Physical activity and psychological distress: Social gradients of living in poverty

by

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Abstract

INTRODUCTION: Research has focused on the relationship between socioeconomic status and physical activity, yet there are limited examinations which directly address social groups dealing with major issues associated with insufficient income. Studies have neglected the role of psychosocial stressors, such as financial stress, food insecurity, availability of government assistance programs, as well as psychological distress relative to the relationship between physical activity and low-income status. The purposes of this study were threefold: 1) to describe the multidimensional characteristics of life among low-income populations; 2) to examine how psychosocial stressors and health conditions vary across subsets of low-income groups; and 3) to examine the relationship among income, psychological distress and physical activity within low-income populations.

METHODS: Data from the 2015 National Health Interview Survey (NHIS) were analyzed for the purposes of this investigation. Descriptive statistics were calculated for the low-income status individuals who provide complete data for all variables of interest to this study. A series of chi-square analyses were conducted to determine whether key psychosocial stressors, health behaviors, and health conditions differed by low-income (FIPR) groups. Two stepwise logistic regression analyses were conducted to examine these factors and their relationships with moderate-intensity (MPA) and vigorous (VPA)-intensity physical activity.

RESULTS: Overall, women made up 58.5% of the sample size. Blacks/African Americans accounted for 20.6% of the sample, yet 28.0% of FIPR Group 1 identified as Black/African American. FIPR Group 1 was disproportionately unemployed, with 63.5% unemployed compared to 46.9% for the sample. One-quarter (25.9%) of the entire sample reported severe psychological distress, yet 33.9% of FIPR Group 1 and 30.8% of FIPR Group 2 reported severe distress. Nearly three-quarters (70%) of the sample was overweight or obese and 44.2% lived with at least one chronic disease at the time the survey was taken. Overall, 67.9% of the sample reported zero minutes of VPA and 51.3% reported zero minutes of MPA. Both psychological distress and income showed significant relationships with VPA. Psychological distress remained significantly associated with VPA after controlling for all covariates; however, income was no longer related to VPA after demographic and health-related variables were added to the model. Income was not related to MPA. Psychological distress demonstrated a weak relationship with MPA before the other covariates were added to the model, at which point the relationship became non-significant. Only the relationship between psychological distress and VPA was significant in the final models. Although some of the psychosocial stressor, demographic, and health-related variables contributed to the relationships between income, physical activity, and psychological distress, these variables explained only a small portion of the variance in both MPA and VPA.

CONCLUSION: Low-income individuals are faced with difficult decisions and are limited in the choices they can make to improve health. It is important to understand the multidimensional characteristics of life under limited income to better serve and improve the health of low-income populations. Further study of the relationships among income, physical activity and psychological distress is needed to further this understanding

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Introduction

An abundance of research documents the existence of a social gradient of health in developed countries, with evidence suggesting the poorest individuals are also the least healthy across study populations (Kosteniuk & Dickinson, 2003). Factors explaining this social gradient include health determinants such as smoking status, access to exercise facilities, access to nutritious food, and residence in unsafe neighborhoods. Health behaviors such as regular engagement in physical activity play a key role in long-term health maintenance and optimal health outcomes (NIH, 1996; Pate et al., 1995; Blair, Kohl, Gordon, & Paffenbarger, 1992).

Physical activity is one of the most important modifiable health behaviors for improved physical and mental health, yet less than half of US residents report meeting physical activity guidelines (Carlson, Fulton, Schoenborn, & Loustalot, 2010). Across studies, a clear pattern emerges in the relationship between socioeconomic status (SES) and physical inactivity: populations of lower SES are significantly more likely to lead physically inactive lifestyles than those of higher SES. Factors including lack of facilities, low social support, and low education have been studied to explain the prevalence of physical inactivity among low-income populations (Wilcox, et al, 2000; Taylor, Baranowski, & Young, 1998; Parks, Housemann, & Brownson, 2003).

Crespo, Smit, Andersen, Carter-Pokras, and Ainsworth (2000) examined the relationship between physical activity and the different indicators of socioeconomic status (e.g. income, education, and occupation) and reported across all race/ethnic groups and gender, lower social class individuals showed a higher prevalence of physical inactivity than those living at or above the poverty line. These patterns may be explained, in part, by a lack of opportunities for

preventive healthcare and low adherence to salubrious health behaviors among low-income populations (Pomerleau, Pederson, Ostbye, Speechly, & Speechley, 1997). Evans and Stoddart (1990) have argued inequalities rooted in social structure are important to health status. Socioeconomic status, life stressors, and deleterious health behaviors work in tandem to influence health. Susser, Watson, and Heppier (1985) suggested individuals of low SES suffer great psychological distress due to poor coping mechanisms and low social support available from family and friends. Others have argued that individuals in lower socioeconomic positions experience poor health due to their social positions (Wilkinson, 1994).

Social scientists posit that life among low-income populations implies more than simple material deprivation. It is an existence built within social relations marked by psychosocial effects in day-to-day life. Characteristic of life in poverty is the resistance to thrive due to an inability to overcome adversity from the structural, social, and economic conditions (Bastos, Rabinovich, & Almeida, 2010; Cidade, Moura, & Eximenes, 2012). The complexity and multidimensional characteristics of life in poverty in the United States are important to understand in order to improve the health of low-income populations.

Social structure or "just a victim of circumstance"

The "term victim of circumstance" is often used to describe the unfortunate situation in which low-income groups find themselves. The label "victim of circumstance" may be dismissive due to its implication that low-income populations can simply change their lives by seeking opportunity to improve (Iyengar, 1990). Poverty is multi-faceted and influences not only how low-income groups live, but also where they live, whether they have access to affordable health care, how often and what they eat, and how often, if ever, they engage in physical activity.

The reality is, for low-income populations, opportunities to improve via higher education, additional job-training, or increased physical activity are beyond their financial capabilities.

A higher annual household income grants higher purchasing power enabling an individual to improve health due, in part, to increased access to healthy food, increased opportunities for physical activity, and access to affordable health care. More purchasing power lessens the burden of life stressors which may exacerbate illness or disease. Higher socioeconomic positioning may contribute to increased opportunities for coping with life stressors (Williams & Collins, 1995). For individuals living in poverty, the presence of significant stressors calls for coping mechanisms such as social support, which is often unavailable.

Financial stress is more burdensome to low-income populations and may partially drive severity of psychological distress (Whelan, 1992). Participation in government assistance programs may also partially drive the higher prevalence of severe psychological distress among low-income groups (Dekker & Schaufeli, 1995; De Witte, 1999). Finally, physical inactivity may drive psychological distress in relation to decreased mood states associated with inactivity (De Mello, et al., 2013). Physical inactivity may be of greater concern among low-income groups as these populations are less likely to possess effective, healthy coping skills to mitigate the impact of multiple stressors and are more likely to engage in deleterious health behaviors than individuals in higher socioeconomic positions (Kosteniuk & Dickinson, 2003).

Poverty, area of residence, and physical activity

Under-resourced areas of residence contribute to poor health outcomes. Haan, Kaplan, and Camacho (1987) analyzed data from the Alameda County study and found a significant association between poverty-area residence and mortality rates after adjusting for age, sex, and

race. Adjusting for income, access to medical care, employment status, and education had little impact on the relative risk associated with poverty-area residence and mortality. However, behavioral risk factors such as smoking, alcohol consumption, physical inactivity, and higher BMI were associated with an increased risk of mortality among those residing in designated areas of poverty.

Living in poverty areas contributes to high levels of physical inactivity. For example, in a cohort analysis of more than 1,700 participants, Yen and Kaplan (1998) found independent of income, education, smoking status, BMI, and alcohol consumption, poverty-area residence was associated with lower levels of physical activity. In poverty-dense neighborhoods, residents report noise, litter, crime, vandalism, graffiti, loitering, public drinking and drug use, trouble with neighbors and other social incivilities (Geis & Ross, 1998; LaGrange, Ferraro, & Supancic, 1992; Lewis & Maxfield, 1980). Environments characterized by these incivilities may undermine health, in part, by discouraging beneficial physical activity. Neighborhood crime, harassment, and danger promote fear among residents (Lewis & Salem, 1986; Taylor & Shumaker, 1990). Residents who fear being robbed, attacked, or otherwise unsafe in their neighborhoods are unlikely to leave their homes to engage in physical activity for pleasure, exercise, or active transportation (Ross & Mirowsky, 2001).

Due to higher rates of crime, violence, and other incivilities, low-income neighborhoods tend to have weaker social cohesion than higher-income neighborhoods (Aslayan, Weir, Lees, Reid, & McInnes, 2003). Individuals living in unsafe neighborhoods may experience low neighborhood cohesion. Social support plays a key role in improving physical and mental health. Neighborhood cohesion - the trusting network of relationships and shared values and norms of residents in a neighborhood - is an important mediator for family health, safety, and overall well-

being (Brisson, 2014). Clark et al. (2011) studied neighbor cohesion and found higher neighborhood cohesion was independently protective against stroke mortality. A neighborhood with low social cohesion may be harmful to health (Lantz, et al., 1998).

Availability of opportunities for physical activity, as well as access to facilities conducive to physically active lifestyles are associated with increased physical activity behavior. Research has shown greater distance to physical activity resources and facilities such as indoor gyms, tennis courts, parks, and bike paths is associated with low levels of physical activity (Sallis et al., 1990; Troped et al., 2001). Simply having a fitness or recreation center in a neighborhood may do little to encourage community physical activity behavior if these facilities cost too much to use. In a study of resource availability and accessibility, Estabrooks, Lee, and Gyurcsik (2003) identified 177 physical activity resources in a small Midwestern city, of which 47 were pay-for-use (less accessible) and 130 were free-for-use. While number of pay-for-use facilities did not differ across low-, medium-, and high-SES neighborhoods, low- and medium-SES neighborhoods had significantly less free-for-use resources than high-SES neighborhoods.

Psychological distress

Social determinants of health, defined as the social circumstances in which individuals live and work, have a powerful influence on health (Wadsworth, Butterworth, Marmot, & Wilkinson, 2006). These circumstances impact health throughout the life course, with negative health outcomes during childhood having significant influence on health behaviors and outcomes in adulthood. Traumatic experiences occurring before the age of 18, also known as adverse childhood experiences, have been shown to have long-term effects on health resulting from continued psychological stress. This continued stress ultimately leads to declined physical and mental health in adulthood (Shonkoff et al., 2012). Evidence suggests a dose-response

relationship such that individuals who report more adverse childhood experiences are more likely to express negative health outcomes in adulthood (Felitti, et al., 1998; Chung, Mathew, Elo, Coyne, & Calhane, 2008; Chung, et al., 2010; Wade, Shea, Rubin, & Wood, 2014).

For example, food insecurity--the limited availability of nutritious food--is a common issue among families living in poverty. Approximately 17.4 million US households experience food insecurity and, despite programs such as SNAP and WIC, overall reported rates of food insecurity remain as high as 34% (Coleman-Jensen, Gregory, & Singh, 2014; Gundersen, Kreider, & Pepper, 2011; Larson & Story, 2011). Adverse experiences and their impact on health do not end in childhood. These experiences continue into adulthood and are met with additional stressors, which further complicate a healthy lifestyle. Stressors such as food insecurity, job security, housing issues, and concerns centered on ability to pay monthly bills continue to add to the multidimensional characteristics of the lives of low-income populations. Housing issues create a significant point of frustration for low-income families. These factors include perceived neighborhood safety, trust and companionship among neighbors, concentrated poverty, and violence, all of which act as significant barriers to optimal health. For low-income populations, health choices are complicated by material hardship, layers of constrained decision-making, and competing priorities in a manner which affluent populations do not experience (Hernandez, 2016). As socioeconomic hardships become more intricately layered, low-income populations become faced with difficult decision-making and intense coping.

Residence in poverty-dense neighborhoods may play a key role in severity of psychological distress among low-income groups. Neighborhood disadvantage is prominent in poverty-dense areas and may add to distress due to lower opportunity (Wilson, 1996), low perceived social support (Sampson & Groves, 1989), and high prevalence of social norms which

promote sedentary behavior (Brewster, Billy, & Grady, 1993; Elliot et al., 1996). Neighborhood disadvantage and the disorder and fear associated therein may also impact physical health.

Threats stimulate the fight or flight response which, in turn, stimulates the release of epinephrine and norepinephrine, which in turn, increases heart rate, blood pressure, and respiration rate and results in the release of glucose into the blood. Simultaneously, cortisone and cortisol are released into the system. These hormones suppress pain, inflammation, allergic reaction, and immunity. Excess cortisone and cortisol have been associated with central obesity, hypertension, and hyperglycemia (Thibodeau & Patton, 1997).

Stress hormones may worsen or jump-start chronic disease (Fremont & Bird, 2000). Stressors may contribute to heart issues including arrhythmia and ischemia possibly leading to infarction of cardiac tissue. Through these chronic conditions, the fight or flight response may stimulate a heart attack and/or damage coronary arteries, leading to the formation of plaque build-up which could block off blood flow over time (Ross & Mirowsky, 2001). Research has shown cortisol release accelerates atherosclerosis and may contribute to arteriosclerosis throughout the body. These chronic conditions, combined with high blood pressure, may develop into coronary heart disease (McEwen, 2000). In short, exposure to chronic stress, a common phenomenon among low-income populations, significantly impairs opportunity for physical activity and contributes to chronic disease.

Jarrett and Jefferson (2004) documented four tactics used by poor families to cope with perceptions of dangers within their neighborhoods. These included: 1.) monitoring the environment and identifying potential sources of danger; 2.) carefully managing social connections; 3.) self-imposing curfews to avoid danger at night; and 4.) cloistering in the home. While these are effective strategies to keep the family safe, they restrict opportunities for social

integration and physical activity, as well as increase exposure and health consequences related to substandard housing conditions. In a study of low-income families, Diana Hernandez (2016) found respondents reported health issues including stress, depression, and asthma associated with living in a substandard housing project in Boston, MA. Hernandez observed respondents tended to embody their housing problems by absorbing stress, coping with depression through medication (if affordable), and living with one asthma trigger to avoid another. Her findings help to illustrate other evidence suggesting the chronic stress associated with poverty manifests in a cumulative corrosion of physical and mental health (Lupen, King, Meaney, & McEwen, 2001).

Living in poverty, psychological distress, and physical activity

Self-worth, self-esteem, feelings of hopelessness and other affective variables may significantly impact an individual's confidence in the ability to perform a given task (Schaufeli, 1995). Individuals who report low self-esteem, low self-worth, greater feelings of hopelessness, or intense feelings of sadness may be less likely to be physically active simply because of the perception of extreme effort required to engage in regular exercise or even to simply walk around the block (Schofield, 2016). A study of low-income, multi-ethnic families in Denver, CO showed poverty-related stress was directly related to symptoms of anxiety and depression (Santiago, Wadsworth, & Stump, 2011). Low social status in a community often results in feelings of inferiority, increases stress and weakens health. Inequality may result in high psychological distress while putting healthy coping mechanisms out of reach. Wide social distances between people of high social status may cause stress and mental health problems among low-income groups (Hillamo, 2014). Messias, Eaton, and Grooms (2011) showed the prevalence of depression was significantly associated with income inequality, concluding the more unequal the income, the higher the prevalence of depression.

Physical activity has been shown to be protective against severe psychological distress and can act as a mediator of symptom severity. Blumenthal and colleagues (2007) found individuals in an exercise group were more likely to achieve remission of major depressive symptoms than those in the placebo group after four months of treatment. In a study of adults aged 20 to 45 years diagnosed with mild to moderate major depressive disorder, Dunn, Trivedi, Kampert, Clark, and Chambliss (2005) found aerobic exercise at a dose reflecting public heath recommendations to be an effective treatment to reduce symptom severity. High-intensity exercise has been shown to be protective against anxiety sensitivity. One study found high-intensity exercise causes more rapid reductions in anxiety sensitivity and produced more treatment responses than low-intensity exercise (Browman-Fulks, Berman, Rabian, & Webster, 2004).

Evidence is limited in the explanation of the extent to which psychological distress contributes to the high levels of physical inactivity common among low-income populations. In a pilot study of 32 adults, Hearon, Quatromoni, Mascoop, and Otto (2014) found anxiety sensitivity, defined as the fear of somatic arousal, may play a role in physical activity avoidance. Results of this study indicate that obese individuals with high anxiety sensitivity engaged in less moderate-intensity physical activity, whereas normal weight individuals with high anxiety sensitivity engaged in more moderate-intensity physical activity compared to individuals who reported no anxiety sensitivity. While no statistically significant differences were detected between diagnoses of depression and anxiety, Helgadottir, Forsell, and Ekblom (2015) reported depressed individuals tended to be less active and more sedentary than non-depressed counterparts. The available evidence does not show depression and/or anxiety cause physical

inactivity, but some studies have implied a bi-directional impact. In a study of 18 to 65-year olds in the Netherlands, Hiles, Lamars, Milaneschi, and Penninx (2017) reported people with anxiety and/or depressive disorders had lower sport participation and general physical activity compared to healthy counterparts. Furthermore, a diagnosis of anxiety and/or depression or greater symptom severity was associated with lower sport participation and general physical activity two years later.

Although research has focused on the relationship between socioeconomic status and physical activity, there are limited examinations that directly address social groups dealing with major issues associated with insufficient levels of income. Furthermore, research studies have neglected the role of psychological distress and psychosocial factors such as financial stress, food insecurity, and enrollment in government assistance programs relative to the relationship between physical activity and low-income status. The purposes of this study were threefold: The first purpose of this study was to describe the multidimensional characteristics of life among individuals living at, below, or close to the federal poverty line. Of particular interest is the extent to which low-income populations report the presence of psychological distress and psychosocial stressors such as food insecurity, financial stress, participation in government assistance programs, and lack of neighborhood cohesion.

The second purpose of this study was to examine how psychosocial stressors and health behaviors and conditions vary across subsets of low-income groups. It was hypothesized psychological distress and psychosocial stressors would be higher among the lowest-earning income groups. The third purpose of this study was to examine the relationships among income, psychological distress, and physical activity among low-income populations. It was hypothesized income would be related to physical activity such that individuals who report higher income

would be more likely to meet both moderate- and vigorous-intensity physical activity recommendations than individuals in lower income groups. Similarly, it was hypothesized psychological distress would be related to physical activity such that individuals who report severe psychological distress would be less likely to meet both moderate- and vigorous-intensity physical activity recommendations comparted to individuals who do not report severe distress.

Methods

National Health Interview Survey

Data from the 2015 National Health Interview Survey (NHIS) were analyzed for the purposes of this investigation. For more than 50 years, NHIS results have provided data to track health status, health care access, and progress toward achieving national health objectives (CDC, 2017). NHIS provides information regarding socioeconomic status (income, education, and occupation), family income to poverty ratio (FIPR), psychological distress, enrollment in government assistance programs, financial stress, and food insecurity. NHIS also provides information on tobacco consumption, food insecurity, leisure-time and structured physical activity as well as health outcomes related to cardiovascular (hypertension, cardiac events), pulmonary (asthma, COPD), and neurological (stroke). This national survey was chosen because it provided information regarding the three main variables of interest (income, psychological distress, and physical activity).

Variables

Physical activity

Physical activity was measured via self-report responses to questions related to frequency, duration, and intensity of moderate and vigorous activity. Three physical activity variables were created. Participants reported time spent in moderate- and/or vigorous-intensity

activities in minutes or hours and were asked on how many days per week they participated in these activities. Minutes per week were totaled for moderate- and vigorous-intensity activity. For vigorous-intensity physical activity (VPA), participants were grouped as follows: *No Activity* (0 minutes reported); *Some Activity* (1-74 minutes/week); *Meeting Guidelines* (75-149 minutes/week); and *Exceeding Guidelines* ($\geq$ 150 minutes/week). For moderate-intensity physical activity (MPA), participants were grouped as follows: *No Activity* (0 minutes reported); *Some Activity* (1-149 minutes/week); *Meeting Guidelines* (150-299 minutes/week); and Exceeding Guidelines ($\geq$ 300 minutes/week).

A dichotomous variable reflecting public health recommendations for vigorous-intensity physical activity was created to use as the dependent variable in the first regression analysis. Individuals who met or exceeded 75 minutes of vigorous-intensity physical activity per week were categorized under "*yes*" (meeting guidelines) and individuals who reported 74 minutes or less were categorized under "*no*" (not meeting guidelines). A dichotomous variable reflecting public health guidelines for moderate-intensity physical activity was created activity for use as the dependent variable in the second regression analysis. Individuals who met or exceeded 150 minutes of moderate-intensity activity per week were categorized under "*yes*" (meeting guidelines) and individuals who reported 149 minutes or less were categorized under "*no*" (not meeting guidelines).

Low income status

Every year the U.S. Census Bureau publishes poverty thresholds based on annual household income, family size, and number of children under the age of 18 residing in the household. Reported annual household income in relation to family size and number of children under the age of 18 residing in the household are used to create a family income-to-poverty ratio

score known as a FIPR score. These ratios are divided into 13 categories reflecting the percent of the federal poverty line (FPL) each annual household income represents. A ratio of less than 0.50 means the annual household income is less than 50% FPL when considering household family size and number of children under the age of 18 present. For the purposes of this study, family income to poverty ratios were categorized to reflect household income ranges of low-income populations. Participants were grouped as follows: *FIPR Group 1*(<0.50); *FIPR Group 2* (0.50--1.00); *FIPR Group 3* (1.00--1.50); *FIPR Group 4* (1.50--2.00). Income was not defined in monetary figures because household size, including number of children under 18 years of age present, varies greatly from household to household.

According to the US Census Bureau (2015), the federal poverty line (FPL) for a family of four (two adults and two children under 18 years old) is an annual household income of $24,036. This family size and annual household income model may be used as a reference to illustrate the family income to poverty ratio (FIPR) variable used to define income for the purposes of this study. A family of four in FIPR Group 1 (FIPR score < 0.50) reported an estimated annual household income of less than 50% FPL in 2015, representing an income of approximately $11,777 or lower. For FIPR Group 2 (FIPR score 0.50-1.00), a family of four reported an estimated annual household income of between 50% and 99% FPL, representing an annual income between $12,018 and $23,795. For FIPR Group 3 (FIPR score 1.00-1.50), a family of four reported an estimated annual household income of between 100% and 149% FPL, representing an annual income between $24,036 and $35,813. For FIPR Group 4 (FIPR score 1.50-2.00), a family of four reported an estimated annual household income of between 150% ranges change depending on family size, number of children under the age of 18, and represent differing financial stability depending on area of residence.

Psychological distress

The Kessler Psychological Distress Scale, a validated tool, was used to assess severity of psychological distress (Kessler, et al., 2002). Prochaska, Sung, Max, Shi, and Ong (2012) assessed the validity of a cutoff score of 13 by comparing participants with identified moderate and severe mental distress on relevant clinical, impairment, and risk behavior measures determined a score greater than 13 was an appropriate cutoff on the K6 scale indicative of severe mental distress. A six-question, short-form known as the K6 scale was used to gauge the degree to which participants experience affective mood states commonly associated with psychological distress. Survey questions detailed the extent to which participants experienced feelings of hopelessness, helplessness, fidgetiness/restlessness, worthlessness, nervousness, or that everything felt like a chore. Participants responded by rating experiences on the following Likert scale: 1 (all of the time); 2 (most of the time); 3 (some of the time); 4 (a little of the time); and 5 (none of the time).

Responses were totaled for scores ranging from a minimum of six (6) to a maximum of 30. Following this scoring system, a lower score would indicate a higher degree of psychological distress. For the purposes of this study, scores were totaled and reversed so a higher score was indicative of higher psychological distress. For descriptive purposes psychological distress was divided into three categories: *Low Distress* (K6 score= 6); *Moderate Distress* (K6 score: 7-12); and *Severe Distress* (K6 score: $\geq$ 13). A dichotomous variable was created for use in the logistic regression analyses to compare the likelihood that individuals who report severe psychological distress would meet moderate- and/or vigorous-intensity physical activity guidelines compared to those who do not report severe psychological distress.

Psychosocial Stress Variables

Financial stress

Financial stress was assessed using eight (8) items measuring the degree to which participants were concerned about their ability to attain affordable healthcare coverage, save money for retirement and children's college, pay for medical costs associated with illness or accidents, maintain a certain standard of living, pay for medical and monthly bills, and pay for housing. Participants rated their concern on the following Likert scale: 1 (very worried); 2 (moderately worried); 3 (not too worried); and 4 (not at all worried). Following this scoring system, a lower score would indicate a higher degree of financial stress.

Scores were reversed, then averaged across the 8 items as follows: *No Financial Stress* (0--2.00); *Low Financial Stress* (2.01--3.00); *Moderate Financial Stress* (3.01--3.99); and *High Financial Stress* (4.00). A dichotomous variable was created for the regression analyses. Individuals who reported moderate to high financial stress (average score >3) were grouped under *High Financial Stress* for the regression analyses.

Enrollment in government assistance programs

Information regarding enrollment in government-sponsored financial assistance programs including the Supplemental Nutrition Assistance Program (SNAP) and Women, Infants, and Children (WIC) Nutrition Services was included in the study. These programs provide assistance to low-income populations who may have a difficult time covering the costs of living in their area of residence. By enrolling in these assistance programs, low-income populations may be better situated to secure needed funding to provide nutritious foods for themselves and their families, as well as ease the burden of daily, weekly, and monthly expenses.

Study participants were divided into one of three categories of government assistance. Participants who were enrolled in no programs were classified as *No Assistance*. Participants who received assistance from one to three programs were classified as *Low Assistance*. Participants who received assistance from four or more programs were classified as *High Assistance*. A dichotomous variable was created for use in the logistic regression analyses.

Neighborhood social cohesion

Neighborhood social cohesion was measured as the extent to which participants report how well they can trust their neighbors, whether neighbors help each other out, and if they feel safe within their neighborhood. Participants indicated the extent to which they agreed or disagreed with each statement via a Likert scale ranging from 1 (definitely agree) to 4 (definitely disagree). Scores ranged from 4 (high social support) to 16 (low social support). These were reversed scored so a higher score indicated higher social support. Individuals who scored four were categorized as *No Cohesion*. Individuals who scored between four (4) and eight (8) were categorized as *Low Cohesion.* Individuals who scored between nine (9) and 12 were categorized as *Medium Cohesion* and individuals who scored between 13 and 16 were categorized as *High Cohesion*. A dichotomous variable was created for the regression analyses.

Food insecurity

Food insecurity was assessed using questions related to the ability of participants to obtain food, eat regularly, or maintain weight assuming enough money was available. Survey questions detailed the extent to which participants went hungry, lost weight, or did not eat because there were not funds available to purchase food. Participants responded to six (6) such questions with a ‘yes’ or ‘no’ answer. Scores were totaled and interpreted so a higher score was indicative of higher food insecurity.

Individuals who answered ‘no” to all relevant questions were categorized as *No Food Insecurity.* Individuals who answered “yes” to one or two questions were categorized as *Low Food Insecurity.* Individuals who answered “yes” to three or four questions were categorized as *Moderate Food Insecurity* and individuals who answered “yes” to five or six questions were categorized as *High Food Insecurity*. A dichotomous variable was created such that individuals who reported moderate to high food insecurity were classified under *High Food Insecurity* and individuals who reported no to low food insecurity were classified under *Low Food Insecurity.*

Health Variables

Chronic disease

Several questions provided information regarding a range of chronic diseases including, hyperlipidemia, hypertension, diabetes mellitus, and bronchitis as well as several different types of cancer. Survey questions also provided detail of chronic conditions including: high blood pressure; high cholesterol; coronary heart disease; angina pectoris; myocardial infarction; stroke; emphysema; chronic obstructive pulmonary disorder (COPD); and diabetes. A dichotomous variable was created such that any participant who answered yes to at least one survey question detailing the diagnosis of a chronic disease was categorized as “yes.”

Smoking status

Participants were asked to report whether they were a current smoker at the time the survey was taken. A dichotomous variable was created such that individuals who reported smoking “some days” or “every day” were categorized as *Current Smoker*. Individuals who reported as a former smoker or never smoker at the time of the survey were categorized as *Not a Current Smoker*.

Weight status

The NHIS calculates BMI based on participants self-reported height and weight. Individuals with a calculated BMI of less than 18.5 kg/m^2 were categorized as *Underweight*. Individuals with a calculated BMI between 18.5 and 24.9 kg/m^2 were categorized as *Normal Weight*. Individuals with a calculated BMI between 25.0 and 29.9 kg/m^2 were categorized as *Overweight*. Individuals with a calculated BMI greater than or equal to 30.0 kg/m^2 were categorized as *Obese*.

Demographic Variables

Variables for age, race/ethnicity, sex, marital status, employment status, and education (*<High School Diploma, High School Diploma – Associate's Degree, $\geq$ Bachelor's Degree*) were included.

Data Analysis

IBM SPSS Statistical software version 24.0 was used to analyze the sample data. Descriptive statistics were calculated for the total sample, and in subsamples of males and females. A series of cross-tabulation analyses were conducted to determine whether key social-psychological stressors and health behaviors and health conditions differed by FIPR groups. A stepwise logistic regression analysis was conducted to examine the factors associated with the likelihood of meeting vigorous-intensity physical activity guidelines. Because the primary research question was interested in the relationship between income and physical activity, income was entered in step 1. Next psychological distress was entered in step 2 to determine whether the inclusion of psychological distress modified the relationship between income and physical activity.

Psychosocial stress variables including financial stress, enrollment in government assistance programs, neighborhood social cohesion, and food insecurity were entered in step 3 to further examine the contribution of psychological distress to the relationships among income, psychological distress, and physical activity. Demographic covariates including age, education, Hispanic decent, marital status, race, and sex were entered in step 4. Health covariates including weight status, chronic disease, and smoking status were entered into the model in step 5. This step-wise logic regression analysis was repeated with moderate-intensity physical activity as the dependent variable.

Results

The National Health Interview Survey of 2015 included 42,288 participants. Participants providing complete data for physical activity, age, sex, race, Hispanic descent, education attainment, marital status, income, employment, psychological distress, smoking status, weight status, and presence of chronic disease along with psychosocial stressors, including financial stress, enrollment in government assistance programs, neighborhood social cohesion, and food insecurity were included. The final sample included 3,329 non-pregnant, mostly white, non-Hispanic, women and 2,361 mostly white, non-Hispanic men for a total sample size of 5,690 individuals. Pregnant women were excluded due to potential temporary changes in physical activity during their pregnancy. Comparison of these complete cases to eligible individuals with missing data revealed differences on several key variables including vigorous-intensity physical activity, psychological distress, age, education, race, and BMI.

Table 1 describes the demographics of the sample and compares differences in study variables. Overall, women made up 58.5% of the sample size. The lowest income groups consisted of disproportionately more women than men with 65.2% of FIPR group 1 (<.50) and

61.6% of FIPR group 2 (.50-1.00) being female. Approximately 29.5% of women and 27.1% of men were between the ages of 25 and 34. Nearly three-quarters (73.1%) of men and two-thirds (68.1%) of women were white. A small portion of both men and women reported being of Hispanic descent (27.9 % and 28.9%, respectively). Overall, approximately 23% of the sample had less than a high school diploma. Over half (53.1%) of the total sample was employed at the time the survey was recorded. More women (51.0%) were unemployed than men (41.3%) and the sample consisted of more single women (63.7%) than single men (51.5%)

More women (28.4%) reported severe psychological distress than men (22.5%). Women reported higher levels of financial stress than men, with 71.1% of women reporting moderate to high financial stress compared to 63.8% of men. A similar pattern was observed with enrollment in government assistance programs, with 66.8% of women and 57.3% of men enrolled in at least one program. A total of 58.0% of men and 54.3% of women reported no to low neighborhood support. More women reported some degree of food insecurity, with 42.7% reporting low to high food insecurity compared to 39.2% of men.

Among the total sample, 5,656 participants reported full data for vigorous-intensity physical activity and 5,633 reported full data for moderate-intensity physical activity. More women reported no vigorous activity (70.4%) than men (64.4%). A higher portion of men (9.9%) reported at least some vigorous-intensity activity (1-74 minutes/week) compared to women (8.2%) and more men (25.7%) met or exceeded vigorous-intensity physical activity guidelines of at least 75 minutes per week than women (21.4%).

For moderate-intensity physical activity, a higher portion of men (53.4%) reported no activity compared to women (49.8%). Women (29.6%) were more likely to report some moderate-intensity activity (1-149 minutes/week) compared to men (26.4%), yet men and

women were equally likely to meet or exceed moderate-intensity physical activity guidelines of at least 150 minutes of activity per week (20.6% and 20.2%, respectively). A higher portion of men (36.0%) met aerobic recommendations of combined moderate- and vigorous-intensity physical activity than women (33.4%).

Table 1: Sample characteristics			
	Total (n= 5690)	**Male 41.5 % (n= 2361)**	**Female 58.5% (n= 3329)**
FIPR			
<0.50	14.3% (n= 813)	11.9 (n= 283)	15.9 (n= 530)
0.50-1.00	30.7% (n= 1750)	28.5 (n= 672)	32.4 (n= 1078)
1.00-1.50	28.8% (n= 1636)	29.7 (n= 701)	28.1 (n= 935)
1.50-2.00	26.2% (n= 1491)	29.9 (n= 705)	23.6 (n= 786)
Age			
25-34	28.5% (n= 1622)	27.1 (n= 641)	29.5 (n= 981)
35-44	24.0% (n= 1363)	22.8 (n= 538)	24.7 (n= 825)
45-54	23.3% (n= 1326)	24.4 (n= 575)	22.6 (n= 751)
55-64	24.2% (n= 1379)	25.7 (n= 607)	23.2 (n= 772)
Race			
White	70.2% (n= 3994)	73.1 (n= 1727)	68.1(n= 2267)
Black/AA	20.6% (n= 1172)	17.2 (n= 407)	23.0 (n= 765)
Asian	2.1% (n= 120)	2.4 (n= 56)	1.9 (n= 64)
AIAN	4.5% (n=257)	5.1 (n= 119)	4.1(n= 138)
Multiracial	2.6% (n=147)	2.2 (n= 52)	2.9 (n= 95)
Hispanic		27.9 (n= 659)	28.9 (n= 961)
Employment			
Employed	53.1% (n=3019)	58.7 (n=1387)	49.0 (n= 1632)
Unemployed	46.9% (n=2671)	41.3 (n= 974)	51.0 (n= 1697)
Education			
< HS Diploma	23.4% (n= 1334)	23.8 (n= 562)	23.2 (n= 772)
HS Diploma-Associates	60.8% (n=3457)	59.7 (n=1410)	61.5 (n=2047)
≥ Bachelors	15.8% (n= 899)	16.5 (n= 389)	15.3 (n= 510)
Marital Status			
Married	41.4% (n= 2354)	48.5 (n= 1146)	36.3 (n= 1208)
Single	58.6% (n= 3336)	51.5 (n= 1215)	63.7 (n= 2121)
Weight Status			
Underweight	1.6% (n= 91)	1.1 (n= 27)	1.9 (n= 64)
Normal	28.4% (n= 1615)	27.7 (n= 653)	28.9 (n= 962)
Overweight	31.3% (n= 1782)	37.8 (n= 893)	26.7 (n= 889)
Obese	38.7% (n= 2202)	33.4 (n= 788)	42.5 (n= 1414)
Current Smoker	29.4% (n= 1674)	33.1 (n= 782)	26.8 (n= 892)
Psychological Distress			
Low	36.7% (n= 2086)	42.2 (n= 996)	32.7 (n= 1090)
Moderate	37.4% (n= 2126)	35.3 (n= 833)	38.8 (n= 1293)
Severe	25.9% (n= 1478)	22.5 (n= 532)	28.4 (n= 946)
Chronic Disease (≥ 1 reported)	44.2% (n= 2517)	46.6 (n= 1011)	45.2 (n= 1506)
Financial Stress			
No Stress	8.5% (n= 485)	11.0 (n= 257)	6.8 (n= 228)
Low Stress	23.4% (n= 1331)	25.2 (n= 596)	22.1 (n= 735)
Moderate Stress	34.1% (n= 1939)	33.5 (n= 792)	34.5 (n= 1147)
High Stress	34.0% (n= 1935)	30.3 (n= 716)	36.6 (n= 1219)
Government Assistance			
No Assistance	37.2% (n= 2113)	42.7 (n= 1009)	33.2 (n= 1104)
Low Assistance	51.2% (n= 2915)	47.2 (n= 1115)	54.1 (n= 1800)
High Assistance	11.6% (n= 662)	10.1 (n= 237)	12.7 (n= 425)
Neighborhood Social Cohesion			
No Cohesion	17.0% (n= 966)	16.6 (n= 392)	17.2 (n= 574)
Low Cohesion	38.9% (n= 2211)	41.4 (n= 977)	37.1 (n= 1234)
Some Cohesion	29.1% (n= 1657)	29.3 (n= 692)	29.0 (n= 965)
High Cohesion	15.0% (n= 856)	12.7 (n= 300)	16.7 (n= 556)

Food Insecurity			
No Food Insecurity	58.7% (n= 3342)	60.8 (n= 1436)	57.3 (n= 1906)
Low Food Insecurity	21.2% (n= 1204)	19.4 (n= 458)	22.4 (n= 746)
Moderate Food Insecurity	13.4% (n= 763)	12.3 (n= 291)	14.1 (n= 472)
High Food Insecurity	6.7% (n= 381)	7.5 (n= 176)	6.2 (n= 205)
	Total **99.4% (n= 5656)**	**Male** **41.4% (n= 2343)**	**Female** **58.6% (n= 3313)**
Vigorous Activity			
No Activity	67.9% (n= 3840)	64.4 (n= 1508)	70.4 (n= 2332)
Some Activity	9.0% (n= 507)	9.9 (n= 234)	8.2 (n= 273)
Meeting Rec	8.2% (n= 462)	8.4 (n= 196)	8.1 (n= 266)
Exceeding Rec	14.9% (n= 847)	17.3 (n= 405)	13.3 (n= 442)
	Total **98.9% (n= 5633)**	**Male** **41.5% (n= 2336)**	**Female** **58.5% (n= 3297)**
Moderate Activity			
No Activity	51.3% (n= 2891)	53.4 (n= 1248)	49.8 (n= 1643)
Some Activity	28.3% (n=1591)	26.4 (n= 616)	29.6 (n= 975)
Meeting Rec	10.6% (n=597)	10.2 (n= 238)	10.9 (n= 359)
Exceeding Rec	9.8% (n= 554)	10.0 (n= 234)	9.7 (n= 320)

Descriptive differences by FIPR group

Table 2 compares differences in study variables between low-income groups. Overall, white individuals made up 70.2% of the study sample. Black/African Americans made up 20.6%, Asians made up 2.1%, American Indian/Alaska Natives (AIAN) made up 4.5%, and multiracial individuals made up 2.6% of the study sample. White individuals made up the majority of each FIPR Group. The percentage of whites in each FIPR group increased as income increased, while the percentage of Black/African American individuals decreased across FIPR groups. A disproportionately large percentage of Black/African Americans was observed in FIPR Group 1, with 28.0% of this income group consisting of Blacks/African Americans compared to 20.6% for the total population. Age was evenly distributed across FIPR groups, except for FIPR Group 1 where the 25 to 34 age group was disproportionately larger (36.2% versus 28.5% overall).

Unemployment decreased across FIPR groups, with 57.8% in FIPR Group 2, 43.7% in FIPR Group 3, and 28.8% in FIPR Group 4 unemployed. For education, 23.4% of the total sample reported less than a high school education and approximately one-third of both FIPR Groups 1 (31.2%) and 2 (32.1%) reported an education level below a high school diploma. Of the total sample population, only 15.8% received a bachelor's degree or higher, yet 22.7% of individuals in FIPR Group 4 had at least a bachelor's degree. Over 50% of the sample population had at least a high school diploma up to an associate's degree.

More than half (58.3%) the sample population was single, with 72.9% of FIPR Group 1, 64.3% of FIPR Group 2, 53.2% of FIPR Group 3, and 50.1% of FIPR Group 4 reported as such. Approximately 70% of the sample population reported a BMI of 25.0 kg/m^2 or higher, meaning approximately two-thirds of these low-income groups were overweight or obese. The highest percentage of overweight or obese individuals was observed in FIPR Group 4, with 72.1% of this

group reporting a BMI of 25.0 kg/m^2 or higher. This is compared to 66.6% of FIPR Group 1, 70.3% of FIPR Group 2, and 69.5% in FIPR Group 3 reporting the same BMI. Over three-quarters (76.8%) of the sample reported less than the recommended minutes of weekly vigorous physical activity, with over two-thirds reporting no vigorous activity. A similar pattern was observed for moderate-intensity physical activity.

Approximately 30% of the total sample were reported as a current smoker. The highest portion of current smokers was observed in FIPR Group 1, with 36.9% reported as such. Approximately 44% of the sample reported living with at least one chronic disease. The highest portion of individuals who reported living with at least one chronic disease was observed in FIPR Group 2, with 50.3% reported as such. This is compared to 42.3% of FIPR Group 1, 44.3% of FIPR Group 3, and 37.8% of FIPR Group 4 who reported living with at least one chronic disease.

Approximately two-thirds (63.3%) scored at least seven (7) on the K6 scale, indicating at least a moderate degree of psychological distress. Over one-quarter (25.9%) of the total sample reported a K6 score of 13 or higher, indicating a severe degree of psychological distress. Overall, approximately two-thirds (68.1%) of the sample reported at least a moderate level of financial stress. Psychological distress appeared disproportionately high in the lowest-earning income groups. Just over one-quarter (25.9%) of the entire sample reported severe psychological distress, yet 33.9% of FIPR Group 1 and 30.8% of FIPR Group 2 reported severe distress. Only 18.7% of the highest-earning income group, FIPR Group 4, reported severe psychological distress. Less than 10% of all FIPR groups reported no financial stress, and approximately one-quarter reported low financial stress.

Most of the sample (88.4%) was enrolled in less than or equal to three government assistance programs and less than 20% were enrolled in more than four. Approximately one-quarter of FIPR Groups 1 and 2 reported no government assistance (23.9% and 22.1%, respectively) and over half of each group reported enrollment in three or fewer assistance programs (58.4% and 60.0%, respectively). FIPR Group 4 showed the least enrollment, with 59.5% enrolled in zero assistance programs. More than half (55.9%) of the sample reported low or no neighborhood support. FIPR Group 4 reported the lowest support, with 61.7% of the sample reporting low or no neighborhood support. Overall, 79.9% of the population reported low or no food insecurity. FIPR Group 2 reported the highest food insecurity, as 27.0% of this group reported at least a moderate level of food insecurity.

Table 2: Sample Characteristic Differences Between Low-Income Groups						
	Total n= 5690	**FIPR 1 (<0.50; n= 813)**	**FIPR 2 (0.50-1.00; n= 1750)**	**FIPR 3 (1.00-1.50; n= 1636)**	**FIPR 4 (1.50-2.00; n= 1491)**	**Chi-Square***
Sex						
Male	41.5% (n= 2361)	34.8 (n=283)	38.4 (n= 672)	42.8 (n= 701)	47.3 (n= 705)	43.7 p< .001
Female	58.5% (n= 3329)	65.2 (n= 530)	61.6 (n= 1078)	57.2 (n= 935)	52.7 (n= 786)	
Age						
25-34	28.5% (n=1622)	36.2 (n= 294)	25.4 (n= 445)	27.3 (n= 446)	29.3 (n= 437)	50.8 p< .001
35-44	24.0% (n= 1363)	25.0 (n= 203)	23.7 (n= 415)	23.9 (n= 392)	23.7 (n= 353)	
45-54	23.3% (n= 1326)	21.6 (n= 176)	23.5 (n= 410)	23.5 (n= 384)	23.9 (n= 356)	
55-64	24.2% (n= 1379)	17.2 (n= 140)	27.4 (n= 480)	25.3 (n= 414)	23.1 (n= 345)	
Race						
White	70.2% (n= 3994)	62.5 (n= 508)	68.4 (n= 1197)	72.6 (n= 1187)	73.9 (n= 1102)	58.7 p< .001
Black/AA	20.6% (n= 1172)	28.0 (n= 228)	21.4 (n= 375)	18.5 (n= 303)	17.8 (n= 266)	
Asian	2.1% (n= 120)	3.0 (n= 24)	2.4 (n= 42)	2.2 (n= 36)	1.2 (n= 18)	
AIAN	4.5% (n= 257)	4.3(n= 35)	4.5 (n= 79)	4.2 (n= 69)	5.0 (n= 74)	
Multiracial	2.6% (n= 147)	2.2(n= 18)	3.3 (n= 57)	2.5 (n= 41)	2.1 (n= 31)	
Hispanic	28.5% (n= 1620)	25.7 (n= 209)	31.4 (n= 549)	29.6 (n= 484)	25.4 (n= 378)	18.4 p< .001
Employment						
Employed	53.1% (n=3019)	36.5 (n= 297)	42.2 (n= 739)	56.3 (n= 921)	71.2 (n= 1062)	376.1 p< .001
Unemployed	46.9% (n=2671)	63.5 (n= 516)	57.8 (n= 1011)	43.7 (n= 715)	28.8 (n= 429)	
Education						
< HS Diploma	23.4% (n= 1334)	31.2 (n= 254)	32.1 (n= 562)	19.5 (n= 319)	13.3 (n= 199)	240.5 p< .001
HS Diploma-Associates	60.8% (n= 3457)	55.7 (n= 453)	56.6 (n= 991)	64.8 (n= 1060)	63.9 (n= 953)	
≥ Bachelors	15.8% (n= 899)	13.1 (n= 106)	11.3 (n= 197)	15.7 (n= 257)	22.7 (n= 339)	
Marital Status						
Married	41.4% (n= 2354)	27.1 (n= 220)	35.7 (n= 625)	46.8 (n= 765)	49.9 (n= 744)	156.0 p< .001
Single	58.6% (n= 3336)	72.9 (n= 593)	64.3 (n= 1125)	53.2 (n= 871)	50.1 (n= 747)	
Weight Status						
Underweight	1.6% (n= 91)	1.7 (n= 14)	1.9 (n= 33)	1.6 (n= 26)	1.2 (n= 18)	18.8 p< .001
Normal	28.4% (n= 1615)	31.7 (n= 258)	27.8 (n= 486)	28.9 (n= 473)	26.7 (n= 398)	
Overweight	31.3% (n= 1782)	30.2 (n= 245)	29.1 (n= 510)	31.7 (n= 518)	34.1 (n= 509)	
Obese	38.7% (n= 2202)	36.4 (n= 296)	41.2 (n= 721)	37.8 (n= 619)	38.0 (n= 566)	
Current Smoker	29.4% (n= 1674)	36.9 (n= 300)	32.3 (n= 565)	28.3 (n= 463)	23.2 (n= 346)	57.4 p< .001
Psychological Distress						
Low	36.7% (n= 2086)	31.4 (n= 255)	34.2 (n= 599)	37.9 (n= 620)	41.1 (n= 612)	95.6 p< .001
Moderate	37.4% (n= 2126)	34.7 (n= 282)	35.0 (n= 612)	38.6 (n= 632)	40.2 (n= 600)	
Severe	25.9% (n= 1478)	33.9 (n= 276)	30.8 (n= 539)	23.5 (n= 384)	18.7 (n= 279)	
Chronic Disease	44.2% (n= 2517)	42.8 (n= 348)	50.3 (n= 881)	44.3 (n= 724)	37.8 (n= 564)	51.9 p< .001
	Total (n=5690)	FIPR 1 (<0.50; n= 813)	FIPR 2 (0.50-1.00; n= 1750)	FIPR 3 (1.00-1.50; n= 1636)	FIPR 4 (1.50-2.00; n= 1491)	Chi-Square
Financial Stress						
No Stress	8.5% (n= 485)	9.3 (n= 75)	9.0 (n= 158)	7.1 (n= 116)	9.1 (n= 136)	31.5 p< .001
Low Stress	23.4% (n= 1331)	19.7 (n= 160)	23.3 (n= 407)	22.8 (n= 373)	26.2 (n= 391)	
Moderate Stress	34.1% (n= 1939)	35.5 (n= 289)	32.2 (n= 563)	34.3 (n= 561)	35.3 (n= 526)	
High Stress	34.0% (n= 1935)	35.5 (n= 289)	35.5 (n= 622)	35.8 (n= 586)	29.4 (n= 438)	
Government Assistance	37.2% (n= 2113)	23.9 (n= 194)	22.1 (n= 386)	39.5 (n= 646)	59.5 (n= 887)	716.2 p< .001
No Assistance	51.2% (n= 2915)	58.4 (n=475)	60.0 (n= 997)	54.4 (n= 891)	37.0 (n= 552)	
Low Assistance	11.6% (n= 662)	17.7 (n= 144)	20.9 (n= 367)	6.1(n= 99)	3.5 (n= 52)	
High Assistance						
Neighborhood Social Cohesion						
No Cohesion	17.0% (n= 966)	14.8 (n= 120)	15.5 (n= 270)	18.7 (n= 306)	18.1 (n= 270)	70.4 p< .001
Low Cohesion	38.9% (n= 2211)	35.1 (n= 285)	36.6 (n= 641)	38.8 (n= 635)	43.6 (n= 650)	
Some Cohesion	29.1% (n= 1657)	29.5 (n= 240)	31.4 (n= 550)	27.4 (n= 449)	28.0 (n= 418)	

High Cohesion	15.0% (n= 856)	20.6 (n= 168)	16.5 (n= 289)	15.1 (n= 246)	10.3 (n= 153)	
Food Insecurity						
No Food Insecurity	58.7% (n= 3342)	51.9 (n= 422)	51.1 (n= 895)	60.6 (n= 991)	69.3 (n= 1034)	
Low Food Insecurity	21.2% (n= 1204)	23.6 (n= 192)	21.9 (n= 381)	20.4 (n= 334)	20.0 (n= 297)	174.9
Moderate Food Insecurity	13.4% (n= 763)	15.9 (n= 129)	17.9 (n= 314)	12.6 (n= 206)	7.6 (n= 114)	p< .001
High Food Insecurity	6.7% (n= 381)	8.6 (n= 70)	9.1 (n= 160)	6.4 (n= 105)	3.1 (n= 46)	
	Total (n=5656)	FIPR 1 (<0.50; n= 810)	FIPR 2 (0.50-1.00; n= 1737)	FIPR 3 (1.00-1.50; n= 1628)	FIPR 4 (1.50-2.00; n= 1481)	Chi-Square
Vigorous Activity						
No Activity	67.9% (n= 3840)	69.4 (n= 562)	72.4 (n= 1257)	68.1 (n= 1108)	61.6 (n= 913)	
Some Activity	8.9% (n= 507)	8.7 (n= 71)	7.8 (n= 135)	9.2 (n= 150)	10.2 (n= 151)	49.2
Meeting Rec	8.2% (n= 462)	6.8 (n= 55)	7.9 (n= 138)	7.5 (n= 122)	10.0 (n= 147)	p< .001
Exceeding Rec	15.0% (n= 847)	15.1 (n= 122)	11.9 (n= 207)	15.2 (n= 248)	18.2 (n= 270)	
	Total (n=5633)	FIPR 1 (<0.50; n= 806)	FIPR 2 (0.50-1.00; n= 1727)	FIPR 3 (1.00-1.50; n= 1622)	FIPR 4 (1.50-2.00; n= 1478)	Chi-Square
Moderate Activity						
No Activity	51.3% (n= 2891)	52.0 (n= 419)	55.8 (n= 964)	51.7 (n= 838)	45.3 (n= 670)	
Some Activity	28.3% (n= 1591)	27.2 (n= 219)	25.3 (n= 437)	26.6 (n= 431)	34.1 (n= 504)	51.5
Meeting Rec	10.6% (n=597)	9.3 (n= 75)	9.8 (n= 169)	11.3 (n= 183)	11.5 (n= 170)	p< .001
Exceeding Rec	9.8% (n= 554)	11.5 (n= 93)	9.1 (n= 157)	10.4 (n= 170)	9.1 (n= 134)	

*Significant chi-square value indicates differences across FIPR groups

Logistic regression analysis: Vigorous-intensity physical activity

The first step of the regression analysis tested the relationship between income and meeting vigorous-intensity physical activity (VPA) guidelines with FIPR Group 4 as the reference group. Table 3 shows the results of each step in this analysis. Individuals in FIPR Group 2 were the least likely to meet vigorous-intensity PA guidelines (OR= .633, 95% CI= .537-.745, $p< .001$) followed by FIPR Group 1 (OR= .713, 95% CI= .583-.873, $p< .001$) and FIPR Group 3 (OR= .750, 95% CI= .638-.882, $p< .001$). Figure 3 depicts the relationship between income and vigorous PA. A downward pattern can be observed in this relationship, such that individuals who reported a higher income showed a higher likelihood of meeting recommendations for VPA. When psychological distress was entered in step 2, a similar pattern was observed with income and VPA and those relationships remained significant. Individuals who reported severe psychological distress (K6 score $\geq$ 13) were significantly less likely to meet VPA guidelines than those who did not (OR= .622, 95% CI= .533-.726, $p< .001$).

When psychosocial covariates were entered in step 3, the relationship between vigorous-intensity physical activity and income became non-significant, except for FIPR Group 2 (OR= .831; 95% CI= .650-.914; $p= .037$). The relationship between psychological distress and VPA remained significant, such that individuals who reported severe distress were less likely to meet VPA guidelines than those who did not (OR= .734, 95% CI= .624-.865, $p= .001$). Individuals who reported high financial stress were less likely to meet VPA guidelines than individuals who reported low financial stress (OR= .837; 95% CI= .731-.958; $p= .010$). Individuals enrolled in at least one government assistance program were less likely to meet VPA guidelines than individuals enrolled in no programs (OR= .564; 95% CI= .493-.646; $p< .001$). Neither neighborhood support nor food insecurity were significantly related to VPA.

Demographic covariates were added to the model in step 4. In this step, income was no longer associated with VPA. The relationship between psychological distress and VPA remained significant. While financial stress became non-significant, neighborhood support showed a significant relationship with VPA, such that individuals who reported low neighborhood support were less likely to meet VPA guidelines compared to those who reported high support (OR= .863; 95% CI= .756-.986; p= .030). Compared to the 25-34 age group, individuals aged 55 to 64 years were the least likely to VPA guidelines (OR= .325, 95% CI= .267-.396, p< .001), followed by the 45 to54 age group (OR= .465, 95% CI= .388-.557, p< .001) and the 35 to 44 age group (OR= .721, 95% CI= .611-.851, p< .001). Men were more likely to meet guidelines than women (OR= 1.240, 95% CI= 1.086-1.416, p< .001).

Compared to individuals with a bachelor's degree or higher, individuals who reported less than a high school diploma were the least likely to meet VPA guidelines among education groups (OR= .477, 95% CI= .384-.592, p< .001). Race was not significantly associated with VPA, except for a relationship for individuals who identified as American Indian/Alaska Native (OR= .654, 95% CI= .473-.906, p= .031). Compared to single individuals, participants who were married were less likely to meet VPA guidelines (OR= .833, 95% CI= .725-.958, p= .011)

Health-related covariates including BMI, chronic disease, and smoking status were added to the analysis in step 5. Income remained non-significant in this step. The relationship between VPA and psychological distress remained significant (OR= .838, 95% CI= .705-.996, p< .001). Relationships and trends observed for government assistance, neighborhood support, age, education, marital status, race, and sex were similar to those observed in step 4.

Individuals who reported a BMI of less than 18.50 kg/m^2 were the least likely to meet VPA guidelines compared to individuals who reported a BMI between 18.50 and 24.99 kg/m^2

(OR= .506, 95% CI= .271-.945, p= .033). Individuals who reported a BMI of at least 30.00 kg/m^2 were also less likely to meet VPA guidelines (OR= .692, 95% CI= .586-.816, p< .001). Neither smoking status nor the presence of at least one chronic condition were significantly related to VPA.

Table 3: Binary Logistic Regression - Vigorous Physical Activity					
	Model 1 (R^2=.008) O.R. [C.I.] p-value	**Model 2 (R^2=.019) O.R. [C.I.] p-value**	**Model 3 (R^2=.041) O.R. [C.I.] p-value**	**Model 4 (R^2=.103) O.R. [C.I.] p-value**	**Model 5 (R^2=.110) O.R. [C.I.] p-value**
FIPR Groups					
FIPR Group 1	.713 [.583-.873] **.001***	.762 [.622-.934] **.009**	.943 [.764-1.164] .586	.887 [.710-1.108] .290	.873 [.698-1.092] .236
FIPR Group 2	.633 [.537-.745] **.000**	.665 [.564-.784] **.000**	.831 [.650-.914] **.037**	.895 [.746-1.074] .233	.890 [.742-1.068] .212
FIPR Group 3	.750 [.638-.882] **.001**	.765 [.650-.900] **.001**	.864 [.732-.1.020] .085	.900 [.758-.1.068] .226	.891 [.750-1.057] .186
FIPR Group 4	1.0	1.0	1.0	1.0	1.0
Psychological Distress					
Yes		.622 [.533-.726] **.000**	.734 [.624-.865] **.000**	.804 [.678-.954] **.012**	.838 [.705-.996] **.045**
No		1.0	1.0	1.0	1.0
Financial Stress					
Low			1.0	1.0	1.0
High			.837 [.731-.958] **.010**	.873 [.758-1.006] .061	.873 [.757-1.007] .062
Government Assistance					
Not Enrolled			1.0	1.0	1.0
Enrolled			.564 [.493-.646] **.000**	.639 [.553-.739] **.000**	.667 [.576-.773] **.000**
Neighborhood Social Cohesion					
Low			.917 [.807-1.043] .189	.863 [.756-.986] **.030**	.870 [.761-.994] **.040**
High			1.0	1.0	1.0
Food Insecurity					
Low			1.0	1.0	1.0
High			.913 [.764-1.090] .313	.961 [.800-1.153] .666	.989 [.823-1.189] .909
Employment					
Employed				1.0	1.0
Unemployed				.945 [.817-1.094] .150	.955 [.825-1.107] .544
Age					
25-34				1.0	1.0
35-44				.721 [.611-.851] **.000**	.748 [.632-.884] **.001**
45-54				.465 [.388-.557] **.000**	.489 [.406-.589] **.000**
55-64				.325 [.267-.396] **.000**	.344 [.279-.424] **.000**
Sex					
Female				1.0	1.0
Male				1.240 [1.086-1.416] **.001**	1.228 [1.073-1.404] **.003**
Education					
< HS Diploma				.477 [.384-.592] **.000**	.497 [.399-.619] **.000**
HS Diploma-Associate's				.561 [.474-.665] **.000**	.591 [.497-.702] **.000**
≥ Bachelor's Degree				1.0	1.0
Race					
White				1.0	1.0
Black/African American				1.010 [.849-1.202] .912	1.006 [.844-1.200] .944
Asian				1.040 [.659-1.641] .867	1.060 [.671-1.676] .803

American Indian/Alaska Native				.654 [.473-.906] **.011**	.602 [.434-.836] **.002**
Multiracial				.907 [.599-1.375] .646	.923 [.609-1.399] .706
Hispanic					
Yes				1.003 [.855-1.177] .973	.965 [.818-1.138] .671
No				1.0	1.0
Marital Status					
Married				.833 [.725-.958] **.011**	.835 [.726-.961] **.012**
Single				1.0	1.0
BMI					
Underweight					.506 [.271-.945] **.033**
Normal Weight					1.0
Overweight					.922 [.783-1.086] .331
Obese					.712 [.603-.842] **.000**
Current Smoker					
Yes					.877 [.749-1.027] .103
No					1.0
Chronic Conditions					
Yes					.901 [.773-1.051] .183
No					1.0

*Emboldened data symbolizes significance at $p \leq 0.05$

Logistic regression analysis: Moderate-intensity physical activity

A similar step-wise logistic regression analysis was performed to examine the relationships between income, psychological distress, and moderate-intensity physical activity (MPA). Step 1 examined the relationship between income and the likelihood of meeting MPA guidelines. Across all steps, income was not significantly related to MPA. Psychological distress was entered in step 2. Individuals who reported severe psychological distress were less likely to meet MPA guidelines than individuals who did not (OR= .851, 95% CI= .730-.991, *p*= .038). Figure 2 illustrates the relationships between psychological distress and MPA. The proportion of individuals who did not meet MPA guidelines decrease slightly among those who reported moderate distress.

When psychosocial covariates were entered in step 3, the relationship between psychological distress and MPA became non-significant. Individuals who reported high financial stress were less likely to meet MPA guidelines than those who did not (OR= .863; 95% CI= .750-.993; *p*= .040). Individuals enrolled in one or more government assistance programs were less likely to meet MPA guidelines than those enrolled in zero programs (OR= .865; 95% CI= .750-.998; *p*= .046). When demographic covariates were entered in step 4, the relationship between psychological distress and MPA remained non-significant and the relationships between financial stress and government assistance became non-significant. Neither neighborhood support nor food insecurity were found to be significantly associated with MPA.

Compared to the 25 to 34 age group, individuals aged 55 to 64 were the least likely to meet MPA guidelines (OR= .675, 95% CI= .557-.819, *p*< .001), followed by the 45 to 54 age group (OR= .795, 95% CI= .662-.956, *p*= .008) in step 4. Blacks/African Americans and

individuals who reported Hispanic descent were the only racial/ethnic groups where a significant difference was observed in the relationship between race/ethnicity and MPA. Both Blacks/African Americans (OR= .759, 95% CI= .634-.909, *p*= .003) and Hispanics (OR= .776, 95% CI= .657-.916, *p*= .003) were less likely to meet MPA guidelines than their White/non-Hispanic counterparts.

Individuals with less than a high school diploma were the least likely to meet MPA guidelines compared to individuals with a bachelor's degree or higher (OR= .601, 95% CI= .479-.754, *p*< .001), followed by individuals who reported a high school diploma up to an associate's degree (OR= .796, 95% CI= .666-.951, *p*= .012). The 55 to 64 age group was the least likely to meet MPA guidelines (OR= .740, 95% CI= .606-.905, *p*= .003), followed by the 45 to 54 age group (OR= .795; 95% CI= .662-.956; *p*= .015).

When health covariates were added in step 5, the relationships between income, psychological distress, all psychosocial variables, and employment remained non-significant. Only age, education, and race remained significantly associated with the likelihood of meeting MPA guidelines. Individuals with a BMI of at least 30.00 kg/m^2 were less likely to meet MPA guidelines than individuals with a BMI of 18.50 to 24.99 kg/m^2 (OR= .829, 95% CI= .700-.982, *p*= .030). Individuals who reported at least one chronic disease were less likely to meet MPA guidelines than individuals who did not (OR= .825, 95% CI= .706-.964, *p*= .015).

Table 4: Binary Logistic Regression Analysis – Moderate-Intensity Physical Activity

	Model 1 (R^2=.001) O.R. [C.I.] p-value	Model 2 (R^2=.002) O.R. [C.I.] p-value	Model 3 (R^2=.005) O.R. [C.I.] p-value	Model 4 (R^2=.022) O.R. [C.I.] p-value	Model 5 (R^2=.027) O.R. [C.I.] p-value
FIPR Groups					
FIPR Group 1	1.017 [.823-1.257] .877	1.042 [.842-1.289] .706	1.104 [.877-1.374] .377	1.155 [.920-1.451] .214	1.133 [.902-1.424] .284
FIPR Group 2	.899 [.755-1.070] .230	.916 [.768-1.091] .324	.973 [.809-1.169] .767	1.062 [.879-1.283] .536	1.058 [.876-1.279] .557
FIPR Group 3	1.074 [.904-1.277] .416	1.082 [.910-1.286] .371	1.125 [.944-1.340] .189	1.166 [.976-1.392] .091	1.159 [.970-1.385] .104
FIPR Group 4	1.0	1.0		1.0	1.0
Psychological Distress					
Yes		.851 [.730-.991] **.038***	.914 [.777-1.074] .274	.915 [.774-1.082] .302	.945 [.797-1.119] .510
No		1.0		1.0	1.0
Financial Stress					
Low			.863 [.750-.993] **.040**	.879 [.760-1.016] .081	.878 [.759-1.016] .081
High			1.0	1.0	1.0
Government Assistance					
Not Enrolled			1.0	1.0	1.0
Enrolled			.865 [.750-.998] **.046**	.924 [.795-1.075] .309	.954 [.819-1.111] .543
Social Cohesion					
Low			1.026 [.899-1.171] .707	1.026 [.897-1.173] .707	1.033 [.903-1.181
High			1.0	1.0	1.0
Food Insecurity					
Low			1.0	1.0	1.0
High			.927 [.776-1.107] .402	.962 [.803-1.153] .676	.982 [.819-1.178] .843
Employment					
Employed				1.0	1.0
Unemployed				.988 [.852-1.146] .872	1.009 [.869-1.171] .907
Age					
25-34				1.0	1.0
35-44				.914 [.766-1.091] .319	.951 [.796-1.137] .582
45-54				.795 [.662-.956] **.015**	.849 [.702-1.026] .091
55-64				.675 [.557-.819] **.000**	.740 [.603-.909] **.004**
Sex					
Female				1.0	1.0
Male				.948 [.828-1.086] .442	.932 [.813-1.070] .318
Education					
< HS Diploma				.601 [.479-.754] **.000**	.604 [.480-.760] **.000**
HS Diploma-Associate's				.796 [.666-.951] **.012**	.808 [.674-.969] **.021**
≥ Bachelor's Degree				1.0	1.0
Race					
White				1.0	1.0
Black/African American				.759 [.634-.909] **.003**	.767 [.640-.920] **.004**
Asian				1.052 [.669-1.655] .827	1.062 [.674-1.673] .796
American Indian/Alaska Native				.852 [.621-1.168] .320	.817 [.594-1.125] .216

Multiracial				1.049 [.703-1.564] .816	1.066 [.714-1.592] .753
Hispanic					
Yes				.776 [.657-.916] **.003**	.769 [.648-.913] **.003**
No				1.0	1.0
Marital Status					
Married				1.044 [.906-1.203] .548	1.048 [.909-1.208] .520
Single				1.0	1.0
BMI					
Underweight					.729 [.417-1.273] .266
Normal Weight					1.0
Overweight					.973 [.822-1.150] .745
Obese					.829 [.700-.982] **.030**
Current Smoker					
Yes					1.031 [.883-1.205] .700
No					1.0
Chronic Conditions					
Yes					.825 [.706-.964] **.015**
No					1.0

*Emboldened data symbolizes significance at $p \leq 0.05$

Discussion

This study was guided by three purposes: 1) to describe the multidimensional characteristics of life among individuals living at, below or close to the federal poverty line; 2) to examine how psycho-social stressors and health behaviors and conditions vary across subsets of low-income groups; and 3) to examine the relationship among income, psychological distress and physical activity among low-income populations. It was hypothesized that: a) psychological distress and psychosocial stressors would increase as income status decreased; and b) psychological distress would be related to income and physical activity such that individuals who report higher income would report lower severity of psychological distress and would be more likely to meet both moderate- and vigorous-intensity physical activity recommendations. Descriptive analyses showed that psychological distress decreased as income increased, with 18.7% of the highest-earning income group (FIPR Group 4) reporting severe distress compared to 33.9% of the lowest-earning group (FIPR Group 1). Psychosocial stressors remained relatively stable across the lower-earning income groups (FIPR Groups 1-3) with the highest-earning group (FIPR Group 4) reporting the lowest severity of these stressors.

Logistic regression analyses revealed a significant relationship between psychological distress and vigorous-intensity physical activity. There was a significant relationship between income and VPA in the initial model, but this relationship became non-significant after demographic and health-related variables were added to the model. Income was not related to moderate-intensity physical activity. Psychological distress demonstrated a weak relationship with moderate-intensity activity before other covariates were added to the model, at which point the relationship was no longer significant. Thus, overall, there was weak support for the primary hypotheses. Only the relationship between psychological distress and vigorous activity was

significant in the final models. Although some of the psychosocial stressor, demographic, and health-related variables in this study contributed to the relationships between income, physical activity, and psychological distress, these variables explained only a small portion of the variance in both MPA and VPA. These findings are discussed in detail below.

Multidimensional characteristics of life in poverty

The first objective of this study was to describe the multidimensional characteristics of life among individuals living at, below, or close to the poverty line. Low-income populations experience significant psychological distress which may be driven by psychosocial stressors including financial stress and low neighborhood cohesion. Over two-thirds (68.1%) of the sample reported at least a moderate level of financial stress and 85% reported only some neighborhood cohesion or less. For education, 84% of the sample attained an associate's degree or lower, with nearly one-quarter (23.4%) who had less than a high school diploma. Employment rates were observed as expected with 46.9% of the population who reported unemployment at the time the survey was taken. A study conducted for the Associated Press (2013) reported approximately 40% of low-earning income groups were under- or unemployed, compared to 7.2% of high-earning income groups. The overall current unemployment rate in the US is 4.2% (BLS, 2017). Enrollment in government assistance programs may play a key role in financial security and employment among low-income populations.

Across the entire sample, 62.8% were enrolled in at least one government assistance program. The primary purpose of programs such as SNAP, WIC, and reduced rent subsidies is to increase financial security among low-income families to improve quality of life and provide opportunities for financial independence, something at which these programs are very successful. (USDA, 2017). Among low-income households enrolled in SNAP, more than half worked while

receiving SNAP benefits and more than 80% worked in the year prior to or the year after enrollment in the program (Rosenbaum, 2013). Government assistance programs are designed to support working families and offer incentives for working adults to return to the work force, including deductions for earned income to reflect the cost of work-related expenses.

A similar trend has been observed among recipients of WIC. One study found approximately one-third of women on WIC return to work within one month of child birth, while the other two-thirds stay home to care for their newborn child (Angelietti, 2009). Social stigma and discrimination may partially explain observed enrollment numbers in government assistance programs. Many recipients of government assistance report bullying or sneers at the checkout lines when they use benefits to purchase their groceries, potentially contributing to the severity of psychological distress reported among low-income populations (Stuber & Schlesinger, 2006).

Income and psychosocial stressors

Living under limited income was related to the likelihood of individuals participating in VPA. Individuals in FIPR Groups 1 and 2 reported the least amount of VPA, with over 70% of each group reporting no to only some vigorous activity. It is interesting to note these two groups also reported the highest proportion of moderate-to-severe psychological distress, with nearly two-thirds (68.6% and 65.8%, respectively) of individuals in each group reporting moderate to severe distress. Individuals in FIPR Groups 1 and 2 also reported the highest portion of chronic disease, with 42.8% of FIPR Group 1 and 50.3% of FIPR Group 2 reporting at least one diagnosed chronic disease.

The majority of the sample identified was White and 29.8% identified as a racial or ethnic minority. Descriptive analyses revealed that Blacks/African Americans were disproportionately divided into the lowest-earning income group (FIPR Group 1). While 20.6%

of the total sample identified as Black/African American, 28.0% of FIPR Group 1 identified in this racial group.

Race/ethnicity plays a key role in predicting health as well as the likelihood an individual will live in poverty within the lifespan. A recent national study found that, although blacks have lower current and lifetime rates of major depression than whites, the cases of depression among blacks were more likely to be persistent, severe, disabling, and untreated (Williams, et al. 2007). Perhaps, in part, this is because racial minorities are more likely to experience racially motivated verbal and physical abuse. In a study of ethnic minorities, Karlsen and Nazroo (2002) found a link between racially motivated physical and verbal abuse and self-reported health. Among a sample of British racial minorities, approximately 3.0% said they had experience racially motivated physical abuse, and 12% reported verbal abuse. Respondents who experienced any form of abuse were 50% more likely to describe their health as fair or poor compared to respondents who had not experienced abuse. In a national representative sample, Bleich et al. (2010) observed a higher likelihood of obesity in black women compared to whites.

Over two-thirds (70.0%) of the study population reported a BMI of 25.0 kg/m^2 or greater. Weight status plays a key role in health and may exacerbate symptoms and severity of many chronic diseases as well as severity of psychological distress (Must et al., 1999). The combination of higher weight status and chronic disease add significant barriers to a physically active lifestyle. In a study of low-income overweight and obese mothers, Chang, Nitzke, Guilford, Adair, and Hazard (2008) found participants who reported high levels of stress were more likely to engage in emotional eating and more sedentary activities than those who did not. Schoenborn, Adams, and Barnes (2002) found the highest rates of obesity among the lowest income and education levels.

Income, psychological distress, and physical activity

Overall, 67.9% of the sample reported no vigorous physical activity and 51.3% reported no MPA. Approximately one-third (34.5%) of the sample met aerobic recommendations for combined moderate- and vigorous-intensity physical activity. These findings support other research reporting low levels of physical activity among low-income populations (Brownson, Baker, Housemann, Brennan, & Bacak, 2001; Taylor, Baranowski, & Young, 1998). These findings are alarming, considering physical activity is important to optimal health. Dart, Nguyen, and Colditz (2016) found an association between physical activity and slower onset of chronic disease. Kohl, LaPorte, and Blair (1988) reported physically active individuals had a lower risk of cancer than less active individuals.

For moderate-intensity physical activity, income was not significantly associated with meeting guidelines. Psychological distress was significantly related to the likelihood of meeting guidelines until psychosocial stress variables were added to the model. Among all variables investigated, chronic disease, education, and race were significantly associated with MPA. Individuals living with at least one chronic disease were less likely to meet MPA guidelines than those who were not. Individuals who had not completed high school were the least likely to meet moderate activity guidelines compared to other education groups. These relationships are well-established in literature and the findings of this study are consistent with other research. For example, a study by Jones et al. (1998) reported that women, ethnic minorities, adults with lower education attainment, and adults living with chronic disease were the least likely to meet moderate-intensity physical activity recommendations.

Although income was not related to MPA, income showed an initial significant relationship to VPA. Perhaps time spent juggling obligations of work and responsibilities of

family care may compete with time available to engage in physical activity. In a study of rural and urban women, Wilcox, Castro, King, Housemann, and Brownson (2000) noted rural women reported more personal barriers to leisure-time physical activity, citing caregiving as their top barrier. Another explanation may be low-income populations associate VPA with pay-for-use fitness facilities – an additional monthly expense which may be out of reach. Although user fees are widely accepted, they may significantly decrease participation in equipment-based activity by families earning less than the median income. More and Stevens (2000) found 23% of low-income study respondents indicated they either reduced use or had gone to a less expensive facility because of fee increases. The authors' analysis suggested low-income populations are much more influenced by access fees than high-income populations. On the other hand, moderate activity such as walking, going up the stairs at work and at home, or general household maintenance may not be considered as physical activity among low-income populations. Furthermore, MPA may not have been associated with income because these types of activities are often free of monetary cost (e.g. walking).

Education was related to both MPA and VPA and increased as income increased, yet most of the study population did not meet public health physical activity guidelines. Approximately one-quarter of the sample did not graduate high school. Individuals with less than a high school diploma were nearly half as likely to meet both MPA and VPA guidelines as individuals with a college degree. Lower education attainment was associated with a significantly lower likelihood of meeting both VPA and MPA guidelines. Education influences health via lifestyle behaviors including regular physical activity, problem-solving capacity, and values (Liberatos, Link, & Kelsey, 1988; Montgomery & Carter-Pokras, 1993). Accordingly, almost half of individuals with less than a high school education report no leisure-time physical

activity (Giles-Corti & Donovan, 2002). FIPR Groups 2 and 3 reported the lowest education attainment with approximately one-third in each group attaining less than a high school diploma. Notably, these two groups were also the least physically active. Education is consistently correlated with salubrious health behaviors which may explain the role of education as a predictor of physical inactivity (Sallis, Hovell, & Hofstetter, 1992). Higher education attainment may overcome some barriers associated with low-income status and may be indicative of an individual's ability to comprehend and value the benefits of exercise for optimal health (Crespo, Smit, Andersen, Carter-Pokras, & Ainsworth, 2000).

Black/African American and Hispanic individuals were the least likely to meet moderate-intensity physical activity guidelines, with Blacks/African Americans being the least likely among all racial/ethnic groups. Race has been linked to lower levels of physical activity due to systemic racism in health care and lower opportunities of physical activity participation granted to racial minorities (McNeill, Kreuter, & Subramanian, 2006). Discrimination, like other measures of social stress, adversely affects health care utilization and adherence behaviors, and it is predictive of increased risk of using multiple substances to cope with stress, including tobacco, alcohol, and illicit drugs (Williams & Sternthal, 2010). Furthermore, the residential conditions of concentrated poverty and social disorder created by racial segregation make it difficult for minorities to eat nutritiously and exercise regularly.

Low-income populations face many barriers against leading physically active lifestyles. Approximately two-thirds of the study sample reported a BMI of 25.0 kg/m^2 or higher. About half reported living with at least one chronic disease and approximately one-quarter reported a severe level of psychological distress. Previous research has linked chronic disease, psychological distress and physical activity. One study found individuals who reported living

with chronic disease were less likely to engage in leisure-time physical activity than those who did not (Ashe, Miller, Eng, & Noreau, 2009). Approximately 40% of the study population reported at least one chronic disease and nearly 68% reported no vigorous physical activity.

Vigorous-intensity physical activity increases cardiovascular fitness, and this provides additional health benefits, including a higher likelihood of longevity. Blair, Cheng, and Holder (2001) found while generally active individuals were less likely than inactive individuals to report chronic disease and to live longer, individuals who engaged in regular vigorous-intensity physical activity showed a greater degree of cardiorespiratory fitness, were even less likely to report chronic disease, and lived longer lives than generally physically active individuals. Other studies have found a dose-response relationship between high levels of cardiovascular fitness associated with regular VPA. Blair, Kohl, Barlow, and Gibbons (1993) reported a difference in mortality rates between the least fit and the most fit upwards of three-fold. In a study of men aged 35 to 69 years, Ekelund et al. (1988) reported participants with lower levels of cardiorespiratory fitness were over three times the risk of death from cardiovascular and coronary heart disease than men with higher cardiorespiratory fitness. The benefits of greater cardiovascular fitness may be lost among low-income groups. This study found approximately three-quarters (76%) of the sample reported less than the weekly recommended minutes of VPA. This may contribute to the high levels of psychological distress observed among the lowest-earning income groups as well as the onset of chronic disease reported by almost half (44.2%) of the sample.

Psychosocial stress variables including financial stress, enrollment in government assistance programs, and low neighborhood cohesion were significantly associated with either moderate- or vigorous-intensity physical activity or both. Financial stress was significantly

related to both MPA and VPA, but these relationships became non-significant when demographic and health variables were added to the models. Enrollment in government assistance programs was significantly related to VPA. This relationship remained significant when demographic and health variables were added. Government assistance was also significantly related to MPA until demographic and health variables were added to the model. Over one-third of the study sample reported moderate to high levels of financial stress. Individuals who experience greater difficulty paying the rent, utilities, and other household bills may not prioritize memberships to fitness facilities or transportations costs for outdoor recreational opportunities (Day, 2006). Government assistance programs exist to help alleviate some financial stress, yet individuals enrolled in government assistance programs were nearly half as likely to meet VPA guidelines as individuals enrolled in zero programs.

Nearly 60% of the sample reported low to no neighborhood cohesion. Neighborhood social cohesion has been linked to physical activity with research showing a relationship between low perceived safety and physically inactive social norms and low levels of physical activity (Bennet et al., 2007; Bauman et al., 2012). Neighborhood cohesion has been shown to be effective in coping with life stressors, yet low-income populations consistently report a significant lack of cohesive neighbors and environments (Molnar, Gortmaker, Bull, & Buka, 2004). The coping effect of neighborhood cohesion may be illustrated in the negative health outcomes associated with chronic severe psychological distress. Chronic distress has been associated with a higher risk of myocardial infarction, stroke, heart disease, hyperlipidemia, hypertension, depression and anxiety, diabetes, and infection (Madge & Marmot, 1987).

Activities such as jogging or circuit training in a nearby park may not be possible if one fears crime and violence or a general lack of support in the neighborhood. However,

neighborhood cohesion was not related to MPA in any step of the model. This finding is different from other findings which report a significant relationship between neighborhood social cohesion and MPA. Cleland et al. (2010) found a significant relationship between higher neighborhood social cohesion and both leisure-time and transportation-related physical activity among women living in socioeconomically disadvantaged neighborhoods in Victoria, Australia. An interesting observation was noted in the relationship between neighborhood social cohesion and VPA. Neighborhood cohesion was not significantly related to VPA when initially added to the model, but the relationship became significant and remained so when demographic and health variables were added.

Overall, the observed relationships between income and physical activity were weaker than anticipated. One explanation may be the use of four levels of low-income status. These levels simply may not have been able to capture distinctions in physical activity. Many studies show a relationship between higher income and increased physical activity. For example, Powell, Slater, and Chaloupka (2004) reported higher median household income and lower poverty rates were associated with increased availability of physical activity-related settings including parks, green spaces, public pools, walking paths, and recreation complexes. Ford et al. (1991) reported higher socioeconomic men and women accumulated more minutes of physical activity per week than men and women of lower socioeconomic status. The authors noted higher SES women spent significantly more time per week in leisure-time physical activity, job-related physical activity, and household physical activity than lower SES women. Lower SES men spent significantly more time per week walking and doing household chores, while higher SES men spent significantly more time in leisure-time physical activity.

Strengths of the study

Unlike other studies which have focused on small samples, the present study examined a large cohort of 5,690 low-income individuals. The present study is one of the first studies connecting a variety of demographic and psychosocial factors to physical activity among low-income groups. This study is unique in that it used multiple levels of low-income status to address potential physical activity differences among low-income populations and is important as lumping individuals into a broad "low-income" category may fail to capture the unique contribution of varying degrees of poverty to physical inactivity. This study is also unique in that it is among the few studies to investigate a multitude of factors associated with the potentially complex challenges of living in poverty conditions.

This study is one of the few to connect family income to poverty ratios (FIPR) with physical activity. The FIPR score accounts for family size in addition to annual household income which is important because family size (a family of four and a family of eight could be classified differently), despite having similar annual household incomes. Taking family size into considerations when considering low income and minority groups becomes these groups tend to have larger family sizes than Caucasian families (Crespo, Smit, Andersen, Carter-Pokras, & Ainsworth, 2000).

The data gathered and analyzed from NHIS enabled an exploration of psychosocial variables thought to be important in the study of low-income populations. Such variables in this study included financial stress, enrollment in government assistance programs, and food insecurity. This study also separated moderate- and vigorous-intensity physical activity to examine the contribution of the multidimensional characteristics of low level income to physical

activity. There may be increased benefits associated with improved cardiovascular fitness related to participation in vigorous-intensity physical activity.

Limitations of the study

Due to the cross-sectional design of this study, neither the causal connections nor the direction of the relationships between the three key variables could be determined. The regression analyses included many variables without accounting for the number of comparisons or the relationships between independent variables. Although this was a large sample, it may not have been representative of all low-income individuals due to exclusion of missing data related to key variables of interest. This study used secondary data analysis, therefore the measures were limited by the way the questions were asked by NHIS. For example, physical activity data were obtained via self-report questions asking about the duration, frequency and intensity of activity in vague terms (e.g. How often do you do vigorous leisure-time physical activities for at least 10 minutes that cause heavy sweating or large increases in breathing or heart rate?). This may have impacted the strength of the associations. The survey asked for self-reported minutes of leisure-time moderate- and vigorous-intensity physical activity, leaving examples of each up to individual respondents to decipher.

Furthermore, the survey limited the scope of physical activity by focusing only on leisure-time physical activity. For example, work- and transportation-related physical activity were not included. Failure to include non-leisure-time physical activity may underestimate physical activity among low-income individuals, many not having the time and resources to engage in leisure activities and often finding themselves in physically active occupations or in use of walking and public transportation rather than the use of automobiles. Individuals also may

have been unable to accurately quantify minutes spent in moderate- and vigorous-intensity physical activity.

In a study comparing physical activity components in the long-form, self-administered version of the International Physical Activity Questionnaire (IPAQ) with an accelerometer, Hagstromer, Ainsworth, Oja, and Sjostrom (2010) reported significant differences between the two instruments and significantly higher values for sitting and VPA from the IPAQ compared to the accelerometer. The authors concluded while the IPAQ is a valid measurement of physical activity in population research, it likely overestimates physical activity compared to data obtained objectively via accelerometers.

Questions detailing the psychosocial variables were similarly vague. For example, questions detailing financial stress were asked in a manner in which time spent worrying about paying monthly bills could not be established (e.g. How worried are you right now about not having enough to pay your normal monthly bills?) It is possible that respondents had paid their bills before the survey was administered, so their current state of worry was low. Questions used to establish enrollment in government assistance programs asked about enrollment in the past year (e.g. At any time during the last calendar year did [you/any family members living here] receive benefits from the WIC program, that is, the Women, Infants, and Children program?). Perhaps psychological distress associated with enrollment in assistance programs was greater during the time of actual enrollment. Participants may have reported higher severity of psychological distress during the time they were enrolled, but the time frame could not be established through the NHIS questionnaire.

Food security was not found to be significantly associated with physical activity in this study. The failure to find any relationship with food insecurity may be due to the way the United

States Department of Agriculture (USDA) defines food security. The USDA (2017) defines food security as food access problems or limitations as well as anxiety associated with food sufficiency or shortage of food in the house. Food insecurity is marked by multiple indications of disrupted eating patterns and reduced food intake. Respondents were asked to describe how often, if ever, they skipped meals because there was not enough food in the house, if they had lost weight because there was not enough food in the house, and other questions designed to indicate availability of food. Respondents were not asked potentially important questions asking about distance to grocery stores, farmer's markets, or other indicators of access to nutritious foods. For this reason, an accurate portrait of food insecurity may not have established.

Future Directions

Research shows physical activity may mitigate severity of depression and anxiety, yet there is little evidence to suggest mental health plays an independent role in physical activity behavior. One question remaining is whether psychological distress results in a higher likelihood of physical inactivity. One suggestion for further research is to perform a longitudinal study comparing physical activity behavior among individuals who report moderate to severe psychological distress against that of individuals who report minimal distress. This approach may help tease out the contribution of psychological distress to the likelihood of long-term physical activity adherence and participation.

It is important to continue to establish an understanding of the multidimensional characteristics of life at the poverty line. Future studies may benefit from more accurate measures of food insecurity, social support, financial stress, and other psychosocial stressors which may disproportionately impact low-income groups and contribute to the severity of psychological distress. Given the mixed findings between income, physical activity, and

psychological distress found in this study, it is important to continue to address the relationship among these three factors in future research.

Conclusions

For individuals living around or below the federal poverty line, life is wrought with circumstances which contribute to significant detriments in physical and psychological health. Low-income populations must mitigate a great deal of chronic stress resulting from uncertainty of ability to pay bills, attain nutritious food, afford additional education and work skills training, and mitigate symptoms of chronic disease and psychological distress. Life at the poverty line is multidimensional and encompasses far more than lack of material possession. This study has shown low-income individuals express great concern regarding financial stability and neighborhood social cohesion. Low-income individuals are faced with difficult decisions. This population is limited in the choices they can make to improve health.

The limitations in choices to improve health may be evident in the low levels of physical activity reported among low-income groups in this study. This study found psychosocial stressors such as financial stress, and enrollment in government assistance programs, as well as psychological distress are inversely related to either VPA or MPA or both. Perhaps psychosocial stressors, obligations related to family care, and juggling work and household duties present significant barriers to physical activity, such that any spare time would rather be spent in more relaxing activities.

Through descriptive analyses of a large sample of individuals living at various levels of low income status, this study has found demographic and psychosocial stressors as significant issues in their lives. Further research is needed to identify the specific magnitude of the impact of these factors on salubrious health behaviors, particularly physical activity, among low-income

populations. It appears that simply focusing on increasing physical activity among low-income groups only scratches the surface of health interventions for this population.

References

Abbey, A. (2002). Alcohol-related sexual assault: A common problem among college students. *Journal of Studies on Alcohol & Drugs, 14*, 118-128.

Angeletti, M. A. (2009). Breastfeeding mothers returning to work: Possibilities for information, anticipatory guidance and support from US healthcare professionals. *Journal of Human Lactation, 25*(2), 226-232.

Ashe, M. C., Miller, W. C., Eng, J. J., & Noreau, L. (2009). Older adults, chronic disease, and leisure-time physical activity. *Gerontology, 55*(1), 64-72.

Aslanyan, S., Weir, C. J., Lees, K. R., Reid, J. L., & McInnes, G. T. (2003). Effect of area-based deprivation on the severity, subtype, and outcome of ischemic stroke. *Stroke*, 2623-2628.

Associated Press. (2013, September 16). Gap in US unemployment rates between rich and poor continues to widen. *New Jersey Times*.

Bastos, A. S., Rabinovich, E. P., & Almeida, M. B. (2010). Living the World of Poverty. *Psychology and Developing Societies, 22*(2), 221-247.

Bauman, A. E., Reis, R. S., Sallis, J. F., Wells, J. C., Loos, R. J., & Martin, B. W. (2012). Correlates of physical activity: Why are some people physically active and others not? *The Lancet, 380*(9838), 258-271.

Bennet, G. G., McNeill, L. H., Wolin, K. Y., Duncan, D. T., Puleo, E., & Emmons, K. M. (2007). Safe to walk? Neighborhood safety and physical activity among public housing residents. *PLoS Medicine, 4*(10). doi:10.1371/journal.pmed.0040306

Blair, S. N., Cheng, Y., & Holder, J. S. (2001). Is physical activity or physical fitness more important in defining health? *Medicine & Science in Sports & Exercise, 33*(6), S379-S399.

Blair, S. N., Kohl, H. W., Barlow, C. E., & Gibbons, L. W. (1991). Physical fitness and all-cause mortality in hypertensive men. *Annals of Medicine, 23*(3), 307-312.

Blair, S. N., Kohl, H. W., Gordon, N. F., & Paffenbarger, Jr. , R. S. (1992). How much physical activity is good for health? *Annual Review of Public Health, 13*, 99-126.

Bleich, S. N., Thorpe, Jr., R. J., Sharif-Harris, H., Fesahazion, R., & LaVeist, T. A. (2010). Social context explains race disparities in obesity among women. *Journal of Epidemiology & Community Health, 64*, 465-469.

Bluementhal, J. A., Babyak, M. A., Doraiswamy, M., Watkins, L., Hoffman, B. M., Barbour, K. A., . . . Sherwood, A. (2007). Exercise and pharmacotherapy in the treatment of major depressive disorder. *Pyschosomatic Medicine, 69*(7), 587-596.

Brewster, K. L., Billy, J. O., & Grady, W. R. (1993). Social context and adolescent behavior: The impact of community on the transition to sexual activity. *Social Forces, 71*(3), 713-740.

Brisson, D. (2014). *Neighborhood Social Cohesion*. doi:10.1093/OBO/9780195389678-0183

Browman-Fulks, J. J., Berman, M. E., Rabian, B. A., & Webster, M. J. (2004). Effects of aerobic exericse on anxiety sensitivity. *Behaviour Research and Therapy, 42*, 125-136.

Brownson, R. C., Baker, E. A., Housemann, R. A., Brennan, L. K., & Bacak, S. J. (2001). Environmental and policy determinants of physical activity in the United States. *American Journal of Public Health, 91*(12), 1995-2003.

Cantor, D., Fisher, B., Chibnall, S., Bruce, C., Townsend, R., Thomas, G., & Lee, H. (2015). *Report on the AAU Campus Climate Survey on Sexual Assault and Sexual Misconduct.* Rockville, Maryland: Westat.

Carlson, S. A., Fulton, J. E., Schoenborn, C. A., & Loustalot, F. (2010). Trend and prevalence estimates based on the 2008 Physical Activity Guidelines for Americans. *American Journal of Preventive Medicine, 39*(4), 305-313.

Centers for Disease Control and Prevention. (2017). *National Health Interveiw Survey*. Retrieved from CDC: National Center for Health Statistics: https://www.cdc.gov/nchs/nhis/

Chang, M.-W., Nitzke, S., Guilford, E., Adair, C. H., & Hazard, D. L. (2008). Motivators and barriers to healthful eating and physical activity among low-income overweight and obese mothers. *Journal of the American Dietetic Association, 108*(6), 1023-1028.

Chung, E. K., Mathew, L., Elo, I. T., Coyne, J. C., & Culhane, J. F. (2008). Depressive symptoms in disadvantage women recieving prenatal care: The influence of adverse and positive childhood experiences. *Ambulatory Pediatrics, 8*(2), 109-116.

Chung, E. K., Murmohamed, L., Mathew, L., Elo, I. T., Coyne, J. C., & Culhane, J. F. (2010). Risky health behaviors among mothers-to-be: The impact of adverse childhood experiences. *Academic Pediatrics, 10*(4), 245-251.

Chung, E. K., Siegel, B. S., Garg, A., Conroy, K., Gross, R. S., Long, D. A., . . . Fierman, A. H. (2016). Screening for social determinant of health among children and families living in poverty: A guide for clinicians. *Current Problems in Pediatiics and Adolescent Health Care, 46*, 135-153.

Cidade, E. C., Moura, J. F., & Eximenes, V. M. (2012). Psychological implications of poverty in Latin American people's lives. *Psicologia Argumento, 30*(68), 87-98.

Clark, C. J., Guo, H., Lunos, S., Aggarwal, N. T., Beck, T., Evans, D. A., . . . Everson-Rose, S. A. (2011). Neighborhood Cohesion is associated with reduced risk of stroke mortality. *Stroke, 42*, 1212-1217.

Cleland, V., Ball, K., Hume, C., Timperio, A., King, A. C., & Crawford, D. (2010). Individual, social, and environmental correlates of physical activity among women living in socioeconomically disadvantaged neighbourhoods. *Social Science & Medicine, 70*(12), 2011-2018.

Coleman-Jensen, A., Gregory, C., & Singh, A. (2014). *Household food insecurity in the United States in 2013.* U.S. Department of Agriculture.

Crespo, C. J., Smit, E., Andersen, R. E., Carter-Pokras, O., & Ainsworth, B. E. (2000). Race/Ethnicity, social class and their relation to physical inactivity during leisure time: Results from the thrid National Health and Nutrition Examination Survey, 1988-1994. *American Journal of Preventive Medicine, 18*(1), 46-53.

Dart, H., Nguyen, N., & Colditz, G. A. (2016). Physical activity and chronic disease prevention. In *The Young Female Athlete* (pp. 163-179). Springer International Publishing.

Day, K. (2006). Active living and social justice: Planning for physical acitvity in low-income, black, and latino communities. *Journal of the American Planning Association, 72*(1), 88-99.

De Mello, M. T., Lemos, V. d., Antunes, H. K., Bittencourt, L., Santos-Silva, R., & Tufik, S. (2013). Relationship between physical activity and depression and anxiety symptoms: A population study. *Journal of Affective Disorders, 149*, 241-246.

De Witte, H. (1999). Job insecurity and psychological well-being: Review of the literature and exploration of some unresolved issues. *European Journal of Work and Organizational Psychology, 8*(2), 155-177.

Dekker, S. W., & Schaufeli, W. B. (1995). The effects of job insecurity on psychological health and withdrawl: A longitudinal Study. *Australian Psychologist, 30*(1), 57-63.

Department of Justice, Office of Justice Programs, Bureau of Justice Statistics. (2013). *Female victims of sexual violence: 1994-2010.* Washington, D.C.

Dickinson, J. G. (2003). Tracing the social gradient in the health of Canadians: Primary and secondary determinants. *Social Science & Medicine, 57*, 263-276.

Dunn, A. L., Trivedi, M. H., Kampert, J. B., Clark, C. G., & Chambliss, H. O. (2005). Exercise treatment for depression: Efficacy and dose response. *American Journal of Preventive Medicine, 28*(1), 1-8.

Ekelund, L. G., Haskell, W. L., Johnson, J. L., Whaley, F. S., Criqui, M. H., & Sheps, D. S. (1988). Physical fitness as a predictor of cardiovascular mortality in asymptomatic North American men. *New England Journal of Medicine, 319*(21), 1379-1384.

Elliot, D. S., Wilson, W. J., Huizinga, D., Sampson, R. J., Elliot, A., & Rankin, B. (1996). The effects of neighborhood disadvantage on adolescent development. *Journal of Research in Crime and Delinquency, 33*(4), 389-426.

Estabrooks, P. A., Lee, R. E., & Gyurcsik, N. C. (2003). Resources for physical activity participation: Does availability and accessibility by neighborhood socioeconomic status? *Annals of Behavioral Medicine, 25*(2), 100-104.

Evans, R. G., & Stoddart, G. L. (1990). Producing health, consuming health care. *Social Science & Medicine, 31*(12), 1347-1363.

Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., . . . Marks, J. S. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults. The Adverse Childhood Experiences (ACE) study. *American Journal of Preventive Medicine, 14*(4), 245-258.

Fremont, A. E., & Bird, C. E. (2000). Social and psychological factors, physiolgocial processes, and physical health. In *Handbook of Medical Sociology* (5th ed., pp. 334-352). New Jersey: Prentice Hall.

Gies, K. J., & Ross, C. E. (1998). A new look at urban alienation: The effect of neighborhood disorder on perceived powerlessness. *Social Psychology Quarterly, 61*(3), 232-246.

Giles-Corti, B., & Donovan, R. J. (2002). Socioeconomic status differences in recreational physical activity levels and real and perceived access to a supportive physical environment. *Preventive Medicine, 35*, 601-611.

Gundersen, C., Kreider, B., & Pepper, J. (2011). The economics of food insecurity in the United States. *Applied Economic Perspectives and Policy, 33*(3), 281-303.

Haan, M., Kaplan, G. A., & Camacho, T. (1987). Poverty and health: prospective evidence from the Alameda County Study. *American Journal of Epidemiology, 125*(6), 989-998.

Hagstromer, M., Ainsworth, B. E., Oja, P., & Sjostrom, M. (2010). Comparison of a subjective and an objective measure of physical activity in a population sample. *Journal of Physical Activity & Health, 7*(4), 541-550.

Harrington, N. T., & Leitenberg, H. (1994). Relationship between alcohol consumption and victim behaviors immediately preceding sexual aggression by an acquaintance. *Violence and Victims, 9*(4), 315-324.

Hearon, B. A., Quatromoni, P. A., Mascoop, J. L., & Otto, M. W. (2014). The role of anxiety in daily physical activity and eating behavior. *Eating Behaviors, 15*, 255-258.

Helgadottir, B., Forsell, Y., & Ekblom, O. (2015). Physical activity patterns of people affected by depressive and anxiety disorders as measured by accelerometers: A cross-sectional study. *PLoS ONE, 10*(1). doi:10.1371/journal.pone.0115894

Hernandez, D. (2016). Affording housing at the expense of health: Exploring the housing and neighborhood strategies of poor families. *Journal of Family Issues, 37*(7), 921-946.

Hiles, S. A., Lamers, F., Milanechi, Y., & Penninx, B. (2017). Sit, step, sweat: Longitudinal associations between physical activity patterns, anxiety, and depression. *Psychological Medicine, 47*, 1466-1477.

Hillamo, H. (2014). Is income inequality 'toxic for mental health'? An ecological study of municipal level risk factors for depression. *PLoS ONE, 9*(3). doi:10.1371/journal.pone.0092775

Iyengar, S. (1990). Framing responsibilty for political issues: The case of poverty. *Political Behavior, 12*(1), 19-40.

Jarrett, R. L., & Jefferson, S. M. (2004). Women's danger management strategies in an inner-city housing project. *Family Relations, 53*(2), 138-147.

Jones, D. A., Ainsworth, B. E., Croft, J. B., Macera, C. A., Lloyd, E. E., & Yusuf, H. R. (1998). Who is meeting public health recommendations? A national cross-sectional study. *Archives of Family Medicine, 7,* 285-289.

Kansas State University. (2017, July 7). *Alcohol & Sexual Assault Prevention*. Retrieved from http://www.k-state.edu/asap/

Karlsen, S., & Nazroo, J. Y. (2002). Relation between racial discrimination, social class, and health among ethnic minority groups. *American Journal of Public Health, 92*(4), 624-631.

Kessler, R. C., Andrews, G., Colpe, L. J., Hiripi, E., Mroczek, D. K., Normand, S. T., . . . Zaslavsky, A. M. (2002). Short screening scales to monitor population prevalences and trends in non-specific psychological distress. *Psychological Medicine, 32*(6), 959-976.

Kohl, H. W., LaPorte, R. E., & Blair, S. N. (1988). Physical activity and cancer. *Sports Medicine, 6*(4), 222-237.

Kosteniuk, J. G., & Dickinson, H. D. (2003). Tracing the social gradient in the health of Canadians: Primary and secondary determinants. *Social Science and Medicine, 57,* 263-276.

LaGrange, R. L., Ferraro, K. F., & Supancic, M. (1992). Perceived risk and fear of crime: Role of social and physical incivilities. *Journal of Research in Crime and Delinquency, 29*(3), 311-334.

Lantz, P. M., House, J. S., Lepkowski, J. M., Williams, D. R., Mero, R. P., & Chen, J. (1998). Socioeconomic factors, health behaviors, and mortality: Results from a nationally representative prospective study of US adults. *Journal of the American Medical Association, 279*(21), 1703-1708.

Larson, N. I., & Story, M. T. (2011). Food insecurity and weight status among U.S. children and families: A review of the literature. *American Journal of Preventive Medicine, 40*(2), 166-177.

Lewis, D. A., & Maxfield, M. G. (1980). Fear in the Neighborhoods: An investigation of the impact of crime. *Journal of Research in Crime and Delinquency, 17*(2), 160-189.

Lewis, D. A., & Salem, G. W. (1986). *Fear of Crime.* Transaction Publishers.

Liberatos, P., Link, B. G., & Kelsey, J. L. (1988). The measurement of social class in epidemiology. *Epidemiology Reveiw, 10*, 87-121.

Lichter, D. T., Beaulieu, L. J., Findeis, J., & Teixeira, R. (1993). Persistent Poverty in Rural America.

Lupen, S. J., King, S., Meaney, M. J., & McEwen, B. S. (2001). Can poverty get under your skin? Basal cortisol levels and cognitive function in children from low and high socioeconomic status. *Developmental and Psychopathology, 13*(3), 653-676.

Lynch, J., Smith, G. D., Hillemeier, M., Shaw, M., Raghunathan, T., & Kaplan, G. (2001). Income inequality, the psychosocial environment, and health: Comparisons of wealthy nations. *The Lancet, 358*(9277), 194-200.

Mackenbach, J. P., van de Mheen, H., & Stronks, K. (1994). A prospective cohort study investigating the explanation of socioeconomic inequalities in health in the Netherlands. *Social Science & Medicine, 38*(2), 299-308.

Madge, M., & Marmot, M. (1987). Psychosocial factors and health. *Quarterly Journal of Social Affairs, 3*(2), 81-134.

Mair, C. D.-R. (2008). Are neighborhood characteristics associated with depressive symptoms? A review of evidence. *Journal of Epidemiology and Community Health, 62*(11), 940-946.

McEwen, B. S. (200). The neurobiology of stress: From serendipity to clinical relevance. *Brain Research, 886*(1), 172-189.

McNeill, L. H., Kreuter, M. W., & Subramanian, S. V. (2006). Social environment and physical activity: A review of concepts and evidence. *Social Science & Medicine, 63*(4), 1011-1022.

Messias, E., Eaton, W. W., & Grooms, A. N. (2011). Income inequality and depression prevalence across the United States: An ecological study. *Pyschiatric Services, 62*, 710-712.

Molnar, B. E., Gormaker, S. L., Bull, F. C., & Buka, S. L. (2004). Unsafe to play? Neighborhood disorder and lack of safety predict reduced physical acitvity among urban children and adolescents. *American Journal of Health Promotion, 18*(5), 378-386.

Montgomery, L. E., & Carter-Pokras, O. (1993). Health status by social class and/or minority status: Implications for environmental equity research. *Toxicology and Industrial Health, 9*, 729-773.

More, T., & Stevens, T. (2000). Do user fees exclude low-income people from resource-based recreation. *Journal of Leisure Research, 32*(3), 341-357.

Must, A., Spadano, J., Coakley, E. H., Field, A. E., Colditz, G., & Dietz, W. H. (1999). The disease burden associated with overweight and obesity. *Journal of the American Medical Association, 282*(16), 1523-1529.

National Institutes of Health. (1996). Consensus conference on physical activity and cardiovascular disease., (pp. 241-246).

Paczkowski, M. M., & Galea, S. (2010). Sociodemographic characteristics of the neighborhood and depressive symptoms. *Current Opinion in Psychiatry, 23*(4), 337-341.

Parks, S. E., Housemann, R. A., & Brownson, R. C. (2003). Differential correlates of physical activity in urban and rural adults of various socioeconomic backgrounds in the United States. *Journal of Epidemiology and Community Health, 57*, 29-35.

Pate, R. R., Pratt, M., Blair, S. N., Haskell, W. L., Macera, C. A., Bouchard, C., . . . Heath, G. W. (1995). Physical activity and public health: A recommendation from the Centers for Disease Control and Prevention and the American College orf Sports Medicine. *Journal of the American Medical Association, 273*(5), 402-407.

Pomerleau, J., Pederson, L. L., Ostbye, T., Speechley, M., & Speechley, K. N. (1997). Health behaviours and socio-economic status in Ontario, Canada. *European Journal of Epidemiology, 13*, 613-622.

Powell, L. M., Slater, S., & Chaloupka, F. J. (2004). The relationship between community physical activity settings and race, ethnicity and socioeconomic status. *Evidence-based Preventive Medicine, 1*(2), 135-144.

Prochaska, J. J., Sung, H.-Y., Max, W., Shi, Y., & Ong, M. (2012). Validity study of the K6 scale as a measure of moderate mental distress based on mental health treatment need and utilization. *International Journal of Methods in Psychiatric Research, 21*(2), 88-97.

Rosenbaum, D. (2013). *The relationship between SNAP and work among low-income households.* Center on Budget and Policy Priorities .

Ross, C. E., & Mirowsky, J. (2001). Neighborhood disadvantage, disorder, and health. *Journal of Health and Social Behavior, 42*, 258-276.

Sallis, J. F., Hovell, M. F., & Hofstetter, C. R. (1992). Predictors of adoption and maintenance of vigorous physical activity in men and women. *Preventive Medicine, 21*, 237-251.

Sallis, J. F., Hovell, M. F., Hoffstetter, C. R., Elder, J. P., Hackley, M., Caspersen, C. J., & Powell, K. E. (1990). Distance between homes and exercise facilities related to frequency of exercise among San Diego residents. *Public Health Reports, 105*, 179-185.

Sampson, R. J., & Groves, W. B. (1989). Community structure and crime: Testing social-disorganization theory. *American Journal of Sociology, 4*, 774-802.

Santiago, C. D., Wadsworth, M. E., & Stump, J. (2011). Socioeconomic status, neighborhood disadvantage, and poverty-related stress: Prospective effects on psychological syndromes among low-income families. *Journal of Economic Psychology, 32*, 218-230.

Schaufeli, S. W. (1995). The effects of job insecurity on psychological health and withdrawl: A longitudinal study. *Australian Psychologist, 30*(1), 57-63.

Schoenborn, C. A., Adams, P. F., & Barnes, P. M. (2002). *Body weight status of adults: United States, 1997-98.* Centers for Disease Control and Prevention.

Schofield, E. C. (2016). The impact of poverty on self-efficacy: and Australian longitudinal study. *Occupational Medicine*.

Shonkoff, J. P., Garner, A. S., Siegel, B. S., Dobbins, M. I., Earls, M. F., McGuinn, L., . . . Wood, D. L. (2012). The lifelong effects of early childhood adversity and toxic stress. *Pediatrics, 129*(1), 232-246.

Stuber, J., & Schlesinger. (2006). Sources of stigma for means-tested government programs. *Social Science & Medicine, 63*(4), 933-945.

Susser, M., Watson, W., & Heppier, K. (1985). Social mobility, stress, and disorders of health. *Sociology in Medicine*.

Taylor, R. B., & Shumaker, S. A. (1990). Local crime as a natural hazard: Implications for understanding the relationship between disorder and fear of crime. *American Journal of Community Psychology, 18*(5), 619-641.

Taylor, W. C., Baranowski, T., & Young, D. R. (1998). Physical activity interventions in low-income, ethnic minority , and populations with disability. *American Journal of Preventive Medicine, 15*(4), 334-343.

Thibodeau, G. A., & Patton, K. T. (1997). *Structure and Function of the Body.* St. Louis, MO.

Troped, P. J., Saunders, R. P., Pate, R. R., Reininger, B., Ureda, J. R., & Thompson, S. J. (2001). Associations between self-reported and objective physical environmental factors and use of a community rail-trail. *Preventive Medicine, 32*, 191-200.

U.S. Bureau of Labor Statistics. (2017). *Labor force statistics from the current population survey.* Washington, D.C.: U.S. Department of Labor.

U.S. Census Bureau . (1991). *Poverty in the United States: Current population reports.* Washington DC: U.S. Goverment Printing Office.

U.S. Department of Agriculture. (2017, September 6). *Economic Research Service*. Retrieved from USDA: https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/definitions-of-food-security/

US Department of Health and Human Services. (2000). *Healthy People 2010. Volume II.* Washington, D.C.: US Department of Health and Human Services.

Wade Jr, R., Shea, J. A., Rubin, D., & Wood, J. (2014). Adverse childhood experiences of low-income urban youth. *Pediatrics, 134*(1), 13-20.

Wadsworth, M., Butterworth, S., Marmot, M. G., & Wilkinson, R. G. (2006). Social determinants of health. 31-53.

Whelan, C. T. (1992). The role of income, life-style deprivation and financial strain in mediating the impact of unemployment on psychological distress: Evidence from the Republic of Ireland. *Journal of Occupational and Organizational Psychology, 65*, 331-344.

Wilcox, S., Castro, C., King, A. C., Housemann, R., & Brownson, R. C. (2000). Determinants of leisure time physical activity in rural compared with urban older and ethnically diverse women in the United States. *Journal of Epidemiology and Community Health, 54*, 667-672.

Wilkinson, M. M. (2006). *Social Determinants of Health* (2nd ed.). New York: Oxford University Press.

Wilkinson, R. G. (1994). The epidemiological transition: From material scarcity to social disadvantage? *Daedalus, 123*(4), 61-77.

Williams, D. R. (1999). Race, socioeconomic status, and health: The added effects of racism and discrimination. *Annals of The New York Academy of Sciences, 896*, 73-188.

Williams, D. R., & Collins, C. (1995). US socioeconomic and racial differences in health: Patterns and explanations. *Annual Review of Sociology, 21*, 349-386.

Williams, D. R., & Sternthal, M. (2010). Understanding racial-ethnic disparities in health: Sociological Contributions. *Journal of Health and Social Behavior, 51*(5), 515-527.

Williams, D. R., Gonzalez, H. M., Neighbors, H., Nesse, R., Abelson, J. M., Sweetman, J., & Jackson, J. S. (2007). Prevalence and distribution of major depressive disorder in African Americans, Caribbean Blacks, and Non-Hispanic whites: Results from the National Survey of American Life. *Archives of General Psychiatry, 64*, 305-315.

Wilson, W. J. (1996). When work disappears. *Political Science Quarterly, 111*(4), 567-595.

Yen, I. H., & Kaplan, G. A. (1998). Poverty area of residenc and changes in physical activity: Evidence from the Alameda County study. *American Journal of Public Health, 88*, 1709-1712.

Appendix 1: Field Experience Report

Master of Public Health Field Experience Report

INTERVENE: BYSTANDER INTERVENTION TRAINING FOR STUDENTS

by

AARON SWANK
MPH Candidate

submitted in partial fulfillment of the requirements for the degree

MASTER OF PUBLIC HEALTH

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2017

Summary

In February of 2017, I met with Jenny Yuen, MPH, CHES with the desire to be involved in raising awareness of sexual assault among students at Kansas State University. We began collaboration on a project with the goal to develop a bystander intervention training workshop to empower students to act in the case of an alcohol emergency, observation of an unhealthy relationship, and to prevent sexual assault. I worked with a small group of three undergraduates to build and deliver *Intervene: Bystander Intervention Training for Students* in April 2017. This program included a discussion of data collected from a mandatory *Alcohol and Sexual Assault Prevention* course which every student must complete at the beginning of each Fall semester. This discussion was followed by intervention skills training which featured videos of young actors portraying scenarios in which many college-aged men and women may find themselves throughout their college careers. These videos helped illustrate appropriate action to take to keep peers safe during an alcohol emergency, how to help a close friend escape an unhealthy relationship, and how to safely intervene to prevent sexual assault at a house party. The details of the *Intervene* programs as well as my involvement in the development of this project as part of my field experience are detailed in the following report.

Subject Keywords: Sexual assault, alcohol emergencies, healthy relationships, bystander intervention, ASAP

Field Experience Scope of Work

Learning Objectives

- To lead a team of undergraduate students in the development of a bystander intervention, primarily focused on sexual assault and alcohol intervention training for the student body of K-State
- To build empathy for victims without shaming or placing the blame on them.
- To create training material that is sensitive to cultural differences among K-State students.

Introduction

My field experience began in February of 2017. I contacted Julie Gibbs, MPH and Jenny Yuen, MPH, CHES, in December of 2016 to inquire about how I could get involved with raising awareness of sexual assault on our campus. At that time, I learned Jenny was planning to work with the student health education organization, the WellCat Ambassadors, to develop intervention training to deliver to the student body. It was suggested that I take a leadership role in developing and delivering the program toward the end of the Spring 2017 semester.

I met Jenny while I was an undergraduate at KSU. During the last few semesters of my course work, I wanted to become more involved on campus and looked into becoming a WellCat Ambassador. I worked with Jenny and the rest of the Health Promotion staff through the required course *EDCEP 311: Interaction and Guidance for the Paraprofessional*. This course provides students the skills required to deliver educational materials and guide discussion of sensitive issues to peers across campus. Skills taught included leadership, public speaking, educational delivery, and cultural sensitivity. Subjects discussed included nutrition, physical activity, stress and time management, sexual assault, and alcohol and drug abuse.

I was active in WellCat Ambassadors throughout my senior year. I hosted discussions on nutrition, worked tabling events in the Union, and participated in forum discussions with a

passion for improving the health of our student body. I grew to know Jenny as one who leads by example and speaks with honesty and tact. I was excited and humbled by the opportunity to work closely with her to complete my field experience. Sexual assault awareness and prevention are subjects about which I am very passionate.

Background

To date, nine out of every 10 victims of sexual assault are female and college-aged women are at an elevated risk of sexual assault, compared to women of other age groups (USDOJ, 2013). Sexual assault is a major problem on college campuses across the nation and a report by the Rape, Abuse, and Incest National Network (RAINN) shows just how pervasive sexual violence on campuses really is.

Among all graduate and undergraduate students, 11.2% experience rape or sexual assault through physical force. Sexual assault happens to both female and male students. College-aged men are 78% more likely than non-student men of the same age to be a victim of rape and sexual assault and 2.2% experience rape or sexual assault through physical force, violence, or incapacitation. College-aged women are three times more likely to be sexually assaulted than non-student women of the same age and 8.8% experience assault through physical force, violence or incapacitation (Cantor, et al., 2015).

Alcohol and drugs are a part of many college students' journey through higher education and young adulthood. Often, these are used to facilitate socialization and ease tensions associated with social anxiety. Unfortunately, alcohol and drugs may lead to negative outcomes beyond a hangover after a night of hearty partying. Antonia Abbey (2002) wrote about the relationship between alcohol consumption and sexual assault and reported that nearly half of sexual assaults among college students are associated with alcohol use. Abbey further reported that, in 81% of

the alcohol-related sexual assaults, both the survivor and the perpetrator had consumed alcohol. In a sample of college-aged students, Harrington and Leitenberg (1994) reported about 55% of survivors of sexual assault were under the influence of drugs or alcohol at the time of the incident.

Alcohol, recreational drug use, and sexual assault at Kansas State University

Our university has already taken steps to raise awareness of campus sexual assault. As part of a comprehensive and proactive approach to encourage students to stay safe and healthy, K-State requires all students to complete the annual web-based Alcohol and Sexual Assault Prevention Program (ASAP). This program is designed to help students: make healthy decisions; know and understand state laws and K-State campus policies; be aware of university community resources available when help is needed; and be aware of how to report concerning behavior (KSU, 2017).

Data from the 2015-16 ASAP Program Summary illustrates the alcohol and drug use and sexual behaviors of the student body. Approximately 65% of students surveyed said they drink alcohol during the week. Less than 1.0% reported drinking daily compared to 33.2% who reported they never drank. Among students who drank, approximately 10% drank two to three drinks, approximately 5.0% consumed four or five drinks, and less than 5% consumed more than six drinks when they drank. Approximately 10% of students who drank experienced a blackout from drinking in the 30 days prior to completion of the training. Similar patterns were observed with drug usage.

Although 78.6% of students said they never used drugs recreationally, 1.4% said they used drugs daily, 2.8% said they used drugs often, 5.6% said they sometimes used drugs recreationally, and 10.5% said they seldom used drugs recreationally. Over 50% of both male

and female students said they were sexually active at the time the course was completed. Approximately 5.0% of males and 10% of females said they had unwanted sex while drunk or using drugs. Sexual assault statistics for KSU are closely guarded due to legal issues and were not allowed to be reported as part of the development of this project.

Product development

As part of my field experience, I was tasked with developing an in-depth intervention training workshop to deliver during an all-campus event in April 2017 in conjunction with Sexual Assault Awareness Month. I was given the opportunity to lead a small group of three undergraduates under the guidance of Jenny as my preceptor. We met on a weekly basis over the course of my field experience to discuss our goals for the project. During each meeting, I assigned goals and objectives for each team member to complete and report at the next week's meeting. It was important that our workshop be evidence-based and unique to students at Kansas State University.

Students and faculty at Cornell University created the program *Intervene* to deliver across their campus to raise awareness and build confidence to intervene in the event of an alcohol emergency or a potential sexual assault. This program included scenarios commonly experienced by college-aged populations. These video scenarios illustrated how to intervene in a variety of situations including racial discrimination, abusive relationships, and unwanted sexual advances. The program developed at Cornell University consisted of seven scenarios, each followed by a brief period of discussion. The running time for Cornell's program was approximately 90 minutes which exceeded the ideal running time for our workshop.

As a team, we decided to cut down the scenarios to focus on alcohol emergencies, unhealthy relationships, and sexual assault. Due to the shortened time available to work on the

project, we incorporated three videos created by students at Cornell to facilitate discussion. All materials developed for Kansas State University were used with permission from Cornell University. The undergraduate students were tasked to develop discussion slides featuring questions to prompt the audience to reflect upon what they observed and facilitate discussion on methods to intervene in each featured scenario. A summary of the workshop follows.

Product delivery

The workshop was delivered on the evening of 27 April 2017 to a small group of approximately 10 students and faculty. The audience was informed that the content of the presentation was of a sensitive nature and may make some uncomfortable. In order to accommodate the preferences and sensitivity of some of the topics discussed, audience participants were encouraged to step away from the presentation should they become uncomfortable and return when they deemed it appropriate. The presentation began with a brief summary report of data from ASAP participation from the 2015-2016 academic year which was described earlier in this report.

Intervene during an alcohol emergency

Alcohol and recreational drug use behavior and their association with sexual assault were discussed in depth in the first five minutes of the presentation. Video scenarios followed the introductory portion of the presentation, with the alcohol emergency scenario discussed first. This scenario illustrated college-aged men and women at a house party consuming alcohol over the course of the evening. One attendee was shown drinking a large quantity of alcohol over the course of the evening to a point of becoming blackout drunk. Other party attendees noted when he became unresponsive to verbal and physical cues. Bystanders were shown actively seeking help for their severely inebriated peer, including calling emergency medical services. The video

concluded with the individual discussing what happened with a friend who was in attendance of the party.

Discussion followed with audience members reflecting on similar scenarios in which they were hesitant to act. It became apparent that students are uneasy with calling for help in alcohol emergencies, particularly if they are under the legal age to consume alcohol. It was important for students to realize that they can call for help if they observe a peer has had too much to drink without legal consequence for themselves. Our team contacted KSU and Riley County Police Department to clarify what students should do in case of an alcohol emergency. Both departments were clear in that they did not support or encourage underage drinking. They were both also clear that it is more important to seek help in an alcohol emergency and that intervening would likely not result in legal action against individuals who call for help. Upon learning this information, the audience indicated they felt more confident in their ability and willingness to intervene in the case of an alcohol emergency.

Intervene in an unhealthy relationship

The next topic of discussion was interpersonal and romantic relationships. Throughout one's college career, a variety of people will enter and leave one's life. Relationships of all levels play a significant role in every student's life. Whether these relationships are of a platonic nature or something more intimate, it is important that college students understand their role in these relationships and how to identify when these relationships become unhealthy. Interpersonal relationships can provide emotional support, social interaction, and academic success via study groups. Relationships may also expose students to racial and gender bias, sexual harassment, or intimate partner violence. Sometimes, students may experience be hesitant to acknowledge their

relationship is unhealthy, particularly if there is romantic attachment. This portion of the presentation discussed unhealthy relationships and methods for bystander intervention.

The video which accompanied this portion featured a young woman speaking with a male friend about her emotionally abusive relationship. The young woman had been dating her boyfriend for several months and had begun to express discomfort in some of her boyfriend's behaviors. He had become overbearing, checking in via text numerous times while she was speaking with her male companion and expressing jealousy that she was having coffee with another man. After her boyfriend began to belittle her, she become notably upset and began to open up a bit more about her relationship. Her male friend sat and listened, provided feedback when asked, and encouraged the young woman to end things before something worse happened. The video concluded with the young woman and her male friend meeting again and discussing how helpful it was to have a close friend in whom she could trust during the difficult break-up.

A discussion followed during which the audience was asked to reflect upon the video and think about the relationships observed in the video. It may be that, in unhealthy relationships, students are uncomfortable speaking up because a behavior that may seem odd to one person, may not seem odd to the next. This may "camouflage" an unhealthy relationship and force someone to tolerate negative behavior which they otherwise should not. If it seems that no one else finds negative behavior troubling, one may be afraid to speak out because it seems to be "normal." That is not a bad thing. In fact, it's quite human. We must begin to remove that camouflage and provide support and compassion to close companions when they are struggling in an unhealthy relationship. It is important that others feel comfortable seeking help as this may be a powerful deterrent to a potentially escalating problem.

Intervene to prevent sexual assault

The final scenario discussed in our presentation showed the audience what to do to intervene to stop sexual assault before it happens. In the discussion of sexual assault, our team felt it was important to discuss the idea of "rape culture." This term pertains to specific situations in which sexual assault, rape, and general violence are ignored, trivialized, normalized, or made into jokes (Ridgeway, 2014). Sexual assault seems to be more of a joke than a problem in our society. Every day, the media portrays sexual assault as a fantasy, normalizing extreme sex in primetime shows such as American Horror Story and Game of Thrones. Programs such as these feature graphic, often brutal, sex scenes during which helpless victims are depicted as helpless and screaming for help while no one is around to intervene. The news media plays a role in rape culture. News stories trivialize reports of sexual assault by assuming blame on victims due to the way they were dressed, the environment, or level of intoxication. Many new stories are guilty of not taking victims seriously when assaults are reported or works, making jokes about rape or defending jokes about rape. The US justice system also plays a role as we see more and more assailants, particularly young assailants, handed reduced sentences because it might "jeopardize their future"

This section of the presentation included a discussion of advocacy for sexual assault survivor rights as well as advocacy to end rape culture. Sexual assault is not a joke and should not be treated as such. It is important to be careful of language used when talking about sexual assault. No one is perfect and sometimes students may get carried away in their conversations among peers. It is important to be aware that some things said may be offensive. If this is the case, on should think critically about what is being said and take the time to reevaluate word choice. Furthermore, it is important that if something offensive is heard, the issue is corrected

politely. The audience was encouraged to take a stand to be less hesitant to speak out if an offensive joke is made. Each student has the power to make a difference at Kansas State University and it starts with showing respect for oneself and each other.

One situation in which nearly all students will find themselves is at a house party. The video accompanying this portion of the presentation showed a small group of students at a well-populated house party. As the night wore on, party guests became more inebriated. The small group of students noticed a young woman and a young man flirting across the room. The young man was acting aggressively, kissing the young woman and attempting to lead her to the second floor of the house. The young woman and the young man were visibly drunk. The young woman was not receptive to the young man's advances and began to attempt to avoid and pull away from him. Toward the end of the video, the young man was seen leading the young woman up the stairs. The small group of peers intervened by separating the young man and the young woman. The men in the group lead the young man into another room on the first floor of the house and they women lead the young women into the bathroom. A thorough discussion of consent followed the video.

It is crucial for students to understand the intricacies of consent laws. The audience agreed that the young man in the video was acting in appropriately. The audience noted that the young man never consented to the young man's advances and that her body language indicated she was not interested. Consent laws may be difficult to understand, particularly if both parties are under the influence of alcohol and/or drugs. In short, consent dictates that "no means no" and no matter how far romance goes, each party has the right to stop when he or she becomes uncomfortable or simply does not feel like going further. When alcohol and drugs are involved, open communication plays a key role. Consent should be acknowledged every step of the way. If

any doubt comes up, the best practice is to cease all action or intervene if a “no” answer is not respected.

At Kansas State University, the faculty, staff, and student bodies work hard to instill a family environment of inclusion, respect, dignity, and academic achievement. As representatives of our University, we all play a crucial role in keeping our peers safe. In non-urgent situations, such as times of great stress, it is important that we provide a listening ear, express concern and compassion, and offer support when our peers need it. In urgent situations, such as those discussed in our presentation, we cannot assume others will act. We must work together in a direct manner to get help for our troubled peers. Toward the end of the presentation, a discussion of bystander emotions helped guide the audience through some common feelings associated with intervening in both non-urgent and urgent situations. The audience indicated a desire to respect the privacy of others and some fear in retaliation or legal trouble should they call for help during an alcohol emergency, particularly if underage drinking is involved. Empathy was used to help alleviate some of these concerns. The audience was asked to think of how they might feel if they were in an emergency and no action was taken. The audience agreed that it is better to act despite potential personal consequences, particularly of the safety of a peer was at stake.

The workshop concluded with a discussion about resources available for students, faculty, and staff at Kansas State University. The audience was shown how to report an incident if they so choose. The website for the Center for Advocacy, Response, and Education (CARE) was displayed for the audience to become more familiar with these offices to report and get help in the case of sexual harassment and/or assault. Information for Riley County Police Department, KSU Police Department, the Office of Institutional Equity, and the Office of Student Life was also provided for the benefit of the audience. A brief survey was distributed among audience

members to gather feedback for the program and make revisions for future use. Overall, my field experience project and my time with Jenny Yuen was invaluable. I was honored to work with a group of young undergraduates who represented a high degree of passion and commitment to create a safer, more inclusive campus environment. Jenny was a powerful and remarkable preceptor. I was able to confide in her and ask endless questions to learn how to deliver sensitive health education materials in an appropriate manner. She took every moment available to work with me and provide guidance and feedback to ensure the presentation stayed on point during the hour-long workshop. I was fortunate to be paired with a preceptor willing to personally invest in my professional development.

MPH Foundational Competencies

Among the 22 foundational competencies all public health master's students are expected to build through the program, I believe the five illustrated in this report are competencies I have built or improved upon the most. Through the report and delivery of national sexual assault and local KSU ASAP data, I demonstrated an ability to **interpret results of data analysis for public health research, policy or practice** by utilizing this data to tell a compelling story of the issues surrounding sexual assault on college campuses at the national and local levels. I utilized this data to describe the cultural aspects of college-aged populations, particularly in terms of decisions regarding experimentation with drugs, alcohol, and sex demonstrating an ability to **apply awareness of cultural values and practices to the design or implementation of public health policies or programs**.

While working with a small group of undergraduates, I demonstrated an ability to **apply principles of leadership, governance & management,** which included creating a vision of empowering my team to work independently outside of meeting times and work together when

time allowed. By delegating tasks including research topics, video editing, and speech writing and by making myself available to answer questions via email, phone, or text, I fostered collaboration & guided decision making to create an evidence-based intervention training tool. Through the utilization and dissemination of data detailing alcohol, drug, and sex behaviors among students at Kansas State University, I demonstrated the ability to **communicate audience-appropriate public health content, both in writing and through oral presentation** during an all-campus event to raise awareness and build bystander intervention skills to prevent sexual assault both on and off campus. Finally, by guiding the audience through a discussion of "rape culture" and how to show compassion for survivors of sexual assault, I demonstrated an ability to **advocate for political, social or economic policies & programs** that will improve health in a diverse population of college-aged men and women.

Appendix 2: Thesis Defense Presentation Slides

Physical Activity & Psychological Distress

Social Gradients of Living in Poverty

Presented in partial fulfillments for the degree
Master of Public Health
Aaron C. Swank
2017

KANSAS STATE UNIVERSITY

Committee

- Emily L. Mailey, PhD – Chair
- Mary McElroy, PhD – Co-Advisor
- Richard Rosenkranz, PhD – Committee Member
- Sonya Lutter, PhD – Committee Member

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Introduction

- Research documents the existence of a social gradient of health
  - Evidence suggests the poorest individuals are also the least healthy across study populations (Kosteniuk & Dickinson, 2003)
- Health behaviors such as PA play a key role in long-term health maintenance & optimal health outcomes
  - Low-income groups more likely to lead physically inactive lifestyles
    - Low social support (Taylor, et al., 1998)
    - Low education (Parks, et al., 2003)
    - Regardless of race/ethnicity/gender, low-income individuals report more physical inactivity (Crespo, et al., 2000)

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Social Structure or "Just a Victim of Circumstance"

- "Victims of circumstance" may dismiss the struggle of living with minimal income
  - Opportunities to improve are beyond financial capabilities
  - Financial stress (Whelan, 1992).
  - Participation in government assistance (Dekker & Schaufeli, 1995)

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Psychological Distress & Income

- Neighborhood disadvantage prominent in poverty-dense areas & may add to distress
  - Lower opportunity (Wilson, 1996)
  - Low perceived social support (Sampson & Groves, 1989)
  - High prevalence of sedentary norms (Elliot, et al., 1996)
- Poverty-related stress was directly related to symptoms of anxiety and depression (Santiago, et al., 2011).

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Purpose(s) of this Study

- 1) Describe the multidimensional characteristics of life among low-income groups
- 2) Examine how psychosocial stressors, health behaviors and conditions vary across subsets of low-income groups
  - Hypothesis: Psychological distress & psychosocial stressors increase as income status decrease
- 3) Examine the relationship among income, psychological distress and physical activity among low-income groups
  - Hypothesis 1: Among low-income groups, individuals reporting higher income are more likely to meet MPA & VPA guidelines
  - Hypothesis 2: Individuals reporting severe psychological distress are less likely to meet MPA & VPA guidelines

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Methods

- National Health Interview Survey (NHIS) 2015
  - 42,288 total participants
  - 5,690 included in this study (inclusion criteria - complete data)
    - 3,329 women
    - 2,361 men
  - Provided measurements for the 3 main variables of interest
    - Income status, Psychological distress, Physical activity
  - Provided measurements for
    - Demographic covariates
    - Psychosocial stressors

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Key Variables:
Physical Activity

- Self-reported leisure-time physical activity (LTPA)
  - Frequency, duration, intensity MPA & VPA
  - Minutes totaled to reflect public health physical activity guidelines
    - Vigorous-intensity physical activity (VPA)
    - Moderate-intensity physical activity (MPA)
    - Aerobic Activity Guidelines

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Key Variables:
Low Income Status

- Based on Family Income to Poverty Ratio (FIPR)
  - Annual income + family size + # children > 18 yrs
    - FIPR Group 1 (<0.50) - lowest income status
    - FIPR Group 2 (0.50-1.00)
    - FIPR Group 3 (1.00-1.50)
    - FIPR Group 4 (1.50-2.00) - highest income status

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Key Variables:
Psychological Distress

- Kessler Psychological Distress Scale
  - Short-form K6
  - 6 questions – mood states
    - Hopeless
    - Helpless
    - Nervous
    - Worthless
    - Everything feels like a chore
    - Restless/fidgety
  - Maximum score 30
    - Low (K6= 6)
    - Moderate (K6= 7-12)
    - Severe (K6≥ 13)

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Psychosocial Stress Variables

- Financial stress
- Government assistance
- Neighborhood social cohesion
- Food insecurity

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Health Variables & Demographics

- Chronic disease (report at least 1 chronic disease)
- Smoking status
- Weight status (BMI)
- Sex
- Age
- Race/ethnicity
- Marital status
- Employment
- Education

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Data Analysis

- SPSS V24.0
- Descriptive statistics
- Cross-tabulations (Chi-square analysis)
  - Differences by FIPR Group
- Step-wise binary logistic regression
  - VPA
  - MPA

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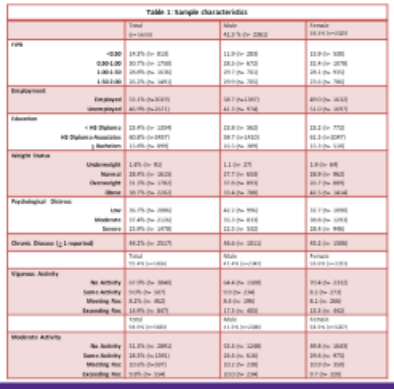
Results

Purpose 1 – Descriptive Analysis of Entire Sample



- Sample= 5,690
  - 58.5% female
  - 46.9% unemployed
  - 23.4% < HS education
  - 70% overweight/obese
  - 63.3% ≥ moderate psych distress
    - 25.9% severe psych distress
  - 44.2% ≥ 1 chronic disease
- VPA
  - 67.9% no activity
- MPA
  - 51.3% no activity

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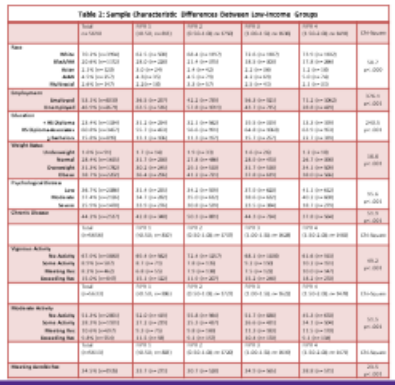
Results:

Purpose 2 – Differences among low-income groups



Summary of Results

- 58% were female
  - FIPR Groups 1 & 2 were disproportionately female (redo table to include gender)
- 20.6% Black/AA
  - FIPR Group 1 disproportionately Black/AA
- FIPR Groups 1 & 2 disproportionately:
  - Unemployed
  - Undereducated
  - Severely distressed
- FIPR Group 2 disproportionately ill
  - 50.3% report ≥ 1 chronic disease
- FIPR Group 2 disproportionately inactive
  - 72.9% no VPA
  - 55.8% no MPA

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Income & Psychosocial Stressors

- FIPR Groups 1 & 2 reported highest proportion of severe psychological distress
- 29.8% identified as a racial/ethnic minority
  - Cases of depression among Blacks/African Americans more persistent, severe, disabling, and likely untreated (Williams, et al, 2007)
    - Racial minorities more likely to experience verbal and physical abuse
- ~33% FIPR Groups 2 & 3 did not graduate high school
  - Education influences health via lifestyle behaviors (Liberatos, et al., 1988)
  - Low education may limit problem-solving and coping skills
- Neighborhood social cohesion effective in coping with life stressors
  - Low-income populations consistently report lack of cohesive environments (Molnar, et al., 2004)
    - 60% reported low neighborhood cohesion

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Results:

Purpose 3 - VPA, Income, & Psychological Distress

Table 3: Binary Logistic Regression - Vigorous Physical Activity

	Model 1 (R^2=.008) O.R. [C.I.] p-value	Model 2 (R^2=.019) O.R. [C.I.] p-value	Model 3 (R^2=.041) O.R. [C.I.] p-value	Model 4 (R^2=.103) O.R. [C.I.] p-value	Model 5 (R^2=.110) O.R. [C.I.] p-value
FIPR Groups					
FIPR Group 1	.713 [.583-.873] **.001***	.762 [.622-.934] **.009**	.943 [.764-1.164] .586	.887 [.710-1.108] .290	.873 [.698-1.092] .236
FIPR Group 2	.633 [.537-.745] **.000**	.665 [.564-.784] **.000**	.831 [.650-.914] **.037**	.895 [.746-1.074] .233	.890 [.742-1.068] .212
FIPR Group 3	.750 [.638-.882] **.001**	.765 [.650-.900] **.001**	.864 [.732-1.020] .085	.900 [.758-1.068] .226	.891 [.750-1.057] .186
FIPR Group 4	1.0	1.0	1.0	1.0	
Psychological Distress					
Yes		.622 [.533-.726] **.000**	.734 [.624-.865] **.000**	.804 [.678-.954] **.012**	.838 [.705-.996] **.045**
No		1.0	1.0	1.0	1.0

*Emboldened data indicate significance at p≤ 0.05

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Results:

VPA & Psychosocial Stressors

Table 3: Binary Logistic Regression - Vigorous Physical Activity

	Model 1 (R^2=.008) O.R. [C.I.] p-value	Model 1 (R^2=.008) O.R. [C.I.] p-value	Model 1 (R^2=.008) O.R. [C.I.] p-value	Model 1 (R^2=.008) O.R. [C.I.] p-value	Model 1 (R^2=.008) O.R. [C.I.] p-value
Financial Stress					
Low			1.0	1.0	1.0
High			.837 [.731-.958] **.010**	.873 [.758-1.006] .061	.873 [.757-1.007] .062
Government Assistance					
Not Enrolled			1.0	1.0	1.0
Enrolled			.564 [.493-.646] **.000**	.639 [.553-.739] **.000**	.667 [.576-.773] **.000**
Social Cohesion					
Low			.917 [.807-1.043] .189	.863 [.756-.986] **.030**	.870 [.761-.994] **.040**
High			1.0	1.0	1.0
Food Insecurity					
Low			1.0	1.0	1.0
High			.913 [.764-1.090] .313	.961 [.800-1.153] .666	.989 [.823-1.189] .909

*Emboldened data indicate significance at p≤ 0.05

Results:

VPA & Demographic Covariates

Table 3: Binary Logistic Regression - Vigorous Physical Activity

	Model 1 (R^2=.008) O.R. [C.I.] p-value	Model 1 (R^2=.008) O.R. [C.I.] p-value	Model 1 (R^2=.008) O.R. [C.I.] p-value	Model 1 (R^2=.008) O.R. [C.I.] p-value	Model 1 (R^2=.008) O.R. [C.I.] p-value
Employment					
Employed				1.0	1.0
Unemployed				.840 [.817-1.094] .110	.955 [.823-1.107] .544
Age					
18-34				1.0	1.0
35-64				.721 [.631-.833] **.000**	.748 [.632-.884] **.001**
65-84				.465 [.388-.557] **.000**	.486 [.406-.588] **.000**
85-64				.325 [.267-.396] **.000**	.344 [.279-.424] **.000**
Sex					
Female				1.0	1.0
Male				1.240 [1.086-1.416] **.001**	1.228 [1.073-1.404] **.003**
Education					
< HS Diploma				.477 [.386-.592] **.000**	.697 [.599-.810] **.000**
HS Diploma-Associate's				.581 [.476-.661] **.000**	.591 [.497-.702] **.000**
≥ Bachelor's Degree				1.0	1.0
Race					
White				1.0	1.0
Black/African American				1.010 [.869-1.202] .912	1.006 [.866-1.200] .944
Asian				1.040 [.859-1.641] .887	1.060 [.871-1.678] .803
American Indian/Alaska Native				.854 [.475-.805] **.011**	.802 [.434-.8581] **.002**
Multiracial				.907 [.599-1.373] .646	.923 [.609-1.399] .706
Hispanic					
Yes				1.003 [.855-1.177] .973	.963 [.818-1.134] .671
No				1.0	1.0
Marital Status					
Married				.835 [.725-.935] **.011**	.835 [.726-.961] **.012**
Single				1.0	1.0

*Emboldened data indicate significance at p≤ 0.05

Results:

VPA & Health Covariates

Table 3: Binary Logistic Regression - Vigorous Physical Activity

	Model 1 (R^2=.008) O.R. [C.I.] p-value	Model 1 (R^2=.008) O.R. [C.I.] p-value	Model 1 (R^2=.008) O.R. [C.I.] p-value	Model 1 (R^2=.008) O.R. [C.I.] p-value	Model 1 (R^2=.008) O.R. [C.I.] p-value
BMI					
Underweight					.506 [.271-.945] **.033**
Normal Weight					1.0
Overweight					.922 [.783-1.086] .331
Obese					.712 [.603-.842] **.000**
Current Smoker					
Yes					.877 [.749-1.027] .103
No					1.0
Chronic Conditions					
Yes					.901 [.773-1.051] .183
No					1.0

*Emboldened data indicate significance at p≤ 0.05

Results:

MPA, Psychological Distress, & Psychosocial Stressors

Table 4: Binary Logistic Regression Analysis - Moderate Physical Activity

	Model 1 (R^2=.001) O.R. [C.I.] p-value	Model 2 (R^2=.002) O.R. [C.I.] p-value	Model 3 (R^2=.005) O.R. [C.I.] p-value	Model 4 (R^2=.022) O.R. [C.I.] p-value	Model 5 (R^2=.027) O.R. [C.I.] p-value
Psychological Distress					
Yes		.851 [.730-.991] **.038***	.914 [.777-1.074] .274	.915 [.774-1.082] .302	.945 [.797-1.119] .510
No		1.0		1.0	1.0
Financial Stress					
Low			.863 [.750-.993] **.040**	.879 [.760-1.016] .081	.878 [.759-1.016] .081
High			1.0	1.0	1.0
Government Assistance					
Not Enrolled			1.0	1.0	1.0
Enrolled			.865 [.750-.998] **.046**	.924 [.795-1.075] .309	.954 [.819-1.111] .543
Social Cohesion					
Low			1.026 [.899-1.171] .707	1.026 [.897-1.173] .707	1.033 [.903-1.181
High			1.0	1.0	1.0
Food Insecurity					
Low			1.0	1.0	1.0
High			.927 [.776-1.107] .402	.962 [.803-1.153] .676	.982 [.819-1.178] .843
Employment					
Employed				1.0	1.0
Unemployed				.988 [.852-1.146] .872	1.009 [.869-1.171] .907

*Emboldened data indicate significance at p≤ 0.05

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Results:

MPA & Demographic Covariates

Table 4: Binary Logistic Regression Analysis - Moderate Physical Activity

	Model 1 (R^2=.001) O.R. [C.I.] p-value	Model 2 (R^2=.002) O.R. [C.I.] p-value	Model 3 (R^2=.005) O.R. [C.I.] p-value	Model 4 (R^2=.022) O.R. [C.I.] p-value	Model 5 (R^2=.027) O.R. [C.I.] p-value
Age					
18-34				1.0	1.0
35-44				.914 [.766-1.091] .319	.931 [.766-1.117] .382
45-54				.797 [.663-.956] **.014**	.849 [.703-1.026] .091
55-64				.673 [.557-.815] **.000**	.740 [.603-.908] **.004**
Sex					
Female				1.0	1.0
Male				.948 [.828-1.086] .442	.932 [.813-1.070] .318
Education					
< HS Diploma				.601 [.479-.754] **.000**	.604 [.480-.760] **.000**
HS Diploma-Associate's				.796 [.666-.951] **.012**	.808 [.676-.969] **.021**
≥ Bachelor's Degree				1.0	1.0
Race					
White				1.0	1.0
Black/African American				.759 [.634-.909] **.003**	.767 [.640-.920] **.004**
Asian				1.052 [.669-1.655] .827	1.062 [.674-1.673] .796
American Indian/Alaska Native				.832 [.621-1.168] .320	.817 [.594-1.125] .216
Multiracial				1.049 [.705-1.584] .818	1.066 [.734-1.592] .755
Hispanic					
Yes				.776 [.657-.918] **.003**	.789 [.668-.933] **.003**
No				1.0	1.0
Marital Status					
Married				1.044 [.906-1.203] .548	1.048 [.909-1.208] .520
Single				1.0	1.0

*Emboldened data indicate significance at p≤ 0.05

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Results:

MPA & Health Covariates

Table 4: Binary Logistic Regression Analysis - Moderate Physical Activity

	Model 1 (R^2=.001) O.R. [C.I.] p-value	Model 2 (R^2=.002) O.R. [C.I.] p-value	Model 3 (R^2=.005) O.R. [C.I.] p-value	Model 4 (R^2=.022) O.R. [C.I.] p-value	Model 5 (R^2=.027) O.R. [C.I.] p-value
BMI					
Underweight					.729 [.417-1.273] .266
Normal Weight					1.0
Overweight					.973 [.822-1.150] .745
Obese					.829 [.700-.982] **.030**
Current Smoker					
Yes					1.031 [.883-1.205] .700
No					1.0
Chronic Conditions					
Yes					.825 [.706-.964] **.015**
No					1.0

*Emboldened data indicate significance at p≤ 0.05

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Summary of Logistic Regression Analysis

- Psychological distress & psychosocial stressors decreased as income increased
- Income associated with VPA, not MPA
- Severe psychological distress associated with VPA & MPA
  - Overall, weak relationships
- Some psychosocial, demographic, & health-related variables contributed
  - Explained only small portions of the variance between variables

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Income, Psychological Distress, & Physical Activity

- Low income related to participation in MPA & VPA
  - Income may play a role
    - FIPR Groups 1 & 2 reported the least VPA
      - Obligations of work and responsibilities of family care (Wilcox, et al., 2000)
  - Financial stress may play a role
    - Inability to afford facility membership fees (More & Stevens 2000)
      - Greater difficulty paying household bills = decrease opportunity for physical activity
  - Race may play a role
    - Blacks/African Americans least likely to meet MPA guidelines.
      - Systemic racism in health care & lower opportunities for physical activity (McNeill, et al., 2006).
  - Education may play a role
    - Higher attainment may overcome some barriers and may be indicative of ability to comprehend & value exercise (Crespo, et al., 2000).
  - Neighborhood cohesion may play a role
    - Cohesion associated with VPA, not MPA
      - Physical activity is difficult if one fears crime and violence or a general lack of support in the neighborhood.

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Strengths of the Study

- Featured a large cohort of 5,690 low-income individuals
- Connected a variety of demographic & psychosocial factors to PA
- Used multiple levels of low-income status
- Investigated multiple factors associated with complex challenges of poverty
- Connected family income to poverty ratios with PA
- Separated MPA & VPA to examine contribution of the multidimensional characteristics of poverty to PA

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Limitations of the Study

- Cross-sectional design
- Measures limited by NHIS questions
- Measurement accuracy of PA variables
- Did not consider work/transportation-related PA
- Vague details provided for psychosocial variables
- Other variables related to psychological distress not included
  - Anxiety & other mental health problems

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Future Directions

- Continue to establish understanding of multi-dimensional characteristics of poverty
  - Future studies may benefit from further exploration of psychosocial stressors which may contribute to the severity of psychological distress among low-income groups.
- Important to continue to address the role of social structural factors in respect to the relationship among income, psychological distress, and PA
- Need to address the extent to which psychological distress impacts participation in PA

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Conclusions

- Life at the poverty line is multi-dimensional
  - Low-income populations must mitigate chronic stress related to:
    - Uncertainty of ability to pay bills
    - Afford additional education/skills training
    - Symptoms of chronic disease & psychological distress
  - Low-income individuals express concern regarding financial stress and neighborhood social cohesion
    - Psychosocial stressors are inversely related to VPA or MPA or both
  - Low-income individuals are faced with difficult decisions
    - Limited in choices to improve health
      - May be evident in observed low levels of physical activity

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Conclusions

- Life at the poverty line is multi-dimensional
  - Low-income populations must mitigate chronic stress related to:
    - Uncertainty of ability to pay bills
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    - Symptoms of chronic disease & psychological distress
  - Low-income individuals express concern regarding financial stress and neighborhood social cohesion
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    - Limited in choices to improve health
      - May be evident in observed low levels of physical activity

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Field Experience
Introduction

- Interested in addressing sexual assault on campus
- Contacted Julie Gibbs, MPH – Director of Lafene Health Promotion
- Preceptor:
  - Jenny Yuen, MPH, CHES – Health Educator - Lafene Health Center
- Goal:
  - To develop and pilot a delivery of a bystander intervention training workshop to students at KSU
- Anticipated product:
  - *Intervene: Bystander Intervention Training For Students*

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Field Experience
Methods

- *Intervene* was adapted from materials developed by students and faculty at Cornell University
- *Intervene* consisted of three videos:
  - Alcohol emergencies
  - Healthy relationships
  - Sexual assault
- Each video showed examples of strategies to safely intervene in each of the three situations

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Field Experience
Foundational Competencies

- Delivery of *Intervene*
  - Delivered in conjunction with Sexual Assault Awareness Month – 27 April 2017
  - Small pilot group of 10 students & faculty
  - Audience feedback was collected after the presentation & given to Lafene Health Promotion Staff
- 5 MPH Foundational Competencies
  - 1) Interpret results of data analysis for public health research, policy or practice*
  - 2) Apply awareness of cultural values and practices to the design or implementation of public health policies or programs

- *indicates which competencies will be discussed in the presentation

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Field Experience
Foundational Competencies

- 5 MPH Foundational Competencies continued:
  - 3) Advocate for political, social or economic policies & programs that will improve health in diverse populations
  - 4) Apply principles of leadership, governance & management, which include creating a vision, empowering others, fostering collaboration & guiding decision making*
  - 5) Communicate audience-appropriate public health content, both in writing and through oral presentation*

*indicates which competencies will be discussed in the presentation

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References

- Ashe, M. C., Miller, W. C., Eng, J. J., & Noreau, L. (2009). Older adults, chronic disease, and leisure-time physical activity. *Gerontology, 55*(1), 64-72.
- Crespo, C. J., Smit, E., Andersen, R. E., Carter-Pokras, O., & Ainsworth, B. E. (2000). Race/Ethnicity, social class and their relation to physical inactivity during leisure time: Results from the third National Health and Nutrition Examination Survey, 1988-1994. *American Journal of Preventive Medicine*, 18(1), 46-53.
- Dekker, S. W., & Schaufeli, W. B. (1995). The effects of job insecurity on psychological health and withdrawl: A longitudinal Study. *Australian Psychologist*, 30(1), 57-63.
- De Mello, M. T., Lemos, V. d., Antunes, H. K., Bittencourt, L., Santos-Silva, R., & Tufik, S. (2013). Relationship between physical activity and depression and anxiety symptoms: A population study. *Journal of Affective Disorders*, 149, 241-246.
- Elliot, D. S., Wilson, W. J., Huizinga, D., Sampson, R. J., Elliot, A., & Rankin, B. (1996). The effects of neighborhood disadvantage on adolescent development. *Journal of Research in Crime and Delinquency, 33*(4), 389-426.
- Gies, K. J., & Ross, C. E. (1998). A new look at urban alienation: The effect of neighborhood disorder on perceived powerlessness. *Social Psychology Quarterly*, 61(3), 232-246.
- Hernandez, D. (2016). Affording housing at the expense of health: Exploring the housing and neighborhood strategies of poor families. *Journal of Family Issues, 37*(7), 921-946.
- Jarrett, R. L., & Jefferson, S. M. (2004). Women's danger management strategies in an inner-city housing project. *Family Relations*, 53(2), 138-147.
- Liberatos, P., Link, B. G., & Kelsey, J. L. (1988). The measurement of social class in epidemiology. *Epidemiology Review, 10*, 87-121.
- Madge, M., & Marmot, M. (1987). Psychosocial factors and health. *Quarterly Journal of Social Affairs, 3*(2), 81-134.
- McNeill, L. H., Kreuter, M. W., & Subramanian, S. V. (2006). Social environment and physical activity: A review of concepts and evidence. *Social Science & Medicine, 63*(4), 1011-1022.
- Molnar, B. E., Gortmaker, S. L., Bull, F. C., & Buka, S. L. (2004). Unsafe to play? Neighborhood disorder and lack of safety predict reduced physical activity among urban children and adolescents. *American Journal of Health Promotion, 18*(5), 378-386.
- More, T., & Stevens, T. (2000). Do user fees exclude low-income people from resource-based recreation. *Journal of Leisure Research, 32*(3), 341-357.

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References

- Parks, S. E., Housemann, R. A., & Brownson, R. C. (2003). Differential correlates of physical activity in urban and rural adults of various socioeconomic backgrounds in the United States. *Journal of Epidemiology and Community Health, 57*, 29-35.
- Ross, C. E., & Mirowsky, J. (2001). Neighborhood disadvantage, disorder, and health. *Journal of Health and Social Behavior*, 42, 258-276.
- Sampson, R. J., & Groves, W. B. (1989). Community structure and crime: Testing social-disorganization theory. *American Journal of Sociology, 4*, 774-802.
- Santiago, C. D., Wadsworth, M. E., & Stump, J. (2011). Socioeconomic status, neighborhood disadvantage, and poverty-related stress: Prospective effects on psychological syndromes among low-income families. *Journal of Economic Psychology, 32*, 218-230.
- Stuber, J., & Schlesinger. (2006). Sources of stigma for means-tested government programs. *Social Science & Medicine, 63*(4), 933-945.
- Taylor, W. C., Baranowski, T., & Young, D. R. (1998). Physical activity interventions in low-income, ethnic minority , and populations with disability. American Journal of Preventive Medicine, 15(4), 334-343.
- Whelan, C. T. (1992). The role of income, life-style deprivation and financial strain in mediating the impact of unemployment on psychological distress: Evidence from the Republic of Ireland. *Journal of Occupational and Organizational Psychology, 65*, 331-344.
- Wilcox, S., Castro, C., King, A. C., Housemann, R., & Brownson, R. C. (2000). Determinants of leisure time physical activity in rural compared with urban older and ethnically diverse women in the United States. *Journal of Epidemiology and Community Health, 54*, 667-672.
- Williams, D. R., & Sternthal, M. (2010). Understanding racial-ethnic disparities in health: Sociological Contributions. *Journal of Health and Social Behavior, 51*(5), 515-527.
- Williams, D. R., Gonzalez, H. M., Neighbors, H., Nesse, R., Abelson, J. M., Sweetman, J., & Jackson, J. S. (2007). Prevalence and distribution of major depressive disorder in African Americans, Caribbean Blacks, and Non-Hispanic whites: Results from the National Survey of American Life. *Archives of General Psychiatry, 64*, 305-315.
- Wilson, W. J. (1996). When work disappears. *Political Science Quarterly, 111*(4), 567-595.
- Yen, I. H., & Kaplan, G. A. (1998). Poverty area of residenc and changes in physical activity: Evidence from the Alameda County study. *American Journal of Public Health, 88*, 1709-1712.

Appendix 3: Intervene Presentation

Intervene

Bystander Intervention Workshop

Adapted from Cornell University for use at Kansas State University

Alcohol Behavior and Sexual Activity at KSU

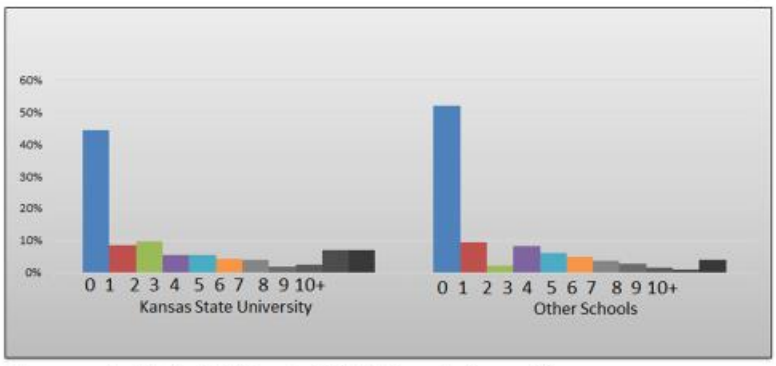
How often do you use alcohol?

Student Selections	Kansas State University (Sample: 4,947)	Other Schools (Sample: 270,142)
Never	33.20%	33.40%
Seldom	24.70%	24.10%
Sometimes	30.20%	30.30%
Often	10.00%	9.40%
Daily	0.60%	1.10%
No Comment	1.20%	1.70%

Note: These are new students from fall 2015 and spring 2016 that are under the age of 22.

WellCAT Ambassadors

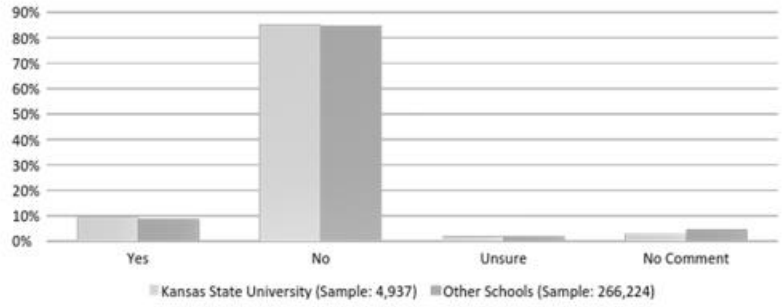
On a given weekend evening, about how much alcohol do you typically drink?



Note: These are new students from fall 2015 and spring 2016 that are under the age of 22

WellCAT Ambassadors

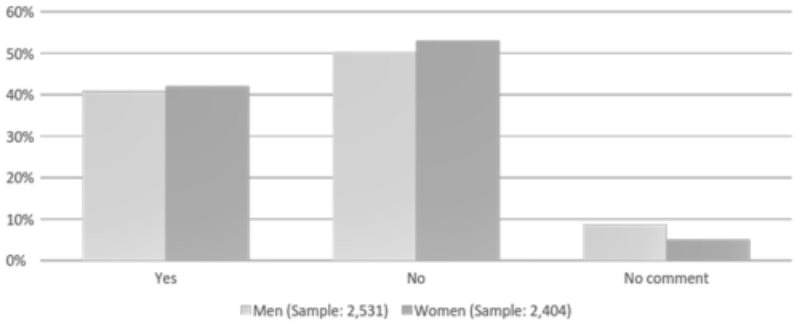
Experienced a blackout from drinking in past 30 days?



Note: These are new students from fall 2015 and spring 2016 that are under the age of 22

WellCAT Ambassadors

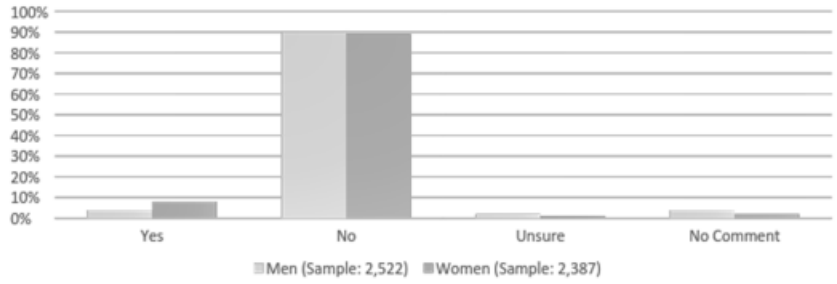
Currently sexually active



Note: These are new students from fall 2015 and spring 2016 that are under the age of 22

WellCAT Ambassadors

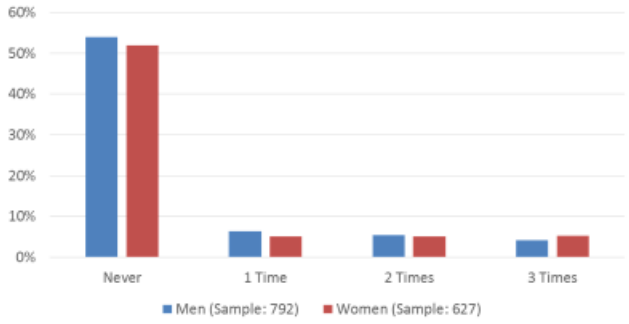
Had unwanted sex while drunk or using drugs



Note: These are new students from fall 2015 and spring 2016 that are under the age of 22

WellCAT Ambassadors

Used a condom while having sex (Past 3 months)



WellCAT Ambassadors

Sex, Alcohol, and College: A dangerous combination?

- About 50% of sexual assaults among college students are associated with alcohol use. (Abbey et al., 1998)[1,4]
- In a college sample, about 55% of victims of sexual assault were somewhat drunk at least at the time of the incidence. (Harrington and Leitenberg, 1994)[2]
- In 81% of the alcohol-related sexual assaults, both the victim and the perpetrator had consumed alcohol. (Abbey et al, 1998)[1,3]
- About 85 to 90 percent of sexual assaults reported by college women are perpetrated by someone known to the victim; about half occur on a date. (Fisher et al, 2000)[5]

WellCAT Ambassadors

Scenario 1: Alcohol Emergency

https://youtu.be/SlAHts22InA?t=15m55s

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Let's Chat: Alcohol/Drug Emergencies

- At what point did his alcohol consumption go from "having fun" to being a problem?
- How could the friends have helped the intoxicated man sooner? When do you think they should have first become worried and called for help?
- Based on his actions in the video, what else could have happened to the main character?
- What emotions might those who intervened feel when taking action?

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Signs of Alcohol Emergency

- **A- Alert**
  - Unable to rouse person or keep awake
  - Vomiting while passed out or incoherent
- **B- Breathing**
  - Breathing slow, irregular pulse
- **C- Color**
  - Skin color "off" or lips bluish, cold or "clammy" to the touch
- **D- Doubt**
  - Not sure if person is ok; Don't let person sleep it off!
    - Call 911 if in doubt

Cornell University 2017

WellCAT Ambassadors

What to Do On Campus: Alcohol or Other Drug Emergencies

On-campus emergencies:

- Remember ABCD signs and call for help

- LifeLine911 Policy
  - KSUPD will not prosecute minors under the influence who call 911 to help themselves or an under-aged friend in an alcohol emergency.
  - To obtain immunity from University disciplinary sanctions, students actively involved in the situation must:
    - Contact PD/EMS
    - Provide your contact information
    - Remain on the scene
    - Cooperate

https://www.k-state.edu/policies/ppm/8500/8550.html

WellCAT Ambassadors

What to do Off Campus: Alcohol/Drug Emergencies

Off-campus emergencies

- Greek Houses are considered off-campus
- RCPD
  - No immunity policy exists
  - Officer's discretion whether to punish other minors in possession/under the influence who call for help for a peer in an alcohol emergency
  - RCPD's main focus is to provide help to the person in need
  - Be courteous and cooperative when EMS/PD arrive

RILEY COUNTY POLICE DEPARTMENT

WellCAT Ambassadors

Healthy Relationships in College

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Role of Relationship

- Friend or Best Friend
- Roommate or teammate
- Acquaintance
- Stranger
- Family

Positive
- Support
- Intimacy
- Connection

Negative
- Causes stress
- Make you feel inferior
- Harassment/intimate partner violence

WellCAT Ambassadors

Scenario 2:
Emotionally Abusive Relationship

https://youtu.be/SlAHts22InA?t=11m14s

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Let's Chat:
Emotionally Abusive Relationships

- What are some signs that Alli is in an emotionally abusive relationship?
- How is Carlos and Nate's relationship different from Alli and Eric's?
- What are some things Carlos did as a friend that represent a positive support system?
- What are some other ways to approach your friends if you are concerned they are in an unhealthy, emotionally abusive relationship?

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Sexual Assault

Scenario 3:
Sexual Assault

https://youtu.be/SlAHts22InA?t=5s

Let's Chat: Sexual Assault

What are your observations of the couple in the scenario?

- How was the young man acting? How about the young woman?

Was consent given? At what point?

- Did you hear the young woman say "no?" How about a "yes"?
- What did her body language tell you?

What did others in the room do?

- How did they intervene?
- Would you feel comfortable stepping up to help a friend? A stranger?

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Let's Chat: Rape Culture

What is Rape Culture and how can we avoid it or call attention to it?

- Pertains to specific situations in which sexual assault, rape, and/or general violence are ignored, trivialized, normalized, or made into jokes. (Ridgeway, 2014)

What we're doing to contribute to the problem:

- Media's portrayal of sexual assaults as "hook-ups"
- Victim blaming due to the way a person's dressed, level of intoxication, etc.
- Not taking victims seriously when assaults are reported
- Make jokes about rape, or defending jokes about rape
- Cat-calling, unwanted sexual remarks, unwanted touching
- Reducing sentences of rapists because it might "jeopardize their future"

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Let's Chat: Rape Culture

Let's do this right!

- Rape is not a joke, and should not be treated as such.
- Believe the victim.

Don't be afraid to take a stand:

- If you hear someone say something offensive, say something about it. That person might not recognize their mistake, and you can help them to realize it.
- Don't get aggressive, but politely correct them.

We have the power to make a difference and it all starts with how we portray ourselves.

- You can be the role model!
- Be an active bystander!

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Camouflage of High Risk Behaviors

- Sometimes we choose not to act because we tolerate behaviors that are inappropriate.
- It seems that no one else finds these behaviors troubling; so they become a "norm."
- We may think "this doesn't concern me, therefore it's not a problem."

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Taking Action

1. Notice the event.
2. Consider whether the situation demands your attention.
3. Decide if you have responsibility to act.
4. Choose what form of assistance to use.
5. Understand how to implement the choice safely.

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Taking Action

- **Non-urgent situations**
  - Listen
  - Express concern
  - Describe what you observe
  - Offer support
  - Connect to resources
- **Urgent/emergency situations**
  - Don't assume others will act
  - Act with others if possible
  - Be direct or distract
  - Call for help

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Remember, being an active bystander means:

- Sometimes you need to act quickly
- **Sometimes you can choose when to act.**
- Sometimes you are the only one who can act.
- **Sometimes you can act with others.**
- Doing something may involve taking a risk.
- **Doing nothing may be a greater risk.**

We are all part of a community. You can make a difference by caring and intervening.

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Reporting Concerns & Getting Help

Reporting

To report any instance of sexual assault, dating violence, stalking or harassment that has occurred on university property or at a university sponsored event, contact the Office of Institutional Equity at 785-532-6220.

To make a report to the criminal justice system, contact the police department.

Bias Incident Report – Office of Institutional Equity

➢ Report Online

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Reporting Concerns & Getting Help

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Reporting Concerns & Getting Help

https://www.k-state.edu/studentlife/concern-guide/

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Thank you!

Intervene *(video and workshop)* were developed by the Skorton Center for Health Initiatives at Cornell University @ 2016. The information contained in the materials is based on the developers' best efforts to interpret a body of research and literature, and to translate this into practical considerations. The materials are informational and educational in nature, and are intended to be used as developed and prepared by the Skorton Center for Health Initiatives. The video content is not to be modified, altered or revised in any way. The workshop content is not to be modified, altered, or revised in any way, except for tailoring to your own institutional practices, policies and resources. The Skorton Center makes no representation or warranty express or implied regarding any particular outcome from the use of the materials. Use in part or whole is permitted with attribution to developers.

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Cost of Inaction

- What might have happened if none of the characters had intervened?
- What could have been the impact on the person in need?
- What could have been the impact on the bystanders? How might they have felt?

Questions or Comments?

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