitude of their relationship. Findings found evidence corroborating the initial hypothesis that there are two possible mechanisms through which PWB shapes the ways that PCCs influence individuals' dietary behaviors. The first mechanism, which is related to PWB explaining the relationship between PCCs and diet, pertains to the idea that PCCs impact mental health which subsequently impacts dietary behaviors. The second mechanism, which is related to the attenuating or attenuating impact of PWB in the relationship between PCCs and diet, pertains to the idea that the strength of the relationship between PWB and dietary behaviors may be conditional on one's level of PWB. In light of evidence that PWB may explain and moderate the relationship between PCCs and diet illuminates the need to ensure that mental health is taken into account when developing interventions seeking to reduce diet-related chronic disease burden in the population.

Finally, a fourth lesson learned is that disparities in diet-related chronic disease risk exists in Los Angeles County, both in terms of their exposure of adverse community environments which may negatively impact individuals' food choice decisions and also, in terms of individuals' access to structural resources that may help them better deal with these negative community environments. In light of emerging evidence that structural and psychosocial factors *both* may influence what people eat, from a program planning and policy standpoint, a point of intervention that should be considered in current obesity and chronic disease-prevention efforts is to address underlying psychosocial drivers of food choice in the population in conjunction with other structural/built-environment factors.

Despite these important lessons, the present dissertation is subject to a few limitations that warrant consideration. The main limitations center on the study design and corresponding survey measures. The study design was cross-sectional and web-based, which may have limited generalizability to the target population. Additionally, the measures were self-reported, which may incur self-report and recall bias. This is especially the case for the key variables of interest: fruit and vegetable consumption and soda consumption. Moreover, in terms of these diet measures there may also be seasonal and

temporal variation in what individuals eat, which may not be captured by the cross-sectional survey. In terms of the other measures used, although validated questions were used whenever possible, due to the originality of the topic some survey questions were internally developed or adapted from previous instruments. Future studies should mitigate these limitations by adopting a more rigorous study design such as a longitudinal cohort study, using 24-hour dietary recall approaches or other gold-standard techniques to measure dietary behaviors in the population, and validating other survey measures specifically for the diverse Los Angeles County population.

Notwithstanding these limitations, the present dissertation has important public health implications both from a research and practice standpoint. First, from a research standpoint, several new constructs were introduced: *psychosocial community characteristics* (PCCs) and *other food choice factors* (FCFs). PCCs are important to study as they capture individuals' *perceptions* about their communities, which are subjective, differ across groups, and may differentially influence individuals' food selection decisions. Although previous studies have examined some of these factors, to the best of my knowledge they have never been studied within a single study. Similarly, FCFs, which where conceptualized the frequency in which individuals get their food when away from home, denote individuals' lack of agency in preparing meals with a healthier nutrient profile. Second, the role that mental health plays on dietary decisions is an understudied topic that the present dissertation sought to fill. Third, another added contribution is that these individual- and community-level psychosocial factors were examined within the context of other structural-level factors that have an indisputable impact on what individuals eat. Ultimately, lessons learned from the three studies have important implications for designing effective programs and policies to improve the management of mental health and dietary behaviors in Los Angeles County, and given the diversity of this region, elsewhere in the United States.

APPENDIX

Table S1.1 The relationships between psychosocial community characteristics and dietary behaviors as moderated by race/ethnicity with Hispanics as the reference category, Los Angeles County Injury and Violence Prevention Survey, 2014 (n=967)[a]

		Fruit and Vegetable Consumption			Soda Consumption		
		African Americans	*Whites*	*Asians*	*African Americans*	*Whites*	*Asians*
PSYCHOSOCIAL COMMUNITY CHARACTERISTICS	**Neighborhood Risks and Resources**	**IRR (95% CI)[¥]**	**IRR (95% CI)[¥]**	**IRR (95% CI)[¥]**	**IRR (95% CI)[¥]**	**IRR (95% CI)[¥]**	**IRR (95% CI)[¥]**
	Perceived neighborhood violence (ref: low violence)						
	Intermediate violence	NS	NS	NS	NS	NS	NS
	High violence	NS	0.69 (0.54-0.88)**	0.68 (0.50-0.91)*	NS	NS	NS
	Park access (ref: has park access)						
	Does not have park access	NS	NS	NS	NS	NS	2.26 (1.17-4.39)*
	Mode of transportation (ref: Car)						
	Bus	NS	NS	NS	NS	3.48 (1.13-10.73)*	NS
	Walking	NS	NS	NS	NS	NS	NS
	Other	NS	NS	NS	2.07 (1.06-4.06)*	NS	NS
	Grocery store distance	NS	NS	NS	NS	NS	NS
	Community-level economic hardship	NS	NS	NS	NS	NS	NS
	Sense of Community						
	Collective efficacy	NS	NS	NS	NS	NS	NS
	Neighborhood satisfaction (ref: very satisfied/satisfied)						
	Very dissatisfied/dissatisfied	NS	NS	NS	NS	NS	NS

Note: NS=interaction not significant
*p <0.05
**p <0.01
*** p<0.001
[¥] Incidence rate ratio

Figure S1.1. The relationship between perceived neighborhood violence and fruit and vegetable consumption as moderated by race/ethnicity

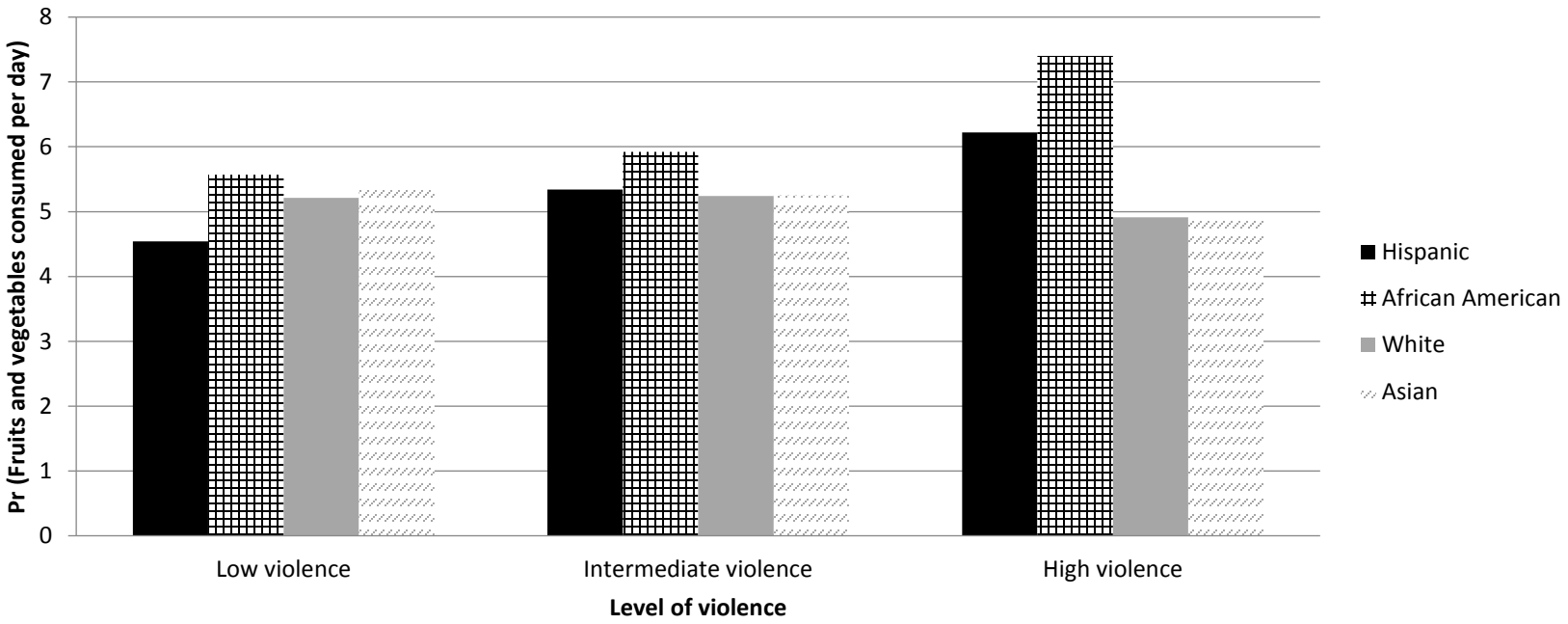


Figure S1.2. The relationship between park access and soda consumption as moderated by race/ethnicity

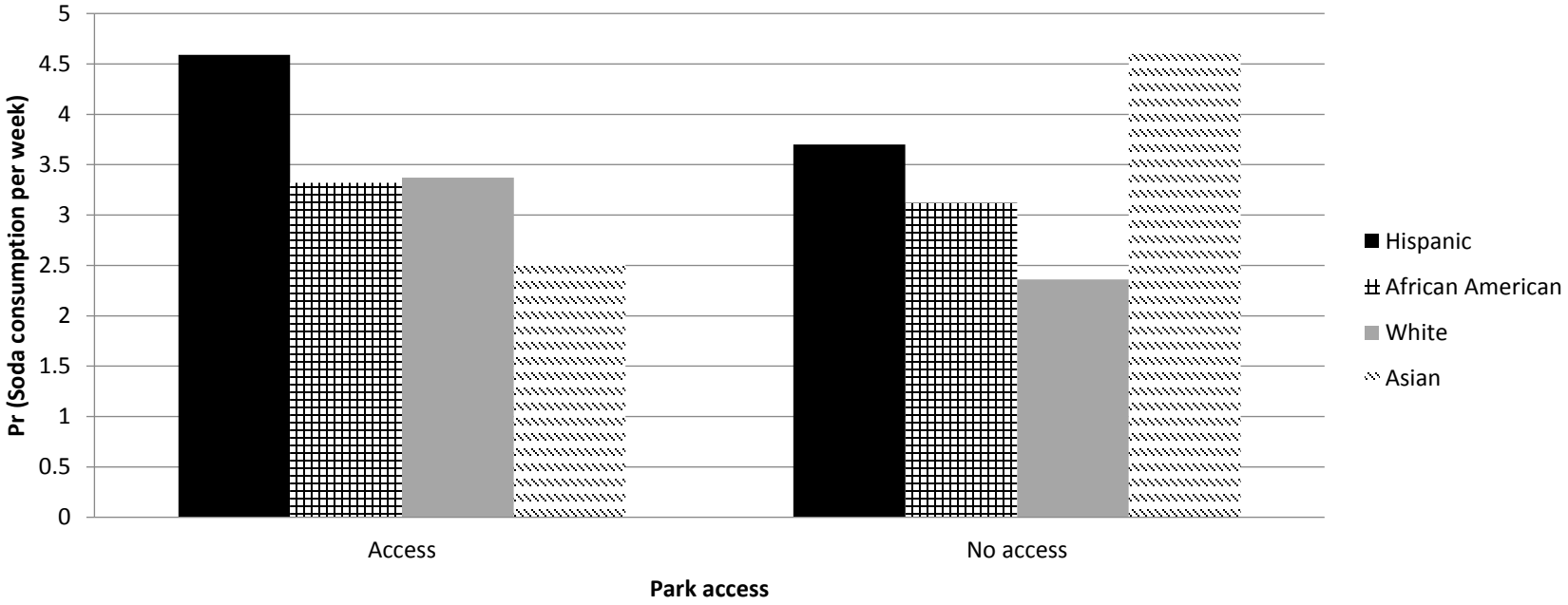
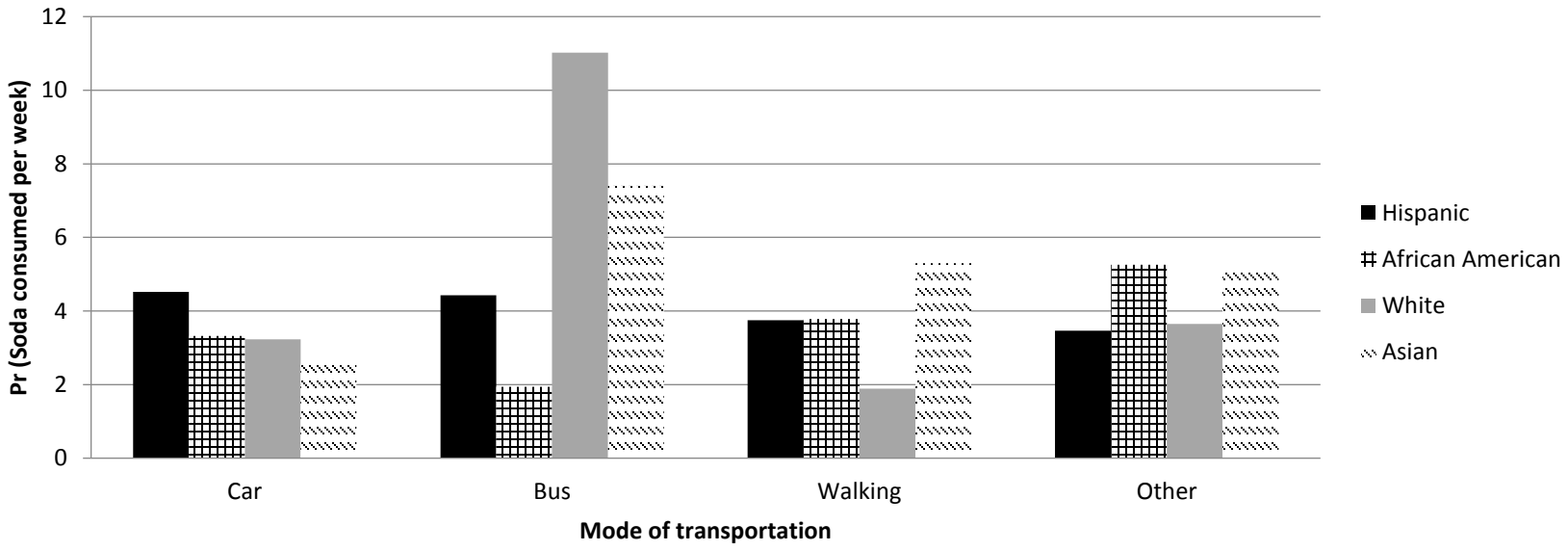


Figure S1.3. The relationship between mode of transportation to the nearest grocery store and soda consumption as moderated by race/ethnicity



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