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Which Activities Count? Gender and Socioeconomic Differences in the Conceptualization of Physical Activity: the Role of Leisure, Housework and Dependent Care, and Paid Work

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WHICH ACTIVITIES COUNT? GENDER AND SOCIOECONOMIC DIFFERENCES IN THE CONCEPTUALIZATION OF PHYSICAL ACTIVITY: THE ROLE OF LEISURE, HOUSEWORK AND DEPENDENT CARE, AND PAID WORK

by

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ABSTRACT

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Survey research on the overall health and physical activity of the United States has relied on self-reports from questions that ask about leisure-only activity. Leisure activity patterns are known to be plagued by social forces that inhibit access and opportunity for women, compared to men, and for lower-socioeconomic individuals, compared to higher-socioeconomic individuals, making the further unpacking of leisure and other time use patterns imperative. To address this, the objective of this dissertation is to assess the different pathways individuals take to engage in health-benefiting physical activity and investigate the reliability and validity of physical activity survey questions as they relate to gender and socioeconomic disparities in physical activity.

The intention of this project is to inform best practices for survey question wording and, more generally, public health policy on physical activity. The research accomplishes the overall objective by pursuing the following specific aims: (1) To assess whether gender and SES physical activity 'gaps' are artificially produced through restrictive measurement of physical activity, which will be completed by analyzing time use patterns of a nationally representative pooled sample from the American Time Use Survey (ATUS); (2) To offer new evidence and discovery on the potential impacts of priming language on physical activity questionnaires that highlight different opportunities for moderate physical activity. Building on the knowledge

gained from the statistical analysis described above, the next step will be to collect new survey data using an experimental design. The experiment consists of eight conditions that include priming language for physical activity questions that previous national survey have overlooked or have not taken into account.

The project contributes an in-depth understanding of the theoretical relationship among gender, SES, social patterns of physical activity and time use in general, and understandings of physical activity as they relate to individuals' survey questionnaire responses. This contribution is significant, because it can potentially transform future survey research as a means of studying the physical activity habits among diverse social groups.

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"Who can say if I've been changed for the better? Because I knew you, I have been changed for good." – *For Good,* Wicked the musical

I. Introduction

Currently, three surveys track the overall health and physical activity of the country. The National Health Interview Survey (NHIS), National Health and Nutrition Examination Survey (NHANES), and Behavioral Risk Factor Surveillance System (BRFSS) serve as key sources of information furthering our understanding of the relationship between habitual physical activity and chronic disease morbidity and mortality (Carlson, Densmore, Fulton, Yore & Kohl 2009). All rely on self-reported data (Maddison, Mhurcha, Jiang, Vander Hoorn, Rodgers, Lawes, & Rush 2007). Despite the importance of physical activity measures for informing and updating the blueprint of U.S. public health, little is known about the accuracy of such self-reports (Presser & Traugott 1992).

Moreover, all three surveys focus on leisure time activity when asking about time engaged in physical activity (Maddison et al. 2007). A sociological perspective suggests this is problematic because social characteristics such as gender (Freysinger 1995; Mattingly & Sayer 2006; Wajcman 2014) and socioeconomic status (Smith, Ng, & Popkin 2014; Mullahy & Robert 2010) shape understandings of, and access to, leisure activity in ways that might bias measures that rely on these concepts in question wording. Furthermore, an understanding of the gendered (Bittman et al. 2003; England & Srivastava 2013; Gupta 2007; Raley et al. 2012; Sullivan 2013) and socioeconomically stratified (Beenacker, et al. 2012; Krieger, Williams, & Moss 1997; Wright 1995) patterns surrounding other domains of physical activity, such as housework/dependent care and paid work, suggests different opportunities for health-benefiting physical activity. The proposed dissertation is informed by previous theory and empirical evidence that demonstrates how different definitions of "physical activity" shape the magnitude

and direction of gender and socioeconomic differences in time spent in health-benefiting physical activity.

Through secondary data analysis of Americans' time use patterns and the primary data collection of an experimentally designed study investigating different question wording that primes for different activities, I generate empirical evidence to test the reliability and validity of current physical activity questions. As these questions inform critical public health research that depends on a more comprehensive understanding of who is, or is not, engaging in adequate amounts of physical activity, this overall research objective is important. Three broad and related research questions drive this analysis. Are current self-report survey questions fully capturing variation in physical activity that may be rooted in important gender and socioeconomic differences? If not, how problematic are these estimates? Are there ways to measure physical activity that better account for this expected variation?

The *objective* of this dissertation is to assess the different pathways individuals take to engage in health-benefiting physical activity and investigate the ways in which responses to physical activity survey questions may be patterned by gender and socioeconomic disparities in physical activity. The *rationale* for this project is that it builds knowledge about the role social forces such as gender and socioeconomic status may play in creating and supporting behaviors linked to health disparities, allowing future researchers to design interventions to correct these disparities.

This project ultimately informs best practices for survey question wording and, more generally, public health policy on physical activity. The research accomplishes this through the following *specific aims:* Aim #1: Assesses whether gender and socioeconomic physical activity 'gaps' are artificially produced through inaccurate measurement of physical activity. This aim is

achieved by analyzing time use patterns of a nationally representative pooled sample from the American Time Use Survey (ATUS) and is the focus of chapter 4. Aim #2: Provide new evidence and discovery on the potential impacts of priming language on physical activity questionnaires that highlight different opportunities for moderate physical activity. Building on the knowledge gained from the statistical analysis in the ATUS, I collect new survey data using a factorial experimental design. The experiment consists of eight conditions that include priming language for physical activity questions that previous national survey have overlooked or not taken into account. This builds knowledge about potential new measures or best practices for public health questionnaires about physical activity.

Measuring Project Success

As Aim #1 states, this dissertation investigates the differences in effects in survey questions on physical activity habits that are produced through institutionalized social mechanisms linked to gender and socioeconomic status. Successfully identifying this variability through secondary data analysis is achieved through investigation of significant difference in gender and socioeconomic status disparities across models that operationalize physical activity with different physical activity domains (e.g. *Leisure-Only Activity* compared to *Leisure & Housework/Dependent Care*). Second, the experimental study systematically demonstrates gender and socioeconomic variation in reporting habits across seven treatment conditions priming language highlighting different domains of physical activity, statistically confirmed with significant interactions of treatment condition and factors with gender and socioeconomic status (e.g. using OLS and Negative Binomial Regressions).

Successful achievement of Aim #2, which investigates the potential impact of priming language on physical activity measurement, comes from the results of the experimental study and

tangentially from the analysis of ATUS data. For the experiment, detecting distinct differences (or not) in the reporting habits of respondents across each factor and condition demonstrates successful completion of Aim #2. Statistically, this is achieved through the inclusion of interaction terms for each factor (e.g. leisure, housework/dependent care, paid work) to show significant variation by activity domain. Additional support for Aim #2 comes from comparisons in gender and socioeconomic coefficients across different definitions of physical activity as dependent variables in the ATUS (Leisure-Only, Leisure + Housework/Dependent Care, Leisure + Paid Work, and Full Activity). Evidence supporting Aim #2 includes statistically significant gender and socioeconomic differences in the number of minutes reported across the four combinations of physical activity domains as measured by post-hoc Wald's tests. These post-hoc tests will illustrate the relationship between gender and physical activity and SES and physical activity are significantly different when the definition of physical activity changes.

Broader Impacts of Dissertation

Estimates of physical activity disparities inform best practices among health care professions, and more broadly public health policy; therefore, unreliable and inaccurate reports undermine a larger public health agenda. Ultimately, this dissertation contributes to the achievement of public health outcomes like reducing obesity and increasing physical activity by informing policies and interventions. This project provides new opportunities to generate original data and juxtapose these data with nationally representative time use data to understand the potential inaccuracies of currently understood gender and socioeconomic patterns of moderate physical activity. Such information is critical for policymakers and researchers to best target interventions for different subsets of the population.

In a society where time is an often-regimented and cherished commodity, it is important to understand the pathways potentially under-active individuals take to access opportunities for healthy physical activity. In order to intervene in public health, we must understand how to encourage and aide at-risk individuals. Here, at-risk individuals are those with constrained access and less control of their time, therefore prohibiting them from engaging in conventional leisure-time exercise activities.

Results from this project will advance the scientific knowledge in three major disciplines, allowing sociologists, survey methodologists, and public health scholars to collectively and collaboratively benefit. Contributions to science will come in the form of expansion of scientific theory on gendered and socioeconomically stratified time use patterns as well as increased precision with the measurement and understanding of physical activity among Americans. Information from this project highlights different understandings of what physical activity looks like that may impact our general understandings of the public's health.

This research expands upon current sociological theory on the intersection of gender, socioeconomic status, and time use by providing empirical evidence demonstrating the ways in which gender specialization of time and socioeconomically patterned time use impacts larger societal structures, namely public health. Specifically, this project shows that understanding public health disparities requires the combination of three key sociological perspectives: sociological theory on time use (gender specialization of time), occupational segregation (gender and SES stratification of occupations), and theory on resource and time allocation for leisure activities in order to comprehensively assess social health behaviors like physical activity. The current project takes an empirical approach that accounts for gender specialization in paid and unpaid work, in addition to socioeconomic differences in opportunity and access to different

domains of physical activity embedded in leisure, paid, and unpaid work. This research will contribute empirical evidence to the knowledge of gender and SES stratification of time use, particularly where these disparities manifest for health-benefiting activity, to prove physical activity is a social space where gender and SES stratification is expressed.

Survey methodologists will gain further understanding of the impact priming examples have on the consistency and validity of survey questions. Results from this study could confirm suspicions of previous researchers (Carlson et al. 2009; Haskell 2012) that question wording plays a key role in the fluctuating estimates of who is most likely to meet physical activity requirements. Furthermore, evidence from the seven treatment conditions in the experimental portion of this project offers empirical evidence for the potential implementation of alternate wording in order to obtain reliable and accurate estimates of physical activity. This data will highlight the consequences of relying on survey questions designed to tap levels of physical activity without considering whether and how social systems, like those that produce gendered and SES stratifying patterns of time use, influence physical activity.

The thrust and scope of this study has the potential to have a large impact on scientists across a range of natural and social science disciplines. Anyone studying sources of health inequality, the obesity epidemic, or conducting research about links between health behaviors like physical activity and health outcomes can benefit from this work. In addition, scientists with interests in how social forces might inform survey design and methodology can benefit, since this project explicitly tests whether and how gendered and SES time use patterns, which are produced and reinforced though many social mechanisms, lead to different opportunities to engage in physical activity.

Finally, this project intends to speak directly to the expansion and improvement of national policies on physical activity promotion. The National Coalition for Promoting Physical Activity has done an extensive job of providing manageable, scalable, and effective policy agendas to promote physical activity in the United States. The NCPPA Policy Agenda for 2015-17 includes four main "spaces" as targets for PA promotion: (1) workplaces; (2) recreational spaces; (3) communities; and (4) health care delivery (NCPPA 2015). National agendas like this indicate that there is an increasing need to focus policy efforts in helping men and women, and those in different socioeconomic statuses, to recognize areas of their life where they can engage in health-benefiting physical activity that is low on cost and resource needs. A focus on activities individuals are already engaging in through housework, child and elder care, and paid and unpaid labor activities have the potential to reshape debates about how we should think about, and address, health disparities such as disparities in physical activity. When time is already a precious commodity, it is critical we educate citizens about practical avenues to accessing health benefiting activities.

Dissertation Structure

This dissertation contains seven chapters. Chapter Two unpacks the theoretical and empirical literature motivating the project and hypotheses. After providing historical context on the conceptualization of physical activity and public health concerns surrounding the general rise of physical inactivity in the United States, the chapter describes gender and socioeconomic patterns in three focal domains of activity: (1) Leisure; (2) Housework/Dependent Care; and (3) Paid Work. Chapter three details the methods used in both parts of the larger project. First, methodology for the secondary data analysis of the ATUS is explained. Second, methods for the experimentally designed primary data collection, including details regarding the data collection

process as well as the analytic strategy, are explained. The fourth chapter documents the results from the ATUS analysis that highlight gendered patterns of time use in three domains: leisure, unpaid housework and care activities, and paid work. Similarly, chapter five provides ATUS results that document the socioeconomic patterns in physical activity. Chapter six presents the results from the experimental primary data collection, specifically investigating how and to what extent question wording that contrasts leisure-time activities, unpaid housework and care activities, and paid work vary reports of weekly physical activity along gender and socioeconomic lines. Finally, chapter seven makes clear how this project impacts current and future research, summarizing how the results across chapters together tell a story of about the role that key social forces play in shaping disparities in physical activity, and the implications this has for broader questions surrounding public health.

II. Theoretical and Empirical Foundations

Historical Context for Conceptualization of Physical Activity

Conceptualization of what counts as physical activity and how it should be measured from a public health perspective has been through many transformations. Initial research in the 1950s on physical activity and health outcomes measured activity according to the rigor of activity required on the job, specifically for male employees (Haskell 2012; Morris & Crawford 1958). For decades, researchers used an occupational classification system to indicate the intensity of men's physical exertion. These data were used to draw associations among men's level of activity and severe coronary events (Morris & Crawford 1958) and mortality (Fox & Haskell 1967). In fact, until the mid-1970's, studies on physical activity did not include data on women or the unemployed (Haskell 2012). As a result, activities traditionally done by women or those not in the workforce, who tend to be in occupations and earning wages that place them in lower socioeconomic standing, were not even accounted for in public health measures of physical activity for the majority of the 20th century.

Eventually, the 1970's saw a shift away from occupation-based activity measurement towards self-reported physical activity. At this point, women and lower socioeconomically-positioned individuals were finally included in empirical inquiry. This has been a critical transition in conceptualization of physical activity as national data demonstrate that higher proportions of men than women and those who come from higher socioeconomic status rather than lower SES status meet physical activity guidelines (Seo & Torabi 2008). In fact, in 2014 the Center for Disease Control and Prevention (CDC) reported that, on average, men (56%) are more likely to meet physical activity guidelines than women (46%), that is more men achieve 150 minutes of moderate physical activity in a week compared to women (CDC 2014). Additionally, the CDC also contends those Americans who are more educated and have a family income above

poverty are more likely to meet physical activity guidelines (CDC 2014). Thus, our best public health data indicate that important gaps in physical activity exist and these are linked to gender and socioeconomic positioning.

What has also been consistent, in addition to these disparities, is the conceptualization of physical activity used in public health research. For decades, the US has used three key surveys to track overall health of the country, each of which makes use of self-reported physical activity that specifically asks about leisure time activity. As a result, the U.S. understanding of physical activity disparities, like those central to this research: gender and socioeconomic disparities, rely on health surveillance systems that only account for leisure time activity (Carlson, Densmore, Fulton, Yore, & Kohl 2009).

In addition to conceptualizations of physical activity consistently characterized by leisure-time activity, methodological issues also arise when trying to measure physical activity in other important domains, such as paid work. One difficulty recognized by previous scholars is accurately estimating time spent in moderate or vigorous physical exertion at work using time diary methods (Spinney, Millward, & Scott 2011; Tudor-Locke et al. 2009). While respondents of time use surveys are reporting on their non-occupational activities, time spent at work is largely treated as a "black box," making it difficult to assess when or if individuals are engaging in health benefiting physical activity in paid work (Harvey & Spinney 2000; Spinney et al. 2011). Thus, research that purports to examine the role that occupation or job plays in shaping work-based opportunities to engage in physical activity must attempt to specify how varying opportunities for physical activity unfold for different types of workers. Within this line of research, several scholars have looked at the impacts of occupation on physical activity habits by framing occupation as time away from leisure-time physical activity that prevents health-

benefiting physical activity (Bauman et al. 2012; Burton & Turrell 2000). I hope to add to this literature by recognizing certain occupations as opportunities to engage in health benefiting physical activity and further investigating the role of paid work in shaping physical activity.

Apart from gender and class stratified occupational systems and links to physical activity, other opportunities to engage in physical activity beyond leisure-based exercise have been overlooked. Studies making use of accelerometers consistently demonstrate that health benefiting physical activity is prevalent in performance of housework and child care as well as paid work (Tudor-Locke et al. 2009). This means current research drawing on self-report measures focused only on leisure-time pursuits, which consistently demonstrates that men and more affluent individuals are more physically active (CDC 2014), may be inaccurate if individuals are indeed engaging in health benefiting activities in other domains. A review of the literature on socioeconomic and gender disparities in housework, childcare, occupation segregation, and leisure time activity will reinforce this concern with the reliability and validity of self-report physical activity estimates that only focus on leisure time activity.

Current Public Health Climate: Stagnant Physical Inactivity a Rising Concern

Public health research recognizes predictors of physical activity that impact ability and opportunity to engage in health-benefiting activity. These include contextual factors such as social environment (Carroll-Scott et al. 2013) but most impactful is individual health status (Seo & Torabi 2007). A meta-analysis of current studies on elements predicting physical activity cite perceived health as one of the key "psychological, cognitive, and emotional factors" found in the literature to be associated with physical activity habits (Trost et al. 2002). Perceived health status is known to have an inverse relationship with physical activity. Moreover, two biological

attributes strongly related to health are overweight and obesity, which also demonstrate inverse relationship to physical activity habits (Bauman et al. 2012; Trost et al. 2002).

One of the central reasons physical activity is consistently tracked is the importance of this indicator for public health. In the US, one major strategy for preventing obesity, cardiovascular diseases, diabetes, and even some cancers are recommendations to increase physical activity (Jakicic & Otto 2005; American Cancer Society 2016). Despite these recommendations, overall daily activity levels have declined, and as of 2010, only 48% of US adults achieve the recommendations of ≥ 30 minutes of moderate-to-vigorous physical activity (MVPA) on at least five days per week (CDC 2014; Flegal, Carroll, Kit & Ogden 2012). Furthermore, a significant body of epidemiologic evidence asserts that sedentary behavior has adverse health consequences (Brownson, Boehmer, & Luke 2005; Smith et al. 2014). An important and understudied area of research is unpacking patterns of time use and generating greater understanding about how time use patterns influence meeting physical activity goals.

A key source of physical inactivity comes from a shift in activity patterns within contemporary occupations. Since the 1960s, trends in sedentary activity in occupational work has steadily increased, while trends in moderate activity has consistently declined (Church et al. 2011; Robinson & Godbey 2010). This means workers are less likely to engage in health benefiting activity in today's jobs than they were in previous historical periods. Yet, there still remain occupations that provide people with more opportunity for health-benefiting physical activity, including service, manufacturing, and forestry professions (e.g., construction worker, plumber, electrician, carpenter, cleaner, hospital nurse, gardener, postal delivery workers; Tudor-Locke et al. 2009). Because occupations are stratified by both gender and SES (BLS 2014), it is

very likely that opportunities to engage in physical activity at work are going to be tied to these characteristics in ways that influence estimates of physical activity gaps.

A second key source of physical inactivity manifests in American leisure time: increases in sedentary behaviors due to large amounts of time dedicated to watching screens. Decades of research detail the profound impact television, tablets, cell phones, and other technologies have had on American leisure (Comstock 1982; Tucker & Bagwell 1991; Robinson & Godbey 2010) and associations with disease, diabetes, and some cancers (Cassidy, Chau, Catt, Bauman, & Trenell 2016; Lenz, Swartz, & Strath 2014). Following sleep and work, screen time is the most time-consuming activity for Americans, making it the number one activity in the leisure-time domain (Tucker & Friedman 1991; Robinson & Godbey 2010). Despite the fact that an increase in mobile devices has allowed for more movement while using technology, Americans are still more likely to be sedentary while in front of a screen than to be moderately active (Robinson & Godbey 2010). A 2014 report from Nielsen ratings systems suggests the average American watches 5 hours of television a day, spends an hour on the internet on a computer, and another hour and seven minutes on a smart phone (Neilsen 2014). More time in sedentary screen time equates to less time available to engage in health-benefiting physical activity.

The Dominating Conceptualization of Physical Activity: Leisure Time Activity

Free time, or leisure time, is a finite resource that represents greater autonomy, particularly the freedom to protect sufficient time from obligatory demands (Robinson & Godbey 1997; Bittman & Wajcman 2000; Mattingly & Bianchi 2003; Beck & Arnold 2009; Peters & Raaijmakers, 1998; Mattingly & Sayer 2006). Leisure is defined as time that is not spent in paid work, unpaid work, or self-care (Mattingly & Sayer 2006; Robinson & Godbey 2010) and has been the main activity domain asked on major health surveillance systems reporting on the

national trends in public health and physical activity (Carson et al. 2009). Both theoretical and empirical foundations in American's allocation of time to leisure recognize gender and SES patterns and disparities. In fact, early theoretical understandings of time allocation have trichotomized an individual's time into a balance between three domains: market work (paid work), housework (unpaid work), and leisure time (Becker 1965; Gronau 1976). From the beginning, gender and SES were recognized as social forces influencing the appropriation of time to these three domains.

Gender and leisure time. Research documents a range of social mechanisms which impact men and women differently when it comes to time use. Early literature pointed to parent status and age of child as two social processes with varying influence on men's and women's leisure time. With supporting empirical evidence from the U.S. and Israel, Gronau (1976) developed the conjecture that presence of children, especially younger children, decreased a women's time in leisure more significantly than a man's. More recent research confirms this notion, suggesting that in contemporary society, still, access to leisure is not equally distributed among across gender for parents (Sayer 2005). Research indicates that women generally have less free time than men and that employment, marriage, and children curtail women's free time more than men's (Bianchi, Robinson, & Milkie 2007; Sayer, 2005). Additionally, research asserts women dedicate smaller portions of their time to pure, uninterrupted leisure-time exercise (Becker 1965; Robinson & Godbey 2010).

In addition to access and availability, there is evidence that the *perceptions* and *quality* of leisure time varies in key ways across gender. Women experience less "pure leisure" free time than men meaning that their leisure time is more often simultaneously performed while engaging in other non-leisure activities (i.e., going on a leisure walk while also caring for children). This

fragmentation of leisure becomes even more exacerbated for women with young children (Craig & Brown 2017). Contrastingly, men's leisure time is less likely to be interrupted or fragmented in this way (Beck and Arnold 2009; Mattingly and Bianchi 2003; Bittman and Wajcman 2000). Therefore, when women are asked to report on self-reported leisure physical activity, they are less likely to report on activities that are simultaneously performed with non-leisure activities, ultimately underestimating the amount of leisure-only health-benefiting physical activity for women. In sum, men experience greater access to both amount and quality of free time, which places them at an advantage for reporting leisure activity estimates on self-reported surveys (Bittman and Wajman 2000).

The way leisure is understood or perceived also varies by gender (Freysinger 1995; Iso-Ahola 1979; Mattingly and Sayer 2006). Earlier research documents that women perceive leisure as a distinct change from family work while men are more likely to classify family-related activities as leisure (Freysinger 1995). Additional research finds gender variations in the relationships between perceptions of time pressure and free time (Bittman & Wajman 2000; Mattingly & Sayer 2006). Specifically, having more leisure reduces perceptions of time pressure for men, but may increase feelings of time pressure for women. This is confirmed in more recent research that alludes to men finding leisure time with children as more enjoyable than women because they have less parenting pressure at the time (Craig & Brown 2017). Overall, these studies point to important gender differences in leisure time that may influence survey responses to questions about physical activity anchored around the concept of leisure.

SES and leisure. The balance between the three identified domains of physical activity (leisure, housework and caregiving, paid work), as theorists assert, is largely impacted by socioeconomic fluctuations, marital status, and parental status (Gronau 1976). According to the

economic theory of time allocation, socioeconomic positioning is positively related to time spent in leisure, supporting an argument that socioeconomic inequality in leisure time favors higher-SES individuals (Becker 1965). Socioeconomic status is also an important theoretical and empirical element shaping leisure time experiences. There is general consensus in the literature, rooted in the theory of time allocation, that people in higher socioeconomic positions are more likely to engage in moderately active leisure time activities compared to those in lower socioeconomic positions (Beenackers et al. 2012). This disparity becomes even more prominent when talking about vigorous physical activity, namely sports and rigorous exercise (Beenackers et al. 2012).

When assessing health disparities, family or personal income and educational attainment are common indicators used to assess the impact socioeconomic status has on health outcomes and behaviors (Krieger, Williams, & Moss 1997). Early theory recognizes one of these indicators, income, to produce physical activity disparities in leisure activity. Theory contends increased income results in alleviation of time from other domains, namely housework, in addition to increased resource potential, that results in more time available to dedicate to leisure for both men and women, equally (Gronau 1976; Becker 1965). Results from current health surveillance systems empirically confirm the association (NHIS 2014), demonstrating that as family incomes increase, the likelihood of meeting physical activity requirements significantly increases (CDC 2014).

Evidence also demonstrates significant disparities in leisure time activity among the other key indicator of one's socioeconomic status: educational attainment. Researchers postulate knowledge of how and where to access health-benefiting leisure due to more recent privatization of locations such as local park and recreational facilities, leads to an educational divide in

utilization, resulting in physical activity disparities (Robinson & Godbey 2010). Indeed, results demonstrate use of local recreation facilities and parks increases "greatly" (p. 317) with education (and income) (Robinson & Godbey 2010). Furthermore, safety issues as well as a general absence of facilities in low-SES environment have been raised and demonstrated in qualitative research as key reasons for a lack of use of public facilities among low-socioeconomic populations (Fluery & Lee 2006; Gordon-Larsen, Nelson, & Popkin 2006). Additional research confirms disparities is use of public facilities for leisure physical activity across high and low SES, with higher-socioeconomic individuals accessing facilities for leisure physical activity significantly more (Giles-Corti & Donovan 2002).

Recent research confirms that national trends demonstrate lower-SES individuals engage in less health-benefiting leisure time physical activities compared to their higher-SES counterparts (Crespo et al. 1999; Ford et al. 1991; He & Baker 2005). Additionally, some research on tastes point to different activity preferences during leisure time. Empirical evidence consistently illustrates individuals with lower income and educational attainment are less likely to exercise and, rather, spend more time in sedentary activities during their leisure time such as television watching (Ford et al. 1991; McNeill, Kreuter, & Subramanian 2006).

Overall, a major barrier to leisure time physical activity among low-socioeconomic individuals are access and resource availability (Becker 1965; Crespo et al. 1999; Gronau 1976; McNeill et al. 2006). Access is decreased because those in lower socioeconomic positions are often pulled into obligatory time in other domains like paid and unpaid work (i.e., required to work multiple jobs and/or care for families), leaving them with less time for leisure (Becker 1965). Moreover, leisure time physical activity, especially vigorous activity, requires resources (i.e., gym membership, athletic equipment, team fees) that create more of a challenge and barrier

for low-income individuals compared to their wealthier counterparts (Beenackers et al. 2012). In fact, individuals with low-SES were nearly one-half as likely to be members of a sporting, recreation, or outdoor club (Giles-Corti & Donovan 2002).

Furthermore, because of constrained time and access to resources, some individuals have fewer opportunities to engage in leisure-based exercise compared to others. In fact, research indicates that individuals with lower income and education are the least likely to exercise compared to more affluent counterparts (McInnes & Shinogle 2011; Mullahy & Robert 2010) and educational attainment is the key sociodemographic characteristic predicting moderate activity in leisure time (Arriaza Jones, Ainsworth, Croft, Macera, Lloyd, & Yusuf 1998).

Since lack of time consistently serves as one of the biggest barriers to exercise in this community, it's important to better understand patterns of time use to help inform effective and attainable strategies to improve physical activity among time-constrained populations. For example, time-constrained populations may spend more time in domestic physical activity like housework and caregiving, which can serve as opportunities to engage in health-benefiting activity. Sociologists and time use researchers have theoretically argued the ways in which access and resources to time have contributed to the gender and socioeconomic disparities in physical activity, illustrating potential reasons why these individuals may face more time constraints, experience different amounts and qualities of leisure time, and more generally endure more barriers to conventional health benefiting activities like leisure-time exercise.

In sum, empirical evidence and theoretical arguments regarding the mechanisms through which gender and socioeconomic positioning influences physical activity suggests low-SES individuals are less likely to achieve physical activity requirements through leisure activity contrasted with the higher likelihood higher-SES individuals will have access and resource

availability for leisure time activity. Similarly, women are more likely to experience smaller amounts and lower quality leisure time activity compared to men. When current health surveillance questions only account for leisure-time pathways to healthy activity, existing research may not be accurately documenting physical activity disparities rooted in social processes connected to gender and SES, a notion purported by several other researchers (Crespo et a. 2000; He & Baker 2005; Jones et al. 1998). Based on these theoretical understandings of the ways in which gender, SES, and leisure time are related to health-benefiting physical activity, as well as previous empirical work, we would expect:

> (H1a.) Men will engage in significantly more minutes of physical activity compared to women when moderate physical activity is operationalized as *Leisure Activities*.
>
> (H1b.) Individuals with higher SES will engage in significantly more minutes of physical activity compared to individuals with lower SES when moderate physical activity is operationalized as *Leisure Activities*.
>
> (H1c.) Men with higher SES will engage in significantly more minutes of physical activity compared to all other individuals when moderate physical activity is operationalized as *Leisure-Only Activities*.

Alternative Domains to Access Physical Activity: Housework and Dependent Care

Central to gender and socioeconomic inequalities in the division of labor are the unequal distribution of housework (Bittman et al. 2003; Greenstein 2000; Gupta 2007; Perry-Jenkins & Folk 1994; Schneider 2011), child care (England & Srivastava 2013; Raley et al. 2012; Sullivan 2013; Bose, Bereano, & Malloy 1984, Strasser & Done 1982) and adult care (Haberkern, Schmid, & Szydlik 2015; Himes, Jordan & Farkas 1996; Laditka & Laditka 2000) among men and women as well as individuals from different socioeconomic standings. Social science theorists look to explain these disparities by pointing to different social mechanisms that shape them, but each theoretical perspective shares the recognition that, on average, unequal

engagement in housework and child care tips in the direction of women and lower-SES individuals spending disproportionately more time on these domestic tasks.

Gender and housework or dependent care. Decades of research have investigated the gendered division of household labor, an inequality that remains largely stagnant over time with women bearing a significantly larger responsibility for housework, childcare, and adult care compared to men (Atkinson & Boles 1984; Greenstein 2000; Hochschild 1989). To explain these gender-based inequalities, social scientists have developed four major conceptual approaches: (1) relative resources approach; (2) Time availability; (3) Gender Ideology; and (4) Gendered Life Course (Greenstein 2000; Moen & Chermack 2005).

For the relative resource approach, bargaining (Becker 1981; Lundberg & Pollack 1996) and exchange theories (Blood & Wolfe 1960; Molm & Cook 1995) point to relative differences in earnings as a critical process influencing couples' decisions about dividing responsibilities for housework and child care duties between them. This decision-making process, then, ultimately creates power differences in couples which enhance the bargaining position of the higher-earning spouse, often the man, leading to women bearing more of the domestic work (Blair & Lichter 1991; Greenstein 2000; John & Shelton 1997; Kamo 1988; Raley et al. 2012; Thébaud 2010). Alternatively, time availability theoretical approaches see time is a finite resource where more time in employment means less time for either child care or housework (Becker 1965; Chesley & Flood 2016; Greenstein 2000). Since women, on average, are less likely to be employed at all, and work fewer hours, research generally finds that women spend more time engaged in housework and child care than men (Bianchi et al. 2007).

The gender ideology and gendered life course perspectives both emphasize the role of identity as well as larger systemic structural processes that reinforce links among gender and

work/family roles (Goffman 1977; West & Zimmerman 1987). A male breadwinner/female care provider model, which has been historically relevant since the mid-19th century remains culturally influential in contemporary society (Chesley 2016; Dillaway & Paré 2008; Meisenbach 2009; Warren 2007). This cultural model continues to promote a gendered division of paid/unpaid work (Craig & Brown 2017). These divisions are further supported by life course research recognizing the important interplay of gender and age due to the timing of role transitions (e.g. child, homeownership, job transition, adult care) at different life stages, ultimately shaping men's and women's lives differently (Umberson, Williams, Powers, Liu & Needham 2006; Moen & Chermack 2005). For instance, even though many women are in the labor force today, scholars note a "neo-traditional" pattern in which women work less than men and continue to be the primary household managers and care providers, in spite of involvement in the labor force (Moen & Sweet 2002). However, social attitudes and institutional structures rooted in intensive mothering (and men engaging more in paid work) lead to women engaging in more hands-on care compared to men whether or not mothers hold paid work positions (Blau & Kahn 2007; Ridgeway 2009). Additionally, caring for older relatives is still performed predominantly by women (Chesley & Poppie 2009; Himes, Jordan & Farkas 1996; Laditka & Laditka 2000). Throughout the life course, roles, relationships, and resources, which are all shaped by gender and age, provide different opportunities for physical activity (Moen & Chermack 2005; Moen 2001; Williams & Umberson 2004). Most critical is women's higher likelihood to care for children at the early child stage in life *and* caring for older adults at yet another life course stage. Literature suggests older adults, compared to younger adults, experience a pile up of social obligations (e.g., simultaneous child care, household tasks, and adult care), which ultimately provide them more opportunity to engage in non-leisure health

benefiting physical activity (Williams & Umberson 2004). Further, women are engaging in these social obligations more than men (Moen 2005). For reasons established through the gendered life course model, investigating the interaction between age and gender is essential to understanding the complexities of health benefiting physical activity in housework and care.

Ultimately, whether the mechanism producing gender differences in housework and care is manifested through relative resource differences that influence bargaining power over the division of household labor, differences in time availability, culturally normative perceptions of gender roles, or a gendered life course, all four theories indicate that women should be more likely than men to engage in most forms of housework and care.

Establishing theoretical foundations on the gendered and socioeconomic nature of the division of labor and time spent in household tasks suggests different opportunities to engage in physical activity that are linked to these characteristics. Put otherwise, those that participate in more household work may have a unique opportunity to engage in non-leisure time health benefiting activities and, overall, sociologists agree women are those individuals. Further, it is understood that housework is deeply gendered and that women have retained the responsibility, especially for routine housework activities, despite economic gains (Hook 2017). Gender specialization of time means women who engage in more unpaid work such as childcare and housework may be more likely to engage in activities that qualify as moderate physical activity through non-leisure activities when compared to men. This key link among gender specialization in time use and differential exposure to moderate physical activity is not captured in current measures of self-reported physical activity or addressed in public health research.

Empirical patterns support these theoretical assertions. Though the total number of hours men and women spend in paid and unpaid work has become more equal, the ratio of paid to

unpaid time remains gender-specialized. Women allocate a larger portion of time to unpaid housework and family care and men allocate more time to paid work (Bianchi et al. 2012). Additionally, we know that men and women differ both in their time allocations to housework (e.g., Bianchi et al. 2012; Schneider 2011), in the types of housework activities that they typically do (e.g., Hook 2017; Kroska 2003; Berk 1985), and in the meaning of housework (Wang 2013). While there is more convergence in gendered patterns around childcare, women still tend to spend more time engaged in childcare than men (Bianchi et al. 2007; Raley et al. 2012; Connelly & Kimmel 2010). Because health research indicates that many commonly performed housework and childcare tasks are sources of moderate physical activity, patterns of time use that show that women spend more time in these activities than men has important implications for understanding men's and women's physical activity, and more generally, gender differences in time use.

SES and housework or dependent care. Theoretical foundations for socioeconomic inequalities in time spent on household activities and dependent care are similar to those investigating gender inequalities and focus on resource availability, time constraint, and technological advancements as key mechanisms impacting class differences in household labor. technological advancements in household goods or purchased services, thus alleviating these individuals from household chores (John & Shelton 1997). Put otherwise, resource availability perspectives assert that more affluent individuals have more liquid income to outsource the tasks of housework and childcare (i.e., hiring cleaning services and child care services) or purchase technological solutions (i.e., dishwashers, robotic vacuums) whereas less affluent individuals are more limited in their ability to outsource domestic work (John & Shelton 1997).

Time constraint perspectives suggest that individuals pragmatically respond to demands like housework and care and so partners distribute workloads towards equilibrium with employment in mind (Hook 2017; Blood & Wolfe 1960; Coverman 1985). As such, spousal employment hours and child presence are key factors increasing housework, while personal employment decreases housework. Key to the theory, and supported by research, is that time constraints do not affect men and women in the same way. Women's time is more responsive to their own employment hours and to children than a man's time (Bianchi et al. 2000; Chesley & Flood 2013). Finally, technological development perspectives see the mass production of household goods as leading to the increased availability and use of labor-saving devices (Bose et al. 1984; Strasser & Done 1982; Wajcman 2014). Therefore, scholars utilizing this approach argue that advancements in technology homogenized household labor across socioeconomic levels by standardizing what was expected in terms of household labor, although some maintain these standards by hiring outside help (Cowan 1983; Glenn 1992; Strasser & Done 1982; Wajcman 2014).

For SES divisions, activity in housework and dependent care is mixed. Some literature suggests there are no socioeconomic divisions, whether measured by income or education, in the amount of household activity performed because of the technological advancements in cleaning and house care (Greenstein 2000; Gregson & Lowe 1993). Other literature suggests otherwise. Researchers found that financial limitations among lower-socioeconomic individuals leads to increased likelihood for engaging in health benefiting housework and care activities such as multi-tasking with child care, housework, and physical exertion for transportation (Ford et al. 1991; McNeill et al. 2006; Smith et al. 1014). Further, research on work and family interference, which directly impacts the amount of housework and child care one is able to provide, also

produced mixed results. Higher SES individuals often have more favorable working conditions with more resources (e.g. flexibility and control over the work situation) in addition to better pay than employees with lower SES. These resources have been suggested to facilitate the possibility to combine work and family for employees with higher SES (Falkenberg, Lindfors, Chandola, & Head 2016; Schieman et al., 2006). Yet, higher socioeconomic individuals also have more responsibility at work, higher demands, and a higher level of job involvement compared to lower SES individuals (Schieman et al., 2006). Schieman et al. (2006) found that higher SES individuals reported higher levels of conflict between work and family than lower SES individuals, suggesting the advantages in resources for higher SES individuals failed to counterbalance demands, ultimately impeding on time for housework and care. With such inconclusive results in the literature, further understanding of the relationship between socioeconomic standing and health benefiting housework and child/adult care is necessary.

Though the research on socioeconomic patterns in housework/care is mixed, the literature on the impacts SES has on gendered divisions of labor is more clear. Research demonstrates educational attainment and income appear to have important effects on the amount of time men spend in child-rearing and household activities (Robinson & Godbey 2010). Numerous studies conclude men with higher education and income levels spend significantly more time in such activities when compared with men who have lower levels of education or income (Berk 2012; Juster & Stafford 1991; Robinson, Andreenkov, & Patrušev 1989). Therefore, socioeconomic status serves as a moderating mechanism for the relationship between gender and time spent in housework/dependent care and will be modeled as such (e.g. interaction between SES and gender predicting housework activity).

In the end, household activities, which we know are allocated unequally across genders and potentially across socioeconomic status, may provide opportunities to engage in health benefiting physical activity that our current health surveillance systems may not capture at all, or capture well. Drawing on these theoretical understandings of the ways in which gender, SES, and the household division of labor and childcare are related to health-benefiting physical activity, leads to these hypotheses:

> (H2a.) Women will engage in significantly more minutes of physical activity compared to men when opeationalizations of moderate physical activity include *Housework/Dependent Care*.
>
> (H2b.) There will be no significant difference in the number of minutes spent in physical activity between High-SES and Low-SES individuals when opeationalizations of moderate physical activity include *Housework/Dependent Care*.
>
> (H2c.) Men with Higher-SES standing will report more minutes of physical activity compared to Men with Lower-SES standing when when opeationalizations of moderate physical activity include *Housework/Dependent Care*.

Alternative Domains to Access Physical Activity: Paid Work

Three basic resources that differentiate occupations are skill, authority, and economic control because they are the fundamental aspects of power (Grusky 2001; Ganzeboom, De Graaf, & Treiman 1992). Both public health (Krieger et al. 1997) and social stratification (Blau, Duncan, & Tyree 2001) scholars draw upon two main approaches in the investigation of occupational hierarchies: (1) socioeconomic classification and (2) occupational prestige rating. Despite a general increase in sedentary time spent at paid work (Brownson, Boehmer, & Luke 2005), there are still several occupations that require moderate physical activity. Occupations most likely to provide people with health-benefiting physical activity are service and manufacturing professions (e.g., construction worker, agriculture, plumber, electrician, carpenter,

cleaner, hospital nurse, gardener, postal delivery workers; Tudor-Locke et al. 2009). These occupations serve as a social space where gender and socioeconomic patterns intersect and emerge, ultimately influencing opportunities for healthy physical activity.

Gender and paid work. Sociological theory speaks to gender segregation within occupations. For decades, labor markets have been segmented along gender lines, with some jobs being predominantly restricted to men, while other jobs are primarily restricted to women (Reich, Gordon, & Edwards 1973; Reskin & Beilby 2005; Watts 1995). Even today, gender segregation within occupations remains high (Cohen 2013). Sociological theory contends cultural consensus on who does what job is a key mechanism maintaining gender divisions in paid work (Reskin & Beilby 2005). Further, workplaces incorporate gender segregation into employment structures and practices. For example, job assignment and promotion practices rooted in either overt discrimination or "statistical discrimination" are theorized to divide genders according to gender stereotypes of men's and women's demeanor and potential (Reskin & Beilby 2005).

Other theory points to the work and family dichotomy where women are expected to "do gender" as a mechanism influencing gender segregation at paid work (Hochschild 1997; West & Zimmerman 1987). Time and income tradeoffs are known to most strongly impact women, meaning that women largely bear the burden of making up for time constraints on a family through housework and child care or making up for income deficits within the family by entering the labor market (Becker 1985; Craig & Brown 2017; Craig & Mullan 2009; Hochschild 1997). This is also referred to as the gender specialization of time use (Bianchi et. al 2007; 2012), which is confirmed in gendered life course assertions that men are more likely to work for pay after retirement (Moen 2005). As such, women enter the workforce on men's terms (Hochschild 1997)

and are segmented into certain professions. The second theoretical perspective recognizes the cultural need to conduct oneself in socially established activities and attitudes aligned with one's gender (Moen 2005; West & Zimmerman 1987). Here, a women's "culture of care" is cited as a mechanism driving gender segregation within the labor force.

Where gender-based workforce segregation impacts physical activity habits lies in the differential opportunities available to men and women workers for health benefiting activity while on the job (Church et al. 2011). Though most contemporary jobs are sedentary, there are still some occupations providing opportunity for health benefiting activity (Tudor-Locke et al. 2009). These occupations include service, manufacturing, laborers, and farming/forestry (Tudor-Locke et al. 2009). According to the Bureau of Labor Statistics (BLS), of the top twenty jobs occupied by women, about three of the top twenty (i.e. janitors and building cleaners, waiters and waitresses, maid and housekeeping cleaners) require moderate physical activity (BLS 2014). In contrast, six of the top jobs for men (i.e. construction, manufacturing – durable goods, manufacturing – nondurable goods, other services – repair and maintenance, janitors and building cleaners, waiters and waitresses) require moderate physical activity (BLS 2014). In conclusion, theoretical and empirical evidence both point to the potential for gender segregation within the labor force to lead to gender differences in the proportion of time spent in sedentary or health benefiting activities at work, which may leave men with greater opportunity than women because of the greater range of occupations open to them that require some level of physical engagement (Parry & Straker 2013).

SES and paid work. Sociological theory cites different mechanisms to explain the interrelatedness of socioeconomic status (often indicated by level of education and income) and occupation. Functionalist perspectives assert that more powerful occupations require more

competent individuals because there is more at stake, therefore, occupational prestige is related to socioeconomic power and status and reflected through high income and greater education (Grusky 2001; Ganzeboom, De Graaf, & Treiman 1992). Additional theoretical perspectives, such as those rooted in Marxist conflict theory, emphasize exploitation and domination as a key mechanism connecting socioeconomic status and occupation. In its broadest sense, this view of occupations recognizes occupational hierarchies: owners, managers, experts, and workers that translate into social locations directly rooted in socioeconomic status (Grusky & Szelenyi 2011; Wright 1989; Wright 1995). Finally, another theoretical take distinguished culture and taste as key bridges to the relation between SES and paid work. Scholars assert, as a result of the subconscious rewarding of students who come from culturally privileged backgrounds, the education system is believed to reproduce inequalities that disallow individuals from 'moving up' the economic and occupational ladder (Bourdieu 1984; Bourdieu & Passeron 1979; Harker 1990). Regardless of theoretical foundation, the recognition of socioeconomic-based segregation within occupational systems is woven through each theoretical perspective.

Where socioeconomic occupational segregation impacts physical activity habits lies in the differential opportunities for high- and low-SES workers to engage in health benefiting activity while on the job (Church et al. 2011). There are differences among professions typically performed by different socioeconomic statuses that favor lower-SES occupations when it comes to physical activity. As previous theorists suggest, positions with more power, and therefore more social and monetary compensation, are managerial and non-manual occupations that often require greater levels of education. As a result, the hierarchy of occupations places non-manual labor skilled jobs higher in the line of social and monetary capital compensation compared to professions associated with more manual labor skill (Wright 1995; Krieger et al. 1997).

Ultimately, theorists predict, and empirical evidence supports, that less educated individuals with lower salaries are more likely to work in occupations that require higher intensity physical activity. Since employment and occupation are associated with SES, shifts towards more sedentary professions impact higher earning, better-educated workers more than others, as the few occupations that still require more physical activity (manufacturing jobs, or craftsman positions such as plumbing, for example) are the "blue collar" occupations more closely associated with lower SES. Systematic reviews of the research confirm the higher prevalence of physical activity among low-SES individuals in their occupation (Beenacker, et al. 2012).

In sum, gender and class segregation in the labor force is expected to provide differential opportunity for engaging in health benefiting activity while at work in ways that might alter our current understanding of either the direction of physical activity gaps, the size of these gaps, or both. Time use researchers suggest aside from sleeping, employed individuals spend the most amount of their time at work (Robinson & Godbey 2010). Whether that job provides physical activity opportunities or largely leaves an individual sedentary has serious impacts on public health. This review suggests that women and higher-socioeconomic individuals are more likely to suffer from physically inactive professions while men and lower-SES individuals may have access to more health benefiting activity at paid work. What becomes incredibly problematic is a lack of documentation of these phenomenon when public health surveillance systems only inquire about leisure time physical activity. These potential gender and class inequalities may not be detected through current physical activity questionnaires, or may be understated (in the case of the gender gap). Overall, my review indicates the following expectations:

> (H3a.) Men will engage in significantly more minutes of physical activity compared to women when when opeationalizations of moderate physical activity include *Paid Work*.

(H3b.) Lower-SES individuals will engage in significantly more minutes of physical activity compared to Higher-SES individual when when opeationalizations of moderate physical activity include *Paid Work.*

(H3c.) Men with Lower-SES standing will report the most minutes of physical activity compared to others when when opeationalizations of moderate physical activity include *Paid Work*.

Physical Activity Requirements

In an effort to address the rising inactivity in America, in 2008, the Department of Health and Human Services (HHS) issued physical activity guidelines for all American citizens. In the report, HHS claimed all able-bodied adults should engage in "at least 150 minutes of moderate-intensity aerobic physical activity a week or 75 minutes a week of vigorous-intensity aerobic physical activity, or an equivalent combination" (HHS 2008, p. 21). HHS guidelines defined physical activity not by the type of activity, but rather by the intensity of the activity according to metabolic equivalents.

Current public health research utilizes metabolic equivalents (METs) to create a scalar measure of moderate and vigorous physical activity. MET is the ratio of working metabolic rate relative to resting metabolic rate (WHO 2012). A single MET is classified as the energy cost of sitting quietly and is equivalent to a caloric expenditure of one kcal/kg/hour (WHO 2012). A person is said to be engaging in moderate levels of physical activity if they are exerting between three to six METS and any activity exhausting more than six METS is considered as vigorous activity (WHO 2012).

However, as a practical issue, the average individual is unaware of the number of METs they exert during physical activity. Therefore, rather than asking individuals to report exact levels of physical exertion, health surveillance systems include references to the amount of

sweating and increased heart-rate that occurs during moderate and vigorous physical activity. Two of the three national surveys that inform public health policy use measurement tools that emphasize connections between leisure time and physical activity (NHIS and NHANES) and omit any reference to moderate childcare or housework activities (for question wording, See Table 1). While the BRFSS does a better job of making housework more salient by referencing housework (e.g. vacuuming) in the introductory paragraph, the wording still omits references to childcare, adult care, and paid work (see Table 1).

Overall, the three key research tools used to measure the health activity of Americans do not fully account for social forces that institutionalize both gender and SES differences at home, at work, and in our leisure activities that potentially shape experiences of, and responses about, physical activity. Previous research suggests that this may be a problem given that the gender and socioeconomic differences produced by these institutionalized systems likely provides individuals with different opportunities to engage in tasks that produce health-benefiting physical activity. Because regular physical activity has such important implications for public health, investigating whether these different opportunities matter when assessing the range and amount of physical activity individuals report in surveys is a focus of this project. Documenting the validity and reliability issues associated with current physical activity self-reports when different activities are highlighted, and establishing whether gender and SES differences shape physical activity estimates are the central goals of this project.

III. Methodology

There are two key aims of this project: (1) to assess whether gender and socioeconomic physical activity 'gaps' are artificially produced through inaccurate measurement of physical activity and (2) to offer new evidence and discovery on the potential impacts of priming language of physical activity questionnaires that highlight different opportunities for moderate physical activity. Both aims ultimately intend to increase the precision with which self-reported physical activity is measured and understood. To achieve the first aim, I analyze time use patterns of Americans using the ATUS. To achieve the second aim, I collect and analyze new survey data through an experimentally designed study where treatment conditions prime different domains of activity.

Secondary Data Analysis: American Time Use Survey

In order to investigate gender and socioeconomic differences in the likelihood of meeting physical activity requirements, data on daily activities with corresponding MET scores of men, women, and individuals from different socioeconomic backgrounds are necessary. All of these requirements are available using the American Time Use Survey (ATUS), therefore I use a multi-year version of the ATUS in this project (Hofferth, Flood, & Sobek 2015).

The ATUS, collected annually since 2003, is a nationally representative time diary study where respondents record everything they did 24 hours before the interview (BLS 2012:3). This offers researchers a unique opportunity to investigate daily patterns of time allocation among respondents. The data contain extensive descriptions of daily activities as well as rich demographic information. By combining waves of data collection the large sample sizes of the ATUS allow gender- and socioeconomic-specific comparisons of adults with different levels

marital status, parental status, and health status, all of which are social locations known to impact physical activity habits.

The ATUS uses a stratified, three-stage sample design[1] and surveys are administered via computer assisted telephone interview (CATI; BLS 2012:11-15). The sampling frame of the ATUS encompasses all civilian, non-institutionalized persons residing in occupied households in the United States that are at least 15 years of age. ATUS respondents report the activities they engage in during a 24-hour period from 4:00am of a specified day until 4:00am the following day. Activities are then coded using a three-tier, six-digit coding system that contains information for over 400 activities. Data were collected all days of the week, with weekends oversampled. A cumulative final weight is used in statistical analyses to account for the complex survey design employed by the ATUS (WBWT & EHWT weight)[2]. Since health is such an important predictor of physical activity and how individuals use their time, more generally, I restrict my data to years in which self-reported health data were collected (2006, 2008, 2010, 2012, 2013). Multiple imputation[3] on the two variables with greater than seven percent data missing (household income and health) was tested across models. Due to differences in imputed and non-imputed data results, multiple imputation was used for all OLS regression moving forward. Seemingly unrelated regression (SUR), given the multivariate nature of the outcome

[1] In the first stage, the oversample of less-populous States in the CPS is reduced in order to better represent each states' approximate proportion of the national population. The second stage of selection stratifies households based on the following characteristics: the race/ethnicity of the household, the presence and age of children, and the number of adults in adult-only households. Finally, the third stage of selection occurs when an eligible person from each household is selected and is randomly designated the interviewee (BLS 2012:11).

[2] WBWT is the necessary weight if using items from the health survey portion for certain years (2010, 2012, 2013) while EHWT is the appropriate weight when using health questions for other years (2006, 2007, 2008, 2014). The two weights were combined to create one weight: gen WEIGHT_P=0; replace WEIGHT_P=ehwt if YEAR == 2006; replace WEIGHT_P=ehwt if YEAR == 2007; replace WEIGHT_P=ehwt if YEAR == 2008; replace WEIGHT_P=ehwt if YEAR == 2014; replace WEIGHT_P=wbwt if YEAR == 2010; replace WEIGHT_P=wbwt if YEAR == 2012; replace WEIGHT_P=wbwt if YEAR == 2013

[3] For multiple imputation, age, educational attainment, employment status, gender, and race were used to impute income and health status. The following STATA commands were used: mi impute mvn INC_CONT HEALTH = AGE EDUC EMPLOY FEMALE RACE, add(5); mi svyset [pweight = WEIGHT_P]

variables, makes analytically addressing missingness difficult (Shaefer & Yucel 2002). Furthermore, all other independent variables did not have any data missing, thanks to ATUS' imputation procedures. Therefore, the final sample is N = 86,954.

In order for the ATUS to be useful for this project, the activities identified in the diaries need to be connected to their metabolic equivalents. In 2008, Tudor-Locke and colleagues assigned a MET score to each of the 438 activities recorded in the ATUS by combining information from the ATUS and the Compendium of Physical Activity[4]. The Compendium of Physical Activity was developed to facilitate comparison of intensity levels across studies and contains a comprehensive list of 605 physical activities with corresponding type, purpose, and intensity (Tudor-Locke et al. 2009). Tudor-Locke and colleagues (2009) systematically used the compendium to assign MET values to the example activities as presented in the ATUS lexicon. MET values were averaged over example activities categorized under a shared 6-digit code to derive a final ATUS Specific Category activity MET value (Tudor-Locke et al. 2009). This rigorous process extended to assessments of paid work physical activity by linking occupational codes to MET values[5]. The resulting data (time diary data linked to MET values) allows researchers to categorize activities on the ATUS based upon the physical exertion it takes to engage in each activity. For the purposes of this project, I am able to develop a dependent variable that sums *only* physical activity that requires three or more METs, which is how research identifies moderate (minimum of 3 METs) to vigorous (minimum of 6 METs) physical activity.

[4] The Compendium of Physical Activity is a comprehensive list of over 600 physical activities with the main purpose to code the type, purpose, and intensity of physical activity performed in daily life (Tudor-Locke et al. 2008).

[5] For further explanation on linking METs to Occupational Codes in ATUS, see: https://www.atusdata.org/atus/resources/linked_docs/metvalue_documentation.pdf

Dependent variables. To assess time differences in physical activity among groups, I develop a series of four dependent variables. Each variable captures the total time in moderate (or more) physical activities when activity is characterized as: (1) *Leisure-Only* activity; (2) *Leisure & Housework/Dependent Work*, (3) *Leisure & Paid Work*, and (4) *Full Activity* with all four activity domains (Leisure, Housework/Dependent Care, Paid Work, Transportation). The *Leisure Activity* variable captures time in leisure-only activities that require at least three METs to perform. This variable is informed by social studies of leisure (Unger and Kernan 1983; Pronovost 1988) and represents the conceptualization of physical activity used on most health surveillance questionnaires. As such, this variable eliminates all moderately rigorous activities that pertain to housework (both interior and exterior), car and furniture maintenance/repair, time in paid work, childcare, and any moderately active transportation (see Table 2).

The *Leisure & Housework/Dependent Care* variable captures time in leisure-only activities that involve at least three METs and adds time in moderately active housework, childcare, and adult care. Moderately active housework includes activities such as interior cleaning, building and repairing furniture, exterior cleaning, interior arrangement. Moderately active child care is represented by four activities including playing with household and non-household children (see Table 2). Similarly, the *Leisure & Paid Work* variable captures time in leisure-only activities that require a minimum of three METs and adds occupational work – for those in occupations that are moderately active. Of the 22 occupations identified and coded in the ATUS only four broad groupings contain periods of work that Tudor and Locke have associated with opportunities for moderate to vigorous health benefiting activity. These are listed in Table 3. Finally, the "Full Activity" variable captures time in all three domains previously discussed: leisure-only activities that involve three METs are added to moderately active housework and care, which are also

added to moderately active occupational work. The second, third, and fourth conceptualizations of physical activity are informed by previous research that indicates that men and women and high and low SES individuals likely engage in physical activities in different social domains, such as leisure, household and care work, and paid work (cites). Importantly, the key differences between the Leisure-Only Activity and Full Activity dependent variables will be that one includes moderately active physical activity in paid work, unpaid work, transportation, and leisure activities (*Full Activity*) and one does not (*Leisure Activity*). For an exhaustive list of all activities included in all four dependent variables, see Table 2. For a list of the specific occupations classified as moderately active, see Table 3.

Further modifications of both dependent variables are necessary in order to accurately operationalize health benefiting activities among respondents. Based on recommendations outlined in the HHS Physical Activity Guidelines, only activity episodes lasting at least ten minutes in duration are considered health benefitting (HHS 2008; Spinney et al. 2011). Therefore, a minimum threshold of ten minutes will be used, meaning only activities that respondents spent at least ten minutes engaging in *and* that are at least three METs will be included in the construction of these two variables. For example, reporting vacuuming for six minutes will not be included in a respondent's calculation of physical activity because, although vacuuming is moderately active, the action lasted less than 10 consecutive minutes.

Next, there are debates in the literature about whether and how paid activity is accurately linked to metabolic equivalents (Spinney et al. 2011; Tudor-Locke et al. 2009). The ATUS does not segment out individual tasks performed while working, but rather employs one code that indicates *working and work related activities* (Tudor-Locke et al. 2009). Despite an extensive iterative process performed to arrive at a single summary MET for each occupation type, some

scholars contend it is not accurate to assume an individual engages in consistent METs during periods of work (Harvey & Spinney 2000; Spinney et al. 2011). To address this, I run several sensitivity analyses investigating impacts of different constructions of the *Leisure & Paid Work* and the *Full Activity* dependent variables that make a range of assumptions about the consistency of activities that generate moderate to vigorous METs during worktime. More specifically, time spent in health benefiting paid work is divided into three cases drawing on three difference assumptions. In the first case, I assume that respondents in moderately active occupations engage in zero work time (0%) where they are exerting three METs or more for 10 consecutive minutes. The second case, I assume the same respondents engage in activity that requires three METs or more 50% of the time they reported being at work. Third, I assume respondents in moderately active occupations engage in activity requiring three METs or more 100% of the time they reported being at work. Therefore, analyses include three different operationalizations of two of the dependent variables: *Leisure & Paid Work* and *Full Activity*. This sensitivity analysis is intended to address debates about levels of moderate physical activity during a full workday.

Independent variables. Both gender and socioeconomic status are key independent variables in this analysis. Gender is operationalized as a dichotomous variable (0 = male, 1= female). To operationalize socioeconomic status, public health and social science research on health use educational attainment and family or individual income as key indicators of socioeconomic positioning (Giles-Corti & Donovan 2002). In order to speak to current public health literature, these two measures will serve as key indicators of socioeconomic status. Educational attainment is operationalized as a 5-category ordinal variable (1 = less than high school, 2 = high school degree, 3 = some college, 4 = college degree, 5 = more than college). Household income is operationalized as a continuous variable. The ATUS utilizes a 16-category

variable ranging from “Less than $5000” to “$150,000 and more.” To convert into a continuous variable, respondents are assigned the middle household income of the category they reported (i.e., when a respondent report “$50,000 - $74.999” they receive a continuous value of $62,500).

Another independent variable representing SES, occupation, is operationalized by a five category indicator of all employed respondent’s industry (0 = Unemployed; 1 = Professional, Managerial, & Sales; 2 = Admin & Services; 3 = Manufacturing, Maintenance, & Agriculture; 4 = Other). The ATUS uses a 22-category occupational survey question for respondents to respond to that is collapsed into five categories for this analysis. The following are the 22 original occupation categories: Unemployed; Management, Business & Finance Operations; Computer & Math Science; Architecture & Engineer; Life, Physical, Social Sciences; Communication & Social Services; Legal Operations; Education, Training, & Library; Arts, Design, Entertainment, & Sports; Healthcare practitioner & tech; Healthcare support; Protective Services; Food prep & serving; Building & grounds clean/maintenance; Personal care & service; Sales & related; Office & Admin Support; Farm, Fish, & Forestry; Construction & Extraction; Installation, Maintenance, & Repair; Production Occupations; Transportation & Material. The role of these SES indicators on estimates of physical activity will be tested to better understand whether and how socioeconomic status differences shape time in physical activity.

Controls. Known correlates of physical activity habits will be included in models as control variables. Broadly speaking, those correlates include social-locational context, parenthood and marital status, and health. Age, race, and employment status represent the social-locational context variables. Previous literature recognizes social-locational factors impacting moderate physical activity through resource- and time-constraint mechanisms. Age is measured as a top-coded continuous, truncated variable ranging from 18 to “85 and Up.” Age is known to be

inversely related to moderate physical activity, meaning older age is associated with less physical activity (Seo & Torabi 2008). Life course literature recognizes the potential for a parabolic relationship between age and health-benefiting activity, therefore, a squared term for age will also be included in analyses (Umberson et al. 2006). Race/ethnicity is measured as a four-category variable (1 = White, 2 = Black, 3 = Hispanic, 4 = Other). I operationalize in this way because literature on racial differences in physical activity habits operationalize race/ethnicity in similar ways (Gordon-Larsen, Nelson, Page, & Popkin 2006; French, Story, & Jeffrey 2001) and consistently report non-white individuals engage in lower levels of physical activity compared to their white counterparts (Gordon-Larsen et al. 2006; McNeill, Kreuter, & Subramanian 2006).

Parent status, presence of a child under the age of six, family size, and marital status represent the control variables known to be associated with gender specialization of time use. Previous literature on gender specialization in time use recognize opportunities for moderate physical activity are often exacerbated by the transition to parenthood (Bianchi et. al 2007; 2012). Research indicates child care requires more intense physical activity for children who are not school age, especially when family size increases (Bianchi 2012; Raley et al. 2012). Therefore, controlling for one's increased opportunity for physical activity from children's age and number in the household is important. The parental status variable is a dichotomous variable (1= parent, 0 = not a parent). Presence of a child under the age of six is also a dichotomous variable (1= child under 6 present; 0 = not present). Household size is operationalized as a continuous variable (range = 1 to 15). Additionally, union status is a collapsed dichotomous variable (1 = married; 0 = not married) from the five-category variable (Married, Widowed, Divorced, Separated, Never Married). Previous studies recognize married individuals tend to engage in more physical activity (CDC 2012; Seo & Torabi 2008), with no significant results

among the complexities of non-married status on physical activity. I collapse three indicators that recognize whether or not the spouse is present at the time of the interview into one all-encompassing "Married" category.

Self-reported health serves as a proxy for biological health in addition to representing the psychological, cognitive health factors found in the literature to be associated with physical activity habits (Bauman et al. 2012; Trost et al. 2002; US HHS 2008; Seo & Torabi 2007). Health status is expected to have an inverse relationship with physical activity. The ATUS measures a respondent's self-reported general health. This is treated as a continuous variable, with higher values representing better health (1 = poor, 2 = fair, 3 = good, 4 = good, 5 = excellent).

Finally, because I use pooled data, year of response and day of the week serve as control variables to ensure data collection or period effects will not confound results. A list of descriptives for the proposed dependent and independent variables within the full sample and by gender are available in Table 4.

Analytic Approach

Analytic strategy. I take a two-part analytic approach to model individuals' health-benefiting time use in physical activity from several different domains. In order to speak to the literature on gender and socioeconomic divisions within each activity domain, the first stage of the analytic approach will include several bivariate relationships between each dependent variable (*Leisure Only, Leisure & Housework/Dependent Care, Leisure & Paid Work, Full Activity*) and key independent variables (gender, educational attainment, household income, occupation) as well as socio-locational variables previous research has established as an influence on opportunity for physical activity, namely parenthood and having a young child.

Evidence from these analyses represented in tables and graphs provides initial results to answer the research questions for how or whether gender or socioeconomic patterns in different domains impact one's engagement in physical activity.

In descriptive analysis, I use the Wilcoxon (Mann-Whitney) test to assess significant differences between gender and socioeconomic differences in the average minutes spent in different types of activities. I employ this technique to account for the non-normality of the distribution in minutes spent engaging in each type of activity (leisure time physical activity, housework/care, paid work, transportation). For an example of the bivariate descriptive analysis I ran using the Wilcoxon (Mann-Whitney) test, please see Table 4 that details average minutes engages in full and leisure activity, broken down by gender and educational attainment.

The second stage of the analytic approach is a series of ordinary least squares (OLS) regressions to examine relationships among predictors and the number of minutes spent in leisure time, housework/dependent care, paid work, and transportation. This analysis will speak to the different amounts (in daily minutes) of physical activity men and women and individuals in lower and higher socioeconomic positions engage in and will document what sorts of forces (e.g., parental status, work status, income, etc.) condition these patterns.

OLS is an appropriate approach for the second stage of the analysis. Previous research is mixed about the proper analysis for time use data since there is often a large number of zeros in time diary data along and time spent in one activity (like housework) is not independent of time spent in another (like leisure activity) (Chesley & Flood 2016). Some scholars argue that Tobit models are more appropriate for time use data, assuming a latent propensity to do an activity and that negative values of this propensity are censored at zero (Sousa-Poza, Schmid, & Widmer, 2001). Others counter that time spent in an activity is not censored and cannot take values less

than zero (see, e.g., Brown & Dunn 2011; Stewart 2009; and Wight, Price, Bianchi, & Hunt, 2009). However, previous research provides evidence that OLS models produce less biased estimates than Tobit models (Stewart 2009), even if the models produce qualitatively similar results (Foster & Kalenkoski 2013). Therefore, many contemporary studies successfully make use of OLS regression to model time spent in specific activities, like childcare (Craig et al. 2017; Chesley & Flood 2016; Raley et al. 2012). It is important to note that certain assumptions for OLS regression are not met by the ATUS data. As previously explained, physical activity typically has large inflation of zeros, making the distribution highly skewed and violating the assumption of normality. The data also violate the assumption of homoscedasticity. For a full table and discussion of the assumptions, see Appendix A. Despite the violation of assumptions, OLS is still employed to allow for comparisons with contemporary time use research.

However, dependencies across activities in a day suggest that the assumption of uncorrelated error terms in these data is not met here. To address this problem, I employ Seemingly Unrelated Regression (SUR) to supplement my OLS regressions. SUR can simultaneously estimate a set of linear equations while relaxing the assumption of independent error terms. This approach was successful in previous time use studies (Chesley & Flood 2013; Hook 2017).

Furthermore, OLS analyses will serve as the analytic tool for conducting analyses to see how sensitive results are to different conceptions and measurement of physical activity in paid work and socioeconomic status. More specifically, I run sensitivity analyses that look at the different measure of paid physical activity when added to the dependent variable under different conditions (0% of time at work, 50% of time at work, 100% of time at work). It is important to note that the sensitivity analysis will speak mainly to the volatility in reporting physical activity

patterns among Americans, and not to the accuracy of how to measure time spent in moderate physical activity in paid work given the current conditions of time use data collection.

Below is a depiction of the four models that comprise the OLS analysis, including reference to the sensitivity analysis:

Figure 1. Four Models for OLS Regression Including Sensitivity Analysis

$$Y_{Full*} = \gamma_0 + \gamma_1 X_{Gender} + \gamma_2 X_{Educ} + \gamma_3 X_{HouseholdIncome} + \gamma_4 X_{Occupation} + \gamma_5 X_{Age} + \gamma_6 X_{Race} + \gamma_7 X_{MaritalStatus} + \gamma_8 X_{ParentStatus} + \gamma_9 X_{KidUnder6} + \gamma_{10} X_{HouseholdSize} + \gamma_{11} X_{Health} + \gamma_{12} X_{Year} + \gamma_{13} X_{Day} + R_i$$

$$Y_{Leisure + Domestic} = \gamma_0 + \gamma_1 X_{Gender} + \gamma_2 X_{Educ} + \gamma_3 X_{HouseholdIncome} + \gamma_4 X_{Occupation} + \gamma_5 X_{Age} + \gamma_6 X_{Race} + \gamma_7 X_{MaritalStatus} + \gamma_8 X_{ParentStatus} + \gamma_9 X_{KidUnder6} + \gamma_{10} X_{HouseholdSize} + \gamma_{11} X_{Health} + \gamma_{12} X_{Year} + \gamma_{13} X_{Day} + R_i$$

$$Y_{Leisure + Paid*} = \gamma_0 + \gamma_1 X_{Gender} + \gamma_2 X_{Educ} + \gamma_3 X_{HouseholdIncome} + \gamma_4 X_{Occupation} + \gamma_5 X_{Age} + \gamma_6 X_{Race} + \gamma_7 X_{MaritalStatus} + \gamma_8 X_{ParentStatus} + \gamma_9 X_{KidUnder6} + \gamma_{10} X_{HouseholdSize} + \gamma_{11} X_{Health} + \gamma_{12} X_{Year} + \gamma_{13} X_{Day} + R_i$$

$$Y_{Leisure\ Only} = \gamma_0 + \gamma_1 X_{Gender} + \gamma_2 X_{Educ} + \gamma_3 X_{HouseholdIncome} + \gamma_4 X_{Occupation} + \gamma_5 X_{Age} + \gamma_6 X_{Race} + \gamma_7 X_{MaritalStatus} + \gamma_8 X_{ParentStatus} + \gamma_9 X_{KidUnder6} + \gamma_{10} X_{HouseholdSize} + \gamma_{11} X_{Health} + \gamma_{12} X_{Year} + \gamma_{13} X_{Day} + R_i$$

* Indicates Sensitivity Analyses, with specific iterations of analyses explained below.

* Y_{Full*} & $Y_{Leisure + Paid*}$ = All Activities + 0% Reported Moderately Active Paid Work
= All Activities + 50% Reported Moderately Active Paid Work
= All Activities + 100% Reported Moderately Active Paid Work

Missingness. To address item nonresponse, the ATUS employs three imputation processes. The first is relational imputation, which "…infers the missing value[s] from other characteristics on the person's record or from records of others in the same household" (BLS 2012 p. 26). The second method of imputation is longitudinal assignment, or using information from the Current Population Survey (CPS) to inform the respondents' current ATUS answers. Because the sample design for the ATUS extracts from participants of the CPS, information (especially demographic information) from previous interviews can be used to resolve current missing data (BLS 2012). Lastly, the ATUS applies hot-deck allocation, which "…assigns a code to a missing value by

copying the code of a record with similar characteristics" (BLS 2012 p. 26). According to the American Time Use Survey User's Guide, all of the variables, minus household income, have rates of imputed data less than 4%.

For my analysis, 11 of the 13 variables do not have any item-responses missing (gender, educational attainment, occupation, marital status, parent status, household size, child under six, age, race, year, day) thanks to ATUS imputation procedures. The two variables that have item non-response are household income and self-reported health. Household income has item non-response among 6.6% of the sample (N = 5,678). Self-reported health has item non-response among 4.1% of the sample (N = 3,573). There are 115 respondents who are missing household income and health. Two logistic regressions are run to determine if any sociodemographic characteristics significantly predict missingness for household income and for self-reported health. Significant results determine that items are not missing completely at random (See Table 5).

The first column in Table 5 indicates that patterns of household income non-response likely reflect systematic, not random, processes Those who do not report household income are systematically different than those who report, specifically, they are more likely to be women with less than a high school degree, more likely to be black and not Hispanic, they are less likely to have a child under six and more likely to have a larger household size. Additionally, the second column illustrates odds ratios predicting missingness for self-reported health. Here, those who fail to report health are more likely to be men with less than a high school degree, more likely to be older and non-white, less likely to be married but more likely to have a child under the age of six and have a larger household size.

I speculate that losing these cases to listwise deletion may underestimate the relationship education, race, and household size each has on different pathways to access physical activity because the variation in respondents who are lower-educated minority and with larger households are diluted when these responses are removed. This is because lower-educated, minority, and those with a larger household are more likely to neither report income nor health status. In other words, there is a higher risk for Type II error for the relationship between education, race, and household size and physical activity reports. For education, it is expected that lower-educated are more likely to access health through paid work, which may not be completely captured in the analytic sample when those missing responses are more likely to be undereducated. It is hard to say how gender and having a child under six will be impacted since the relationship with missingness changes between household income and health.

Assessing speculations about the impacts of listwise deletion requires the comparison of analysis using listwise deletion and a form of imputation. Multiple imputation has been identified as a superior process for imputation as it leads to more accurate estimates than other traditional methods of imputation (Enders 2010). Multiple imputation fills in missing data by drawing from a conditional distribution, in this case a multivariate normal, of the missing data given the observed data. Multivariate normal distribution is used because previous research leads to reliable estimates even when the normality assumption is violated given a sufficient sample size (Demirtas et al. 2008; Lee & Carlin 2010). As previous research suggests, it is important to use similar independent variables in the analytic model for imputing missing data, and therefore, the same independent variables are used for imputing income and health (Enders 2010). Five imputations were used for this analysis. After imputation, diagnostics were run to demonstrate imputations do not negatively impact analysis. The relative variance increase (RVI) for income is

.171 suggesting the variances for income increased by 17% compared to if income had complete data. RVI for health is .024. Both RVIs are not too large to cause concern the imputations will negatively impact analysis (Enders 2010). To determine whether analysis is different when using imputation or listwise deletion, Table 6 compares regression analysis of each of the four pathways for accessing physical activity.

Results from Table 6 confirm some speculations about Type II error for listwise deletion and concludes results are different depending on whether or not imputation is utilized. Relationships that change depending on method of handling missingness are bolded in the table. Results for accessing physical activity through leisure and housework/dependent care demonstrates understanding of education's impact on physical activity differs whether multiple imputation or listwise deletion is performed (see bold values in third and fourth column of Table 6). Under multiple imputation the negative relationship between three categories of higher education and leisure and housework/dependent care are significant at $p < .05$. Yet, listwise deletion does not capture this significance like speculations of missingness impacts purported. Since a large number of undereducated respondents are lost in listwise deletion, the relationship is underestimated when losing those cases. Similar Type II error occurs for the relationship between having a child under six and accessing physical activity through leisure and paid work (fifth and sixth columns) – relationship is significant at $p < .05$ under multiple imputation but no significant difference under listwise deletion. A third difference occurs with education and accessing physical activity through all domains. The significant relationship between high school degree compared to less than high school education diminishes under multiple imputation but is significant at $p < .05$ under listwise deletion. With proof that listwise deletion changes the

understanding of how education and having a child under six impacts different pathways to physical activity, multiple imputation will be used in all regression analysis.

My sample of years 2006, 2007, 2008, 2010, 2012, 2013, and 2014 has a total of N = 86,594. The total number of respondents with missing data is N = 9,136 (10.6% of the sample). Multiple imputation maintains these respondents so the final analytic sample for this analysis is N = 86,594.

Primary Data Collection for Experimentally Designed Analysis

In addition to secondary data analysis drawing the ATUS, described above, I also analyze data I collected using an experimental design to test whether and how gender and SES shape health-benefiting physical activity. This experimental design contrasts eight conditions that vary wording in ways that should capture the extent to which gender and SES impact estimates of time spent in physical activity. In order to speak to current physical activity disparities, it is important to use wording from one health surveillance survey that provides contemporary statistics to inform general public health knowledge. As such, question wording from the NHANES survey serves as the control condition. The remaining seven conditions take into account different combinations of the three physical activity domains expected to vary by gender, SES, or both: (1) leisure activity; (2) paid work; and (3) housework and unpaid adult and child care.

For an experimental design like this, it is imperative that each treatment condition holds as much of the original wording constant as possible. The *only* difference among the eight conditions are the types of activities primed in the script and question. After establishing the control condition, the seven additional conditions tested allow a researcher to determine the

extent to which domain-specific stimuli change the amount of physical activity reported and whether these estimates are patterned by gender and SES.

The first activity domain, Leisure, is represented by the priming language used in the NHANES health surveillance system. NHANES question wording is used for the control because of its reference to moderate *leisure* physical activity. Though NHIS also refers to leisure time physical activity, the question construction includes several allusions to the definition of moderate activity within the question, making it difficult to maintain consistent wording across difference activity domains. Instead, NHANES uses a probe to define moderate leisure activity, which can be identically replicated using references to other activities, making NHANES the best choice as a control condition in this experiment.

The second and third activity domains, Housework/Dependent Care and Paid Work, required further development of priming language. First, specific activities to represent each domain were included by referring back to the activities in the ATUS that were identified as moderately active. For example, based on the metabolic equivalents, housework such as interior cleaning, decoration, food preparation, repairs, and childcare such as playing with children are all considered moderate physical activity, in addition to moderately active professions such as maintenance, repair, and forestry jobs (Tudor Locke et al. 2009; WHO 2012).

To build on this initial analysis of moderate activities as identified by Tudor-Locke and the ATUS, I conducted 28 cognitive interviews to investigate the reliability and validity of the proposed question wording for each of the experimental conditions. These cognitive interviews confirmed that priming respondents to think of "leisure" or "paid work" activities limits the scope of their response about their physical activity, consistent with previous research (Hippler, Schwarz, & Sudman 2012; Schwarz & Sudman 2012). I employed the

"think aloud" strategy for cognitive interviewing because the goal was to elicit data on participants' thought processes as they respond to questionnaire items (Knafl, Deatrick, Gallo, Holcombe, Bakitas, Dixon, & Grey 2007). This pretest process suggested that the way questions are framed significantly influenced self-reported time in physical activity. Results from this pretest ultimately assisted in the final decision of which activities and words would be primed to represent the Housework/Dependent Care and Paid Work conditions. For example, the cognitive interview results indicated that in order to make Housework/Dependent Care more salient across genders, household activities from both sides of the gender specialization spectrum needed to be included in question wording (see Appendix B). Furthermore, results demonstrated priming language of specific moderately active professions unnecessarily narrowed responses to moderateactivity at work, such that general priming language regarding paid work activity was ultimately chosen (see Appendix C).

To create the four multi-domain conditions (control, leisure, unpaid work, paid work), the same words and activities were used to represent each domain and were connected using "and" or "as well as" in order to maintain uniformity across conditions. Just as NHANES makes use of two questions to ask about moderate physical activity engagement, so too do all seven treatment conditions. The first question asks about the number of days in a week spent engaging in moderate physical activity. The second question asks respondents for about how long they engage in moderate activity. For accuracy purposes, I asked a third clarifying question whether the respondent reported in minutes or hours.

The experimentally designed conditions were fielded using Qualtrics survey development tools that randomly assign a two question set about engagement in physical activity with systematic alterations in question wording that emphasize: (1) NHANES question wording (control condition #1); (2) physical activity removing reference to leisure activity (*No Prime*

condition #2); (3) physical activity within the unpaid (*Housework/Dependent Care* condition #3) domain; (4) physical activity within the paid work domain (*Paid Work* condition #4); (5) physical activity within both leisure and unpaid work domains (*Leisure + Housework/ Dependent Care* condition #5); (6) physical activity within both leisure and paid work domains (*Leisure + Paid Work* condition #6); (7) physical activity within both the unpaid work and paid work domains (*Housework/Dependent Care + Paid Work* condition #7); and finally (8) physical activity within all three domains (*All Domains* condition #8) (for exact question wording, see Appendix D). In addition to the two questions in each of the eight conditions and clarifying question, the survey also includes: (1) a script for the opening screen; (2) pertinent demographic questions; and (3) an accuracy screening check question.

In order for these experimental results to present meaningful information on the impacts of priming language, the experiment should be implemented drawing upon a diverse and broad population. Reaching a national and diverse population is most efficiently achieved through online recruitment forums like Mechanical Turk, operated through Amazon. An ideal sample recruitment tool provides access to a diverse set of people at a national level that is cost and time efficient. All of these essentials are met with the web-based tool, Mechanical Turk, used here.

In 2005, Amazon introduced Mechanical Turk (MTurk) as a "marketplace for work that requires human intelligence," by bringing together the people and tools to enable task creation, recruitment, compensation, and data collection (Buhrmester, Kwang, & Gosling 2011; Rouse 2015). MTurk does not yield a nationally representative probability sample—workers tend to be younger and more educated than the general population, and anyone with a Social Security Number can participate, regardless of where they live. While we lack external validity in this sense, the experimental design does have internal validity—a common tradeoff in many studies.

In addition, several empirical studies investigated the validity and reliability of MTurk and results are generally positive. The first peer-reviewed article examining experimental research conducted using MTurk-generated samples identified a number of benefits including a lack of potentially biasing interactions, access to a more diverse population compared to more typical college student samples, anonymity, and availability of cross-national data (Paolacci, Chandler, and Ipeirotis 2010). Subsequent research investigating psychometric quality and test-retest reliability has reinforced these findings, supporting the utilization of MTurk to generate experimental samples (Buhrmester et al. 2011; Holden, Dennie, & Hicks 2013, respectively). Furthermore, research comparing the demographics of MTurk respondents to other online data collection services acknowledges similarities, if not slightly more diverse samples among MTurk workers when compared to standard Internet samples from survey tools like Survey Monkey (Buhrmester et al. 2011).

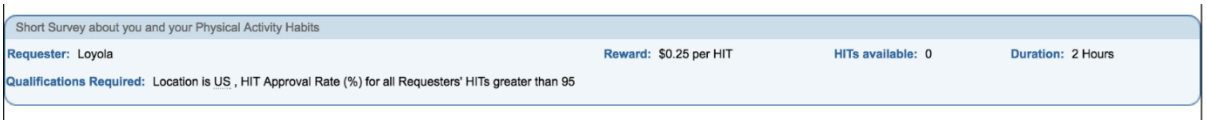
MTurk respondents are compensated on a task by task basis, based on the number of Human Intelligence Tasks (HITs) a worker performs (Rouse 2015). Researchers deposit money into an account and set the compensation amount prior to posting a task, which can either be awarded automatically or manually (Buhrmester et al. 2011). Prior research demonstrates that the compensation level (i.e. 2 cents versus 10 cents versus 50 cents) does not significantly impact the quality of the data collected but *does* impact the speed at which data is collected (Buhrmester et al. 2011).

The compensation rate for this experiment was informed by blog posts and online discussion boards where researchers discuss the ethics and fairness in paying participants. General consensus is that $.10/min is the minimum researchers should be considering to pay workers. Some suggest working off the U.S. minimum wage ($7.25/hour) which translates into

(~$.12/minute). It is important to recognize the 10% of each payment that Amazon takes and factor that into the compensation. Since the survey instrument is not expected to take more than 5-10 minutes, a time estimate that is supported in the cognitive interview data collected, the compensation rate was set at $0.25.

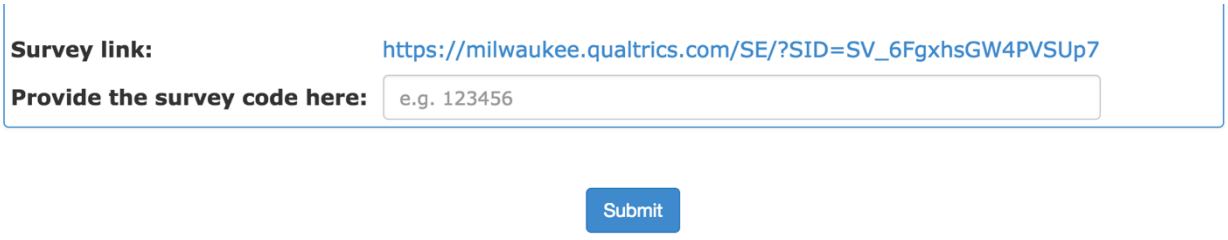
The HIT displayed for this project included very brief information on the study, compensation for taking the survey, and keywords to provide quick further information, see Figure 2.

Figure 2. Information Provided to MTurk Workers in HIT



When a worker clicks on the HIT, they receive an IRB approved letter serving as the consent to participate that includes information on the study, the risk and benefits of being a part of the study, details on the compensation process, and language on confidentiality and voluntary participation. For an example script, please see Appendix D. The script explains that by clicking on the survey link, participants are consenting to the study and are directed to the Qualtrics survey instrument, see Figure 3.

Figure 3. Visualization of HIT Concluding Information with Link to Qualtrics Survey



Qualtrics was the online survey instrument through which the questionnaire was distributed to participants and data was collected from respondents. Qualtrics was an ideal survey instrument developer because it provides necessary features for proper experimental design: block randomization and random code generator. The block randomization feature in Qualtrics

randomly allocated individuals to each condition. A second key feature is a random code generator that allows researchers to maintain confidentiality and still pay respondents. Participants received a random code upon completion of the survey that then becomes the validation code in MTurk to obtain their payment. In addition to the two questions in each of the eight conditions and clarifying question, the survey also includes: (1) a script for the opening screen; (2) pertinent demographic questions; and (3) an accuracy screening check question.

Measurement

Dependent variables. There are three measurements of moderate physical activity engagement that serve as the dependent variables. First, the reported number of *minutes a day* spent in moderate physical activity (i.e. answer to the second question of the experimental conditions). This dependent variable conceptualizes respondents' time use in a 24-hour span that is dedicated to moderate physical activity. Second, the reported number of *days in a week* spent in moderate physical activity (i.e. answer to the first question in the experimental conditions). This dependent variable conceptualizes the regularity with which respondents engage in health-benefiting physical activity. Third, the number of *minutes a week* a respondent reports engaging in physical activity (i.e. the multiplication of respondents' answers to both experimental questions). This dependent variable conceptualizes the weekly amount of physical activity engagement, which speaks to HHS requirements of 150 minutes a week of moderate physical activity (HHS 2008).

Gender and SES. Since the focus of the study is to explore gender and socioeconomic difference in who is engaging in physical activity, gender and educational attainment are the two focal independent variables. Both are operationalized as a dichotomous variable (female = 1, male = 0; college or more = 1, less than college = 0). Power analysis results indicated that it

would be difficult to detect group-level differences using other operationalizations of SES, such as differences in household income.

Additional measures. Theoretically driven demographic characteristics are included in the survey to further investigate how characteristics known to impact physical activity habits relate to each condition. More specifically, sociodemographic characteristics of respondents help unpack potential patterns in cause-effect relationships. Each respondent is asked a range of questions regarding their gender, education, income, employment status, marital status, age, self-reported health, race/ethnicity, occupation, and caretaker status. Because gender specialization of time is often exacerbated by the transition to marriage and parenthood (Bianchi et. al 2007; 2012), variables recognizing marital status (married = 1, not married = 0) and caretaker status (0 = non-caretaker, 1 = caretaker of child under six, 2 = caretaker of child over six and/or adult) are included in the analysis. Because access to moderate activity within paid work may be intensified through gendered SES occupational patterns, a variable recognizing occupational status (professional managerial, & sales = 1, admin & service = 2, education & healthcare = 3, manufacturing, maintenance, & agriculture = 4, other = 5) was used in the analysis.

According to Seo and Torabi (2007), race/ethnicity, age, education, household income, employment status, and marital status are all significant predictors of physical activity among U.S. adults. Table 13 presents descriptive statistics for the independent variables in the whole sample as well as within each condition. Additionally, an accuracy screening check informed by previous research was included to improve validity of the data by inspecting for non-human responses (e.g. automated computerized responses; Buhrmester et al. 2011). For an example of the survey structure and question wording, please see Appendix D.

Sample. Before opening up the survey to MTurk workers, I ran a power analysis to ensure results would detect statistically significant and meaningful differences between demographic characteristics of interest (gender and education). The power analysis helped ensure data collection efforts would result in adequate sample size for statistical analysis. Power analysis results demonstrate a sample size of 3,500 has the potential to illustrate very large effect sizes when investigating gender differences and small to intermediate effect sizes for educational differences. Furthermore, results suggest conceptualizing socioeconomic status through educational attainment will more likely lead to successful identification of significant effects compared to other measures of SES, namely household income. For a full analysis and results of the power analysis, see Appendix E.

With the goal of obtaining 3,500 responses (e.g., about 438 respondents per condition), I opened up the survey to MTurk workers on July 13, 2016. A total of 3,954 individuals responded to the survey over the course of about four weeks. Individuals who did not complete the survey (N = 160) were removed from the analytic sample. Additionally, individuals who reported responses outside of the maximum number of minutes (e.g. more than 10,080 minutes in a week; N = 0) or maximum number of days (e.g. more than seven days in a week; N = 144) were also eliminated from the analytic sample. Overall, 304 respondents were removed from the sample. Outliers were tested for leverage and influence using Cook's D and that analysis did not point to any cases that should be removed from the dataset. The final analytic sample is N = 3,652, which is divided fairly equally across all eight conditions, see Table 7.

Analytic Approach

Analytic strategy. The analytic strategy with these experimental data involves a series of regression analyses, using OLS regression for log-transformed minutes per week and negative

binomial regression for days per week. First, regressions of the dependent variables "minutes a week" and "days a week" on the experimental 1) factors and 2) conditions examines whether or not there are significant differences in physical activity among the experimental factors and conditions. Since the distribution of "minutes a week" is skewed, it is appropriate to take the log-transformed version of the dependent variable. For the count variable, "days a week," it was most appropriate to use negative binomial regression to account for the inflation of zeros reported. Regressions that include an interaction between the three factors indicate how and if there are systematic differences in the impacts of each factor on respondents reports of physical activity engagement, net of the number and type of physical activities that are included in the priming. Lastly, I examine whether the effects of the physical activity priming varies across gender and levels of education.

Hypotheses for this project are motivated by empirical and theoretical literature on gender, SES, and patterns of time use. To recap the arguments discussed in chapter two, empirical evidence and theoretical arguments regarding the mechanisms through which gender and SES influences physical activity suggests low SES individuals are more likely to engage in physical activity through job-related physical activity, while high SES individuals are more likely to engage in physical activity during leisure time. Women are more likely to engage in physical activity through house and care work than are men, while men are more likely to engage in physical activity through leisure time than are women; based on the literature, men are expected to engage in more health-benefiting activity at work compared to women. Thus, given the focus on physical activity during leisure time, current health surveillance questions would not be able to account for pathways to healthy activity that are taken on by women and lower-SES

individuals, potentially misrepresenting levels of physical activity engagement in the U.S. both overall and across social groups. From this understanding, I expect the following:

> (H1.) Overall, the amount of physical activity (number of days per week and minutes per week; "physical activity" in the hypotheses below) respondents report engaging in will vary across the experimental conditions in which different combinations of physical activity domains are primed. I propose an additive hypothesis in which more physical activity is reported on average as more domains of physical activity are presented.
>
> (H2.) Men will engage in significantly more physical activity compared to women when physical activity questions ask about *Leisure Activities*.
>
> (H3.) Men will engage in significantly more physical activity compare to women when physical activity questions ask about *Paid Work*.
>
> (H4.) Women will engage in significantly more physical activity compared to men when physical activity questions ask about *Housework and Dependent Care Activities (house/care work below)*.
>
> (H5.) Persons with higher levels of education (the component of SES I use in this study) will engage in significantly more physical activity compared to those with lower levels when physical activity questions ask about *Leisure Activities*.
>
> (H6.) Persons with lower levels of education will engage in significantly more minutes of physical activity compared to those with higher levels when physical activity questions ask about *Paid Work*.
>
> (H7.) There will be no significant difference between persons with higher and persons with lower levels of education when physical activity questions ask about *House/Care Work*.

A full descriptions of expected results by each condition for gender differences and SES differences can be found in Table 8.

IV. ATUS Data: Results and Discussion for Gendered Story of American's Physical Activity

The overall question driving this part of the project is: Do gender disparities in physical activity look different if the definition of what "counts" as health-benefiting physical activity is broadened beyond leisure activity? Current health surveillance systems only ask about leisure activity, which continues to depict a gender disparity in physical activity that favors men. Literature on gendered time constraints to leisure (Bianchi, Robinson, & Milkie 2006; Sayer, 2005), as well as access and availability of pure leisure (Beck and Arnold 2009; Mattingly and Bianchi 2003; Bittman and Wajcman 2000) suggest men are more likely to have the opportunity to engage in leisure. From this literature, the first of three hypotheses to be tested in this chapter developed:

> (H1a.) Men will engage in significantly more minutes of physical activity compared to women when moderate physical activity is operationalized as *Leisure Activities*.

Literature focusing on activity beyond leisure, however, predicts a change in gender disparities of physical activity. Key literature on gender specialization in time use point to housework (Bittman et al. 2003; Greenstein 2000; Gupta 2007; Perry-Jenkins & Folk 1994; Schneider 2011), adult care (Himes, Jordan & Farkas 1996; Laditka & Laditka 2000) and child care (England & Srivastava 2013; Raley et al. 2012; Sullivan 2013; Bose et al 1984, Strasser & Done 1982) as opportunities for health benefiting physical activity that are predominantly performed by women. From this literature, emerged one of the hypotheses tested in this chapter:

> (H2a.) Women will engage in significantly more minutes of physical activity compared to men when moderate physical activity is operationalized as *Housework/Dependent Care*.

Further research on the relationship between gender and housework and care suggest moderating impacts of parent status and having a young child. Despite a convergence on the

amount of time men and women spend on housework, women still spend more time in childcare than men (Bianchi et al. 2007; Raley et al. 2012; Connelly and Kimmel 2010). Therefore, it is expected that parent status exacerbates the amount of physical activity reported by women more than men for housework, childcare, and eldercare reports (Bianchi et. al 2007; 2012). Secondly, time use research recognizes a significant increase in time spent in childcare when the child is under the age of six (Bianchi 2012; Raley et al. 2012). Again, women's reports of physical activity are expected to increase at a greater rate when they are a parent to a child under six more than men. These two moderating hypotheses, rooted in the theory of gender specialization of time use, are tested in this chapter.

Lastly, research on the gender patterns of U.S. occupational systems suggest that gender segregation in occupation remains high even today (Cohen 2013; Reich, Gordon, & Edwards 1973; Reskin & Beilby 2005; Watts 1995). This segregation impacts physical activity reports because certain occupations provide better opportunity to engage in health-benefiting physical activity (Church et al. 2011). Overall, the number of occupations that are more labor-intensive tend to also be the occupations predominantly designated to men (Parry and Straker 2013. From this literature, a third hypotheses to be tested in this chapter is:

> (H3a.) Men will engage in significantly more minutes of physical activity compared to women when moderate physical activity is operationalized as *Paid Work*.

Two test these hypotheses, this chapter analyzes several means comparisons using the Mann-Whitney test to assess average minutes reported in moderate physical activity that have zero inflation. First, means comparisons for four different opportunities for healthy activity by gender and parent were compared. Next, means comparisons are run by gender and having a child under six are run to begin to assess whether parental status, or having a younger child,

intensifies a gender gap in physical activity. The next step in the analysis focuses on how gender disparities change, if at all, across four different summations of opportunities for moderate physical activity by utilizing OLS regression. To speak to goodness of fit, seemingly unrelated regressions and a post-hoc Wald's Test determine if gender is related to physical activity in significantly different ways across four different summations of health-benefiting activity. Finally, the two hypotheses rooted in gender specialization of time use that imply moderating impacts of parent status and having a young child are tested using OLS with interactions and predictive results by interaction. Collectively, each step of the analysis focuses on assessing the overall question of this project, which is: (1) Do the gender disparities in physical activity we know today significantly change when we change the definition of physical activity?

Table 9 displays the weighted descriptive statistics for the whole sample, the sample of individuals who never engaged in moderate activity (zero moderate activity), outliers, and the four dependent variables[6]. Significance tests indicate where demographics are significantly different from the nationally representative sample (whole sample). These differences provide a first glance into the changing profile of individuals who engage in different domains of physical activity (See Table 9).

First, I compare the whole sample to the 36,958 individuals who report engaging in zero minutes of moderate physical activity from any domain in a typical day. These individuals make up 42.6% of the sample. Compared to the nationally representative whole sample, this group has slightly more men than women, is comprised of more individuals working in Professional/Managerial and Administrative & Sales occupations, and tends to be slightly

[6] Important to note: Respondents in these sample are not unique from each other. They are subset of the whole sample. For example, a respondent who reported 10 minutes of Leisure activity will be included in the Full Activity, Leisure Activity, Leisure + Housework, and Leisure + Paid Work.

younger and less white. Individuals in the zero moderate activity group are also less likely to be married, there are fewer parents represented, and fewer of the parents in this group have children under six than in the whole sample. Therefore, they have significantly smaller household sizes. Finally, these individuals report significantly lower overall health. These empirical patterns track research findings explaining shifts in the contemporary professions towards more sedentary behaviors. Professional/Managerial and Administrative & Sales occupations are providing less opportunity for moderate physical activity. Further, these patterns confirm racial disparities understood by current health surveillance systems that suggest non-Hispanic Blacks are more likely to be completely sedentary.

Second, the third column in Table 9 displays descriptive statistics for the 4,528 outliers and compares these to statistics for the whole sample. Outliers were determined by assessing leverage and outlier status through Cook's D (see Appendix A). In comparison to the whole nationally representative sample, a higher proportion of men than women report the highest amounts of moderate physical activity in a typical day (66% of outliers compared to 48.4% of whole sample), a significantly higher percentage of the outlier cases have less education with much lower household incomes. Outlier cases also have a significantly higher percentage in the Manufacturing & Agricultural profession (48.1% of outliers compared to 16% of whole sample), are significantly younger on average, with a significantly higher percentage of Hispanic (20% of outliers compared to 14.5% of whole sample). Finally, outlier cases contain a higher proportion of married individuals, as well as having higher numbers of parents with children under six, and a larger household size. Unsurprisingly, the profile of those who report the most minutes of moderate physical activity—perhaps even unusual amounts--are individuals with characteristics previous theorizing and research already identifies as important, namely those whose paid jobs

are in the Manufacturing & Agricultural sector (which also makes being male and less educated more likely). Further, previous research tells us that individuals with particular characteristics (married, parents, with young children) are engaging in significantly more housework and child care, and we see that reflected here. These descriptive patterns suggest that time spent in paid work can make a strong difference in the number of minutes reported in moderate physical activity. Further, nothing in the pattern of descriptive results justifies omitting these outliers as they are pretty clearly a group of individuals accessing legitimate amounts of physical activity while at paid work. Sensitivity analysis will be more appropriate for understanding the influences of paid work on accounts of health benefiting physical activity.

The next four columns provide profiles for who is reporting any moderate activity spent in different domains, based on theoretically different opportunities to engage in health activity. The *Leisure* dependent variable represents minutes reported by respondents spent in moderate physical activity during exercise, activities in a hobby, or volunteering. The group of individuals who report at least 10 minutes in these activities are significantly more male (54% of those engaging in *Leisure* compared to 48% in whole sample), significantly higher percentage of more educated individuals with significantly higher household income, are significantly older, significantly more white, are significantly more married but fewer parents or parents of young children, have smaller household sizes and report significantly higher overall health. This profile aligns with previous literature that contends men have greater opportunity for leisure time, while higher SES (educational attainment and income) have greater time and monetary resources to access exercise leisure time.

The next column represents the demographic characteristics of the second summation of physical activity, *Leisure & Housework/Dependent Care*. This dependent variable represents

minutes reported spent in moderate physical activity during exercise, activity in hobbies, volunteering, as well as interior and exterior housework, and child/elder care. Gender profiles shift in the expected way, after including housework and care: individuals reporting at least 10 minutes in leisure or housework/dependent care are significantly more female compared to a nationally representative sample (55% of those engaging in *Leisure & Housework/Care* compared to 51% of representative sample). Furthermore, these individuals report significantly more education with significantly higher household income, are significantly older, whiter, married with children, including children under six and report significantly higher overall health.

The third summation of physical activity combines leisure activities and moderate activity spent at paid work. According to literature, we would expect this subsample to be more male and less affluent, since men are more likely to access leisure time physical activity and both men and those in lower-SES positions are more likely to hold occupations with more opportunity for health-benefiting activity. This expected pattern is what we see in the descriptive results. Individuals who access moderate activity through *Leisure & Paid Work*, compared to a national sample, are significantly more male, have a significantly larger percentage with less than a high school education or high school degree, but have a significantly higher income, with a much higher percentage in Manufacturing and Agricultural occupations, are older, much more white, more married, but are not parents nor have children under six so have a smaller household size and report significantly higher overall health.

Lastly, the fourth dependent variable combines any possible activity that takes moderate physical exertion including leisure, housework, child/elder care, exercise, paid work, or travel. Individuals who access at least 10 minutes of moderate physical activity in any domain represent 57.6% of the whole analytic sample. This group is more female, with a slightly higher household

income, are more unemployed or not in the labor force, are slightly older, more white and Hispanic and less black and "other," are more married, with children, and especially children under the age of six, which translates into a larger household size and slightly higher overall health.

Overall, these descriptive comparisons suggest that the profile of who is accessing moderate activity in different domains changes significantly, depending on what activities are considered. A nationally representative sample of the United States demonstrates that different people access health-benefiting activity through different pathways. Further analysis helps unpack how these demographic characteristics are related to the different pathways to moderate physical activity.

The next table, Table 10, provides insight into which activities are represented by each dependent variable, as well as the average minutes reported by two key independent variables: gender and educational attainment. For interpretative purposes, as well as the ability to compare to the experimental study results (see Chapter 6), educational attainment was dichotomized to those with a College degree or more and those who have less than a college degree. Mann-Whitney tests by education across gender and by gender across educational attainment test whether these groups are engaging in significantly different amounts of activity within different domains of physical activity (See Table 10).

First, the dependent variable *Leisure* is comprised of health-benefiting activity that individuals identify separate from paid and unpaid work, namely exercise and hobbies (i.e. gardening and volunteer work). I will be interpreting results for gender and educational differences by each activity (rows). For *Leisure*, I would expect to see men with higher education engaging in the most activity, based on literature. Results show this is partially true. Men, on

average, report significantly more minutes compared to women, regardless of educational attainment (difference of 13.1 minutes for College educated and 21.3 minutes for Less than College educated). For women, expected educational differences hold: those with a college education report significantly more minutes in leisure compared to those with less than a college education (24.8 – 19.1= 5.7-minute difference). Contrastingly, the expected educational difference reverses for men: those with less than a college degree engage in significantly more leisure (40.4 – 37.9 = 2.5-minute difference). These results speak to and support hypotheses H1a, men report significantly more minutes of physical activity when the definition is restricted to leisure-only activities. Results further demonstrate that these gender disparities uphold regardless of educational attainment.

The second summation of activity combines all moderate activities associated with leisure with activities related to *Housework and Dependent Care*. The two new categories of activity are housework, which includes interior and exterior cleaning as well as household repairs and maintenance, and care, which includes active care for adults and children. Reviews of the literature predict gender differences favoring women in both activity categories (H2a), but no significant educational differences (H2b). Time use research, however, predicts men in more affluent positions are more likely to dedicate more time to childcare and housework compared to men in less affluent positions (H2c). For housework, gender patterns confirm hypothesis H2a. Women, regardless of educational attainment, engage in significantly more housework compared to men (difference of 4.3 minutes for College educated and 9.3 minutes for Less than College educated). In contrast to predictions from H2b and H2c, there are significant educational differences in housework reports, both for women and for men that suggest less educated individuals engage in significantly more minutes of housework compared to more educated

individuals (difference of 5.9 minutes for women and 0.9 minutes for men). The second activity category that comprises Housework/Dependent Care is active care for children and adults (i.e. playing games and sports with household and non-household children). Gender patterns are maintained, further supporting H2a that women will engage in more minutes when physical activity is defined as housework/dependent care. Women report significantly more minutes in care, regardless of educational attainment (difference of 1.7 minutes for College educated and 1.0 minutes for Less than College educated). Again, hypothesis H2b is contradicted, as there are significant educational patterns in child/adult care. Unlike housework, however, care activities provide support for hypothesis H2c, men with higher education engage in significantly more care than their less educated counterparts (1.5-minutes difference). Last, when leisure and housework/dependent care are summed, there is a convergence in average minutes across gender and educational attainment. Men with less than a college education report the highest average minutes in Leisure and/or Housework/Dependent Care (70.8 minutes), followed by women with a college degree (69.3 minutes), men with a college education (69.2 minutes), and women with less than a college education report the lowest number of physical activity (68.7 minutes). Therefore, it appears gender disparities and educational disparities in physical activity are more prominent in leisure activity, outstripping the reversed gender relationship among housework and care reports.

The third summation of activities combines leisure activities and any moderate activity reported at paid work. Previous literature suggests men and lower-SES individuals will report more health-benefiting activity compared to their female, higher-SES counterparts (hypotheses H3a, H3b, H3c). All three hypotheses are strongly supported by results in Table 10. Gender differences uphold regardless of educational attainment, with men reporting significantly more

minutes in paid work activity (difference of 23.5minutes for College educated and 75.3 minutes for Less than College educated), supporting hypothesis H3a. Educational attainment patterns uphold regardless of gender with less educated individuals engaging in significantly more health benefiting activity through paid work (H3b). Results are especially pronounced for less educated men. Men with less than a college degree engage in an average of 52.1 more minutes of moderate paid work compared to men with a college degree or more. This supports hypothesis H3c regarding the interrelatedness of gender and socioeconomic patterns in paid work. Totals for the third dependent variable sum activity in leisure and in paid work. Unsurprisingly, men with less than a college degree report the most moderate activity by over 50 minutes (103.4 minutes), followed by men with a college degree (51.3 minutes), women with less than a college degree (28.1 minutes) and lastly women with a college degree or more (27.8 minutes).

The final summation of healthy activities is *Full Activity*, which adds any moderate activity across any domain that lasts at least 10 minutes. The only activity category that is added, which has not already been discussed is active transportation. This category averages less than a minute across gender and educational status, with men engaging in slightly more active transportation and men with less than a college education engaging in the most active transportation (.675 minutes). Looking at *Full Activity* totals, men with less than a college education report the most minutes in health-benefiting activity (134.5 minutes) and women with a college education report the fewest minutes (72.4 minutes). Second highest reported comes from men with a college degree or more (83.1 minutes) and third highest are women with less than a college education (78.0 minutes).

With initial insight into whether hypotheses are upheld, next steps are to investigate theoretical perspectives on the ways in which gendered patterns in physical activity emerge. A

theoretical perspective, gender specialization of time, suggests parental status, and specifically parents of younger children exacerbate the gender disparity in physical activity. The next table, Table 11 and associated Figures 4 and 5, provides results for average minutes under each of the four variation of physical activity definitions by gender and parent status. Wilcoxon (Mann-Whitney) tests by parent status across gender and by gender across parent status provide statistical tests for whether these groups are engaging in significantly different amounts of activity within different domains (See Table 11 and Graphs 4 and 5).

Gender specialization of time use suggests parents' leisure time is more constrained than the time of individuals who are not parents. This is partially confirmed by results in Table 11. For both men and women, parents report lower average minutes spent in leisure activity. But the difference between parents and non-parents for women is significant (5.3-minute difference), but the difference among men is not (2.9-minute difference). Support for hypothesis H1a remains; men are reporting significantly more minutes spent in leisure time compared to women; here, regardless of parent status.

Assessment of the means comparisons for leisure and housework/childcare give evidence supporting the gender specialization hypothesis. Overall, parents are engaging in more leisure and housework/childcare physical activity, but the disparity between parents and non-parents is significantly larger for women than for men (11.4-minute difference and 4.9-minute difference, respectively). This suggests parent status intensifies reports of physical activity for women more so than men. These moderating relationships can be visually seen in Figures 4 and 5. Further, evidence in Figure 4 supports hypothesis H2a because women (not men) who are parents report the most average minutes when housework/care is added to the conceptualization of physical activity (75.5 minutes).

Gender differences in average reports of time spent in leisure and paid work favor men overall. Regardless of parent status, men are engaging in significantly more minutes of physical activity, supporting hypothesis H3a. The differences across parental status are more drastic for men than for women. Men who are parents report an average of 15 more minutes in leisure and paid work compared to men who are not parents. The disparity for women is reversed and smaller. Women who are not parents report 3.6 more minutes in leisure and paid work compared to women who are parents. For a full definition of physical activity, overall men engage in more minutes of physical activity and parents engage in more moderate activity. The gender disparity between parents is significantly larger than non-parents (50.3-minute difference and 40.3-minute difference, respectively).

The next table, Table 12 and associated Figures 6 and 7, provides results for average minutes under each of the four variation of physical activity definitions by gender and presence of young child. Wilcoxon (Mann-Whitney) tests by presence of young child across gender and by gender across presence of young child provide statistical tests for whether these groups are engaging in significantly different amounts of activity within different domains (See Table 12 and Figures 6 and 7).

Previous literature suggests women with children under six have less access and opportunity for leisure activities and, rather, significantly more time opportunity in housework and childcare, especially compared to men or women without a child under six years old. Results in Table 12 support the gender specialization theory. Under the leisure conceptualization of physical activity women, overall, reported fewer minutes, and women with a child under six reported the least amount of time in leisure activities. This gender disparity provides further evidence for hypothesis H1a, which suggests men will engage in more leisure than women. The

leisure disparity for child status is much larger for men than for women, though both are significant. Women without a child under six report 7.6 more minutes of leisure, while men without a child under six report 14.1 more minutes compared to those with children under six. Disparities that favor individuals without children under six reverse when moderate physical activity in housework and care is considered. For the second conceptualization of physical activity that adds leisure and housework/dependent care, women with a child under six now report the highest number of minutes (100.5 minutes), a complete reversal from the leisure-only pattern. Regardless of gender, those who have a child under six report significantly more minutes of activity in *Leisure & Housework/Dependent Care* compared to those who do not have a child under six, with a larger disparity among women than men (37.4-minute difference for women and 14.6-minute difference for men). Just as the gender specialization literature suggests, parents of young children are engaging in significantly more moderately active housework and childcare activities, and that difference is even stronger for women than for men.

Analysis of patterns related to the third (*Leisure + Paid Work*) and fourth (*Full Activity*) dependent variables continue to provide insight into how parenting young children impacts gender disparities in physical activity. For the third heath-benefiting activity summation, leisure and paid work are added together. Again, we see significance across gender and child status. Overall, men engage in significantly more minutes of leisure and paid work, regardless of child status (82.2-minute difference for those with a child under six and 57-minute difference for those without a child under six). Interestingly, men with a child under the age of six are engaging in significantly more minutes of moderate activity at work and in leisure compared to men who do not have a child under six (16.9-minute difference). The opposite relationship is true for women.

The fourth summation (*Full Activity*), which accounts for all moderate activity in all domains, demonstrates men with a child under six are those reporting the most minutes in moderate activity (159.7 minutes), followed by men without a child under six (114.2 minutes), next women with children under six (107.6 minutes), and women without a child under six report the fewest minutes in physical activity (71.1 minutes). Overall, results provide evidence supporting the gender specialization of time. Gender specialization of time use suggests men and those without small children are most likely to have opportunities for time in leisure, which was clearly demonstrated in leisure results. The theory also contends women and those with young children are more likely to dedicate time to housework and care, which was supported results from the summation of leisure and housework/dependent care.

OLS Regression

Next, regression analysis further assesses the gendered time use story across different domains of physical activity, controlling for known correlates of physical activity and time use. Table 13 presents results from four OLS regressions with four different dependent variables regressed onto 13 variables. Focal independent variables will tell the story of how gender and socioeconomic status shape pathways to health-benefiting activity. This chapter will focus on the gender story (for the socioeconomic story, see Chapter V).

The first column shows the coefficients for the relationships between each variable and the number of minutes reported in *Leisure* moderate activity (exercise, hobby activities, volunteering) (See Table 13). According to literature and hypothesis H1a and H1c, men are expected to report significantly more minutes in leisure-only activity. Results confirm this; women report 20 less minutes of health-benefiting activity compared to men when leisure activities are considered. All three indicators of socioeconomic standing demonstrated significant

disparities in physical activity time between lower- and higher- SES individuals. First, those with higher educational attainment are engaging in less leisure activity compared to those with less than a high school degree. Those with a high school degree report 4.6 fewer minutes in leisure compared to those with less than a high school education. For those with some college, the disparity is even larger (6.2 minutes), while the disparity decreases for college and more than college (4.6 minutes for College degree, and 3.6 for those with more than a college degree). Income coefficients indicate that those with larger household incomes report more minutes in leisure activity, supporting my hypothesis that higher-SES individuals engage in more leisure activity (H1b). When it comes to exercise, hobby activities, and volunteering (*Leisure*) the unemployed and those not in the labor force report significantly more minutes if health-benefiting activity compared to their employed counterparts in all occupations. Disparities range from 18 minutes difference between Professional/Managerial occupations compared to unemployed and 15 minutes less minutes among Admin, Service, Maintenance, and Agriculture.

There is no significant difference in the amount of leisure time activity spent across ages, nor is there a parabolic relationship. Race confirms previous research: White individuals have significantly greater access to health-benefiting leisure activity compared to Hispanic and Black individuals. Specifically, Hispanics report 7.4 less minutes compared to Whites while Blacks report 12.9 less minutes compared to Whites. The final four controls that significantly account for the variation in leisure time physical activity are marital status, having a child under the age of six, household size, and general health reports. All relationships align with previous research, those who are married engage in 4 more minutes of leisure compared to those who are not married. Further, those with a child under the age of six are engaging in significantly less leisure (9.4 fewer minutes) while those reporting larger household size engage in less leisure activity.

Finally, those with better health engage in significantly more minutes (5.4 more minutes). Year and Weekday were included in the model to account for time and period. Neither were expected to demonstrate significance, yet both did. Interestingly, individuals in 2006 reported significantly less minutes in leisure activity compared to those in 2007, 2008, 2010, and 2012. Additionally, significantly less leisure was reported on weekdays compared to weekends, which does align with time use research that suggests individuals have more time for non-paid work activities on the weekends (Saturday and Sunday) more than the weekdays.

The second summation of activity (*Leisure & Housework/Care*) adds to leisure activities (exercise, hobby, volunteering) all health-benefiting physical activity in housework and care (exterior/interior cleaning and repairing, caring for adults and children). Hypothesis H2a contends that including housework/dependent care activities will reduce the gender gap in physical activity because women are expected to access physical activity to a greater extent in the unpaid work domain. Results validate this conjecture; the gender disparity is smallest under the leisure and housework/care summation. Women report 4.97 less minutes than men which is a smaller gender gap than we observed when leisure-time only activities were considered. Patterns in SES coefficients here indicate relationships to time in health-benefiting activity are similar to those for leisure-only activity. Those who attended some college, have a college degree, or more than a college degree report significantly less minutes engaged in leisure and/or housework/dependent care compared to their counterparts who did not receive a high school degree. This time, household income is not significantly related to engagement in leisure & housework/dependent care. Unemployed respondents report significantly more minutes compared to their employed counterparts in all other occupations, but now the disparities have

increased, ranging from 35.4 less minutes for Maintenance & Agriculture to 44.9 minutes less for Professional/Managerial.

Further, age demonstrates significance and a parabolic relationship in this equation. Since the squared term is negative, the parabola for the relationship between age and leisure & housework/dependent care opens downward. This means those who are younger and much older are engaging in fewer minutes of leisure and housework/childcare moderate physical activity. According to the algorithm for the access of symmetry, individuals engage in significantly more minutes of physical activity until 50 years old (-b/2a = -(2.04/2*-.02)), when folks begin to engage in significantly less minutes of activity as they get older. White individuals are engaging in significantly more leisure and housework/dependent care compared to all other race/ethnicities.

There is still a significant disparity between married individuals and non-married people that increases the divide between married and not-married (married engage in 10.7 more minutes of physical activity). Adding housework/dependent care drives the significant disparity for parental status; parents engage in 4.7 more minutes of leisure and housework/care compared to those who are not parents. For those caring for a young child, adding housework/care reverses the disparity previously established in leisure-only activity. Now those with a child under six are reporting significantly *more* physical activity (25 minutes more). Household size does not influence reports of leisure & housework/dependent care. Those who report better overall health report significantly more moderate activity. Year only had one significant difference between 2007 and 2006, and day of the week did demonstrate that individuals interviewed on weekdays report significantly fewer minutes in leisure and/or housework/dependent care.

My third conceptualization of physical activity adds moderate activity at paid work to leisure activities (*Leisure & Paid Work*). In Table 13, 100% of the minutes reported in paid work was accounted for in the calculation. For a sensitivity analysis of how relationships change depending on how much of one's paid work activity is counted as health-benefiting activity, see Table 14 which will be explained in detail in the next section. The *Leisure & Paid Work* equation produces the largest gender disparity compared to all other definitions. Women report 28.8 fewer minutes in leisure and/or paid work compared to men, which confirms hypothesis H3a that predicts men will report more time spent in moderately active physical activity when paid work is condisered. The relationship between educational attainment and moderate activity holds, those with less than a high school degree report significantly more physical activity compared those with higher education. Those with a higher household income report .053 more minutes for every $1000 increase of income. Notably, the relationship between occupation and engagement in leisure and paid work tells a different story. Professional/Managerial respondents engage in 22.7 less minutes of moderate physical activity compared to unemployed individuals. Administrative & Service respondents report 16.4 less minutes compared to unemployed individuals. Maintenance & Agriculture respondents, contrastingly report 141.2 *more* minutes of health-benefiting physical activity compared to unemployed individuals. This demonstrates how strongly occupation impacts physical activity reports in paid work. Finally, those in an "Other" profession report 17.4 less minutes.

Age demonstrates a significant parabolic relationship. With a negative coefficient for the squared term, those who are younger and much older are engaging in fewer minutes of leisure. According to the algorithm for the access of symmetry, individuals engage in significantly more minutes of physical activity until 48.9 years old (-b/2a = -(.489/2*-.005)), when folks begin to

engage in significantly less minutes of leisure and paid work activity as they get older. For race, Black respondents engage in 19.9 fewer minutes of physical activity compared to their White counterparts. Those who identify in the "Other" category report 6.4 minutes less than White individuals. Those who are married report significantly more minutes in leisure and paid work, but there is no significant difference in physical activity engage for parents versus non-parents. Having a young child, however, leads to significantly fewer minutes (3.73 minutes) of physical activity. Household size also has an inverse relationship with leisure and paid work physical activity. Consistently, however, general health significantly influences one's engagement in moderate activity, with those reporting better health also reporting significantly more minutes (6.11) of physical activity. There are no period effects for year of data collection. Finally, weekday impacts demonstrate significance. Those being interviewed on a weekday are reporting significantly more minutes compared to weekends.

The fourth regression in Table 13 displays relationships between 13 independent variables and the number of minutes spent in *Full Activity*, which sums any activity from any domain that requires three METs. The gender story is consistent, in that men engage in significantly more physical activity than women, but the gender gap is smaller that the gap estimated when *Leisure Only* activity is assessed. According to the results from the *Full Activity* model, women report 14.2 fewer minutes of physical activity compared to men. For socioeconomic factors, educational attainment shows that those with less than a high school degree engage in significantly more minutes of physical activity compared to their more educated counterparts. Household income is positively and significantly related to *Full Activity*. For occupation, all professions report significantly fewer minutes in physical activity compared

to unemployed individuals, except Maintenance & Agriculture. Those in Maintenance & Agriculture report 120 *more* minutes of activity compared to unemployed.

Age significantly influences variation in number of minutes reported in all forms of moderate activity, and the relationship is parabolic. Individuals engage in significantly more minutes of physical activity until 49.8 years old (-b/2a = -(2.59/2*-.026)), when folks begin to engage in significantly less minutes of all moderate activity. White respondents report significantly more minutes compared to Black and Other respondents (36.1 fewer minutes for Blacks and 13.0 fewer minutes for "Other" individuals). Variables tracking family experiences (marital status, parent status, presence of a young child) operate in the way expected by time use research. Married individuals report 5.71 more minutes in health-benefiting full activity compared to those who are not married. Parents report 6.56 more minutes in physical activity compared to those who are not parents. Those with a child under six engage in an average of 30.8 more minutes of physical activity compared to those who do not. Household size has an inverse relationship with full activity, where individuals with larger household sizes report significantly less activity. In line with literature, those reporting better health also report significantly more minutes in health-benefiting activity.

Paid Work Sensitivity Analysis

Results from Table 13 demonstrate that the size of a gender disparity in physical activity that favors men fluctuates based on the range of moderate physical activities (housework/dependent care or paid work) that are assessed. Completing housework/dependent care activities significantly reduces a gender gap in physical activity while engaging in paid work activities significantly widens that gap. The widening from paid work documented in Table 13, however, is based on estimates that assume every minute reported at paid work is producing

moderate physical activity. It is a strong assumption to believe every minute spent at paid work is moderately active, requiring three METs. Previous research raises doubt about whether this is a solid assumption. To better understand how time at paid work might shape physical activity reports, Table 14 presents three versions of the *Full Activity* variable and three versions of the *Leisure & Paid Work* variable. In both cases, I include the same regression results reported in Table 12 that assume 100% of paid work minutes are moderately active. The next two models assume that 50% and 0% of the minutes reported at paid work are moderately active. These two new calculations assume individuals spent half their time at paid work in moderately active activity or none of their time, respectively.

Important to this sensitivity analysis are the impacts on the gender gap in physical activity reports. As literature suggests and results from Table 13 confirm, including moderate activity at paid work benefits men more than women, since they are more likely to be in a labor-intensive occupation. Through sensitivity analysis, I hope to illustrate the ways in which the gender differences in physical activity reports shift when different assmuptions are made about how much paid work activity is actually health-benefiting (See Table 14).

I focus on the gender results as this chapter concentrates on the gender story and the ways in which the gender disparities change. First, regardless of the amount of paid work included, men consistently report more minutes spent in health-benefiting physical activity. The gap between men and women, however changes depending on the amount of paid work included. For *Full Activity*, with 100% of paid work, women report 14.2 fewer minutes of moderate physical activity than men. When we assume that half of paid work time (50% paid work) incorporates moderate physical activity that gap shrinks, with women reporting 9.79 fewer minutes of physical activity, a difference of 4.41 minutes. Not surprisingly, the gap decreases even more

when we assume that no moderate physical activity at paid work is taking place (0% paid work)[7]. Women report 5.38 fewer minutes in health-benefiting physical activity, a difference of 8.82 minutes compared to results that assume 100% of the minutes in paid work allow for moderate physical activity.

The closing of the gender gap continues with sensitivity analysis for *Leisure & Paid Work*. As with *Full Activity*, assuming 100% of paid work time is spent engaged in moderate physical activity creates the biggest gender gap. Women report 28.8 fewer minutes in moderate leisure and paid work activity compared to men under this assumption. When we assume 50% of paid work is allowing for moderate physical activity, women report 24.4 fewer minutes compared to men, which reduces the gender gap by 4.4 minutes. Finally, the gender gap closes even more when 0% of paid work is included. Women report 20 fewer minutes of physical activity in this case (which amounts to omitting the influence of paid work on physical activity) compared to men. The gender disparity in physical activity reports reduces by 8.8 minutes going from including 100% to 0% of paid work moderate activity.

Sensitivity analysis confirms that the inclusion of paid work moderate activity impacts the gender gap. The more paid work that is accounted for as moderately active, the larger the gap grows that favors men. Important to note, no other demographic disparity changes as much as the gender disparity, except for the disparity between Maintenance/Agricultural employees and those who are unemployed. In other words, the gender story, more than any other demographic disparity (i.e. race, income, parent status differences, etc.) is *most impacted* by assumptions about opportunities to engage in health benefiting activity at work.

[7] The Full Activity summation includes minutes spent in moderately active transportation (i.e. biking and walking to a destination), which is why "Full Activity" without paid work is not identical to "Leisure + Housework/Dependent Care" summation.

Seemingly Unrelated Regression

The next step in the analytic strategy is to simultaneously estimate all four regression models and test the influence of gender across them using seemingly unrelated regression (SUR) techniques. Since error terms are most likely related (with the potential for the same respondents to be accounted for in several dependent variables), seemingly unrelated regressions accounts for this by allowing error terms to correlate (UCLA 2016). An addition benefit of SUR is that the post-hoc Wald Tests allows for simultaneous assessment of equality across each of four regressions, while also accounting for correlated error terms. Thus a SUR model is run for two reasons: (1) to check that results from the simultaneously estimated equations track with OLS results in terms of direction and significance; and (2) to generate post-hoc tests that allow me to assess the influence of gender across all four dependent variables simultaneously.

Results from the SUR model simultaneously estimating equations for *Leisure Only*, *Leisure & Housework/Care*, *Leisure & Paid Work*, and *Full Activity* are consistent with results from OLS regressions (SUR regression not shown). Table 15 presents post-hoc Wald test results for the effect of gender in all four equations.

The first row in Table 15 presents individual tests for including gender in each regression. All are significant, meaning that the inclusion of gender into each model significantly improves our understanding of the variation in each of the four definitions of physical activity. The second row provides post-hoc results for the simultaneous test for differences in the relationship between gender and physical activity defined in four different ways. Wald Test results confirm each relationship between gender and a physical activity is significantly different, significant at $p < .001$. These results help confirm the overarching question for this chapter: Does the gender gap significantly change when the definition of physical activity changes? Results

from regressions confirm that gender disparity looks different depending on what activities "count" as physical activity, but what the SUR analysis adds is confirming that these disparities are significantly different from *each other*. In other words, gender is operating significantly differently when we are talking about leisure or housework/dependent care or paid work.

Interactions

Different theories on the ways in which gender patterns influence physical activity habits suggest interactions between gender and other demographic characteristics that will either mitigate or intensify physical activity disparities. Gender specialization of time use would point to having a child under six and parental status as key characteristics that interact with gender when predicting physical activity habits. These two interactions were tested for each of the four dependent variables in OLS regressions. Post hoc tests determined which interactions are significant. Based on these post hoc tests, interactions were included in each of the four models. Table 16 presents the results for an OLS for the four dependent variables (*Leisure*, *Leisure & Housework/Care*, *Leisure & Paid Work*, *Full Activity*), including interactions (See Table 16).

The focus of this section is to assess the impacts of interactions, so interaction results will be the only results discussed from Table 16. First, post hoc Wald tests were used to determine if the two interactions should be included in the model. All of the interactions significantly accounted for variation in all four dependent variables except one. The interaction between gender and having a child under six did not significantly account for the variation in leisure and paid work, therefore, this interaction was not included in the model.

Minutes of leisure-based physical activity (*Leisure Only*) were predicted by the interaction between gender and parent (of a child over five) as well as by gender and having a

child under six to help understand how parent of child over five status is moderating the relationship between gender and different definitions of physical activity. The interaction results are depicted in Figure 8.

For the relationship between gender and leisure-based physical activity, parent of child over five status decreases the amount of minutes engaged in leisure for women (0.85-minute difference between parents and non-parents). When housework/dependent care is added to what counts as physical activity (second set of bars in Figure 8) the moderating effects for parent status reverse. Being a parent produces a difference of .96 more minutes for women that are parents, whereas men who are parents report 4.66 more minutes compared to men who do not have a child over five. Overall, being a parent increases reports of leisure & housework/dependent care for men more than women.

For gender differences in reports of physical activity in leisure and paid work, parent of children over five status varied much more for men than women. There is a 1.77-minute difference between women who are parents and women who are not parents (44.89 predicted minutes compared to 46.67 predicted minutes) compared to the 7.52-minute difference between men who are parents compared to men who are not (79.33 predicted minutes compared to 71.81 predicted minutes). Being a parent *decreased* reports of leisure and paid work for women but *increased* reports for men. For the fourth definition of physical activity (*Full Activity*), parent status increases physical activity reports overall, but varies in how much for women and men. For women, being a parent increases reports of healthy activity by 5 minutes (123.7 predicted minutes compared to 118.7 predicted minutes). For men, being a parent increases reports of healthy activity more (8.3 minutes).

The second interaction tested was the interaction between gender and having a child under the age of six. Gender specialization of time use research suggests that having a young child will have moderating effects on men and women's engagement in housework and childcare. Women are expected to bear the larger burden of housework *and* childcare with the presence of a young child more than similarly situated men. Predicted minutes spent in each definition of physical activity were calculated by gender and by having a child under six to illustrate the moderating impacts based on interactions in the OLS regressions. Figure 9 provides these results.

For engagement in leisure physical activity, having a child under the age of six decreases the number of minutes compared to those people who do not have a child under six. This decrease, however, is more dramatic for men than for women (10.09-minutes decrease compared to 7.27-minute decrease). Similar to the impacts of being a parent, the impact of having a child under six reverses when housework and dependent care is added. Having a young child increases the number of minutes reported in physical activity when it is defined as *Leisure & Housework/Dependent Care*. As gender specialization of time use theory suggests, this increase is much more dramatic for women (23.29-minute increase) than for men (20.46-minute decrease).

As mentioned previously, having a child under six did not demonstrate significant moderation effects for leisure and paid work according to the Wald Test and was, therefore, not included in the model. For the final summation of physical activity, full activity, having a young child continues to demonstrate moderating impacts that increase for women more than men. There is a 39.1-minute difference between women who do not have young children and those that have young children. Men experience a 36.2-minute difference between those who have a

young child and those who do not. These findings confirm gender specialization of time use assertions.

Discussion

Does accounting for well-documented patterns of gender specialization in paid work, housework, and dependent care in the measurement of physical activity reduce or close the gender gap in the likelihood of meeting physical activity requirements? Findings suggest that, yes, when time spent on *any* form of moderate level physical activity is accounted for, including time spent on paid and unpaid work, the gender gap in physical activity is significantly smaller than previous research only focusing on leisure activity suggests. The current approach infused an understanding of two bodies of literature, (1) gender specialization in time use that contrasts time in paid and unpaid work activities; and (2) gender differences in the understanding and experiences of leisure.

As a whole, these two streams of literature suggest that if physical activity estimates included housework/dependent care activities, the gender gap in physical activity would decrease. Evidence from the ATUS consistently demonstrates this. Further, what gender specialization theory suggests is important socio-locational differences indicating heightened gender specialization in housework and care (e.g. being a parent, having a young child) exacerbates women's participation in moderate activity in, especially, unpaid domestic tasks (Bianchi, Robinson, and Milkie 2007; Bianchi, Sayer, Milkie, Robinson 2012). Results only partially support these assertions. Having a young child intensifies women's reports of activity more drastically than men, which supports hypotheses. Yet, predictive minutes when physical activity is defined by *Leisure & Housework/Dependent Care* demonstrates that being a parent has larger modifying impacts that intensify men's reports of physical activity more than

women's reports. This is contrary to hypotheses from gender specialization literature. One potential explanation could be that leisure is still a driving force in men's reports of *Leisure & Housework/Dependent Care*, moreso than the minutes spent in housework/dependent care. Therefore, men as parents have more to gain from adding housework and care rather than women, who are starting with much less minutes in leisure before adding minutes in housework/dependent care.

Second, previous literature suggests that adding paid work to the definition of physical activity would enlarge the gender gap. Indeed, results consistently demonstrate that when health-benefiting physical activity at work is included in the definition of what counts as physical activity, the gender gap favoring men widens. As sensitivity analysis in this chapter demonstrates (Table 14), assumuptions about the amount of time spent in labor-intensive occupations that is considered health-benefiting significantly changes estimates of the size of the gender gap. Adding paid work increases men's reports of physical activity and leads to larger disparities in physical activity reports that favor men. Just as important as the inconsistencies in the size of gender gaps, evidence from this sensitivity analysis clearly demonstrates a pathway some men can use to access health-benefiting physical activity. That men with other markers of inequality (lower education) may have better access to opportunities to engage in moderate physical activity at work, should certainly be considered in policy and program discussions about how best to promote physical activity among groups in the United States.

Interestingly, however, when *all* moderate activity is taken into account, gender disparities in physical activity decrease, despite the inclusion of paid work. These findings answer an overarching question for this project: Do we have different understandings of gender

disparities in physical activity when we broaden the definition of physical activity to include all health benefiting physical activity? The answer is, to some degree, yes. The gap in physical activity shrinks, but in the end is still there, suggesting that men do engage in more physical activity than women, on average.

What is clear from the research is that men and women access moderate activity in different ways. Drawing on time use data from the ATUS, I am able to document that accounting for time in all moderate to vigorous physical activities, including time in paid and unpaid work, tells a different story about an important activity shaping gender and health. When it comes to gender differences in pathways to physical activity, men are more likely to access health-benefiting activity through leisure and paid work while women are more likely to access moderate physical activity through housework and care for children and adults. Further investigation finds socio-locational attributes that exacerbate or mitigate these relationships. Occupation deters women's access to moderate physical activity more so than men, meaning occupations tend to provide women with fewer opportunities to engage in health-benefiting activity, whereas men are not as impacted by their job status. Additionally, having a child under the age of six intensifies women's access to physical activity much more than men such that women report *more* moderate activity than men when both have a young child. As a whole, these patterns highlight what sociologists have documented repeatedly: gendered patterns of time use create different opportunities for men and women to engage in a range of activities, including health-benefiting physical activity.

The reliance on self- reported physical activity responses rooted in leisure activities points to gender disparities in physical activity that favor men, but these results suggest men and women access healthy activity through different pathways that are otherwise completely

unexamined by current health surveillance systems. This research concludes that acknowledging how moderate physical activity is shaped by an entrenched gender system provides a better opportunity to understand how and where men and women are accessing physical activity. Incorporating the gender specialization in paid and unpaid work into research designs clearly tells a different story about gender and physical activity in which women would be better positioned than previously thought to meet physical activity guidelines. Thus, current physical activity statistics continue to reify social ideas of gender disparities in physical activity, rather than illustrating a more accurate picture of the amount of moderate physical activity women and men engage in. As the concern of physical inactivity grows in the United States, hopefully future health surveillance systems recognize potentially biased results that arise from survey questions that neglect the social processes influencing gender differences in time use.

V. ATUS Data: Results and Discussion for Socioeconomic Story of Americans Physical Activity

Those in higher-SES positions, namely individuals with higher levels of education and income, are consistently found to engage in more physical activity according to public health reports that focus on leisure activity (CDC 2014). However, previous research investigating the role of SES in shaping engagement in other domains like housework, childcare, and paid work suggest different opportunities for health-benefiting activity. Therefore, a second overall question driving this project is: Do socioeconomic disparities in physical activity look different when the definition of what "counts" as health-benefiting physical activity is broadened beyond leisure activity? Theoretical and empirical research demonstrate that socioeconomic patterns rooted in access and opportunity for health benefiting physical activity in other domains suggest current socioeconomic disparities may be inaccurate. In order to assess the validity and reliability of current health surveillance systems and their representation of socioeconomic disparities, the following chapter is dedicated to unpacking whether and how educational, income, and occupational differences in physical activity reports vary when different definitions of "what counts" as health-benefiting activity (leisure, housework and care, and paid work) are used.

Previous research investigating socioeconomic patterns in leisure time activity support evidence from current health surveillance systems, and indicate that those with higher-SES positions are more likely to engage in leisure activity. Literature focusing on income as a key SES indicator highlights the role of increased resources (such as financial access, equipment, and membersihps) as a key reason higher-SES individuals are more likely to engage in physical activity (Beenackers et al. 2012; Crespo, Ainsworth, Keteyian,

Heath, & Smit 1999; Giles-Corti & Donovan 2002). When SES is indicated by educational attainment, scholars point to knowledge of how and where to access health-benefiting leisure is a key mechanism benefiting higher educated individuals (Robinson & Godbey 2010; Jones et al. 1998). Further, previous literature on gender patterns, confirmed by results in Chapter 4, suggest men engage in more physical activity, therefore it is asserted that men in higher-SES positions will engage in the most amount of leisure-time physical activity. Thus, previous research supports two distinct hypotheses:

> (H1b.) Individuals with higher SES will engage in significantly more minutes of physical activity compared to individuals with lower SES when moderate physical activity is operationalized as *Leisure Activities*.
>
> (H1c.) Men with higher SES will engage in significantly more minutes of physical activity compared to all other individuals when moderate physical activity is operationalized as *Leisure-Only Activities*.

Previous studies investigating non-leisure physical activity levels finds that there is a shift in which SES groups are engaging in more health-benefiting activity. The research on socioeconomic patterns in housework and dependent care—already shown to be an important source of health-benefiting physical activity--is mixed, regardless of how SES is defined. Some of this research suggests technological advancements in cleaning and house care homogenizes household labor across SES levels by standardizing access and availability (Bose et al 1984, Strasser & Done 1982; Greenstein 2000; Wacjman 2014). Further, researchers found that financial limitations among lower-socioeconomic individuals leads to increased likelihood for engaging in health benefiting housework and care activities such as multi-tasking with child care, housework, and physical exertion for transportation (Ford et al. 1991; McNeill, Kreuter, & Subramanian 2006; Smith et al. 1014; Sullivan 2013). On the other hand, higher SES individuals often have more

favorable working conditions with more resources suggesting they are able to facilitate the possibility to combine work and family for employees with higher SES (Schieman et al., 2006). Based on this mixed results in the literature, Hypothesis H2b contends:

> (H2b.) There will be no significant difference in the number of minutes spent in physical activity between High-SES and Low-SES individuals when moderate physical activity is operationalized as *Housework/Dependent Care*.

Despite mixed findings on the relationship between SES and housework/dependent care, previous research more clearly suggests SES serves as a moderating factor shaping the relationship between gender and housework/dependent care. Studies conclude that men with higher education and income levels dedicate more time to child-rearing and household activities compared to their lower-SES male counterparts (Robinson & Godbey 2010; Stone 1972; Juster and Stafford 2005). From this research, hypotheses H2c predicts the interaction effects between gender and SES:

> (H2c.) Men with Higher-SES standing will report more minutes of physical activity compared to Men with Lower-SES standing when moderate physical activity is operationalized as *Housework/Dependent Care*.

Socioeconomic occupational segregation suggests different access and opportunity to health-benefiting physical activity at paid work for higher-SES compared to lower-SES individuals. Socioeconomic occupational segregation impacts physical activity habits due to differential opportunities for high- and low-SES workers to engage in health benefiting activity while on the job (Church et al. 2011). As previous theorists suggest, positions with more power, and therefore more social and monetary compensation, are managerial and non-manual occupations that often require greater levels of education. As a result, the hierarchy of occupations places non-manual labor skilled jobs higher in the line of social and monetary capital compensation compared to professions associated with more manual

labor skill (Wright 1995; Krieger et al. 1997). Ultimately, theoretical and empirical evidence contends that less educated individuals with lower salaries are more likely to work in occupations that require higher intensity physical activity (i.e. maintenance, manufacturing, agricultural). Further, occupational segregation is not only socioeconomically patterned, but also patterned by gender. Overall, men are more likely to be in more labor-intensive professions. Therefore, moderating impacts of gender on SES relations with paid work physical activity are asserted in hypotheses H3c:

> (H3b.) Lower-SES individuals will engage in significantly more minutes of physical activity compared to Higher-SES individual when moderate physical activity is operationalized as *Paid Work.*
>
> (H3c.) Men with Lower-SES standing will report the most minutes of physical activity compared to others when moderate physical activity is operationalized as *Paid Work*.

The interrelatedness of socioeconomic markers of education, income, and occupation are complex and scholars often warn to not treat them as interchangeable (Braveman, Cubbin, Egerter, et al. 2005; Shavers 2007). Income is known measure access to material goods and services influencing health, while education is better at capturing aspects of lifestyle and behavior differences in health, and occupation is known to be a good structural link between education and income (Shavers 2007). Important to recognize is how each conceptualizes socioeconomic position similarly yet differently.

Drawing on previous theory and research that emphasizes the need to use multiple indicators of socioeconomic status, I operationalize SES as education (college educated or not), household income ($100K or less), and occupation (maintenance, manufacturing, agriculture; professional, managerial; and all other). Public health and sociological research focused on understanding social forces that shape physical activity does not often

use occupation as a key measure of socioeconomic status, but with occupation playing a large role in engagement in health-benefiting activity at paid work, measuring SES using occupation is important. Based on occupational prestige literature, labor-intensive jobs like maintenance, manufacturing, and agriculture are considered "lower-SES" while other professions are "higher-SES" (Church et al. 2011). Professional and managerial professions are identified as highest-SES professions, which are also more likely to be sedentary (Grusky & Szelenyi 2011; Wright 1995; Krieger et al. 1997).

The operationalizations for each measure of SES are rooted in previous research. Education is dichotomized as college or more compared to less than college degree to facilitate comparisons to previous studies. Possessing a college degree or more is used as a key indicator of a qualification linked to knowledge acquirement and lifestyle circumstances in high- versus low-socioeconomic standing (Duncan et al. 2002; Shavers 2007). Recognizing the highest quintile of household income has been used in previous research to identify those benefiting from the growing inequality in the U.S. (Krieger et al. 1997). The ATUS does not have an income category identifying the highest quintile, but those in the $100K or more categories represent about the top 15% of the sample and will be used to distinguish the socioeconomic status providing greatest access to health-benefiting resources and opportunity. Finally, occupation is operationalized as three categories to contrast the occupations that require moderate activity and juxtapose those with the professions theory has distinguished as 'high SES,' professional, managerial, and sales, which are regarded as higher-status occupations (Grusky & Szelenyi 2011; Wright 1995; Krieger et al. 1997).

I expect each of these three measures of socioeconomic status to operate in the same way as detailed in the hypotheses. Therefore, those who are college educated, have a household income of $100K or more, and those not in a labor occupation will report significantly more leisure activity, no significant difference in household and dependent care, and significantly less paid work. Further, men who are college educated, with a household income of $100K or more, and/or those not in a labor occupation will report the most leisure activity and report significantly more housework and dependent care. Men in a labor occupation (e.g. maintenance, manufacturing, and agriculture) will report the most physical activity.

To begin to assess the six hypotheses about socioeconomic status, this chapter details several comparison of means using the Mann-Whitney test to assess non-normally distributed variables. First, means comparisons for each of the four operationalizations of physical activity by gender and educational attainment is assessed. Next, *Leisure*, *Leisure & Housework/Dependent Care, Leisure & Paid Work,* and *Full Activity* means comparisons are run by gender and education, gender and household income, and lastly by gender and occupation. Corresponding graphs help to visualize these mean differences. The next step in the analysis focuses on how the three measures of socioeconomic status influence physical activity reports that define moderate physical activity in four different ways utilizing OLS regression. Here, four OLS regressions with the three measures of SES are analyzed. To speak to goodness of fit, seemingly unrelated regressions are run so that post-hoc Wald's Test can determine if the socioeconomic status is related to physical activity in significantly difference ways across four definitions of physical activity. Finally, with two of the six hypotheses (H2c and H3c) implying moderating effects of

gender on SES's impact on physical activity reports, an analysis is performed on the interaction effects between gender and each of the three SES measures. Here, associated predictive means are assessed through graphs to examine how the moderating relationship impacts reports of physical activity. Collectively, each step of the analysis provides evidence to document and explain the relationship between SES and physical activity and whether SES disparities change across different social domains.

Table 17 illustrates descriptive gender and education patterns that reflect how much time individuals spend in health-benefiting physical activity when "what counts" as physical activity is defined in different ways. Figure 10 and 11 illustrate these differences across *Leisure*, *Leisure & Housework/Dependent Care*, *Leisure & Paid Work*, and *Full Activity*, each by education and gender. Wilcoxon (Mann-Whitney) tests by gender across educational attainment and by educational attainment across gender statistically assess whether these groups are engaging in significantly different amounts of activity within each activity domain (See Table 17 and Figures 10 and 11).

Previous research would indicate that, regardless of gender, more educated individuals report more time in leisure activity and less time in moderately active paid work (H1b and H3b). Further, previous studies find mixed results in the amount of time spent in housework/care between more or less educated individuals (H2b). Results in Table 13 and Figures 10 and 11 partially support all three hypotheses. Hypothesis H1b is supported for women but not men. Women with a college degree or more engage in an average of 5.7 minutes more in leisure-based physical activity compared to women who do not hold a college degree. Men with a college degree, however, report 2.5 *less* minutes of physical activity compared to their less educated counterparts. This result is contrary to

Hypothesis H1c; more educated men did *not* report the most minutes in leisure-based physical activity, less educated men did. Both disparities are significant according to the Wilcoxon (Mann-Whitney) test.

Hypothesis H2b is also partially supported. Significance tests demonstrate there are clear differences in physical activity between more and less educated individuals, which is inconsistent with H2b. However, the actual differences in minutes spent in leisure and housework/care are less than two minutes for both men and women (0.6 minutes for women; 1.6 minutes for men), suggesting the actual time differences are hardly substantial, which supports H2b. Looking at the results for leisure and housework/dependent care by gender and education simultaneously, I find evidence refuting hypothesis H2c. Technically, Wilcoxon (Mann-Whitney) results support H2c because there are *significant* differences between less educated and more educated men, with less educated reporting more (70.8 minutes compared to 69.2 minutes). Yet, as previously recognized, the actual differences in average minutes spent are very small (1.6 minutes).

H3b is supported by means comparisons in Table 17. Regardless of gender, less educated individuals report significantly more time spent in moderately active leisure and paid work. This educational disparity is especially prominent among men, which supports hypothesis H3c that contends lower-SES men will report the most minutes in physical activity when paid work is added to the definition. Men with less than a college education report an average of 103.3 minutes in leisure and paid work, which is double the minutes reported by men with a college degree (50.8 minutes) and more than triple what women

report (28.0 and 28.2 minutes). Hypothesis H3c is supported, men with less educated report the *most* moderately active minutes spent in paid work.

Lastly, the fourth row of Table 17 in the right-most set of bars in Figure 10 and 11 show means differences by gender and educational attainment for all (*Full Activity*) health-benefiting activities. Overall, less educated individuals engage in more activity compared to individuals who have a college degree or more and men engage in more activity compared to women. Socioeconomic disparities, measured by educational attainment, are larger among men (51.7-minute difference) compared to women (5.4-minute difference). Wilcoxon (Mann-Whitney) tests suggest these SES differences by gender are both significant and in the *opposite* direction of disparities identified in current health surveillance systems – lower-SES individuals, regardless of gender, are engaging in significantly *more* moderate activity, compared to their higher-SES counterparts.

Studies of socioeconomic differences in time use and physical activity that measure SES using household income as a key indicator focus on resource availability and time control as mechanisms which support access to leisure time activity (H1b). Table 18 and Figures 12 and 13 presents descriptive results to explore this hypothesis and five others investigating the relationship between physical activity, SES (measured here by household income), and gender. Wilcoxon (Mann-Whitney) tests are run to determine significant differences between household income by gender and between gender by household income (See Table 18 and Figures 12 and 13).

Unlike when SES is measured by education, household income differences fully confirm hypothesis H1b. Regardless of gender, those with $100,000 household income or more report significantly more leisure-based physical activity compared to those earning

less (less than $100K). Men with a household income at or above $100,000 report the largest average number of leisure-based physical activity minutes (41.2 minutes), confirming hypothesis H1c. These results mirror the disparities understood by current public health reports, higher-SES individuals engage in more leisure time physical activity and men with higher-SES engage in more leisure-based physical activity than their lower-SES male counterparts as well as their female counterparts.

Looking at engagement in *Leisure & Housework/Care* by SES and gender, there is partial support for hypothesis H2b, while hypothesis H3c is not supported. As when SES is measured by educational attainment, results for household income, overall, suggest few large differences between the average minutes higher-SES individuals engage in health-benefiting housework/dependent care activity compared to lower-SES individuals (1.3-minute difference for women and 0.2-minute difference for men). Substantively, hypothesis H2b is not confirmed because it is statistically significant. Statistically, according to the Wilcoxon (Mann-Whitney) tests for significances, these differences are significant which contradicts Hypothesis H2b that contends no significant SES differences in who is engaging in household/dependent care. Further, Hypothesis H2c is rejected, based on Wilcoxon (Mann-Whitney) test that demonstrate men with a household income less than $100K are reporting significantly *more* leisure and housework/dependent care compared to men with household income of $100K or more. The substantive difference, however, is a matter of 12 seconds (0.2 minutes) as illustrated in Figure 13, which still rejects hypothesis H2c that suggests men with higher SES would engage in substantively more minutes of physical activity when housework and dependent care is added to the calculation of physical activity.

When what "counts" as physical activity includes moderate activity in leisure and paid work (*Leisure & Paid Work)*, hypothesis H3b is partially confirmed and hypothesis H3c is fully confirmed. Hypothesis H3b is confirmed by results for men but not for women. Men who have a household income less than $100K report significantly more minutes in leisure and paid work compared to men who have a household income $100K or more (18.8-minute difference). The opposite is true for women, with a 1.3-minute difference favoring women with a household income more than $100K. As argued earlier, this difference is substantively small, but still rejects hypothesis H3b that contends lower income individuals will engage in substantively more physical activity when paid work is added to the definition of physical activity. Again, men with lower-SES, in this case less than a $100K household income, report the most activity in leisure and paid work (92.5-minutes). Though the disparity is significant, the differences in minutes reported are not as stark when SES is measured by education.

For the final definition of what "counts" as physical activity, health-benefiting activity in all domains (*Full Activity*), we once again see results that support an opposite story than the one told by current health surveillance systems. Overall, lower-SES individuals, measured here by household income, engage in *more minutes of physical activity* compared to individuals with higher-SES, regardless of gender. Socioeconomic disparities, measured by household income, are larger among men (21.2-minute difference) compared to women (5.4-minute difference). Wilcoxon (Mann-Whitney) tests confirm these SES differences are significant for both men and women.

Table 19 and Figures 14 and 15 present results investigating the relationship among physical activity time, SES (measured here by *occupation,* comparing those who

work in all other occupations with those working in labor-intensive occupations), and gender. The focus of this analysis is on employed individuals to capture the SES differences associated with occupation. Wilcoxon (Mann-Whitney) tests are run to determine significant differences between occupation by gender and between gender by occupation (See Table 19 and Figures 14 and 15).

Hypothesis H1b is technically supported by the means comparison of reported leisure-based physical activity by SES (measured my occupation) and gender for women but not for men. For women, higher-SES (those not in labor-intensive occupations) report significantly more time spent in leisure compared to those who are not in labor-intensive occupations, however the substantive difference is small (1.24 more minutes for women). Men in lower-SES (maintenance, manufacturing, and agricultural jobs) report *more* minutes of physical activity compared to their higher-SES male counterparts. Overall, these results provide little support for Hypothesis H1b and do not support H1c. Men in higher-SES positions did not report the most minutes in leisure activity (H1c).

Assessing results for *Leisure & Housework/Dependent Care* reveal hypothesis H2b and H2c are not supported due to lack of significant differences in means comparisons. Overall, means comparisons in the amount of time spent on leisure-based physical activity and housework and dependent care tasks that are moderately physically active do not significantly differ by gender. The SES disparity for time spent in leisure and housework/care is larger for men (7.1-minute difference) than for women (4.9-minute difference). Hypothesis H2c asserts men in higher-SES positions engage in more housework/dependent care than their lower-SES male counterparts, which is not supported in the results for leisure and housework/dependent care. Men who are not in a labor

intensive job (higher-SES) report an average of 59.1 minutes in leisure and housework/care while men in labor intensive jobs (lower-SES) report an average of 66.2 minutes.

As expected, results for *Leisure & Paid Work* demonstrate the largest socioeconomic disparities in physical activity time (when SES is defined by occupation). Both men and women in maintenance, manufacturing, and agricultural positions report significantly higher time spent in leisure and paid work compared to their counterparts in other occupations (105.1 more minutes for women, 179.7 more minutes for men). These significant disparities confirm hypothesis H3b, which theorized lower-SES individuals would engage in more physical activity when the definition of physical activity extended to include paid work. Hypothesis H3c is also confirmed, because men in lower-SES occupations report over five times more minutes in leisure and paid work compared to men in higher-SES occupations.

Again, the final definition of physical activity (*Full Activity*) that includes health-benefiting activity in all domains (e.g. leisure, housework/care, and paid work), once again tells the opposite story understood by the CDC and all other major public health surveillance systems that only focus on leisure-based physical activity. Overall, lower-SES individuals, measured here by occupation, engage in *more activity* compared to individuals with higher-SES, regardless of gender. Socioeconomic disparities, again measured here by the difference between all occupations and those in labor-intensive professions, are larger among men (184.0-minute difference) compared to women (111.4-minute difference). Wilcoxon (Mann-Whitney) tests suggest these SES differences by gender are both significant.

The series of means comparisons across four definitions of what "counts" as physical activity and three key indicators of socioeconomic status and gender demonstrate both that: 1) the *size* of SES disparities change based on what activities are "counted" as physical activity, and 2) regardless of indicator (education, income, occupation), the *direction* of SES disparities differs when we measure health benefiting activities that are not occurring during leisure time. Put simply, what "counts" as physical activity matters and so does the way we measure SES.

OLS Regression

Next, use regression analysis to build on the descriptive analysis and test hypotheses, while controlling for individual and contextual factors known to affect time in physical activity. Table 20 presents results from four OLS regressions with four different definitions of physical activity regressed onto 14 variables. Since this chapter focuses on socioeconomic status, just results from the focal independent SES variables will be reported in the following results section (education, income, and occupation). Looking separately at each SES indicator allows us to better understand how key SES differences shape different patterns of physical activity.

The first column (*Leisure Only*) documents the coefficients from the regression predicting the number of minutes reported in Leisure time moderate activity (exercise, hobby activities, volunteering), which is the only physical activity currently asked about on health surveillance questions (See Table 20). Hypothesis H1b suggests that those in higher SES positions will report significantly more leisure activity compared to those in lower SES positions due to access, resources, and knowledge of opportunities to engage in leisure. After controlling for known correlates of physical activity and patterned time use,

educational attainment shows no significant impact on leisure activity reports. Income and occupation, however, demonstrate significant differences, but in opposing ways. Income supports the H1b hypothesis, reporting that those with a household income of $100,000 or more engage in, on average, 2 more minutes of leisure activity compared to those with lower-SES. This finding supports literature that suggests the financial freedom needed to access leisure activities helps those with more income more than those with less financial income. Occupation tells a different story. Both professional and managerial as well as maintenance/agricultural professions report significantly less minutes in leisure time activity compared to all other professions. Based on hypothesis H1b, we would expect professional and managerial professions to engage in the most leisure activity because of their socioeconomic positioning. Important to note, however, is the literature citing recent increases in the number of work hours among professional and managerial jobs, leaving less time for leisure (Kallenberg 2013). For this intricacy and the results of this project, the way socioeconomic status is measured matters for whether there are significant impacts on physical activity. Educational attainment does not influence reports of physical activity, yet, household income and occupation do.

The second definition of physical activity, *Leisure and Housework/Dependent Care*, counts health benefiting activity in exercise, hobbies, and volunteer (leisure) with exterior/interior cleaning and repairing and caring for adults and children (housework/dependent care). This regression provides assessment of hypothesis H2b that predicts there will not be significant SES differences when housework/dependent care is considered. This hypothesis is rejected by results for educational attainment and occupational measures of SES but not by income. The coefficient for educational

attainment suggests that higher-SES individuals, even after controlling for numerous correlates, engage in significantly *less* health-benefiting minutes when physical activity is assessed in both leisure and domestic activities, contrary to findings when the definition of physical activity is only measured by leisure. Those with a college degree or more report 6.00 less minutes in leisure and housework/dependent care compared to those with less than a college degree. Variation in income does not appear to influence the number of minutes spent in leisure and housework/dependent care for high earners when compared to everyone else. This finding supports hypothesis H1b. Occupation, on the other hand, exhibits contradicting evidence, with higher-SES occupations (professional and managerial) as well as lower-SES (labor intensive occupations) reporting significantly less time in leisure and housework/dependent care compared to all other professions (-23.6 minutes and 16.3 minutes, respectively). Here, results demonstrate that, at least for most widely used indicators of socioeconomic status – educational attainment, income, and occupation –different stories emerge about the relationship between SES and time spent in leisure and housework/dependent care.

The third column provides results from an OLS regression of 14 variables onto a definition of physical activity that includes *Leisure and Paid Work*. Here, leisure activities (exercise, hobbies, volunteering) are added to 100% of the minutes reported in paid work that are moderately active. Hypothesis H3b outlines the expectation that SES disparities in physical activity at paid work favor those in lower-SES positions. Results from this regression analysis present partial evidence supporting this hypothesis and partial evidence refuting this hypothesis. After accounting for known correlates, more educated individuals report significantly less minutes in leisure and paid work. This aligns with

hypothesis H3b; higher-SES engage in less moderately active paid work (3.44 less minutes). Contrastingly, results for household income report the opposite story. Those with a household income of $100K or more on average report significantly *more* minutes in leisure and paid work. Specifically, higher-SES – when SES is measured as household income – engage in an average of 6.51 more minutes of physical activity at leisure and work compared to their lower-SES counterparts. Unsurprisingly, there is a large disparity between occupations that favors those in maintenance, manufacturing, or agriculture. Further, those in the higher-SES professions, professional and managerial, engage in significantly less minutes of physical activity further supporting hypothesis H2b. Those in labor-intensive occupations report an average of 151.4 more minutes of physical activity in leisure and paid work compared to their non-labor intensive counterparts. These results indicate that those in professional and managerial occupations engage in an average of 13.6 less minutes of physical activity when it is measured by leisure and paid work compared to all other professions. These results support hypothesis H2b. Overall, educational attainment and occupation uphold theoretical and empirical expectations that lower-SES will engage in more health-benefiting activity at work compared to higher-SES individuals (H2b), while household income reports the opposite.

The fourth column (*Full Activity*) represents the regression predicting the definition of physical activity that accounts for any activity in any domain that requires three METs. There are no specific hypotheses for combining all activities, however a key aim of this dissertation is to determine if our current understandings of physical activity disparities uphold when different domains of activity are considered, beyond leisure. This full activity regression confirms the known disparities do not hold. Current public health

recognizes SES disparities in physical activity that favor higher-SES individuals, but only account for leisure time activity. When all domains of physical activity are taken into account, educational attainment and occupation tell the opposite story: those who are more educated (higher-SES) report significantly *fewer* minutes spent in physical activity (-9.28 minutes) compared to less educated (lower-SES) and those in labor-intensive occupations (lower-SES) report an average of 141.2 *more* minutes in physical activity compared to all other occupations (higher-SES). Further, those in higher-SES professions (professional and managerial) report significantly fewer minutes in physical activity compared to all other occupations (-27.7 minutes), which further contradicts physical activity disparities currently understood by CDC and other public health institutions. Additionally, household income reports no significant differences in the amount of time individuals with a household income of $100K or more spend in moderately active physical activity compared to those who do not have a household income of $100K, which also demonstrates a change in the story currently understood by SES disparities.

To further test the overarching question driving this dissertation: *Does the relationship between socioeconomic status and physical activity shift if different domains of physical activity are introduced into the definition of physical activity?*, the final analysis step in this chapter investigates influences of education, income, and occupation when all four regression equations presented are simultaneously estimated and post-hoc tests of their significance across equations are conducted using seemingly unrelated regression (SUR) techniques. The post-hoc Wald tests determine whether each of the three SES measures are equal across all four definitions of physical activity. Results from the post-hoc tests indicate that the impact of education (X^2= 55.94, $p < .0001$), income (X^2=

26.99, $p < .0001$), and occupation ($X^2 = 16{,}715.0$, $p < .0001$) across the four different definitions of physical activity (*Leisure Only*, *Leisure + Housework/Care*, *Leisure + Paid Work*, *Full Activity*) are all significantly different. The answer to the overarching research question, according to the Wald tests is *yes,* the relationship between SES and minutes of moderate physical activity significantly changes when physical activity is measured in different ways, regardless of how SES is measured. Post-hoc results confirm that the relationship between each measure of SES has a significant contribution, a critical contribution, to understanding each definition of physical activity that are all *significantly different* from eachother.

Interaction Analysis

Hypotheses H1c, H2c and H3c highlight the expectation that gender moderates the relationship between socioeconomic status and minutes reported in physical activity. To investigate this, four interactions were added to the four OLS models: (1) education by gender; (2) income by gender; (3) professional and managerial occupation by gender; (4) maintenance and agricultural occupation by gender. Regression results are presented in Table 21, along with post-hoc Wald tests results testing whether the inclusion of each interaction significantly improved the model. Further, graphs present the predictive moderate physical activity for each combination of SES and gender. These graphs are available in Figures 16, 17, 18 and 19.

The first column in Table 21 presents main and interaction coefficients for leisure-based physical activity (*Leisure*). According to the Wald test, including all four interactions significantly improved the model ($X^2 = 14.99$, $p < .0001$), however, the individual Wald Test for gender by Maintenance was not significant ($X^2 = 0.68$, $p > .05$).

Three of the interaction terms demonstrate significance: education by gender, income by gender, and professional/managerial by gender. Therefore, the main effects of educational attainment and income on *Leisure* are significantly moderated by gender. Additionally, the main effects of being in a professional/managerial or a maintenance/agricultural occupation on leisure physical activity are significantly moderated by gender. For reports of *Leisure & Housework/Dependent Care*, including all four interaction terms significantly improved the model (X^2= 28.83, p <.00001), however, again we see the individual Wald Test is not significant for the interaction between gender and maintenance/agricultural occupations (X^2= 0.05, p > .05). Further, the interaction between professional/managerial occupation and gender is significant while, the significance for maintenance/agricultural is likely due to Type II Error. Therefore, the main effects of being in a professional/managerial occupation on minutes spent in leisure and housework/dependent care significantly varies by gender. Based on results in the third column of Table 21 (*Leisure & Paid Work*), the relationship between all three indicators of SES (educational attainment, income, and occupation) and leisure and paid work are all significantly modified by gender. The Wald test confirms that these interactions significantly add to the understanding of reports of leisure and paid work (X^2= 104.24, p <.0001). Each individual Wald Test suggests the inclusion of all four interaction variables significantly contributes to understanding the variation in physical activity spent in leisure and in paid work. For *Full Activity*, where are moderately active physical activity is accounted for, the influence of educational attainment, income, and being in a maintenance/agricultural occupation on engaging in physical activity is contingent on gender. Again, simultaneous assessement of all four interactions in post-hoc tests verify

these interactions significantly improve the model (X^2= 59.25, p <.0001). The individual Wald Test for the interaction between gender and professional/managerial occupation demonstrates including the interaction does not significantly improve the model.

To interpret how the gender modifies the influence of socioeconomic status on different definitions of physical activity, Figures 16, 17, 18, and 19 illustrate the predictive minutes spent in each summation of physical activity for each set of interactions. Figure 16 shows results for educational attainment and gender; the left-most set of bars are results for leisure, followed by predictive minutes for leisure and housework/care, then leisure and paid work, and finally full activity. Lighter shaded bars represent results for women and darker shaded bar represent results for men (See Figure 16).

Overall, the SES disparities, as measured by educational attainment, tell a different story depending on gender. For women, those with less than a college education report *less* leisure compared to those with a college education or more (3.61 minute difference). For men, however, those with less than a college education report *more* leisure compared to those with a college education or more (4.59-minute difference). The modifying effects of gender reverse the SES disparity story for leisure-only activity. Thus, the direction of the difference in physical activity reverses, depending on gender. Further, the results reject hypothesis H1c, since men from higher-SES positions – here, more college education – are expected to engage in the most minutes of leisure time activity and they did not, men with lower-SES did.

When housework and dependent care is added to leisure for the summation of physical activity, the SES disparities become larger. Overall, those with less than a college education report significantly more leisure and housework/dependent care compared to

those with a college education or more, regardless of gender. Hypothesis H2c is not supported. Rather than men in higher-SES positions reporting more physical activity when housework/dependent care are added, men in lower-SES positions are predicted to engage in more. Predictive minutes for men with less than a college degree is 45.5 minutes, and men with a college degree or more is 32.5 minutes, a difference of 13 minutes. According to results, women with less than a college degree are expected to engage in 39.5 minutes and women with a college degree or more are expected to engage in 33.9 minutes, a difference of 5.6 minutes. For modifying effects, the size of the gender difference is bigger for men than women, but in the same direction, in that less educated individuals engage in more physical activity.

Next, the leisure and paid work, provides partial support hypothesis H3c. For men, those with less than a college education – lower-SES individuals – report significantly more leisure and paid work compared to their higher-SES counterparts, which confirms hypothesis H3c. Women, however tell the opposite story. Women with a college degree or more are predicted to report more minutes of physical activity compared to their less educated counterparts, when physical activity is measured by leisure and paid work. Results demonstrate men with less than a college degree report the most amount of minutes in physical activity then paid work is added to the definition of physical activity. Men with less than a college degree are predicted to engage in 26.8 minutes of leisure and paid work whereas men with a college degree or more are expected to engage in 14.9 minutes of leisure and paid work, a difference of 8.57 minutes. The modifying effects of gender reverse the SES disparity story for leisure and paid work. As a result, the direction of educational differences in physical activity reverses, depending on gender. These

findings support hypothesis H3c that suggests modifying effects of gender will lead to men without a college degree engaging in the most amount of physical activity.

Finally, adding all moderately active physical activity, full activity, creates a significant SES disparity that favors lower-SES individuals, regardless of gender. This is the opposite of the SES disparity currently understood by health surveillance systems (See Figure 17).

Overall, the SES disparities – as measured by income – tells a different story about the modifying impacts of gender on SES. The disparities between higher and lower SES are roughly the same, demonstrating little modifying effects of gender on the SES. For men, the difference between higher-SES and lower-SES as measured by income is 1.1 minutes. For women, the disparity is 1.2 minutes. Though hypothesis H1c is technically supported because men in higher-SES are predictive to engage in more minutes, substantively that difference between higher and lower-SES men is small.

Hypothesis H2c is contradicted by results from predictive minutes for physical activity when housework/dependent care is added to leisure definitions. Men in a higher SES position were expected to report more minutes in housework and dependent care compared to their lower SES counterparts, but the opposite is true. Predictive minutes for men with a household income of less than $100K is 7.8 minutes *more* than men with a household income higher than $100K. The income disparity is larger for women (12.6-minute difference) and also demonstrates lower-SES are expected to report more minutes of moderate activity.

Next, the third set of bars in Figure 17 present results for the interaction of income and gender on time spent in leisure and paid work. Here, results contradict hypothesis

H3c. Men in lower-SES positions were hypothesized to report the most minutes in moderate activity when paid work is added to the operationalization. Instead, men with a household income of $100K or more are predicted to report the most minutes: 37.7 minutes. Men with a household income less than $100K are expected to engage in 26.2, a difference of 11.5 minutes.

Results for predictive minutes when all activities that require 3 METs are considered (*Full Activity*), household income disparities known by current health surveillance systems are upheld for men by not for women. Higher-SES men (those with household income of $100K or more) are expected to report significantly more physical activity compared to lower-SES counterparts, a difference of 8.6 minutes. Contrastingly, women in a higher-SES are expected to engage in *fewer* minutes compared to their lower-SES counterparts. Here, modifying effects of gender for SES impacts on physical activity completely reverse the relationship, suggesting important modifying impacts. Therefore, the direction of the SES difference – as measured by income – in physical activity reverses, depending on gender.

Figure 18 presents results for the third measure of SES, occupation. Predictive minutes are plotted for the interaction between being in a professional/managerial occupation and gender for each of the four definitions of physical activity (See Figure 18). First, hypothesis H1c is tested in the left-most set of bars. Results reject H1c, men from a higher-SES position – here, those in a managerial or professional occupation – are expected to report the most minutes of moderate leisure activity. According to results, men in all other professions (lower-SES) are expected to engage the most minutes: 47.2

minutes of leisure activity, compared to men in professional/managerial roles (34.2 minutes), a difference of 13 minutes.

Next, the tests hypothesis H2c investigates what happens when housework/dependent care is added to the definition of physical activity. There are SES disparities that favor those in lower-SES positions, regardless of gender. Further, men in higher-SES positions (profession/managerial occupations) are expected to engage in less physical activity than men in lower-SES positions, which rejects hypothesis H2c. Specifically, men in all other professions (lower-SES) are expected to engage in 42.5 minutes, while men in professional/managerial occupations (higher-SES) are expected to report 15.3 minutes, a difference of 27.2 minutes in the opposite direction expected by hypothesis H2c.

Results for the third definition, when paid work is added (*Leisure & Paid Work*), demonstrate SES disparities that favor lower-SES, regardless of gender. Hypothesis H3c is confirmed; men in lower-SES (all other professions) are expected to engage in the most minutes of physical activity when paid work is added to the definition of physical activity. Lower-SES men are expected to engage in 26.2 minutes of leisure and paid work, whereas men in higher-SES positions (professional/managerial) are expected to engage in 9.4 minutes, a difference of 16.8 minutes.

The influence of the interaction between professional/managerial occupations and gender on all moderately active activities is assessed in the right-most group of bars in Figure 18. According to these results, the socioeconomic disparity understood today is reversed when all moderately active physical activity is taken into account. Higher-SES no

longer engage in significantly more activity; lower-SES individuals do regardless of gender (See Figure 19).

The final graph, Figure 19, presents results for the third measure of SES, occupation with a focus on labor-intensive occupations. Predictive minutes are plotted for the interaction between being in a maintenance/manufacturing/agricultural occupations and gender for each of the four definitions of physical activity. First, hypothesis H1c is tested in the left-most set of bars. Results support H1c, men from a higher-SES position – here, those in all other occupations – are expected to report the most minutes of moderate leisure activity. According to results, men in all other professions (higher-SES) are expected to engage the most minutes: 47.7 minutes of leisure activity, compared to men in professional/managerial roles (38.0 minutes), a difference of 9.7 minutes.

Next, the tests hypothesis H2c focuses on moderating impacts of gender on SES when housework/dependent care is added to the definition of physical activity. There are SES disparities that favor those in higher-SES positions, regardless of gender. Further, men in higher-SES positions (all other professions) are expected to engage in the most physical activity, which supports hypothesis H2c. Specifically, men in all other professions (higher-SES) are expected to engage in 42.5 minutes, while men in manufacturing/maintenance/ agricultural occupations (lower-SES) are expected to report 23.5 minutes, a difference of 19 minutes in direction expected by hypothesis H2c.

Results for the third definition, when paid work is added, demonstrate the most significant SES disparities that favor lower-SES, regardless of gender. Hypothesis H3c is confirmed; men in lower-SES (maintenance/agricultural) are expected to engage in the most minutes of physical activity when paid work is added to the definition of physical

activity. Lower-SES men are expected to engage in 190.2 minutes of leisure and paid work, whereas men in higher-SES positions (all other professions) are expected to engage in 26.2 minutes, a difference of 164.0 minutes.

Finally, the influence of the interaction between maintenance/agricultural occupations and gender on all moderately active activities (full activity) is assessed in the right-most group of bars in Figure 19. According to these results, the socioeconomic disparity understood today is reversed when all moderately active physical activity is taken into account. Higher-SES individuals no longer engage in significantly more activity; lower-SES individuals do, regardless of gender (See Figure 20).

An additional graph provides further understanding for the interaction impacts of being in a high-SES standing versus low-SES standing. Figure 20 compares predicted minutes spent in moderate activity under the full activity definition for similarly SES situated men and women. Women in high-SES situations, meaning those in with a college education or more, a household income of $100,000 or more, and in a professional/managerial occupation, are predicted to engage in -19.4 minutes of full activity compared to men (-11.6) in similarly situated SES positions. That is a difference of 7.8 minutes that favors men. Gender disparities among low-SES individuals is much larger. Women with less than a college education, less than $100,000 income, and maintenance/manufacturing occupation – low-SES – are predicted to engage in 105.1 minutes of full activity compared to men (177.1 minutes) in similar SES positions, a difference of 72 minutes that again favors men. Here, it is clear that the modifying effects of low-SES *intensifies* the gender disparity in physical activity reports compared to higher-SES disparities.

Discussion

Inequality in education, income, and occupation is known to exacerbate the gap between the health "haves" and "have nots" by shaping health behaviors such as physical activity (Adler & Newman 2002). Previous research drawing on surveys that focus definitions of physical activity on leisure repeatedly demonstrate that individuals in higher socioeconomic positions are more likely to meet physical activity requirements compared to lower socioeconomic individuals (CDC 2012). This chapter, informed by sociological theory and research, sought to demonstrate how socioeconomic characteristics influence levels of physical activity across several key social locations (leisure, unpaid housework, paid work). Further, this chapter investigated the separate influence of three key indicators of socioeconomic status (education, income, occupation) and showed how each can influence levels of physical activity in different ways.

Widening the scope of what is considered physical activity draws attention to the unique pathways individuals take to healthy activity. First, these results unequivocally demonstrate that socioeconomic disparities linked to leisure-only definitions of physical activity shift when other forms of physical activity are assessed. Regardless of how SES is measured, the relationship with physical activity changes with every single definition of what "counts" as health-benefiting physical activity. Professional/managerial occupations is the only measure of SES that I find some consistency in significance and direction of the relationship with physical activity. However, results for professional/managerial occupations tell the *opposite story* as current health surveillance systems, further confirming the lack of validity and reliability of current physical activity questions.

Results suggest individuals in different socioeconomic positions access physical activity through different socially patterned opportunities. Paid work is a key driver of the SES disparity differences, specifically when it comes to SES disparities measured by occupation. Comparing the expected engagement in activity for the highest-SES occupations (professional/managerial) to the lowest-SES occupations (manufacturing/maintenance), the story completely reverses and in the opposite direction previous research recognizes, which highlights the unreliability of narrow definitions of physical activity.

Another important finding from this project concerns the different influences different aspects of SES appear to have on physical activity engagement. Scholars investigating social intersections with health have argued that SES is a complex construct and that different aspects of it may both support and detract from physical health (Braveman et al. 2005; Shavers 2007). For instance, while greater levels of education may provide knowledge that enhances understanding about the importance of physical activity for overall health, it may also tie individuals to long-hours professional jobs that tend to be more sedentary. Evidence from this analysis demonstrates that key indicators of SES do not all have uniform influences on physical activity levels, thus, "one size does not fit all" when it comes to thinking about SES and health (p.2879 Braveman et al. 2005).

The impacts of education on health are known to derive from knowledge and life skills that allow better-educated persons to gain access and information on physical activity-promoting resources (Adler & Newman 2002). Results from the inclusion of paid work support this assertion: more educated individuals are not accessing physical activity in paid work because their degree qualifications and skills place them in occupations that

do not require labor-intensive work. Similarly, more educated people are found to report fewer minutes in housework and childcare. These results may provide evidence that more educated people have the life skills and knowledge for outsourcing housework and childcare or for creating efficiencies in these activity domains. Further, results from the interaction of education and gender support research that suggests a more egalitarian distribution of the housework and dependent care among more educated men and women compared to less educated men and women (Robinson & Godbey 2010).

For income, previous research cites financial freedoms and purchasing power as the key mechanisms that provide higher-SES individuals resources necessary to aide health behaviors like physical activity (Adler & Newman 2002; Wilkinson 1997). Of all domains, leisure activities likely require the most financial investment (e.g. gym memberships, recreational equipment, team fees) and results for SES as measured by household income support this. Leisure is one of two definitions of physical activity that demonstrate significant difference between high and low SES-positioned individuals. Those with greater purchasing power (higher income) report significantly more physical activity in leisure. In fact, income is the only measure of SES that adheres to the disparities understood by current research for leisure-only physical activity. Interestingly, the other definition of physical activity where income demonstrates higher-SES individuals report more is when paid work is added. This is the opposite of what is hypothesized. One explanation for this is the discontinuity in SES status between occupation and income; though maintenance and manufacturing occupations are *socially* low in the occupational hierarchy, often these occupations pay well, so according to measures of SES that focus on income, these individuals are at a higher status than where

their occupation places them. Therefore, the relationship between household income and reports of leisure and paid work operate in the reverse of how literature and previous research suggest: in this case, household income is not a straightforward indicator of higher versus lower socioeconomic position.

Third, for occupation, research on the SES mechanisms influencing health behaviors suggests lower-status jobs expose workers to both physical and psychosocial risks that influence health behaviors like physical activity (Adler & Newman 2002; Angell 1993). In other words, the labor-intensive professions that require much more physical activity while on the job leads individuals to retreat from healthy activity in other domains. Those in maintenance/manufacturing occupations engage in significantly less physically active leisure and housework/childcare, confirming previous scholar's assertions. Here, SES status in the form of occupation demonstrates a clear primary domain lower-SES individuals are accessing physical activity, paid work, that is completely unrepresented in current health surveillance systems.

The research rooted gender and socioeconomic time use that suggests higher-SES men will engage in the most physical activity is consistently confirmed in weighted means across all three SES measures, and almost all predictive minutes. Educational attainment is the only predictive minutes that suggests men with less than a college education will engage in the most leisure activity. Perhaps these results suggest financial freedom (associated with income) and freedom from physical and social stressors in one's occupation (associated with occupation) are more important in determining leisure activity rather than knowledge of opportunities associated with education.

Finally, when estimates of physical activity time across all activities (*Full Activity*) are examined (see Figure 20), we see clear evidence that lower SES individuals spend more time in physical activity compared with higher-SES individuals. This is not what current health surveillance systems document. Our national statistics, grounded in leisure-time activity measures, report that SES disparities in physical activity favor *high-SES individuals*. However, my results show that when we account for *all* health-benefiting activity, less-educated individuals are engaging in significantly more activity, there is no difference among different household income backgrounds, and those in occupations considered lower-socioeconomic status report significantly more activity. Put simply, research strategies that focus our attention on leisure-only physical activity do not fully capture the nature of SES disparities in health benefiting physical activity.

Does accounting for a well-documented pattern of occupation segregation and SES divisions in unpaid work for men reduce, close, or reverse the socioeconomic gap in the number of minutes spent in health benefiting physical activity? Further, does the SES disparity in physical activity change across different measures of socioeconomic status? Findings suggest that, yes, when time spent in moderate activity in other domains of activity beyond leisure-based activity, particularly paid work, are accounted for, the socioeconomic disparities in physical activity change and, some cases, even reverse. The results from this chapter clearly demonstrate that understanding social mechanisms for different measures of SES is very important when looking to explain the relationship between SES and health behaviors. Opportunities to engage in physical activity in different domains vary across each measure of SES in different ways.

This study adds valuable knowledge about SES differences in public health. The reliance on self-reported physical activity responses rooted in leisure activities points to SES disparities in physical activity that favor higher-SES individuals, but these results suggest lower-SES individuals access healthy activity in other domains, namely housework, dependent care, and most importantly paid work. Thus, current physical activity reports underspecify physical activity that ultimately changes our understanding of who is engaging in more physical activity. Underrepresenting pathways to healthy activity in current physical activity statistics continues to reify social ideas of SES disparities in physical activity. Instead, results from this study offer evidence for directed promotion of health benefiting activity through different activity domains based on one's educational attainment, household income, and occupation that go beyond leisure time physical activity.

VI. MTURK Data: Results and Discussion from Experimental Study

This chapter examines physical activity reports generated from an experimental research design and drawing from a sample of Americans recruited through Amazon's Mechanical Turk online research platform. Respondents were randomly asked about their level of physical activity in specific domains (e.g., housework/care, leisure). Eight random physical activity social locations were tested to investigate the role of domain on physical activity reports. This experimental design provides evidence to help address the overall questions informing this project: *Are gender and socioeconomic physical activity disparities artificially produced through inaccurate measures of physical activity? If so, what are the impacts of different priming language on physical activity questions that highlight different opportunities for moderate physical activity?*

The experiment allows me to assess the accuracy of current health surveillance questions that only ask about leisure-based physical activity by comparing to seven other conditions (such as physical activity that takes place in paid work settings) that target different domains where health-benefiting physical activity may also occur. Further, this experiment systematically tests the influence of gender and socioeconomic status on the level of physical activity across different domains where such activity is possible. The expected direction of each relationship, as detailed by hypotheses H1-H6 in Table 8, are rooted in previous research that suggests men (Beck and Arnold 2009; Mattingly and Bianchi 2003; Bittman and Wajcman 2000) and higher-SES individuals (Beenackers et al. 2012; Crespo, Ainsworth, Keteyian, Heath, & Smit 1999; Giles-Corti & Donovan 2002) are expected to engage in more activity when leisure is primed (H2 and H5, respectively). Further, when paid work is part of the priming language, men (Church et al. 2011; Parry & Straker 2013) are expected to report more minutes of moderate activity

(Hypotheses H3 and H6, respectively). For housework/dependent care, women (Bianchi et al. 2007; Raley et al. 2012; Connelly and Kimmel 2010) and lower-SES individuals (Church et al. 2011) should report more minutes in physical activity when housework/dependent care are primed through question wording (Hypotheses H4 and H7, respectively). Each of the three physical activity domains that are used in priming language are *factors* in the 2x2x2 factorial design. This factorial design produced eight *conditions* that facilitate comparisons between results from this experimental study and the anlysis of the ATUS described in chapters four and five: (1) NHANES (leisure), (2) No Prime, (3) Housework/Dependent Care, (4) Paid Work, (5) Leisure & Housework; (6) Leisure & Paid Work; (7) Housework & Paid Work; (8) All Three Domains (leisure, housework, paid work).

To test these hypotheses, this chapter analyses descriptive statistics in addition to utilizing regression techniques that assess the relationship between each experimental condition and minutes or days per week of physical activity. The reported number of minutes a week coupled with reports of number of days per week in which physical activity takes place allows me to estimate the distribution of the weekly amount of physical activity engagement. This is important for producing results capable of informing current health policy. At present, HHS requirements suggest individuals engage in 150 minutes a week of moderate physical activity in order to maintain their health (HHS 2008). Reports of both minutes per day of physical activity and days per week of activity are highly skewed due to a large number of zeros. To address this, variables measuring minutes of physical activity per week were log transformed. I use negative binomial regression to model days per week, as the distribution of this variable more closely matches the distributions in count data.

Descriptive statistics document the demographic makeup of each group assigned to one of the eight conditions, as well as the average minutes of reported physical activity. These descriptive patterns can provide initial insight into hypotheses H1, which predicts additive properties for conditions that prime more than one domain (factor, e.g., paid work, leisure). The next set of analyses report OLS and negative binomial regression results looking at the main effects for conditions and factors. These results provide further evidence to address hypotheses H1. The third and final set of analyses introduce interactions between the two demographic characteristics of interest: gender and SES by factor and by condition. These regressions with interaction effects will provide evidence for hypotheses H2 through H7. Keep in mind that, in the experimental data, SES differences are only captured through a single indicator, education (college or more/Less than college degree).

Descriptive statistics for the full analytic sample and each group of respondents randomly assigned to one of the eight conditions are displayed in Table 22 (See Table 22). The first column on the left provides nationally representative estimates from the American Time Use Survey (ATUS) 2014 to help assess how comparable the samples derived from MTurk are to the United States population. Confidence intervals of 95% were used to assess whether demographics were significantly different across each of the eight experimental conditions and the nationally representative sample. The samples derived from MTurk were, in some condition groups, more male (*NHANES, Housework + Paid Work, All Domains*) and in one group more female (*Leisure + Housework*) than what we would expect given gender distributions in the ATUS. Overall, the MTurk sample is more educated than the national population (weighted ATUS distribution). Further, all eight experimental groups had significantly lower household income, with a lower numbers of married respondents, are significantly younger by around ten

years, and are significantly more White and "Other" race/ethnicity. From descriptive statistics, it is clear that the experimental sample derived from MTurk differs in key ways from the U.S. population. That said, the analytic sample for this experiment does contain demographically diverse Americans.

To better understand the impact of different priming words and how they influence reports of physical activity, Table 23 presents respondent reports of minutes a day, days a week, minutes a week, and whether HHS requirements[8] were met by each of the eight conditions. These results provide evidence to test hypothesis H1, which hypothesizes additive properties of the conditions with more than one domain (factor) primed. For example, I expect that reports for the condition that asks about leisure *and* paid work to generate higher reports of physical activity than the conditions that only ask about leisure or only ask about paid work. Further, the condition that asks about all three domains (factors) should have the highest average minutes and days reported (See Table 23).

Estimates of average minutes per week and days per week for each of eight conditions are documented in Table 23. Confidence intervals indicate whether conditions are significantly different than the control condition, *NHANES* survey question wording. The *NHANES* control condition primes leisure-only physical activity, thus, this condition is akin to the *Leisure Only* construction presented in chapters 4 and 5. Table 23 shows that the average minutes a day of physical activity reported range from 56 minutes (*NHANES*) to 183 minutes (*Housework + Paid Work*). Interestingly, the control condition (*NHANES*) generated the lowest average minutes per day. Additionally, any condition with Housework/Care in the priming language had an average minutes a day reported of over 100. Each experimental condition is significantly different than

[8] the Department of Health and Human Services (HHS) suggests all able-bodied adults engage in a minimum of 150 minutes of moderate physical activity a week (HHS 2008).

the NHANES control condition and reports are significantly *more* minutes in physical activity, compared to this control. Overall, hypothesis H1 is not confirmed by results for minutes a day. The condition that asks only about housework/dependent care has a higher average minutes reported than two of the three conditions with two domains (*Leisure* + *Housework* and *Leisure* + *Paid Work*). These results do not clearly support the additive properties expected by hypothesis H1.

The second physical activity reported in Table 23 is how many days a week respondents are engaging in moderate activity within different domains. The number of days a week demonstrate the regularity with which respondents engage in moderate physical activity. Understanding how consistently individuals are engaging in health-benefiting activity is also important when documenting the proportion of Americans meeting public health guidelines. The average days a week ranged from 2.3 days (*Paid Work*) to 5.2 (*Housework*). Four of the conditions had average days a week around five days: (1) *Housework/Dependent Care*; (2) *Leisure* + *Housework/Dependent Care*; (3) *Housework/Dependent Care* + *Paid*; (4) *All Domains*. This pattern suggests housework is an important domain driving regular engagement in physical activity. The control condition, *NHANES* (leisure-only), generated an average of two less days a week spent in moderate physical activity (3.0). In the third row, minutes a week are calculated by multiplying the number of minutes by days per week, as reported by the respondent. The number of minutes a week range from 216.5 (*NHANES*) to 1034.3 (*Housework/Dependent Care* + *Paid Work*). Again the control condition, which duplicates the wording used in a key survey tools documenting the physical activity habits of Americans, resulted in the lowest number of minutes a week. Hypothesis H1 is again disconfirmed because conditions with one factor primed have more average minutes reported than two factor

conditions, namely housework/dependent care. Additionally, the condition that primes all three factors should have the highest average minutes reported according to H1, but it does not. *Housework/Dependent Care*, *Leisure + Housework/Dependent Care*, and *Housework/Dependent Care + Paid Work* all have higher average minutes than the all three domains condition.

Finally, the percentage of respondents that met HHS physical activity guidelines was calculated across each condition. The percentages range from 35.1% (*Paid Work*) to 79.5% (*All Domains*). It is no surprise that when we capture physical activity across more domains of daily life, higher percentages of respondents meet physical activity requirements. Conditions that include housework in the priming language generating physical activity reports result in the highest percentages of respondents achieving at least 150 minutes of moderate physical activity in a week.

Physical Activity Across Experimental Treatments and Factors

Main Effects. Public health provides physical activity requirements based on suggested number of minutes a week (150) of moderate-to-vigorous activity, therefore, this analysis begins with reported minutes a week as the dependent variable. Results from the regression of minutes a week (log-transformed) by condition gives insight into whether there are significant differences in the average minutes a week reported by respondents across each experimental treatment, compared to the control (*NHANES*) that represents leisure-based physical activity. Table 24 documents regression coefficients and corresponding exponentiated transformation to get percentages of the coefficients to aid interpretation. These percentages were calculated by taking the coefficients, exponentiating to get the IRR, and turning into a percent by subtracting by one and then multiplying by 100: $100 * [\exp(\beta) - 1]$ (Woodridge 2009). For the regression of condition onto minutes a week (two left columns) OLS is used and negative binomial regression

is used to estimate the relationship between condition and days per week of physical activity (two rightmost columns).

Using the NHANES wording (*Leisure Only*) as the baseline comparison, there are significant differences between each condition and the NHANES condition (with one exception, the *No Prime* condition) (See Table 24). All experimental conditions that expand the definition of physical activity beyond leisure-based activities (to include housework/dependent care or paid work, for example) generate reports of significantly *more* minutes per week of health-benefiting physical activity ($p < 0.001$) compared to the NHANES control condition. The differences range from reporting 33% more minutes a week (*Paid Work* condition) to reporting 280.8% more minutes a week (*Housework/Dependent Care + Paid Work*). Because minutes per week of physical activity is log transformed, the coefficients can be interpreted in terms of percentage change, such that minutes per week of physical activity changes by $100 * [\exp(\beta) - 1]$ percent for a one-unit increase in the independent variable, holding all other variables in the model constant (Wooldridge 2009). This pattern of results does not support hypothesis 1, and points to housework/dependent care as the factor motivating significantly larger reports of physical activity because each condition that contains priming for housework/paid care has average reports more than 150% that of NHANES reports.

Moving to the third and fourth columns of Table 24 that document results from the negative binomial regression of days a week by each condition, there are different relationships compared to minutes a week. The results ranged from 26.3% less days a week (*Paid Work*) to 73.4% more days a week (*Housework/Dependent Care*). In this analysis, the *No Prime* condition is now significantly different from the NHANES control condition. Those who receive *No Prime* report an average of 27.5% more days a week of physical activity compared to those who receive

the NHANES condition. The second important difference is, for the first time, there is a condition reporting significantly fewer days a week spent in physical activity compared to NHANES, which is the *Paid Work* condition. Those who receive the *Paid Work* condition report an average of 25.7% fewer days a week in health-benefiting activity compared to the NHANES control priming. Further, *Leisure + Housework/Dependent Care* condition demonstrated an average of 64.2% more days a week compared to the NHANES control condition. For *Housework/Dependent Care + Paid Work*, participants report an average of 71.5% more days a week compared to the NHANES control, and 63.2% more days a week under the *All Three Domain* condition compared to NHANES control condition.

Using the *No Prime* condition as the comparison category (see Table 25) demonstrates how each of the conditions compares to not priming any physical activity domain. Overall, with respect to minutes per week of physical activity, the NHANES condition (which anchors reports around leisure activities) is no different from a condition that does not prime for any sort of physical activity. Further, each of these conditions (*NHANES*, *No Prime*) leads to lower reported minutes per week of physical activity than all other conditions which prime for different social domains, or combinations of activity domains. The only difference between *NHANES* and *No Prime* as baseline comparisons for other conditions is that the variation in reports of physical activity is not as large when comparisons are to *No Prime* (range from 26% increase for *Paid Work* and 259.7% increased report in minutes a week for *Housework/Dependent Care + Paid Work*).

For results of the treatment effects for conditions by days a week, patterns change when *No Prime* (rather than *NHANES*) is the comparison condition. First, when *No Prime* is the baseline category, estimates for all other conditions are significantly different from this baseline

estimate. The results range from 41.7% less days a week (Paid Work) to 36.0% more days a week (Housework/Dependent Care). Compared to the *No Prime* condition, there are two other conditions – both containing paid work in the condition wording – that generate reports of significantly fewer days of physical activity a week. Those receiving the *Paid Work* condition report an average of 41.7% fewer days a week compared to those receiving *No Prime*. Further, *Leisure + Paid Work* reports an average of 20.9% fewer days a week compared to the *No Prime*. Contrastingly, three other conditions demonstrate significantly more days a week reported compared to *No Prime*: *Leisure + Housework/Dependent Care, Housework/Dependent Care + Paid Work*, and *All Three Domains*. All other conditions, except the control *NHANES*, report significantly more days a week compared to no prime.

Finally, regression on the treatment effects of each condition on minutes a week and days a week uses *Housework/Dependent Care* as the comparison category. Using Housework/Dependent Care as the comparison category provides insight into how similar average reports in Housework/Dependent Care are to all other conditions (See Table 26).

The first noticeable difference is that most conditions generate reports of significantly fewer minutes in physical activity, when compared to the Housework/Dependent Care condition. These differences ranged from 66% *less* minutes a week (*NHANES*) to 28% *more* minutes a week (*Housework/Dependent Care + Paid Work*). Three other conditions generate reports of significantly *less* minutes a week compared to the *Housework/Dependent Care* condition (*No Prime, Paid Work, Leisure + Paid Work*). No other conditions were significantly different than *Housework/Dependent Care*. Overall, these patterns support Hypothesis 1, showing clear differences in the amount of physical activity reported across different treatment conditions. There is also support for the hypothesis of additive properties for the conditions with more than

one factor primed. Respondents report significantly more minutes a week in physical activity when primed by *Housework/Dependent Care + Paid Work* compared to just being primed by *Housework/Dependent Care.* Finally, the relationship between days a week and condition, using *Housework/Dependent Care* as the comparison category, is analyzed. When *Housework/Dependent Care* serves as the comparison condition, four conditions generate reports of average days of physical activity per week that differ from this baseline estimate. In each case, the four conditions generate reports of significantly *less* days a week of physical activity when compared to the *Housework/Dependent Care* condition. The differences range from 57.2% less days a week (Paid Work) and 26.5% less days a week (*No Prime*). *NHANES* and *Leisure + Paid Work* are the two other conditions with significantly less days a week reported compared to *Housework/Dependent Care*.

Table 27 documents treatment effects of factors (rather than conditions) on minutes per week (log-transformed and modeled using OLS) and days per week (modeled using negative binomial regression) (See Table 27). Reports of minutes a week of physical activity changes by 26% when *Paid Work* is mentioned versus not and by 182% when *Housework/Dependent Care* is mentioned versus not. The treatment effects of including leisure-focused priming language versus not including such language was not significant. This means that asking respondents about their leisure activity habits has no significant impact on reports versus not specifying any type of activity. These results provide support for hypothesis 1 that suggests asking about different domains of physical activity will lead to significantly different (and generally higher) reports of health-benefiting physical activity. Indeed, adding wording about *Housework/Dependent Care* and *Paid Work* both significantly increase reports of minutes a

week spent in physical activity, to different degrees, compared to not asking about any specific activity.

The third and fourth columns of Table 27 present results for main effects of factors on reports of the number of days a week respondents spend in health benefiting activity. Here, all three factors are significantly different than not asking about any activity, two actually negatively impact reports while one positively impacts reports. Asking about paid work versus asking about nothing decreases the number of days a week reported by 10.1%. The other negative relationship is between leisure and days a week (3.34%). Housework/dependent care, on the other hand, increases reports of the number of days a week by 66.7%. Again, hypothesis 1 (H1) is supported. Asking about different domains of physical activity produces significantly different reports.

Interactions. Before unpacking the interaction effects on the two main physical activity disparities central to this project, gender and SES, I estimated regressions interacting the three factors (paid work, housework/dependent care, leisure) to better understand if any factors significantly modify reports of physical activity in different ways when asked in combination with another factor. These results address hypothesis H1. Table 28 presents results for minutes a week (columns one and two) and days a week (columns three and four) (See Table 28).

Results for minutes a week demonstrate no significant interactions. This means that none of the factors have significant modifying impacts (e.g., intensifying, mitigating, or shifting the pattern) on reports of minutes a week spent in physical activity with other factors. Unlike minutes per week, however, there are significant two and three-way interactions between the experimental factors in predicting days per week spent engaged in physical activity (columns three and four). Relative to including no physical activity prime (the baseline), there is a decrease in the days per week of physical activity when including just the *Paid Work* factor (42%), the

Leisure factor (22%), and the *Paid Work* and *Leisure* factors together (21%); that is, adding leisure language to paid work levels out the days per week of physical activity reported. There is an increase in days per week spent in physical activity (relative to no prime) when the priming includes *Housework/Dependent Care* alone (36%), *Paid* and *Housework/Dependent Care* (34%), *Leisure* and *Housework/Dependent Care* (29%), and all three factors together (28%); thus the negative effect of *Paid* does not appear to mitigate the effect of housework/dependent care, although the negative effect of leisure does appear to mitigate the effect of housework/dependent care slightly. Overall, it appears that the leisure factor reduces both the positive effects of *Housework/Dependent Care* and the negative effects of paid work on days per week of moderate physical activity. For ease of interpretation, I also include the table of mean days per week spent in physical activity for each of these combinations of primes, in which the upper left corner is the no prime condition (See Table 29).

With respect to hypothesis 1, which expects additive properties of the factors when more than one factor is primed in survey question language, it appears unsupported when considering days per week of physical activity—rather than each type of activity additively increasing the days per week of physical activity, both paid and leisure appear to decrease the days per week of physical activity, and there are interaction effects among the three factors.

Gender

Hypotheses Two, Three, and Four that infer men will report more physical activity with leisure is primed (H2) as well as when paid work is primed (H3), but women will report more physical activity when housework/dependent care is primed (H4), require an investigation of the relationship between gender, the conditions and factors of the experiment, and the reported minutes and days per week engaged in physical activity. Regression results for minutes a week

and days a week by the interaction between gender and condition are reported in Table 30. Further, predictive percentage changes (OLS Linear regression) and incidence rate ratios (Negative binomial regression) in physical activity reported compared to those who received housework/dependent care condition (comparison category) are graphed in Figures 21 and 22 to provide evidence of the modifying effects of gender on reports in different conditions (See Table 30 and Figures 21 and 22).

First, I investigate the interactions for the seven experimental conditions by gender for minutes a week (Table 30, left column). Because previous research suggests Housework/Dependent Care will be the more crucial factor shaping significant gender disparities, I use the *Housework/Dependent Care* condition as the comparison category. There is a significant interaction for five of the eight treatment conditions by gender relative to the *Housework/Dependent Care* treatment condition. A significant interaction term implies that the reports of each condition significantly vary by gender when compared to the *Housework/Dependent Care* treatment. First, women receiving the *NHANES* condition report 75.4% fewer minutes of physical activity compared to the women receiving *Housework/Dependent Care* (100*(exp(-.699-.702)-1)), while men who receive the *NHANES* prime report a 50.3% fewer (100*(exp(-.702)-1)) in minutes a week relative to *Housework/Dependent Care*. Therefore, the leisure condition (NHANES) more intensely decreases reports for women than for men, compared to those who receive the *Housework/Dependent Care* condition. Next, women who receive the *No Prime* condition report 73.2% fewer minutes of physical activity compared to women who *Housework/Dependent Car*e condition (100*(exp(-.671-.646)-1)), while men who receive the *No Prime* condition report a 73.2% fewer minutes per week of physical activity (100*(exp(-.646)-1)) relative to men who

receive *Housework/Dependent Care*. Here, for both the *NHANES* control and *No Prime* conditions, gender has significant modifying effects. Being a woman increases the disparities between reporting minutes a week spent in *NHANES* or *No Prime* compared to housework/dependent care more than being a man. In other words, men's reports of minutes a week spent in *NHANES* (leisure-only) or *No Prime* are more like men's reports of *Housework/Dependent Care* than women. These results support hypothesis H4.

Another significantly interaction was between gender and the *Leisure + Housework/Dependent Care* condition. Compared to women who receive *Housework/Dependent Care* condition, women who receive the *Leisure + Housework/Dependent Care* condition report 13.0% fewer minutes per week of physical activity (100*(exp(.263-.402)-1)), while men who receive the *Leisure + Housework/Dependent Care* condition report a 30.0% more minutes a week relative to men receiving *Housework/Dependent Care* (100*(exp(.262)-1)). For *Leisure + Paid Work* condition, compared to women who receive *Housework/Dependent Care* condition, women who receive the *Leisure + Paid Work* condition report 66.9% fewer minutes per week of physical activity (100*(exp(-.340-766)-1)), while men who receive the *Leisure +Paid Work* condition report a 28.8% fewer minutes a week relative to men receiving *Housework/Dependent Care* (100*(exp(-.340)-1)). Results for both of these conditions suggest that being a man limits the disparities between *Housework/Dependent Care* and *Paid Work* or *Leisure + Paid Work*. Men's reports of *Paid Work* and *Leisure + Paid Work* are *closer together* in minutes reported a week compared to reports under *Housework/Dependent Care* compared to women, whose reports in *Paid Work* or *Leisure + Paid Work* and *Housework/Dependent Care* are farther apart. These results provide support for H3 about *Leisure + Paid Work*. Hypotheses suggest men will

report more under paid work and leisure priming in survey questions and the interactions between gender and *Paid + Leisure* confirm that.

Finally, for *All Three Domains*, women who receive the condition with all three domains report 2.18% more minutes per week of physical activity (100*(exp(.390-.369)-1)) compared to women receiving the *Housework/Dependent Care*, while men who receive the condition with all three domains report a 47.7% more (100*(exp(.390)-1)) in minutes a week relative to *Housework/Dependent Care*. Evidence from these interactions supports the hypothesis inferring *Housework/Dependent Care* priming language increases women's reports of physical activity more so than men (Hypothesis 4), because the inclusion of leisure and paid work intensifies men's responses more than women's. Women's reporting of physical activity is increased under the housework/dependent care (comparison category).

When days a week is the dependent variable and gender is interacted with eight conditions, there are two significant interactions: gender and *No Prime* and gender and *Leisure + Paid Work*. Results showed women who receive the *Paid Work* condition report 62.6% fewer dyas a week in physical activity compared to women who receive the *Housework/Dependent Care* condition (100*(exp(-.682-.300)-1)), while men receiving the *Paid Work* only report 49.4% fewer days a week than men who receive *Housework/Dependent Care* (100*(exp(-.300)-1)). Further, women who receive the *Leisure + Paid Work* condition report 49.7% fewer days in physical activity compared to women receiving the *Housework/Dependent Care* condition (100*(exp(-.365-.323)-1)). The decrease in reported days a week is smaller for men, where men receiving *Leisure + Paid Work* report only 30.6% fewer days a week compared to men who receive *Housework/Dependent Care* (100*(exp(-.323)-1)).

Next, I regress log-transformed minutes per week and days a week on the interaction between gender and each experimental *factor* (leisure, housework/dependent care, and paid work) (See Table 31 and Figure 23). For minutes a week (left bar chart in Figure 23), there is a significant gender by housework/dependent care interaction, such that the positive effect of housework/dependent care on reported physical activity is stronger for women compared to men. Compared to men who receive no housework/dependent care prime in questions about physical activity, men who receive a housework/dependent care prime report a 95.6% increase in minutes per week of physical activity (100*(exp(.671)-1)), while women who receive a condition with the housework/dependent care factor report a 273% increase (100*(exp(.671+.646)-1)) compared to those who did not receive any factor. These results further confirm hypothesis H4. The presence of housework/dependent care wording leads to significantly higher reports of physical activity among women compared to men (H3). No other interactions were significant.

For the results for days a week (right bar chart in Figure 23), there are more significant interactions between factors. However, just like minutes a week, the housework/dependent care factor is the only one to demonstrate significant interaction with gender in predicting days per week of physical activity, such that the positive effect of including housework/dependent care language (vs. not) on reported physical activity is even stronger for *men* compared to women, contrasting the results from minutes a week. Women who receive *Housework/Care* compared to women who receive no prime report 13.2% more days a week reported in physical activity (100*(exp(-.169+.292)-1). For men who receive *Housework/Care* compared to men who receive no prime have a 15.7% increase in days a week reported (100*(exp(.145)-1). Thus, for both minutes and days per week, priming respondents to think about moderate physical activity that can include housework/dependent care produces estimates that are in stark contrast to those

produced by current health surveillance systems. Overall, these results support the fourth hypothesis, that women report significantly more minutes a week in physical activity when asked about housework/dependent care than do men. We do not see support for the second hypothesis, in that there is no gender difference in minutes per week of physical activity when leisure is primed (we expected men to report more physical activity in this instance) and again no support for hypothesis three that suggests men will engage in significantly more paid work, since the paid work and gender interaction produced no significant difference.

Education

Addressing hypotheses five, six, and seven that suggest those with more than a college degree will benefit more from leisure priming language (H5), those with less than a college degree will benefit more from paid work priming language (H6) and no significant difference for housework/dependent care language (H7), requires an investigation of the relationship between college degree attainment, the conditions and factors of the experiment, and the reported minutes and days per week engaged in physical activity. Again, I begin with the impacts of interactions among college degree attainment and the seven treatment conditions for reported minutes and days per week. The *NHANES* (leisure only) control condition serves as the comparison category (see Table 32). Further, Figure 24 provides illustration of the modifying impacts educational attainment has on reports of health-benefiting physical activity by condition.

For reports of minutes a week of physical activity, there is a significant interaction for four treatment conditions: (1) *Housework/Dependent Care*; (2) *Paid Work*; (3) *Leisure + Paid Work*; and (4) *Leisure + Housework/Dependent Care* by educational attainment relative to the *NHANES* condition (See Table 32 and Figure 24). In general, as Figure 24 illustrates, physical activity questions that reference the possibility of activity in non-leisure domains (e.g.,

housework, paid work) produce higher estimates of physical activity among those with less education than those with more education. For instance, college educated receive the *Housework/Dependent Care* condition report 133.4% more minutes of physical activity compred to college educated who receive *NHANES* (100*(exp(1.35-.501)-1)). In contrast, those without a college education who receive the housework/dependent care language report a 285.3% increase in minutes a week relative to the *NHANES* control condition (100*(exp(1.35)-1)). These results do not support hypothesis seven (H7) because it was expected there would be no significant difference between higher and lower educated individuals. Instead, having less than a college education significantly increased reports of physical activity when housework/dependent care references are embedded in question wording compared to those with a college education or better.

There is a similar intensifying pattern when it comes to the influence of paid work language in physical activity questions. College educated who receive the *Paid Work* condition report 8.7% fewer minutes of physical activity compared to college educated who receive th *NHANES* condition (100*(exp(.600-.691)-1)). For non-college educated, those receiving the *Paid Work* condition report 82.2% more minutes per week of physical activity compared to those who received *NHANES* (leisure) (100*(exp(.600)-1)). This pattern supports hypothesis six that suggests priming *Paid Work* would produce higher estimates of physical activity among the less educated.

The third significant interaction, *Leisure + Paid Work* condition, demonstrates that college educated who receive this condition report 8.1% more minutes of physical activity compared to colleged educated who receive *NHANES* (leisure only) question wording (100*(exp(.582-.504)-1)). For non-college educated, those receiving the *Leisure + Paid Work*

condition report 78.9% more minutes a week relative those who receive NHANES control condition (100*(exp(.582)-1)). Thus, including references to two non-leisure domains increases reports of physical activity much more dramatically for those with lower (rather than higher) education levels. This provides further evidence that supports the overall conjecture that physical activity questions anchored in leisure-only activities produce bias in physical activity estimates that favor higher SES individuals.

Finally, *Housework/Dependent Care + Paid Work* was the fourth significant interaction. Hypotheses again outline the expectation that priming these two social domains through physical activity question wording will produce intensification effects on reports of physical activity for less educated, versus more educated respondents. Results support this hypothesis because the percent increase is significantly larger for those without a college degree that are asked about housework/care + paid work (213.7% increase) (100*(exp(1.56-.412)-1)) while those without a college educated report a 376.1% increase in physical activity(100*(exp(1.56)-1)) compared to their couterparts receive the *NHANES* condition.

The next regression, second column of Table 32, documents the impacts of the interaction among educational attainment and the seven conditions when the outcome is days a week reported in physical activity. Figure 25 also provides an illustration of the interaction impacts between condition and educational attainment on days a week reported in physical activity (See Figure 25).

The only two-way interaction that is significant is between education and paid work. College educated who receive *Paid Work* condition report 24.8% days a week of physical activity compared to college educated who receive the *NHANES* control. However, among less than college educated, respondents who receive the paid work priming language in their physical

activity question report a smaller decrease: 7.99% (100*(exp(-.083)-1)) in days a week relative to *NHANES* (leisure) language. This pattern in physical activity reports suggests that the threshold for engaging in physical activity at paid work varies by one's educational attainment such that having a college degree intensifies the relationship between time spent in paid work moderate physical activity and the number of days reported in physical activity, reducing estimates more significantly when respondents have more education, a pattern that provides support for Hypothesis six (H6). Hypothesis five (H5) is not supported because leisure only physical activity reports do not vary significantly by educational attainment. Expectations of the influence of housework/dependent care priming language on estimates of days per week with physical activity are supported (H7) since there is no evidence of a significant difference in reports by education and housework/dependent care language.

Expectations for conditions that prime two or more non-leisure domains are partially supported. I expected *Leisure + Paid Work* priming effects to cancel each other out. The coefficient for the interaction between college *Leisure + Paid Work* is not significant, which supports the hypothesis about cancelling properties. *Leisure + Housework/Dependent Care* was expected to be mitigated, which is again what happened as suggested, since the coefficient for the interaction between college and *Leisure + Housework/Dependent Care* was not significant. Similarly, I expected *Housework/Dependent Care + Paid Work* to favor those with *less* than a college degree and results show no significant difference, contrary to expectations. The priming language with all three domains had mitigating results, which was to be expected.

After unpacking interaction impacts by the seven treatment conditions, analysis of the interactions of college attainment and the three experimental factors (leisure, housework/dependent care, paid work) provides further evidence as to whether or how primes

for different domains of physical activity increase, reduce or shift the direction of SES differences in physical activity reports. Drawing on regression results of the log-transformed minutes per week on the interaction between education and the experimental factors provides additional evidence as to whether minutes reported in physical activity vary across the experimental factors and levels of education (See Table 33).

While there were no significant interactions among the main effects (e.g., paid work x housework/care) for the experimental factors when predicting minutes per week, interesting interactions emerge when education (college or more vs. less than college) is added to factors. The college x paid work interaction indicates that those with a college degree or more report 10.2% *fewer* minutes per week of physical activity relative to who receive no priming language (100*(exp(.512-.619)-1)). On the other hand, those without a college degree who received physical activity questions with paid work language report 66.9% *more* minutes relative to other respondents with similar education levels who not receive paid work priming language (100*(exp(.512)-1)). This pattern is consistent with hypothesis six, which lays out the expectation that those with less than college education would report *more* minutes of physical activity when question wording includes references to activities on the job (paid work factor) than more highly educated individuals. Similarly, among respondents who are primed with housework/dependent care factor in the physical activity question, those with a college degree report 129.7% *more* minutes per week of physical activity relative to those who do not receive any priming language (100*(exp(1.26+-.430)-1)). Further, those who do not have a college degree and receive housework/dependent care priming language in the physical activity question report 253% more minutes of moderate physical activity per week compared to those who do not have a college degree and did not receive priming language (100*(exp(1.26)-1)). This pattern of

evidence does not align with hypothesis seven (H7), because, here, less educated individuals report more moderate physical activity under the housework/dependent care priming language compared to more educated counterparts.

The third significant interaction with college attainment that predicts minutes a week of moderate physical activity involves both the paid work and housework/dependent care factors. Those with a college degree have a smaller percentage increase in minutes reported (208.6%) when compared to those who do not receive any factor versus those who are not college educated and receive paid and housework/dependent care priming (336.3%). These results provide support for hypotheses predicting intensification for paid and housework/dependent care priming language for those with lower education. Further, there is no evidence that those with a college education or more report more physical activity when leisure activity was primed compared to those with less than a college education (Hypothesis 5).

The final analysis examines relationships among educational attainment and each factor as it relates to reports of days a week respondents say they engage in physical activity, utilizing negative binomial regression. The only factor that has significant variation across educational attainment is paid work. Examining days per week as the dependent variable, those with a college education report 24.8% fewer days per week of physical activity when primed with paid work compared to those receiving no prime (100*(exp(.061+-.347)-1), consistent with Hypothesis 6. Here, Hypothesis 7 is supported (no difference across education when primed with housework/dependent care), and again, no support for Hypothesis 5.

Discussion

Does priming for different domains of physical activity result in different reports of physical activity engagement? These findings suggest that, yes, when time spent in

housework/dependent care and paid work is introduced in survey questions, self-reports of minutes per week and days per week vary significantly when compared with the current wording we use to measure Americans' physical activity habits (leisure-only). In general, these results suggest that the current reporting method anchored in language that emphasizes *leisure-time physical activity* (NHANES control condition) appears to generate significantly lower estimates of physical activity than when similarly-worded questions invite opportunities to consider activity in other social domains, such as paid work. While I hypothesized additive properties according to the number of factors (housework/dependent care, paid work) primed through the question wording, this is not supported by the mean minutes per week reported across each condition. I expected the condition priming all three experimental factors to have the highest reports of physical activity. This was not supported by the data. Rather, the data indicate that housework/dependent care individually, and in conjunction with leisure and paid work produces higher average reports of physical activity. Important to note in these results is the commonality of housework/dependent care represented in priming language for each of the three highest average minutes reported. It may be that there is a saturation point for the number of activities a survey question can prime for before respondents fail to recall activities associated with multiple social domains. Priming more than two domains at a time may not improve the accuracy of respondents' recall efforts.

Main effects of each condition and factor draw attention to differences predicting minutes a week spent in healthy activity versus predicting days a week spent in healthy activity. Overall, conditions behaved similarly except paid work (Tables 22 and 23). Including paid work in priming language significantly increased minutes a week reported but significantly *decreased* days a week reported. This may be a reflection of the stark contrast

between those in labor-intensive professions versus those who are not. Overall, fewer people are likely to be in a labor-intensive job, which means a large number of people likely report zero days in moderate physical activity at paid work. Further, among the individuals who *do* report moderate activity at work, they are likely reporting their time spent in a full shift at work, which quickly increases the number of minutes reported in a week. Regarding impacts of different primes, an interesting area for future research is in the direction of the effect of the paid work prime and how it varies depending on the dependent variable: paid work is associated with increased minutes per week reported, yet is associated with decreased reported regularity.

Drawing on sociological literature that highlights varying opportunities and access to different physical activity domains across gender and SES, I also wanted to assess whether priming for housework/dependent care and paid work change the story current health surveillance systems tell about gender and socioeconomic disparities in physical activity. First, language on housework/dependent care consistently reverses the gender disparity (which favors men over women) documented in current public health reports. As Figure 21 demonstrates, predicted percentage change in minutes a week reported are higher for women under any condition that includes housework/dependent care language (housework/dependent care, leisure + hw/care, hw/care + paid work). These results provide support for the gender specialization of time use theory that contends patterns in time use manifest in certain domains, with women allocating more time than men to housework/dependent care activities (Bianchi, Sayer, Milkie, Robinson 2012; Schneider 2011). An interesting departure from this overall pattern are reports for days a week in housework/dependent care, which indicate a larger percent change for men than women (Figure 23). In other words, women, though they are

reporting far more minutes spent in housework/dependent care, men report that they are engaged in housework/dependent care on more days per week. This contradicts literature claiming, in general, women perform much more of the "daily chores" and men perform more of the infrequent household tasks. One reason for these results could be reporting habits of men. Research has shown that men tend to overreport the amount of housework they engage in where women are less likely to do so (Kamo 2000). Further research could certainly benefit from unpacking the relationship between men's and women's reports of housework on daily versus weekly basis.

Next, gender disparities under the paid work condition repeatedly demonstrate that priming language for paid work (paid work and leisure + paid work) intensifies men's reports of physical activity more than women, widening the physical activity gap already established in research. Results from both housework/dependent care and paid work domains underscore claims in the literature that men and women likely take very different paths to healthy activity that are rooted in gendered divisions in paid and unpaid work, and are unlikely to be estimated acurately by current physical activity questions that only ask about leisure activity.

For educational disparities, consistent with theory of hierarchical occupational structures that fall along SES and health-benefiting lines, results demonstrate that those with lower educational attainment reported significantly more physical activity when primed for paid work compared to those with higher educational attainment (Beenacker, et al. 2012; Wright 1995; Krieger et al. 1997). The time and resource availability argument (McInnes & Shinogle 2011; Mullahy & Robert 2010) is not upheld, with the interaction of education and leisure demonstrating no statistical significance (hypothesis five). Those with lower educational attainment report significantly more physical activity in housework/dependent care

compared to those with higher education when the dependent variable is minutes per week, which supports previous research citing knowledge and skills associated with higher education as important for accessing efficiencies in housework and dependent care. Further, results may be indicative of other social forces such that individuals with lower educational attainment might have less control of their time and are more likely to be pulled into obligatory tasks like housework, child care, and care for family members (Becker 1965; Crespo et al. 1999; Gronau 1976; McNeill, Kreuter, & Subramanian 2006). Since lack of time consistently serves as one of the biggest barriers to exercise (Hare et al. 2016), it is important to better understand patterns of time use that can help inform effective and attainable strategies to improve physical activity among time-constrained populations.

The strongest and most consistent finding maintained across all statistical analyses is the gendered story about housework and dependent care. Hypothesis four is supported by both regression results from minutes per week and days per week. When individuals are asked about time spent in moderately active housework and dependent care, women consistently report significantly more and more regular engagement in health-benefiting activity than men. The literature on unpaid work tells us that women are still doing more of the housework and childcare that is required on a daily basis (Bianchi, Robinson, and Milkie 2007; Bianchi, Sayer, Milkie, Robinson 2012), even when they work full-time (Chesley and Flood 2016). Some of these activities require moderate levels of physical exertion, thus more women are likely meeting physical activity requirements when these activities are taken into account. We also find evidence that indicates that markers of SES—like education—shape physical activity habits, with less educated individuals more likely to engage in health-benefiting activity at paid work. Some of these activities require moderate level physical activity, and more individauls

with less education might actually be meeting physical activity requirements when these activities are accounted for in our measurements.

Overall, this experiment documents that accounting for time in health-benefiting activies occur in different domains *beyond leisure* tells a different and more comprehensive story about health, and health disparities. Accounting for time in housework and dependent care (for the gender story) and paid work (for the SES story) actually *reverses* the disparity America has understood for decades: women actually engage in more physical activity when asked to consider housework/dependent care and individuals with lower levels of education engage in more physical activity when asked to paid work. This indicates that considering a broader range of physical activities should improve our understanding of who is meeting physical activity requirements in the US.

One important area for future research is to link the reported physical activity to actual physical activity. While this study has increased reported physical activity under certain conditions, I am not able to provide evidence of the validity of these reports without linking to actual physical activity. This is an important area of research for a future study.

Results should be interpreted with some important limitations in mind. One, more general, limitation to consider is how the use of MTurk and the potential sample may systematically modify the theoretical relationship between gender, SES, and the perceptions of physical activity as they relate to reporting on a survey question. Previous studies using MTurk do acknowledge a higher percentage of men and more affluent individuals in the sample for MTurk. This holds true in the current analytic sample. Therefore, one could argue the results from this experiment do not accurately represent general population averages and should, therefore, not be compared to current health surveillance systems. However, my inability to

determine population *rates* of physical activity should not hinder the important goal of investigating the *theoretical* relationship between one's gender and/or socioeconomic status and perceptions of moderate physical activity as they relate to survey reports. Therefore, though the sample may *look* different on focal measures (and descriptive tables say they certainly do) when compared to rates of the general population, the use of an MTurk sample should not pose a threat to the investigation of the potential for social status variables, like gender and SES, to shape how individuals in different social locations access health-benefiting physical activity.

A second limitation is the use of one indicator (educational attainment) to conceptualize socioeconomic status. Public health and sociological research often use income and occupation as indicators of socioeconomic status, in addition to educational attainment. Limited statistical power inhibits my ability to use these in this study. However, much of the research on disparities in physical activity recognize educational attainment as one key indicator that accounts for most of the variation in socioeconomic differences in activity (Jones et al. 1998; He & Baker 2005). Further educational attainment, alone, has been found to serve as a key mechanism shaping time in both care work and housework (England & Srivastava 2013; Sullivan 2010). Therefore, education as one indicator of SES is an important focus for this work.

Even with these limitations, this study adds valuable knowledge about gender and SES differences in public health. The findings highlight the consequences of relying on survey questions designed to tap levels of physical activity without considering the broad social forces, like gender specialization in time use and SES-segregation patterns in American occupational structures, that shape actual experiences of physical activity. Physical inactivity has become a growing concern in the United States. These results suggest that measures of physical activity that leverage how moderate physical activity is shaped by an entrenched

gender and SES system that encourages and supports gender and SES specialization in paid and unpaid work will tell a different story about physical activity habits.

Indeed, these findings demonstrate that one's gender and SES create different access points to physical activity through unpaid housework and dependent care, as well as different paid work options that may better position women and lower SES individuals to meet physical activity guidelines. Thus, current physical activity statistics continue to reify social ideas of gender and SES disparities in physical activity, rather than illustrating a more accurate picture of the amount of moderate physical activity Americans are engaging in. As the concern of physical inactivity grows in the United States, results like these underscore that future health surveillance systems must recognize potentially biased results that arise from survey questions that neglect the social processes influencing differences in time use.

VII. Conclusion

Physical activity is repeatedly cited in public health as one of the top key health indicators providing insight into the overall health of both groups of individuals and societies as a whole (HHS 2008). Accurate understanding of who is accessing health-benefiting physical activity and where they are accessing it is crucial for informing and updating the blueprint of U.S. public health. This research seeks to determine if the current method health surveys use to ask about individuals' level of physical activity was giving a comprehensive picture of this important health behavior. Overall, my findings present a resounding "no." Indeed, my results suggest that inattention to social forces connected to gender and SES is limiting our understanding of how much health benefiting physical activity American's engage in, and the pathways different groups employ to access these activities.

This project was informed by previous theory and empirical evidence that demonstrates how different definitions of "physical activity" shape the magnitude and direction of gender and socioeconomic differences in time spent in health-benefiting physical activity, merging at the intersection of sociological, public health, and survey methodological research and perspective. An understanding of the gender (Bittman et al. 2003; England & Srivastava 2013; Gupta 2007; Raley et al. 2012; Sullivan 2013) and socioeconomically stratified (Beenacker, et al. 2012; Krieger et al. 1997; Wright 1995) patterns surrounding other domains of physical activity, such as housework/dependent care and paid work, suggest different opportunities for health-benefiting physical activity.

Three overarching research questions motivated this research: Are current self-report survey questions comprehensively capturing variation in physical activity that may be rooted in important gender and socioeconomic differences? If not, how problematic are these estimates

with respect to reported gaps in physical activity by gender and SES? Are there ways to measure physical activity that better account for this expected variation? I successfully answered these questions through secondary data analysis of Americans' time use patterns and the primary data collection of an experimentally designed study investigating different question wording that primes three different activity domains.

Are current reports capturing the full variation in physical activity habits across gender and socioeconomic position by focusing on leisure-only activity? The answer here is no. For gender variation, secondary analysis drawing of the ATUS in which I add housework, childcare, and elder care to the definition of physical activity reveals opportunities to engage in healthy activity that women, rather then men, are much more likely to access. Experimental results confirm this. The addition of priming language asking about housework and dependent care that may involve moderate levels of physical activity significantly increases reports of physical activity for women far more than men. This variation is completely unexamined with current physical activity survey questions.

Another unexamined source of healthy activity is paid work. Here, the secondary data analysis shows that men utilize this path to physical activity more than women. Again, experimental results support this. Overall, the analysis here indicates that physical activity question wording that includes paid work significantly increases men's reports of physical activity, relative to women's reports. An important element to think about, however, is the tradeoff in physically demanding jobs between access to healthy activity and long term affects to overall health. Being in a physically demanding job for extended years leads to a higher likelihood of physical affects (i.e. exposure to unhealthy toxins, earlier deterioration of joints). Though this project clearly highlights paid work as a key opportunity for certain populations to

access healthy activity, it is important to understand this healthy activity, when done for long periods of time, can have unhealthy affects on individuals.

For socioeconomic variation, current estimates drawn from measures anchored in leisure-time physical activity again overlook important SES differences in other activity domains. Priming respondents to think about physical activity that takes place in the context of housework, dependent care, or paid work changes the relationship between socioeconomic status and levels of physical activity. Housework and care, under most measures of SES, reverse our understanding of who is engaging in more activity with lower-SES, rather than higher-SES individuals reporting more activity. A similar trend emerges with paid work: individuals in lower-status occupations that require less formal education are expected to engage in more physical activity than individuals in more prestigious jobs, when paid work is added to the definition. Results from the experimental study replicate the inverse relationship; adding priming language about paid work produced larger estimates of physical activity from lower-SES more so than higher-SES individuals. These data underscore that relying on physical activity measures that only prime for leisure-based activity captures physical activity that higher-SES individuals are much more likely to access physical activity. This approach also fails to capture activities in social domains that lower-SES individuals are more likely to access. Neglecting the full story of how *all* individuals across gender and SES gain access to physical activity not only leads to misrepresentation in public health dialogue that influences policy and programs, societally it perpetuates the narratives that the marginalized groups (women and lower-SES individuals) are not engaging in health-benefiting behaviors.

How problematic is using measure that restrict physical activity to leisure activities? I used disparities in physical activity by gender and SES to examine what happens to the gaps in

physical activity across different specifications of physical activity. In some cases, like the overall gender story, current reports from leisure-only questions are over exaggerating the gender disparity. Even with all healthy activities taken into account, men still engage in significantly more activity than women. In this case, detrimental impacts on how policy and programs are shaped is not as severe. However, in some cases the leisure-only reports get the relationship wrong and the reverse is true. Specifically, SES as measured by education and occupation, and gender among parents of young children, have opposite relationships with health-benefiting moderate physical activity when all activity is taken into account. For these groups, program and policy rooted in leisure-only reports may overlook how individuals in specific social locations are capitalizing on different domains to achieve healthy physical activity. By maintaining leisure-only questions, the narrative continues that in order to access physical activity one must have the time and money for gym memberships, sports teams, athletic gear, and other leisure-focused means to physical activity.

Finally, are there better ways to account for variation in physical activity? One thing is certain: leisure-only questions that target levels of physical activity engagement are clearly insufficient. Rather than providing the magic solution for accurately inquiring about the nation's physical activity habits, this project highlights different opportunities to healthy-activity that should be recognized when diagnosing the physical activity levels of specific groups of Americans. Another important addition to understanding how we ask questions about physical activity comes from the experimental study. Experimental results suggest priming language for two domains helps better replicate known variation in physical activity, but three domains in priming language might hurt recall efforts for the respondent. An important limitation to this recommendation is the recognition that this project did not explicitly investigate issues of

meausurement validity. Results from this study cannot specifically assert the most valid and reliable measure of physical activity, but can recognize how reports vary and when, depending on what activities are primed. Future research would benefit from further investigation of measurement validity in order to establish criterion validity.

Overall, results from both the ATUS analysis and the experimental study demonstrate that time spent in healthy housework, care for others, and paid work matters, and more importantly, clearly presents opportunities for physical activity to sub-populations thought to lack healthy levels of activity. Most specifically is the clear opportunity for healthy activity in *moderately* active activities as oppose to *vigorous* activity. By only asking about leisure activity, the focus (intentionally or not) is drawn to vigorous physical activity. Broadening the scope to include healthy activity in housework, childcare, adult care, and paid work brings to light the importance of moderate physical activity. Results from this study support the recommendation to focus on moderately active physical activity in future survey questions. Therefore, this project demonstrates that public health institutions need to consider that different people access physical activity in different ways and this needs to be reflected in how we study health, and the behaviors that support it.

Beyond providing answers to the overarching questions guiding this project, nuances emerged in the analysis that contribute to the literature on the intersection of social patterns in time use and physical activity habits. First, through analysis of the ATUS it became clear that paid work is a driving force in physical activity disparities for men compared to women and for lower-SES individuals compared to higher-SES individuals, producing the most drastic disparities in physical activity estimates. The sensitivity analysis revealed that reducing the amount of time at paid work that is considered health-benefiting still leads to strong, significant

disparities in physical activity. The literature on including paid work in assessments of physical activity has continued to highlight concerns about best practices for assessing moderate in paid work settings (Spinney, Millward, & Scott 2011; Tudor-Locke et al. 2009), often referring to the time spent on the job—and in physical activity on the job – as a "black box" (Harvey & Spinney 2000; Spinney et al. 2011). My research contributes to this conversation by demonstrating how impactful paid work is on physical activity estimates and, further, how vital it is to understanding the scope and nature of gender and socioeconomic disparities. If nothing more, this should motivate future research to systematically understand how to accurately capture time spent in healthy activity at work. Time use research continues to remind us that Americans spend the majority of their time in paid work (Robinson & Godbey 2010), so our limited understanding of how work activity and experiences contribute to health behaviors is doing a disservice by not capturing a major part of many American's lives.

This project also contributed to the literature by identifying the ramifications that come with measuring SES in three different ways for understanding SES physical activity disparities. Results in chapter five suggest that education, income, and occupation do not operate in the same way when it comes to providing opportunity and access to physical activity. Just looking at results for leisure activity (Table 18 and 19), for example, none of the measures behave in the same way. Further, income as one indicator of SES is the only measure that replicates current reports of SES disparities. Leisure is an activity that often requires monetary resources, therefore, it makes sense that income was the one measure that demonstrated those with larger resources engaged in more leisure. The variability in results across measures points to distinct social patterns surrounding each measure of SES that impact opportunities and access to physical activity in different ways. This work underscores that future research must take these differences

into account when analyzing the relationship between SES and health behaviors like physical activity. SES is too complex to limit its operationalization to one measure when analyzing health behaviors.

A final intricacy that emerged from this project is the unexplained relationship between priming language on housework/dependent care and the gender disparity switch between minutes a week and days a week. In the experimental results, women reported significantly more minutes a week when primed with housework/dependent care language but men actually reported significantly *more* days a week engaged in healthy activity when primed with housework/care. This means men are reporting more regular engagement in housework/dependent care than women, which completely contradicts previous literature. Previous research contends women are more likely to take care of the daily household work like washing dishes and preparing meals whereas men are more likely to do the infrequent household work like raking the leaves. One explanation for this result could be the time of year the survey was distributed. The Mechanical Turk survey was distributed in June and July, in summer months when outdoor household tasks are more likely to be taken care of due to weather, potentially increasing the number of days men report engaging in housework. A second explanation could be the reporting habits of men. Some research indicates men are more likely to report their engagement in housework compared to women (Kamo 2000). Needed future research can unpack this relationship to understand where men's and women's reports of days a week and minutes a week in housework and care diverge in order to better understand who is engaging in healthy housework and when.

Finally, this project intended to speak to national policies on physical activity promotion. The National Coalition for Promoting Physical Activity strives to provide effective policy agendas to promote physical activity in the United States. The NCPPA Policy Agenda

for 2015-2017 includes four main "spaces" as targets for PA promotion: (1) workplaces; (2) recreational spaces; (3) communities; and (4) health care delivery. National agendas like this indicate that there is an increasing need for policy efforts that target life domains where individuals can engage in health-benefiting physical activity that is low on cost and resource needs. Results from this study demonstrate the home, specifically in the form of housework and care, are a key social space Americans, especially women and those from lower-SES backgrounds, have the opportunity to access healthy activity. Future policies should include a focus on housework, childcare, and adult care as additional social spaces for organizations like the NCPPA to target physical activity promotion. A focus on activities individuals are already engaging in through housework, child and elder care, and paid and unpaid labor activities have the potential to reshape debates about how we should think about, and address, health disparities by eliminating misconceptions that may come with leisure-focused narratives that physical activity is something that requires 'masculine' and/or high financial resources and attributes. Honing in on social areas of life that already exist and that are accessible more diverse populations benefits public health and the individuals seeking healthy activity with fewer resources. When time is already a precious commodity, it is critical we educate citizens about practical avenues to access health benefiting activities.

Table 1. Comparison of Question Wording on Three U.S. Health Surveillance Systems, NHIS, NHANES, and BRFSS

Survey	Question Wording	Domain of Physical Activity Assessed
NHIS	*Moderate Activity*[a] "How often do you do LIGHT OR MODERATE LEISURE-TIME physical activities for AT LEAST 10 MINUTES that cause ONLY LIGHT sweating or a SLIGHT to MODERATE increase in breathing or heart rate?" "About how long do you do these light or moderate leisure-time physical activities each time?"	Leisure-time physical activity
NHANES	*Moderate Activity*[a] "In a typical week, on how many days do you do moderate-intensity sports, fitness or recreational activities? PROBE IF NEEDED: "Moderate-intensity sports, fitness or recreational activities cause small increases in breathing or heart rate and is done for at least 10 minutes continuously." "How much time do you spend doing moderate-intensity sports, fitness or recreational activities on a typical day?"	Leisure-time physical activity
BRFSS	*Moderate Activity*[a] "During the past month, other than your regular job, did you participate in any physical activities or exercises such as running, calisthenics, golf, gardening, or walking for exercise?" "Now, thinking about the moderate activities you do {when you are not working} in a usual week, do you do moderate activities for at least 10 minutes at a time, such as brisk walking, bicycling, vacuuming, gardening, or anything else that causes some increase in breath or heart rate?"	Nonoccupational physical activity

[a]Note: All three surveillance systems also ask about vigorous physical activity. The question wordings are essentially the same, except "vigorous-activity" is substituted for "moderate-activity" and "large/heavy sweating, breathing, and heart rate" is substituted for "light/slight sweating, breathing, and heart rate."

Table 2. Summation of ATUS Activity Variables into "Leisure," "Leisure & Housework/Dependent Care," "Leisure & Paid Work," and "Full Activity" Variables

All Activity Variables in ATUS with Corresponding MET value (*X = part of the summation for variable)*							
Major Category (ATUS Tier 1 category codes)	**General Category** (ATUS Tier 2 category codes)	**Specific Category** (ATUS Tier 3 category codes)	**Summary MET value**	**Leisure Activity**	**Leisure & Housework/Care**	**Leisure & Paid Work**	**Full Activity**
Household Activities	Housework	Interior Cleaning	3.01		X		X
Household Activities	Housework	Storing interior HH items, including food	3.39		X		X
Household Activities	Interior Maintenance, Repair, and Decoration	Interior arrangement, decoration, and repairs	3.33		X		X
Household Activities	Interior Maintenance, Repair, and Decoration	Building and repairing furniture	4.25		X		X
Household Activities	Interior Maintenance, Repair, and Decoration	Heating and cooling	4.42		X		X
Household Activities	Interior Maintenance, Repair, and Decoration	Interior maintenance, repair and decoration, n.e.c.	3.85		X		X
Household Activities	Exterior Maintenance, Repair and Decoration	Exterior Cleaning	3.93		X		X

Household Activities	Exterior Maintenance, Repair and Decoration	Exterior repair, improvements, and decoration	4.75		X		X
Household Activities	Exterior Maintenance, Repair and Decoration	Exterior maintenance, repair and decoration, n.e.c.	4.49		X		X
Household Activities	Lawn, Garden, and Houseplants	Lawn, Garden, and Houseplants	3.66	X	X	X	X
Major Category (ATUS Tier 1 category codes)	**General Category** (ATUS Tier 2 category codes)	**Specific Category** (ATUS Tier 3 category codes)	**Summary MET value**	**Leisure Activity**	**Leisure & Housework/Care**	**Leisure & Paid Work**	**Full Activity**
Household Activities	Lawn, Garden, and Houseplants	Lawn and garden, n.e.c.	3.45	X	X	X	X
Caring for and Helping HH Members	Caring for and Helping HH Children	Playing with HH children, not sports	3.26		X		X
Caring for and Helping HH Members	Caring for and Helping HH Children	Playing sports with HH children	5.00		X		X
Caring for and Helping nonHH Members	Caring for and Helping nonHH Children	Playing with nonHH children, not sports	3.30		X		X
Caring for and Helping	Caring for and Helping nonHH Children	Playing sports with nonHH children	5.00		X		X

nonHH Members							
Caring for and Helping nonHH Members	Helping nonHH Adults	House & lawn maintenance and repair assistance for nonHH adults	4.30		X		X
Caring for and Helping nonHH Members	Helping nonHH Adults	Animal and pet care assistance for nonHH adults	3.00	X	X	X	X
Caring for and Helping nonHH Members	Helping nonHH Adults	Vehicle & appliance maintenance/ repair assistance for nonHH adults	3.33		X		X
Sports, Exercise, and Recreation	Participating in Sports, Exercise, or Recreation	Playing baseball	5.00	X	X	X	X
Sports, Exercise, and Recreation	Participating in Sports, Exercise, or Recreation	Boating	4.64	X	X	X	X
Sports, Exercise, and Recreation	Participating in Sports, Exercise, or Recreation	Bowling	3.00	X	X	X	X
Major Category (ATUS Tier 1 category codes)	**General Category** (ATUS Tier 2 category codes)	**Specific Category** (ATUS Tier 3 category codes)	**Summary MET value**	**Leisure Activity**	**Leisure & Housework/Care**	**Leisure & Paid Work**	**Full Activity**
Sports, Exercise,	Participating in Sports,	Dancing	4.50	X	X	X	X

and Recreation	Exercise, or Recreation						
Sports, Exercise, and Recreation	Participating in Sports, Exercise, or Recreation	Participating in equestrian sports	5.33	X	X	X	X
Sports, Exercise, and Recreation	Participating in Sports, Exercise, or Recreation	Fishing	4.50	X	X	X	X
Sports, Exercise, and Recreation	Participating in Sports, Exercise, or Recreation	Golfing	3.75	X	X	X	X
Sports, Exercise, and Recreation	Participating in Sports, Exercise, or Recreation	Hunting	4.50	X	X	X	X
Sports, Exercise, and Recreation	Participating in Sports, Exercise, or Recreation	Softball	5.00	X	X	X	X
Sports, Exercise, and Recreation	Participating in Sports, Exercise, or Recreation	Vehicle touring/racing	3.30	X	X	X	X
Sports, Exercise, and Recreation	Participating in Sports, Exercise, or Recreation	Playing volleyball	5.50	X	X	X	X
Sports, Exercise, and Recreation	Participating in Sports, Exercise, or Recreation	Walking	3.80	X	X	X	X
Sports, Exercise, and Recreation	Participating in Sports, Exercise, or Recreation	Participating in water sports	5.22	X	X	X	X

Sports, Exercise, and Recreation	Participating in Sports, Exercise, or Recreation	Weightlifting/strength training	3.00	X	X	X	X
Major Category (ATUS Tier 1 category codes)	**General Category** (ATUS Tier 2 category codes)	**Specific Category** (ATUS Tier 3 category codes)	**Summary MET value**	**Leisure Activity**	**Leisure & Housework/Care**	**Leisure & Paid Work**	**Full Activity**
Sports, Exercise, and Recreation	Participating in Sports, Exercise, or Recreation	Doing yoga	3.00	X	X	X	X
Sports, Exercise, and Recreation	Participating in Sports, Exercise, or Recreation	Playing sports, n.e.c.	5.10	X	X	X	X
Attending Sporting/Recreational Events	Sports, exercise and recreation, n.e.c.	Sports, exercise and recreation, n.e.c.	4.78	X	X	X	X
Volunteer Activities	Indoor and Outdoor Maintenance, Building, and Clean-Up Activities	Building houses, wildlife sites, and other structures	4.50	X	X	X	X
Volunteer Activities	Indoor and Outdoor Maintenance, Building, and Clean-Up Activities	Indoor and outdoor maintenance, repair, and clean-up	3.56	X	X	X	X
Volunteer Activities	Indoor and Outdoor Maintenance, Building, and Clean-Up Activities	Indoor & outdoor maintenance, building & clean-up activities, n.e.c.	3.82	X	X	X	X

Sports, Exercise, and Recreation	Participating in Sports, Exercise, or Recreation	Doing Aerobics	6.83	X	X	X	X
Sports, Exercise, and Recreation	Participating in Sports, Exercise, or Recreation	Playing basketball	8.00	X	X	X	X
Sports, Exercise, and Recreation	Participating in Sports, Exercise, or Recreation	Biking	8.00	X	X	X	X
Sports, Exercise, and Recreation	Participating in Sports, Exercise, or Recreation	Playing football	8.00	X	X	X	X
Sports, Exercise, and Recreation	Participating in Sports, Exercise, or Recreation	Hiking	6.00	X	X	X	X
Major Category (ATUS Tier 1 category codes)	**General Category** (ATUS Tier 2 category codes)	**Specific Category** (ATUS Tier 3 category codes)	**Summary MET value**	**Leisure Activity**	**Leisure & Housework/Care**	**Leisure & Paid Work**	**Full Activity**
Sports, Exercise, and Recreation	Participating in Sports, Exercise, or Recreation	Playing hockey	8.00	X	X	X	X
Sports, Exercise, and Recreation	Participating in Sports, Exercise, or Recreation	Participating in martial arts	10.00	X	X	X	X
Sports, Exercise, and Recreation	Participating in Sports, Exercise, or Recreation	Playing racquet sports	8.50	X	X	X	X
Sports, Exercise,	Participating in Sports,	Rollerbladin g	6.00	X	X	X	X

and Recreation	Exercise, or Recreation						
Sports, Exercise, and Recreation	Participating in Sports, Exercise, or Recreation	Playing rugby	10.00	X	X	X	X
Sports, Exercise, and Recreation	Participating in Sports, Exercise, or Recreation	Running	7.50	X	X	X	X
Sports, Exercise, and Recreation	Participating in Sports, Exercise, or Recreation	Skiing, ice skating, snowboarding	7.00	X	X	X	X
Sports, Exercise, and Recreation	Participating in Sports, Exercise, or Recreation	Playing soccer	7.00	X	X	X	X
Sports, Exercise, and Recreation	Participating in Sports, Exercise, or Recreation	Using cardiovascular equipment	8.00	X	X	X	X

Table 3. MET Values for Occupation Categories, Those that are Moderately Active		
Major Category	**ATUS Occupational Code**	**Summary MET Value**
Working and Work Related Activities	Bldg & Grounds Cleaning, Maintenance	3.58
Working and Work Related Activities	Farming, Fishing, and Forestry	3.67
Working and Work Related Activities	Construction and Extraction	4.29
Working and Work Related Activities	Installation, Maintenance, and Repair	3.19

Source: Tudor-Locke et al. 2009 (https://epi.grants.cancer.gov/atus-met/met.php?major%5B%5D=05&keywords=&metval_min=3&metval_max=)

Table 4. Descriptive Statistics for the Dependent and Independent Variables in the Pooled American Time Use Surveys 2006, 2008, 2010, 2012, 2013, 2014 for Full Sample and by Gender *weighted percentages and standard errors in parentheses*

	Full Sample (% / Mean)	Women (N = 48,580)	Men (N = 38,014)
Dependent Variables			
Leisure Activity	29.9	20.7*	39.7*
	(.336)	(.333)	(.590)
Leisure & HW/Care	69.6	68.9	70.4
	(.499)	(.628)	(.787)
Leisure & Paid	57.5	28.0*	89.0*
	(.677)	(.478)	(1.26)
Full Activity	97.7	76.5*	120.3*
	(.750)	(.708)	(1.33)
Key Independent Variables			
Gender			
Female	51.6%	100%	---
Male	48.4%	---	100%
Socioeconomic Status			
Educational Attainment			
Less than H.S.	17.6%	16.9%*	18.3%*
H.S. Degree	29.4%	28.9%	30.0%
Some College	25.2%	26.4%*	23.9%*
College Degree	17.8%	18.2%	17.4%
College +	9.9%	9.6%	10.2%
Household Income (in 1000's)	66.3	63.9*	68.9*
	(.256)	(.357)	(.371)
Occupation			
Unemployed	37.2%	42.9%*	31.1%*
Professional/ Managerial	21.4%	17.9%*	25.1%*
Admin & Services	19.2%	25.5%*	12.5%*
Maintenance& Agriculture	16.0%	5.8%*	26.9%*
Other	6.2%	7.8%*	4.4%*
Control Variables			
Age	44.7	45.4*	43.8*
	(.089)	(.122)	(.131)
Race			
White	68.3%	68.2%	68.4%
Hispanic	14.5%	13.8%*	15.2%*

	Full Sample (% / Mean)	Women (N = 48,580)	Men (N = 38,014)
Black	11.6%	12.3%*	10.9%*
Other (non-Hisp.)	5.6%	5.7%	5.5%
Marital Status			
Married	57.0%	54.9%*	59.2%*
Not Married	43.0%	45.1%*	40.8%*
Parental Status			
Parent	40.6%	42.1%*	39.1%*
Not a Parent	59.4%	57.9%*	60.9%*
Child Under Six			
Child under 6 yr	13.6%	14.5%*	12.6%*
No Child under 6	86.4%	85.5%*	87.4%*
Household Size	3.01	2.99*	3.04*
	(.008)	(.010)	(.011)
General Health	3.51	3.48*	3.54*
	(.005)	(.007)	(.007)
Year			
2006	13.7%	13.7%	13.7%
2007	13.9%	13.9%	13.9%
2008	14.0%	14.0%	14.1%
2010	14.2%	14.2%	14.3%
2012	14.6%	14.6%	14.6%
2013	14.7%	14.7%	14.7%
2014	14.8%	14.8%	14.8%
Day of Week			
Weekday	71.5%	71.5%	71.4%
Weekend	28.5%	28.5%	28.6%

Source: American Time Use Survey (ATUS), 2006, 2008, 2010, 2012, 2013 (N = 86,594);
* = significantly different than full sample (CI 95%)

Table 5. Logistic Regression Predicting Missingness for Household Income and Self-Reported Health (Odds Ratios Reported) ***standard errors in parentheses***

	Household Income Missingness	Health Missingness
Key Independent Variables		
Gender		
Female	1.08*	.899**
	(.033)	(.034)
Socioeconomic Status		
Education		
H.S. Degree	.914*	.834**
	(.040)	(.045)
Some College	.699***	.713***
	(.033)	(.040)
College Degree	.658***	.658***
	(.035)	(.044)
College +	.622***	.729***
	(.039)	(.057)
Occupation		
Professional,	.969	.957
Managerial, Sales	(.042)	(.053)
Admin & Service	1.01	1.08
	(.043)	(.056)
Manufact.,	1.04	.927
Maintenance, &	(.048)	(.054)
Agricul.		
Other	.903	.893
	(.064)	(.080)
Control Variables		
Age	1.01***	1.02***
	(.001)	(.001)
Race		
Black	1.13**	1.50***
	(.045)	(.073)
Hispanic	.768***	1.38***
	(.036)	(.070)
Other	.988	1.78***
	(.067)	(.123)
Married	1.01	.839***
	(.034)	(.035)
Parent	.915	.993
	(.043)	(.058)
Child Under 6	.827***	1.32***
	(.043)	(.073)

	Household Income Missingness	Health Missingness
Household Size	1.04**	1.12***
	(.016)	(.019)
Household Income	---	1.00
		(.001)
Health Status	1.01	---
	(.014)	

Source: American Time Use Survey (ATUS), 2006, 2008, 2010, 2012, 2013 (N = 86,594)
*p<.05; **<.01; ***<.001

Table 6. Comparing Multiple Imputation to Listwise Deletion for Linear Regression for each of Four Dependent Variables (Leisure Only, Leisure & Housework/Dependent Care, Leisure & Paid Work, Full Activity)

	Leisure Only		Leisure & Housework/Dependent Care		Leisure & Paid Work		Full Activity	
	Multiple Imputation	Listwise Deletion	Multiple Imputation	Listwise Deletion	Multiple Imputation	Listwise Deletion	Multiple Imputation	Listwise Deletion
Key Independent Variables								
Gender								
Female	-20.0***	-19.5***	-4.97***	-4.93***	-28.8***	-27.9***	-14.2***	-13.7***
	(.713)	(.736)	(1.02)	(1.06)	(1.01)	(1.04)	(1.23)	(1.28)
Socioeconomic Status								
Education (<HS)								
High School	-4.62***	-4.44***	1.54	1.71	-10.5***	-11.7***	**-4.55**	**-5.79***
	(1.18)	(1.23)	(1.72)	(1.81)	(2.34)	(2.47)	**(2.57)**	**(2.72)**
Some College	-6.22***	-5.87***	**-3.50***	**-3.31**	-9.86***	-10.2***	-7.29**	-7.74**
	(1.16)	(1.21)	**(1.72)**	**(1.81)**	(2.23)	(2.34)	(2.49)	(2.61)
College	-4.57***	-4.18**	**-3.94***	**-3.50**	-10.7***	-11.4***	-10.3***	-11.0***
	(1.31)	(1.36)	**(1.89)**	**(1.98)**	(2.29)	(2.39)	(2.59)	(2.70)
College +	-3.62*	-3.75*	**-4.37***	**-4.41**	-11.9***	-13.1***	-12.6***	-13.8***
	(1.48)	(1.53)	**(2.19)**	**(2.27)**	(2.45)	(2.55)	(2.85)	(2.97)
Income (in 1000s)	.035***	.038***	.012	.014	.053***	.060***	.030*	.036*
	(.007)	(.008)	(.011)	(.012)	(.014)	(.013)	(.015)	(.016)
Occupation								

(unemployed)								
Professional/ Managerial	-18.0*** (1.08)	-17.5*** (1.11)	-44.9*** (1.56)	-44.6*** (1.62)	-22.7*** (1.25)	-22.2*** (1.29)	-49.7*** (1.67)	-49.4*** (1.73)
Admin & Services	-15.0*** (.978)	-14.5*** (1.01)	-38.7*** (1.52)	-38.2*** (1.59)	-16.4*** (1.12)	-16.0*** (1.16)	-40.2*** (1.61)	-39.8*** (1.67)
Maintenance& Agriculture	-15.0*** (1.31)	-13.1*** (1.36)	-35.4*** (1.88)	-34.4*** (1.97)	141.3*** (3.20)	143.8*** (3.34)	120.0*** (3.35)	122.4*** (3.49)
Other	-15.7*** (1.35)	-15.1*** (1.38)	-41.0*** (2.05)	-40.2*** (2.11)	-17.4*** (1.54)	-16.8*** (1.57)	-42.6*** (2.16)	-41.8*** (2.23)
Control Variables								
	Multiple Imputation	Listwise Deletion	Multiple Imputation	Listwise Deletion	Multiple Imputation	Listwise Deletion	Multiple Imputation	Listwise Deletion
Age	-.068 (.116)	-.095 (.122)	2.04*** (.168)	2.02*** (.177)	.489** (.189)	.536** (.197)	2.59*** (.220)	2.64*** (.231)
Age-squared	.001 (.001)	.001 (.001)	-.020*** (.002)	-.020*** (.002)	-005** (2.63)	-.005** (.002)	-.026*** (3.08)	-.027*** (.0023)
Race (white)								
Hispanic	-7.35*** (.956)	-7.18*** (.993)	-7.90*** (1.46)	-7.74*** (1.52)	-2.65 (1.99)	-2.77 (2.05)	-3.21 (2.20)	-3.31 (2.27)
Black Only	-12.9*** (.907)	-13.3*** (.923)	-29.1*** (1.32)	-29.2*** (1.38)	-19.9*** (1.60)	-20.3*** (1.64)	-36.1*** (1.84)	-36.2*** (1.90)
Other Non Hisp.	-5.16** (1.59)	-5.36** (1.67)	-12.0*** (2.25)	-11.5*** (2.38)	-6.40* (2.63)	-6.50* (2.74)	-13.0*** (1.66)	-12.4*** (3.23)
Married	4.09*** (.770)	3.72*** (.802)	10.7*** (1.19)	10.2*** (1.24)	5.71*** (1.44)	5.16** (1.50)	12.2*** (1.66)	11.6*** (1.73)
Parent	.891 (1.02)	1.51 (1.07)	4.74** (1.72)	4.99** (1.82)	5.71*** (1.44)	3.35 (2.11)	6.56** (2.31)	6.77** (2.39)

Child Under Six	-9.41*** (.898)	-9.24*** (.936)	25.2*** (1.60)	25.5*** (1.66)	**-3.73*** **(1.91)**	**-2.77** **(1.97)**	30.8*** (2.22)	31.9*** (2.30)
Household Size	-.665* (.312)	-.854** (.324)	-.563 (.593)	-.628 (.628)	-2.19*** (.636)	-2.60*** (.649)	-2.08** (2.50)	-2.38** (.750)
General Health	5.38*** (.334)	5.28*** (.345)	8.10*** (.498)	7.89*** (.519)	6.11*** (.593)	6.03*** (.604)	8.88*** (.681)	8.68*** (.700)
Year (2006)								
2007	2.82* (1.20)	1.85 (1.29)	4.84** (1.82)	4.78* (1.98)	2.87 (2.19)	1.18 (2.33)	4.82 (2.49)	4.05 (2.67)
2008	2.75* (1.18)	2.08 (1.27)	1.78 (1.75)	1.33 (1.92)	3.68 (2.23)	2.51 (2.42)	2.63 (2.50)	1.66 (2.71)
2010	3.70** (1.17)	3.95** (1.23)	2.83 (1.71)	2.91 (1.80)	1.66 (2.09)	2.24 (2.18)	.724 (2.38)	1.13 (2.50)
2012	3.21** (1.19)	3.07* (1.29)	2.87 (1.77)	2.91 (1.85)	4.16 (2.20)	3.81 (2.26)	3.96 (2.52)	3.80 (2.61)
2013	1.26 (1.24)	1.10 (1.29)	-.099 (1.84)	-.061 (1.91)	.731 (2.19)	.348 (2.26)	-.577 (2.52)	-.758 (2.61)
	Multiple Imputation	Listwise Deletion	Multiple Imputation	Listwise Deletion	Multiple Imputation	Listwise Deletion	Multiple Imputation	Listwise Deletion
2014	2.01 (1.16)	1.92 (1.21)	-1.49 (1.71)	-1.44 (1.79)	1.48 (2.14)	1.24 (2.22)	-1.96 (2.43)	-2.04 (2.53)
Weekday	-11.5*** (.687)	-11.5*** (.709)	-24.6*** (.976)	-25.1*** (1.01)	13.4*** (1.04)	13.6*** (1.07)	.519 (1.22)	.197 (1.27)
F-statistic	84.84***	78.85***	133.0***	124.5***	165.6***	156.0***	206.05***	193.8***
R-squared		0.0432		0.0563		0.2210		0.1721

Source: American Time Use Survey (ATUS), 2006, 2008, 2010, 2012, 2013 (N = 86,594)
Note: **Bolded** coeffients represent differences across listwise and multiple imputation; *p<.05; **<.01; ***<.001

Table 7. Mechanical Turk Analytic Sample: Process of Listwise Deletion

	Full Sample	NHANES	No Prime	HW/Care	Paid	Leisure + HW/Care	Leisure + Paid	HW + Paid	All Three
Total Responses	3,954	486	485	482	474	480	482	479	471
Incomplete Surveys	- 160	- 6	- 7	- 6	- 12	- 5	- 4	- 4	- 7
Out of range responses	- 144	- 5	- 10	- 31	- 15	- 23	- 7	- 36	- 17
Final Sample	3,652	475	468	445	447	452	471	439	447

Data: 2016 Mechanical Turk Physical Activity Survey, N= 3,652

Table 8. Proposed Hypotheses for Results for each Condition by Gender and by SES Differences		
Conditions	Hypothesis for Gender Differences	Hypothesis for SES Differences
Leisure	**More for Men (H2)**	**More for College + (H5)**
Paid Work	**More for Men (H3)**	**More for < College (H6)**
Housework/Care	**More for Women (H4)**	**More for < College (H7)**
Leisure + *Paid Work*	Men + Men = **Men (effects intensified)**	(College +) + (< College) = **Mitigated (effects canceled out)**
Leisure + *HW/Care*	Men + Women = **Mitigated**	(College +) + (< College) = **Mitigated**
HW/Care + *Paid Work*	Women + Men = **Mitigated**	(< College) + (< College) = **< College (effects intensified)**
All Three domains	Men + Men + Women = **Men**	(College +) + (< College) + NSD = **Mitigated**

Table 9. Weighted Averages for Independent Variables Across Different Samples: Whole Sample, Zero Moderate Activity Sample, Outlier Sample, and Four Dependent Variables

Independent Variables	Whole Sample (N = 86,594)	Zero Moderate Activity (N = 36,958)	Outliers (N = 4,528)	Leisure (N = 22,880)	Leisure + Housework/ Care (N = 46,770)	Leisure + Paid Work (N = 26,197)	Full Activity (N = 49,636)
Gender							
Female	51.6	50.6*	33.9*	45.2*	55.2*	41.3*	52.4*
Male	48.4	49.4*	66.1*	54.8*	44.8*	58.7*	47.6*
Socioeconomic Status							
Educational Attainment							
Less than H.S.	17.6	17.4	21.8*	17.5	16.9*	18.9*	17.7
H.S. Degree	29.4	28.8	20.6*	26.6*	29.3	28.9*	30.0
Some College	25.2	26.4	25.6*	23.2*	24.3*	23.3*	24.3*
College Degree	17.8	17.9	13.6*	19.9*	18.6*	17.9	17.8
College +	9.9	9.5	8.5*	12.7*	10.9*	11.0*	10.2
Household Income (in 1000's)	66.3 (.256)	65.6 (.399)	61.1* (.753)	72.7* (.496)	67.6* (.346)	70.2* (.452)	66.9 (.328)
Occupation							
Unemployed	37.2	33.6*	23.0*	42.9*	43.0*	36.9	40.1*
Professional/ Managerial	21.4	25.0*	13.7*	21.1	19.7*	18.2*	18.5*
Admin & Services	19.2	22.5*	10.7*	15.6*	17.6*	13.6	16.6*
Maintenance& Agriculture	16.0	12.2*	48.1*	13.9*	13.5*	25.7*	19.0*
Other	6.2	6.6	4.5*	6.4	6.2	5.6*	5.8*

Independent Variables	Whole Sample (N = 86,594)	Zero Moderate Activity (N = 36,958)	Outliers (N = 4,528)	Leisure (N = 22,880)	Leisure + Housework/ Care (N = 46,770)	Leisure + Paid Work (N = 26,197)	Full Activity (N = 49,636)
Age	44.7 (.089)	43.6* (.136)	45.2* (.234)	46.6* (.179)	46.1* (.123)	45.5* (.162)	45.5* (.118)
Race							
White	68.3	65.4*	60.8*	75.1*	71.7*	72.6*	70.6*
Hispanic	14.5	13.4*	20.1*	12.4*	14.4	14.7	15.3*
Black	11.6	15.1*	11.8	7.2*	8.6*	7.6*	8.8*
Other (non-Hisp.)	5.6	6.1*	7.3*	5.3	5.3	5.1*	5.2*
Marital Status							
Married	57.0	51.9*	59.3*	59.6*	61.5*	59.7*	61.0*
Not Married	43.0	48.1*	40.7*	40.4*	38.5*	40.3*	39.0*
Parental Status							
Parent	40.6	51.9*	51.0*	36.6*	42.5*	38.6*	43.8*
Not a Parent	59.4	48.1*	49.0*	63.4*	57.5*	61.5*	57.2*
Child Under Six							
Child under 6 yr	13.6	9.7*	19.5*	9.0*	16.8*	11.2*	16.6*
No Child under 6	86.4	90.3*	80.5*	90.2*	83.2*	88.8*	83.4*
Household Size	3.01 (.008)	2.96* (.011)	3.08	2.90* (.014)	3.03 (.011)	2.97* (.014)	3.04* (.010)
General Health	3.51 (.005)	3.45* (.008)	3.52 (.016)	3.65* (.009)	3.56* (.007)	3.63* (.009)	3.56* (.006)

Data: 2006, 2007, 2008, 2010, 2011, 2012, 2013, 2014 Pooled Sample; American Time Use Survey (ATUS), N= 86,594
*p<.05; **<.01; ***<.001

Table 10. Weighted Average Minutes Spent in Five Categories of Physical Activity across Educational Attainment and Gender *(linearized standard errors in parentheses)*

	LEISURE				LEISURE + HOUSEWORK/CARE				LEISURE + PAID WORK				FULL ACTIVITY			
	WOMEN		MEN		WOMEN		MEN		WOMEN		MEN		WOMEN		MEN	
	College or More	Less than College	College or More	Less than College	College or More	Less than College	College or More	Less than College	College or More	Less than College	College or More	Less than College	College or More	Less than College	College or More	Less than College
Leisure	24.8[ab] (.598)	19.1[ab] (.400)	37.9[ab] (.911)	40.4[ab] (.738)	24.8[ab] (.598)	19.1[ab] (.400)	37.9[ab] (.911)	40.4[ab] (.738)	24.8[ab] (.598)	19.1[ab] (.400)	37.9[ab] (.911)	40.4[ab] (.738)	24.8[ab] (.598)	19.1[ab] (.400)	37.9[ab] (.911)	40.4[ab] (.738)
Housework					43.9[ab] (.860)	49.8[ab] (.654)	39.5[ab] (.994)	40.4[ab] (.760)					43.9[ab] (.860)	49.8[ab] (.654)	39.5[ab] (.994)	40.4[ab] (.760)
Child/Elder Care					11.5[ab] (.391)	9.27[ab] (.311)	9.75[ab] (.433)	8.23[ab] (.324)					11.5[ab] (.391)	9.27[ab] (.311)	9.75[ab] (.433)	8.23[ab] (.324)
Paid Work									3.00[ab] (.416)	9.03[ab] (.458)	13.4[ab] (1.01)	63.0[ab] (1.54)	3.00[ab] (.416)	9.03[ab] (.458)	13.4[ab] (1.01)	63.0[ab] (1.54)
Travel													.251[ab] (.041)	.222[ab] (.024)	.533[a] (.072)	.675[a] (.072)
Totals	24.8[ab] (.598)	19.1[ab] (.400)	37.9[ab] (.911)	40.4[ab] (.738)	69.2[ab] (1.05)	68.8[ab] (.771)	69.2[ab] (1.25)	70.9[ab] (.975)	27.8[ab] (.733)	28.1[ab] (.599)	51.3[ab] (1.34)	103.4[ab] (1.65)	72.4[ab] (1.13)	78.0[ab] (.877)	83.1[ab] (1.56)	134.5[ab] (1.72)

Note: To test gender and educational differences in time use, the Wilcoxkon (Mann-Whitney) test was used, allowing the results to account for nonnormality in the distribution of minutes spent in each group of activities.

[a] difference between men and women according to Wilcoxon (Mann-Whitney) test is significant with p-values $p<.05$

[b] difference between less than college and college or more according to Wilcoxon (Mann-Whitney) test is significant with p-values $p<.05$

Data: 2006, 2007, 2008, 2010, 2011, 2012, 2013, 2014 Pooled Sample; American Time Use Survey (ATUS), N= 86,594

Table 11. Weighted Average Minutes Spent in Leisure, Leisure & Housework/Dependent Care, Leisure & Paid Work, and Full Activity for Parental Status across Gender ***(linearized standard errors in parentheses)***

	WOMEN		MEN	
	Parent	Not a Parent	Parent	Not a Parent
Leisure	17.6 [ab] (.427)	22.9 [ab] (.483)	38.0[a] (.824)	40.9 [a] (.812)
Leisure & Housework / Childcare	75.5 [ab] (.913)	64.1 [ab] (.855)	73.4 [ab] (1.10)	68.5 [ab] (1.08)
Leisure & Paid Work	25.8[ab] (.663)	29.4[ab] (.670)	98.1[ab] (1.89)	83.1[ab] (1.67)
Full Activity	83.9[ab] (1.02)	71.1 [ab] (.967)	134.2[ab] (1.98)	111.4[ab] (1.77)

Note: To test gender differences in time use, the Wilcoxon (Mann-Whitney) test was used, allowing the results to account for nonnormality in the distribution of minutes spent in each group of activities.

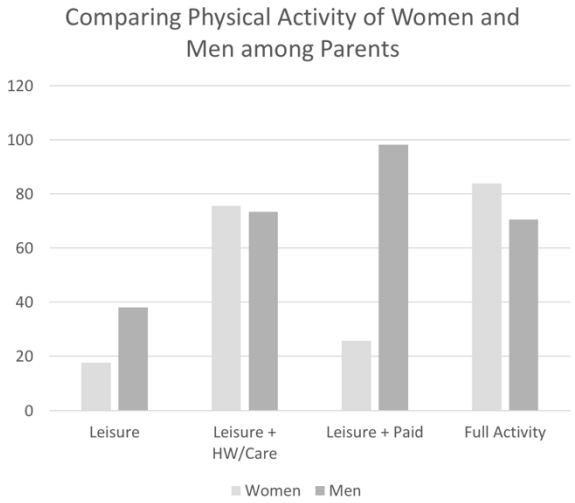
[a] difference between men and women according to Wilcoxon (Mann-Whitney) test is significant with p-values p<.001

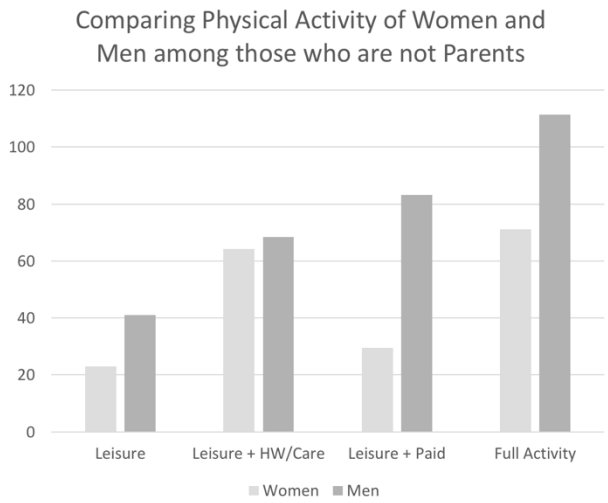
[b] difference between parents and non-parents according to Wilcoxon (Mann-Whitney) test is significant with p-values p<.001

Data: 2006, 2007, 2008, 2010, 2011, 2012, 2013, 2014 Pooled Sample; American Time Use Survey (ATUS), N= 86,594

*p<.05; **<.01; ***<.001

Figures 4 & 5. Weighted Average Minutes Spent in Leisure, Leisure & Housework/Dependent Care, Leisure & Paid Work, and Full Activity for Parents (left) and Non-Parents (right) across Gender





Data: 2006, 2007, 2008, 2010, 2011, 2012, 2013, 2014 Pooled Sample; American Time Use Survey (ATUS), N= 86,954

Table 12. Weighted Averages Minutes Spent in Leisure, Leisure & Housework/Dependent Care, Leisure & Paid Work, and Full Activity for Child Under Six Status across Gender ***(linearized standard errors in parentheses)***

	WOMEN		MEN	
	Kid Under 6	No Kid Under 6	Kid Under 6	No Kid Under 6
Leisure	14.3 [ab] (.645)	21.9 [ab] (.392)	27.2 [ab] (1.31)	41.3 [ab] (.670)
Leisure + Housework / Childcare	100.5 [ab] (1.74)	63.4 [ab] (.698)	83.1 [ab] (2.10)	68.5 [ab] (.881)
Leisure + Paid Work	21.1[ab] (1.03)	29.4 [ab] (.556)	103.3 [ab] (3.64)	86.4 [ab] (1.40)
Full Activity	107.6 [ab] (1.87)	71.1 [ab] (.795)	159.7[ab] (3.80)	114.2[ab] (1.47)

Note: To test gender differences in time use, the Wilcoxon (Mann-Whitney) test was used, allowing the results to account for nonnormality in the distribution of minutes spent in each group of activities.

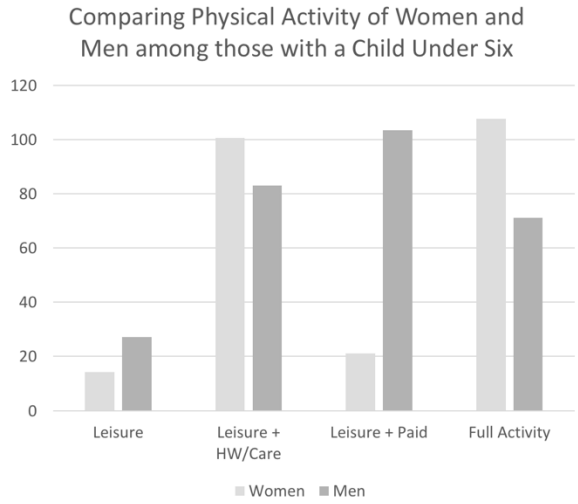
[a] difference between men and women according to Wilcoxon (Mann-Whitney) test is significant with p-values p<.001

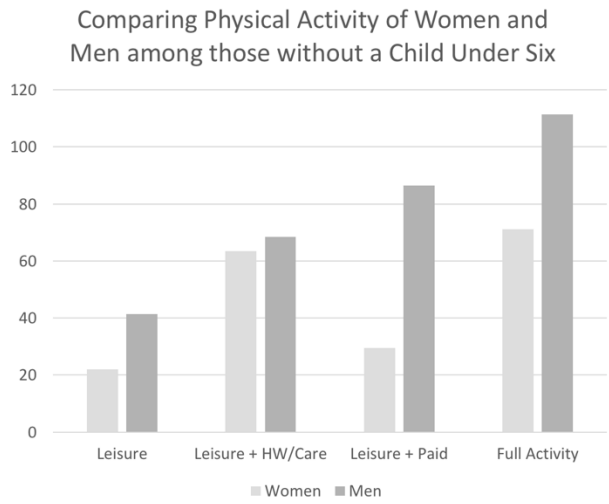
[b] difference between those with and without Kids Under Six according to Wilcoxon (Mann-Whitney) test is significant with p-values p<.001

Data: 2006, 2007, 2008, 2010, 2011, 2012, 2013, 2014 Pooled Sample; American Time Use Survey (ATUS), N= 86,594

*p<.05; **<.01; ***<.001

Figures 6 & 7. Weighted Average Minutes Spent in Leisure, Leisure & Housework/Dependent Care, Leisure & Paid Work, and Full Activity for Those with Children Under Six (left) and Those without Children Under Six (right) across Gender





Data: 2006, 2007, 2008, 2010, 2011 2012, 2013, 2014; American Time Use Survey (ATUS), N = 86,954

Table 13. Linear Regression for each of Four Dependent Variables (Leisure Only, Leisure & Housework/Dependent Care, Leisure & Paid Work, Full Activity)

	Leisure Only	Leisure & Housework/Care	Leisure & Paid Work	Full Activity
Key Independent Variables				
Gender				
Female	-20.0***	-4.97***	-28.8***	-14.2***
	(.713)	(1.02)	(1.01)	(1.23)
Socioeconomic Status				
Education (< HS)				
High School	-4.62***	1.54	-10.5***	-4.55
	(1.18)	(1.72)	(2.34)	(2.57)
Some College	-6.22***	-3.50*	-9.86***	-7.29**
	(1.16)	(1.72)	(2.23)	(2.49)
College Degree	-4.57***	-3.94*	-10.7***	-10.3***
	(1.31)	(1.89)	(2.29)	(2.59)
More than College	-3.62*	-4.37*	-11.9***	-12.6***
	(1.48)	(2.19)	(2.45)	(2.85)
Income (in thousand)	.035***	.012	.053***	.030*
	(.007)	(.011)	(.014)	(.015)
Occupation (unemployed)				
Professional/ Managerial	-18.0***	-44.9***	-22.7***	-49.7***
	(1.08)	(1.56)	(1.25)	(1.67)
Administrative & Services	-15.0***	-38.7***	-16.4***	-40.2***
	(.978)	(1.52)	(1.12)	(1.61)
Maintenance & Agriculture	-15.0***	-35.4***	141.3***	120.0***
	(1.31)	(1.88)	(3.20)	(3.35)
Other	-15.7***	-41.0***	-17.4***	-42.6***
	(1.35)	(2.05)	(1.54)	(2.16)
Control Variables				
Age	-.068	2.04***	.489**	2.59***
	(.116)	(.168)	(.189)	(.220)
Age-squared	.001	-.020***	-.005**	-.026***
	(.001)	(.002)	(2.63)	(3.08)
Race (white)				
Hispanic	-7.35***	-7.90***	-2.65	-3.21
	(.956)	(1.46)	(1.99)	(2.20)
Black Only	-12.9***	-29.1***	-19.9***	-36.1***
	(.907)	(1.32)	(1.60)	(1.84)

Other NonHisp.	-5.16**	-12.0***	-6.40*	-13.0***
	(1.59)	(2.25)	(2.63)	(1.66)
Married	4.09***	10.7***	5.71***	12.2***
	(.770)	(1.19)	(1.44)	(1.66)
Parent	.891	4.74**	2.78	6.56**
	(1.02)	(1.72)	(2.04)	(2.31)
Child Under Six	-9.41***	25.2***	-3.73*	30.8***
	(.898)	(1.60)	(1.91)	(2.22)
Household Size	-.665*	-.563	-2.19***	-2.08**
	(.312)	(.593)	(.636)	(2.50)
	Leisure Only	Leisure & Housework/Care	Leisure & Paid Work	Full Activity
General Health	5.38***	8.10***	6.11***	8.88***
	(.334)	(.498)	(.593)	(.681)
Year (2006)				
2007	2.82*	4.84**	2.87	4.82
	(1.20)	(1.82)	(2.19)	(2.49)
2008	2.75*	1.78	3.68	2.63
	(1.18)	(1.75)	(2.23)	(2.50)
2010	3.70**	2.83	1.66	.724
	(1.17)	(1.71)	(2.09)	(2.38)
2012	3.21**	2.87	4.16	3.96
	(1.19)	(1.77)	(2.20)	(2.52)
2013	1.26	-.099	.731	-.577
	(1.24)	(1.84)	(2.19)	(2.52)
2014	2.01	-1.49	1.48	-1.96
	(1.16)	(1.71)	(2.14)	(2.43)
Weekday	-11.5***	-24.6***	13.4***	.519
	(.687)	(.976)	(1.04)	(1.22)

Data: 2006, 2007, 2008, 2010, 2011, 2012, 2013, 2014; American Time Use Survey (ATUS), N = 86,954; *p<.05; **p<.01; ***p<.001

Table 14. Sensitivity Analysis | Linear Regression for 0%, 50%, 100% Paid Work Accounted for in Full Activity and Leisure & Paid Work Dependent Variables

	Full Activity (100% Work)	Full Activity (50% Work)	Full Activity (0% Work)	Leisure & Paid Work (100% Work)	Leisure & Paid Work (50% Work)	Leisure (0% Work)
Key Independent Variables						
Gender						
Female	-14.2***	-9.79***	-5.38***	-28.8***	-24.4***	-20.0***
	(1.23)	(1.07)	(1.02)	(1.01)	(.795)	(.713)
Socioeconomic Status						
Education (<HS)						
High School	-4.55	-1.60	1.34	-10.5***	-7.57*	-4.62***
	(2.57)	(1.91)	(1.72)	(2.34)	(1.52)	(1.18)
Some College	-7.29**	-5.47**	-3.65*	-9.86***	-8.04***	-6.22***
	(2.49)	(1.90)	(1.73)	(2.23)	(1.48)	(1.16)
College Degree	-10.3***	-7.25***	-4.17**	-10.7***	-7.65***	-4.57***
	(2.59)	(2.05)	(1.89)	(2.29)	(1.59)	(1.31)
More than College	-12.6***	-8.49***	-4.37*	-11.9***	-7.74***	-3.62*
	(2.85)	(2.34)	(2.19)	(2.45)	(1.76)	(1.48)
Income (in thousand)	.030*	.021	.011	.053***	.044***	.035***
	(.015)	(.012)	(.011)	(.014)	(.009)	(.007)
Occupation (unemployed)						
Professional/ Managerial	-49.7***	-47.3***	-.45.0***	-22.7***	-20.4	-18.0***
	(1.67)	(1.58)	(1.56)	(1.25)	(1.12)	(1.08)
Administrative & Services	-40.2***	-39.5***	-38.8***	-16.4***	-15.7***	-15.0***
	(1.61)	(1.54)	(1.53)	(1.12)	(1.01)	(.978)
Maintenance &	120.0***	42.2***	-35.5***	141.3***	63.5***	-15.0***

Agriculture	(3.35)	(2.25)	(1.88)	(3.20)	(1.92)	(1.31)
Other	-42.6***	-41.7***	-40.9***	-17.4***	-16.5***	-15.7***
	(2.16)	(2.08)	(1.88)	(1.54)	(1.39)	(1.35)
Control Variables						
Age	2.59***	2.31***	2.03***	.489**	.210	-.068
	(.220)	(.180)	(.168)	(.189)	(.136)	(.116)
	Full Activity (100% Work)	Full Activity (50% Work)	Full Activity (0% Work)	Leisure & Paid Work (100% Work)	Leisure & Paid Work (50% Work)	Leisure (0% Work)
Age-squared	-.026***	-.023***	-.020***	-005**	-.002	.001
	(3.08)	(.002)	(.002)	(2.63)	(.001)	(.001)
Race (white)						
Hispanic	-3.21	-5.56**	-7.91***	-2.65	-5.00***	-7.35***
	(2.20)	(1.45)	(1.46)	(1.99)	(1.27)	(.956)
Black Only	-36.1***	-32.6***	-29.1***	-19.9***	-16.4***	-12.9***
	(1.84)	(1.45)	(1.32)	(1.60)	(1.16)	(.907)
Other Non-Hisp.	-13.0***	-12.4*	-11.8***	-6.40*	-5.78**	-5.16**
	(1.66)	(2.46)	(2.27)	(2.63)	(1.85)	(1.59)
Married	12.2***	11.4***	10.6***	5.71***	4.89***	4.09***
	(1.66)	(1.30)	(1.19)	(1.44)	(.967)	(.770)
Parental	6.56**	5.61**	4.67**	5.71***	1.84	.891
	(2.31)	(1.82)	(1.73)	(1.44)	(1.33)	(1.02)
Child Under Six	30.8***	28.0***	25.1***	-3.73*	-6.57***	-9.41***
	(2.22)	(1.72)	(1.60)	(1.91)	(1.21)	(.898)
Household Size	-2.08**	-1.31*	-.547	-2.19***	-1.43**	-.665*
	(2.50)	(.599)	(.594)	(.636)	(.412)	(.312)
General Health	8.88***	8.52***	8.15***	6.11***	5.74***	5.38***
	(.681)	(.541)	(.499)	(.593)	(.410)	(.334)
Year (2006)						
2007	4.82	4.80	4.77*	2.87	2.84	2.82*
	(2.49)	(1.96)	(1.82)	(2.19)	(1.49)	(1.20)

2008	2.63	2.16	1.70	3.68	3.22*	2.75*
	(2.50)	(1.75)	(1.76)	(2.23)	(1.48)	(1.18)
2010	.724	1.75	2.77	1.66	2.68	3.70**
	(2.38)	(1.87)	(1.71)	(2.09)	(1.49)	(1.17)
2012	3.96	3.48	3.01	4.16	3.69*	3.21**
	(2.52)	(1.95)	(1.77)	(2.20)	(1.48)	(1.19)
	Full Activity (100% Work)	Full Activity (50% Work)	Full Activity (0% Work)	Leisure & Paid Work (100% Work)	Leisure & Paid Work (50% Work)	Leisure (0% Work)
2013	-.577	-.314	-.051	.731	.994	1.26
	(2.52)	(1.99)	(1.84)	(2.19)	(1.51)	(1.24)
2014	-1.96	-1.70	-1.44	1.48	1.74	2.01
	(2.43)	(1.89)	(1.72)	(2.14)	(1.45)	(1.16)
Weekday	.519	-11.9***	-24.3***	13.4***	.937	-11.5***
	(1.22)	(1.03)	(.977)	(1.04)	(.779)	(.687)

Data: 2006, 2007, 2008, 2010, 2011, 2012, 2013, 2014; American Time Use Survey (ATUS), N = 86,954;
*p<.05; **p<.01; ***p<.001

Table 15. Post-Hoc Test Results for the Seemingly Unrelated Regression for each of the Four Dependent Variables (Leisure Only, Leisure & Housework/Dependent Care, Leisure & Paid Work, Full Activity)

	Leisure Only	Leisure & Housework/Care	Leisure & Paid Work	Full Activity
Individual Post-Hoc Wald Tests (Female = 0)	150.4***	1902.1***	22.37***	1518.8***
Simultaneous Post-Hoc Wald Test that Relationship between Gender and Each DV are Significantly Different	1116.0***			

Data: 2006, 2007, 2008, 2010, 2011, 2012, 2013, 2014 Pooled Sample; American Time Use Survey (ATUS), N = 86,954
*p<.05; **<.01; ***<.001

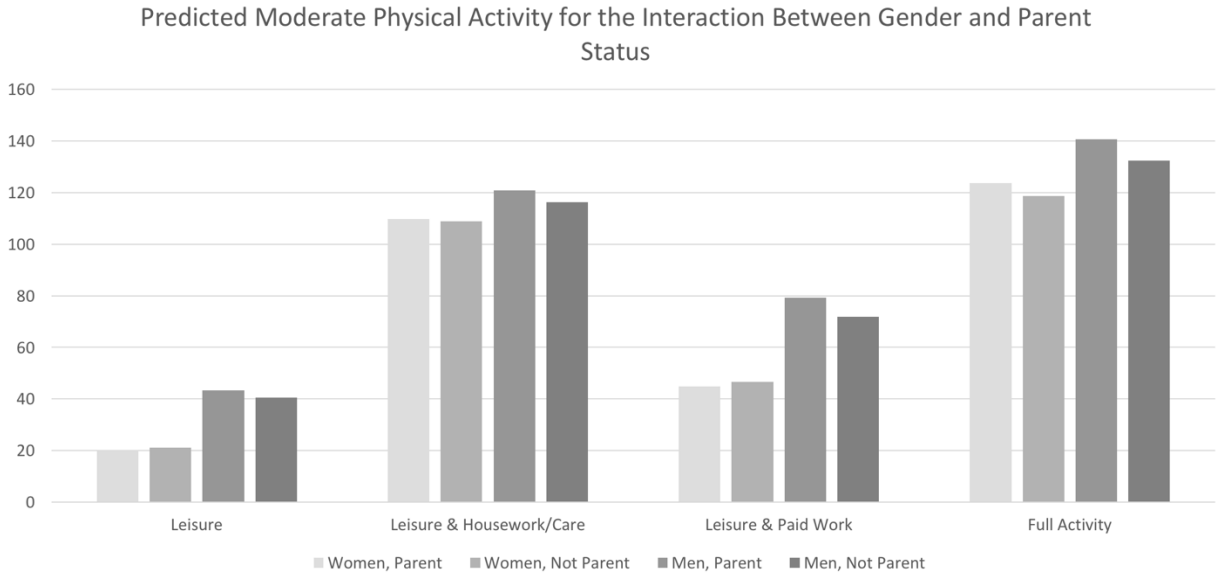
Table 16. Ordinary Least Squares Regression for each of Four Dependent Variables (Leisure Only, Leisure & Housework/Dependent Care, Leisure & Paid Work, Full Activity) including Interactions

	Leisure Only	Leisure & Housework/Care	Leisure & Paid Work	Full Activity
Key Independent Variables				
Gender				
Female	-19.4***	-7.38***	-25.1***	-13.6***
	(.963)	(1.36)	(1.43)	(1.69)
Socioeconomic Status				
Education (< HS)				
High School	-4.63***	1.30	-10.3**	-4.52
	(1.18)	(1.72)	(2.33)	(2.58)
Some College	-6.21***	-3.74*	-9.63***	-7.28**
	(1.16)	(1.72)	(2.24)	(2.49)
College Degree	-4.57***	-4.26*	-10.4***	-10.3***
	(1.31)	(1.89)	(2.29)	(2.59)
More than College	-3.63***	-4.65*	-11.6***	-12.6***
	(1.48)	(2.19)	(2.45)	(2.86)
Income (in thousand)	.034***	.012	.052***	.030*
	(.007)	(.011)	(.014)	(.015)
Occupation (unemployed)				
Professional/ Managerial	-17.9***	-44.0***	-23.1***	-49.7***
	(1.08)	(1.56)	(1.25)	(1.67)
Administrative & Services	-14.9***	-38.1***	-16.7***	-40.24***
	(.981)	(1.53)	(1.12)	(1.61)
Maintenance & Agriculture	-14.1***	-34.5***	140.8***	120.1***
	(1.31)	(1.88)	(3.22)	(3.36)
Other	-15.6***	-40.4***	-17.7***	-42.5***
	(1.35)	(2.05)	(1.54)	(2.16)
Interactions				
Female x Parent	-3.70**	.531	-9.29	-3.30
	(1.51)	(2.12)	(2.42)	(3.02)
Female x Kid < 6	6.53***	17.3***	---	5.32
	(1.81)	(3.05)		(4.41)
Control Variables				
Age	-.056	2.05***	.512**	2.60***
	(.116)	(.168)	(.189)	(.221)
Age-squared	.001	-.020***	-.005**	-.026***

	(.001)	(.002)	(.002)	(.002)
Race (white)				
Hispanic	-7.36***	-8.00***	-2.58	-3.21***
	(.956)	(1.46)	(1.99)	(2.20)
Black Only	-12.9***	-29.2***	-19.8***	-36.1***
	(.907)	(1.32)	(1.60)	(1.84)
Other Non-Hisp.	-5.14**	-11.8***	-6.48*	-13.0***
	(1.59)	(2.25)	(2.63)	(3.08)
Married	4.07***	10.8***	5.59***	12.2***
	(.771)	(1.18)	(1.44)	(1.66)
	Leisure Only	Leisure & Housework/Care	Leisure & Paid Work	Full Activity
Parent	2.85	4.66*	7.52**	8.30***
	(1.47)	(2.17)	(2.83)	(3.22)
Child Under Six	-12.9***	15.8***	-3.64	27.9***
	(1.61)	(2.43)	(1.91)	(2.22)
Household Size	-.669*	-.547	-2.22	-2.08**
	(.311)	(.595)	(.636)	(.725)
General Health	5.36***	8.08***	6.08***	8.86***
	(.334)	(.498)	(.593)	(.680)
Year (2006)				
2007	2.81*	4.83**	2.87	4.82
	(1.20)	(1.82)	(2.19)	(2.49)
2008	2.76*	1.79	3.68	2.62
	(1.18)	(1.75)	(2.23)	(2.50)
2010	3.70**	2.83	1.64	.722
	(1.17)	(1.70)	(2.09)	(2.38)
2012	3.19**	2.83	-4.15	3.96
	(1.19)	(1.77)	(2.20)	(2.52)
2013	1.28	-.035	.719	-.578
	(1.24)	(.985)	(2.19)	(2.51)
2014	2.01	-1.47	1.48	-1.96
	(1.16)	(1.71)	(2.14)	(2.43)
Weekday	-11.5***	-24.6***	13.5***	.519
	(.687)	(.976)	(1.04)	(1.22)
Wald Test for genderXparent	29.12***	4.03*	28.73***	9.78**
Wald Test for genderXkidunder6	18.63***	30.2***	0.76	4.07*

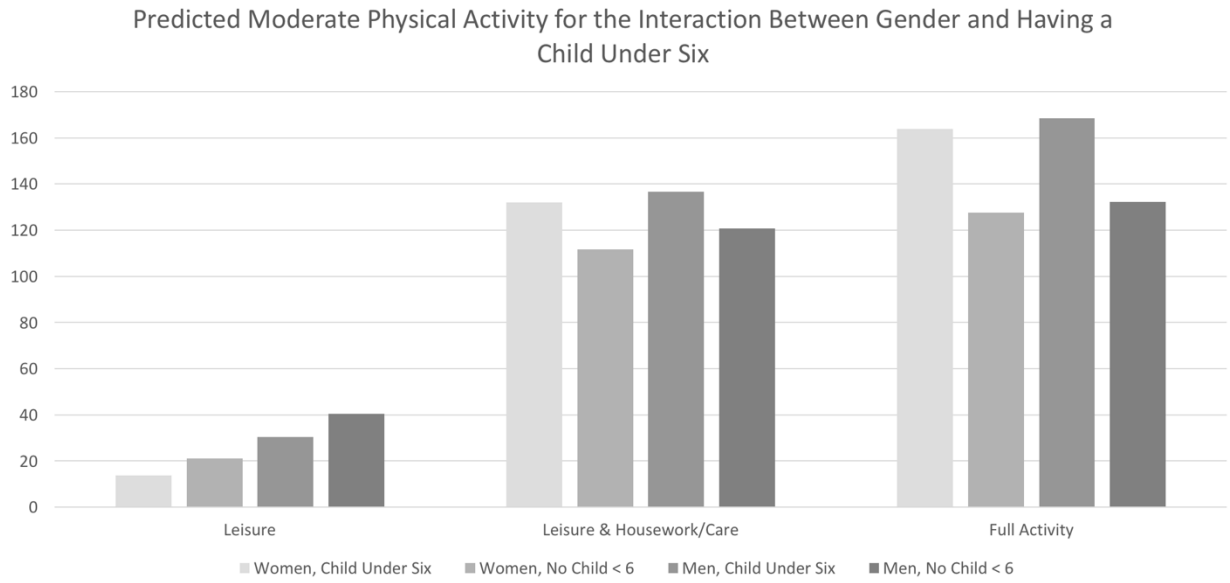
Data: 2006, 2007, 2008, 2010, 2011, 2012, 2013, 2014 Pooled Sample; American Time Use Survey (ATUS), N = 86,954
*p<.05; **<.01; ***<.001

Figure 8. Assessing Interaction Effects: Predicted Minutes Spent in Leisure, Leisure & Housework, Leisure & Paid Work, and Full Activity by Gender and Parent Status



Data: 2006, 2007, 2008, 2010, 2011, 2012, 2013, 2014 Pooled Sample; American Time Use Survey (ATUS), N= 86,954

Figure 9. Assessing Interaction Effects: Predicted Minutes Spent in Leisure, Leisure & Housework, Leisure & Paid Work, and Full Activity by Gender and Having a Child Under Six



Data: 2006, 2007, 2008, 2010, 2011, 2012, 2013, 2014 Pooled Sample; American Time Use Survey (ATUS), N= 86,954

Table 17. Weighted Average Minutes Spent in Leisure, Leisure & Housework/Dependent Care, Leisure & Paid Work, and Full Activity for Men and Women across Educational Attainment *(linearized standard errors in parentheses)*

	COLLEGE EDUCATED		LESS THAN COLLEGE	
	Women	Men	Women	Men
Leisure	24.9 [ab] (.618)	37.7 [ab] (.931)	19.2 [ab] (.419)	40.2 [ab] (.763)
Leisure + Housework / Childcare	69.3 [ab] (1.08)	69.2 [ab] (1.28)	68.7 [ab] (.807)	70.8 [ab] (1.02)
Leisure + Paid Work	28.0[ab] (.764)	50.8 [ab] (1.35)	28.2 [ab] (.626)	103.3 [ab] (1.72)
Full Activity	72.6 [b] (1.17)	82.9 [b] (1.59)	78.0[ab] (.917)	134.6[ab] (1.79)

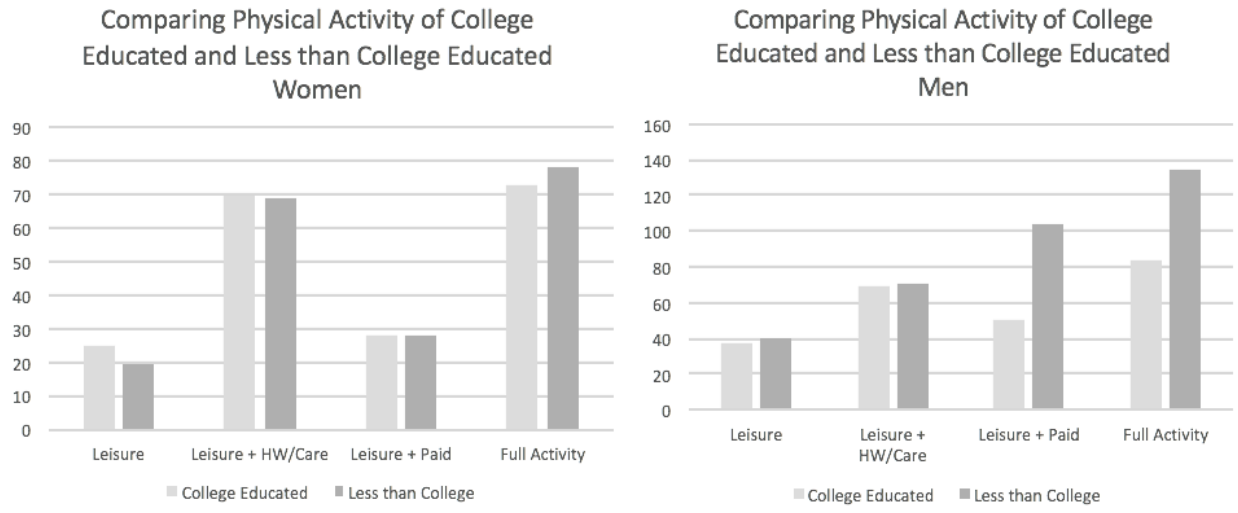
Note: To test gender differences in time use, the Wilcoxon (Mann-Whitney) test was used, allowing the results to account for non-normality in the distribution of minutes spent in each group of activities.

[a] difference between men and women according to Wilcoxon (Mann-Whitney) test is significant with p-values p<.001

[b] difference between those with and without a College Degree according to Wilcoxon (Mann-Whitney) test is significant with p-values p<.001

Data: 2006, 2007, 2008, 2010, 2011, 2012, 2013, 2014 Pooled Sample; American Time Use Survey (ATUS), N= 86,954

Figures 10 & 11. Weighted Average Minutes Spent in Leisure, Leisure & Housework/Dependent Care, Leisure & Paid Work, and Full Activity for Women (left) and Men (right) across Educational Attainment



Data: 2006, 2007, 2008, 2010, 2011, 2012, 2013, 2014 Pooled Sample; American Time Use Survey (ATUS), N= 86,954

Table 18. Weighted Average Minutes Spent in Leisure, Leisure & Housework/Dependent Care, Leisure & Paid Work, and Full Activity for Men and Women across Household Income, Top 15% compared to all else *(linearized standard errors in parentheses)*				
	$100,000 OR MORE		**LESS THAN $100K**	
	Women	Men	Women	Men
Leisure	25.2 [ab] (.818)	41.2 [ab] (1.27)	19.8 [ab] (.384)	39.0[ab] (.692)
Leisure + Housework / Childcare	67.8 [ab] (1.42)	70.2 [ab] (1.73)	69.1 [ab] (.735)	70.4 [ab] (.923)
Leisure + Paid Work	29.2[ab] (1.05)	73.7 [a] (1.35)	27.9 [ab] (.564)	92.5[a] (1.46)
Full Activity	72.1 [b] (1.56)	103.3 (3.03)	77.5[ab] (.832)	124.5[a] (1.55)

Note: To test gender differences in time use, the Wilcoxon (Mann-Whitney) test was used, allowing the results to account for non-normality in the distribution of minutes spent in each group of activities.

[a] difference between men and women according to Wilcoxon (Mann-Whitney) test is significant with p-values p<.001

[b] difference between those with a household income of $100K versus those who have less than $100K according to Wilcoxon (Mann-Whitney) test is significant with p-values p<.001

Data: 2006, 2007, 2008, 2010, 2011, 2012, 2013, 2014 Pooled Sample; American Time Use Survey (ATUS), N= 86,954

Figures 12 & 13. Weighted Average Minutes Spent in Leisure, Leisure & Housework/Dependent Care, Leisure & Paid Work, and Full Activity for Women (left) and Men (right) across Household Income, Top 15% compared to all else

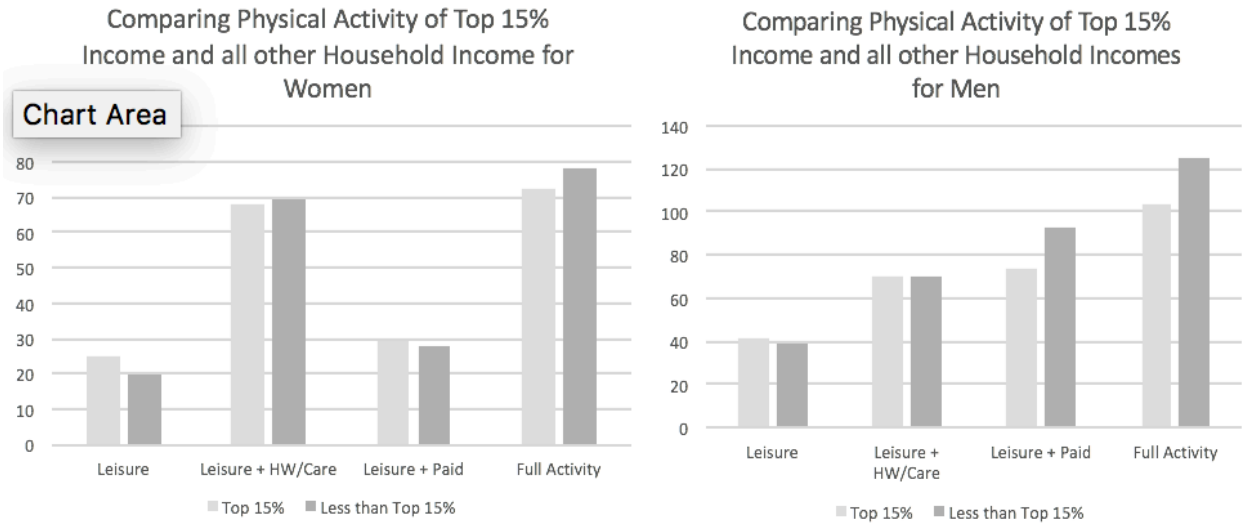


Table 19. Weighted Average Minutes Spent in Leisure, Leisure & Housework/Dependent Care, Leisure & Paid Work, and Full Activity for Men and Women across Occupation, *(linearized standard errors in parentheses)*

	ALL OTHER OCCUPATIONS		MAINTENANCE, MANUFACTURING, & AGRICULTURE	
	Women	Men	Women	Men
Leisure	18.04[ab] (.416)	31.8[ab] (.766)	16.8[ab] (1.39)	34.6[ab] (1.18)
Leisure + Housework / Childcare	55.9 (.767)	59.1[b] (1.02)	60.8 (2.51)	66.2[b] (1.71)
Leisure + Paid Work	19.2 [ab] (.435)	33.1 [ab] (.796)	124.3 [ab] (5.47)	212.8 [ab] (3.79)
Full Activity	57.3[ab] (.777)	61.0 [ab] (1.04)	168.7 [ab] (5.63)	245.0 [ab] (3.78)

Note: The Wilcoxon (Mann-Whitney) test was used, allowing the results to account for non-normality in the distribution of minutes spent in each group of activities.

[a] difference between Men and Women according to Wilcoxon (Mann-Whitney) test is significant with p-values p<.001

[b] difference between those in a Maintenance, Manufacturing & Agricultural occupation compared to others according to Wilcoxon (Mann-Whitney) test is significant with p-values p<.001

Data: 2006, 2007, 2008, 2010, 2011, 2012, 2013, 2014 Pooled Sample; American Time Use Survey (ATUS), N= 86,954

Figures 14 & 15. Weighted Average Minutes Spent in Leisure, Leisure & Housework/Dependent Care, Leisure & Paid Work, and Full Activity for Women (left) and Men (right) across Occupation

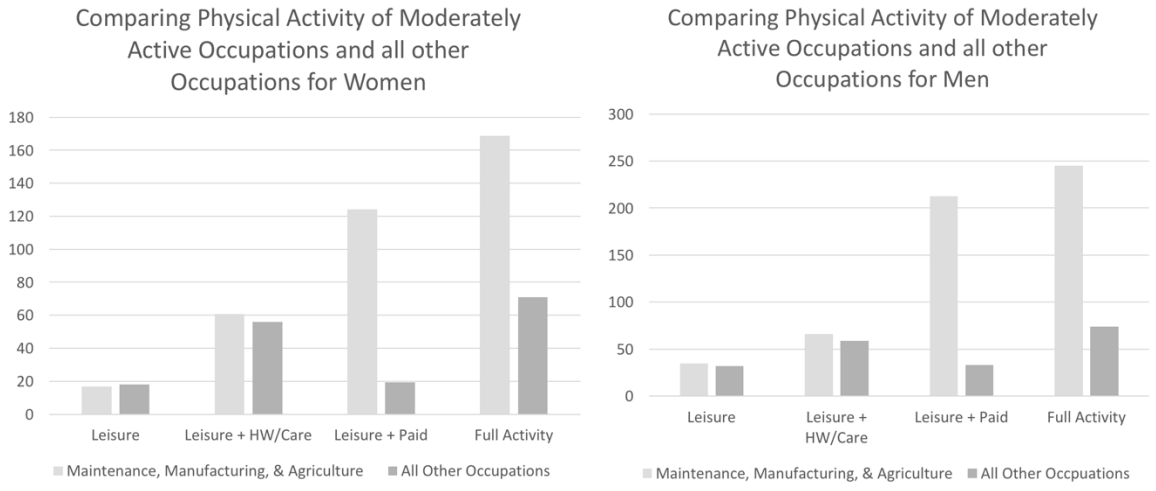


Table 20. Linear Regression of Four Dependent Variables (Leisure Only, Leisure & Housework/Dependent Care, Leisure & Paid Work, Full Activity) and Key Independent Variables

	Leisure Only	Leisure & Housework/Care	Leisure & Paid Work	Full Activity
Key Independent Variables				
Gender				
Female	-20.4***	-6.87***	-28.8***	-15.8***
	(.741)	(1.07)	(1.04)	(1.28)
Socioeconomic Status				
Education (Less than College)				
College or More	-.184	-6.00***	-3.44***	-9.28***
	(.804)	(1.20)	(1.15)	(1.43)
Income (Less than $100K)				
$100,000 or More	2.00*	-2.58	6.51***	1.94
	(.933)	(1.36)	(1.71)	(1.93)
Occupation (All Else)				
Professional & Managerial	-9.49***	-23.6***	-13.6***	-27.7***
	(.844)	(1.21)	(.944)	(1.29)
Maintenance & Agriculture	-6.24***	-16.3***	151.3***	141.2***
	(1.21)	(1.74)	(3.28)	(3.38)
Control Variables				
Age	-.634***	.955***	-.230	1.34***
	(.110)	(.159)	(.175)	(.206)
Age-squared	.008***	-.005***	.003	-.010***
	(.001)	(.002)	(.001)	(.002)
Race (white)				
Hispanic	-6.22***	-6.69***	-.602	-1.02
	(.955)	(1.50)	(2.04)	(2.26)
Black	-13.0***	-28.2***	-20.0***	-35.1***
	(.909)	(1.37)	(1.63)	(1.89)
Other non-Hisp.	-4.83**	-10.1***	-5.97***	-11.2**
	(1.66)	(1.24)	(2.70)	(3.21)
Married	3.73***	10.1***	4.92**	11.2***
	(.800)	(1.24)	(1.48)	(1.71)

Parent	2.80***	6.89***	5.44**	9.51***
	(1.06)	(1.81)	(2.07)	(2.37)
Child Under Six	-10.1***	25.5***	-4.40*	31.1***
	(.924)	(1.64)	(1.92)	(2.25)
Household Size	-.518	-.235	-2.23***	-1.94**
	(.320)	(.622)	(.640)	(.744)
Health	4.63***	6.16***	5.19***	6.77***
	(.335)	(.510)	(.588)	(.685)
Year				
2007	1.85	4.92*	1.12	4.13
	(1.28)	(1.99)	(2.32)	(2.68)
2008	2.43	1.72	2.72	1.89
	(1.26)	(1.91)	(2.39)	(2.69)
	Leisure Only	Leisure & Housework/Care	Leisure & Paid Work	Full Activity
2010	4.37***	4.06*	2.54	2.15
	(1.26)	(1.82)	(2.18)	(2.51)
2012	3.39**	4.00*	3.88	4.64
	(1.24)	(1.86)	(2.26)	(2.62)
2013	1.54	1.29	.542	.325
	(1.29)	(1.93)	(2.25)	(2.62)
2014	2.23	-.244	1.18	-1.25
	(1.20)	(1.80)	(2.21)	(2.53)
Weekday	-11.5***	-25.0***	13.6***	.213
	(.707)	(1.01)	(1.07)	(1.27)

Data: 2006, 2007, 2008, 2010, 2011, 2012, 2013, 2014 Pooled Sample; American Time Use Survey (ATUS), N = 86,954
*p<.05; **<.01; ***<.001

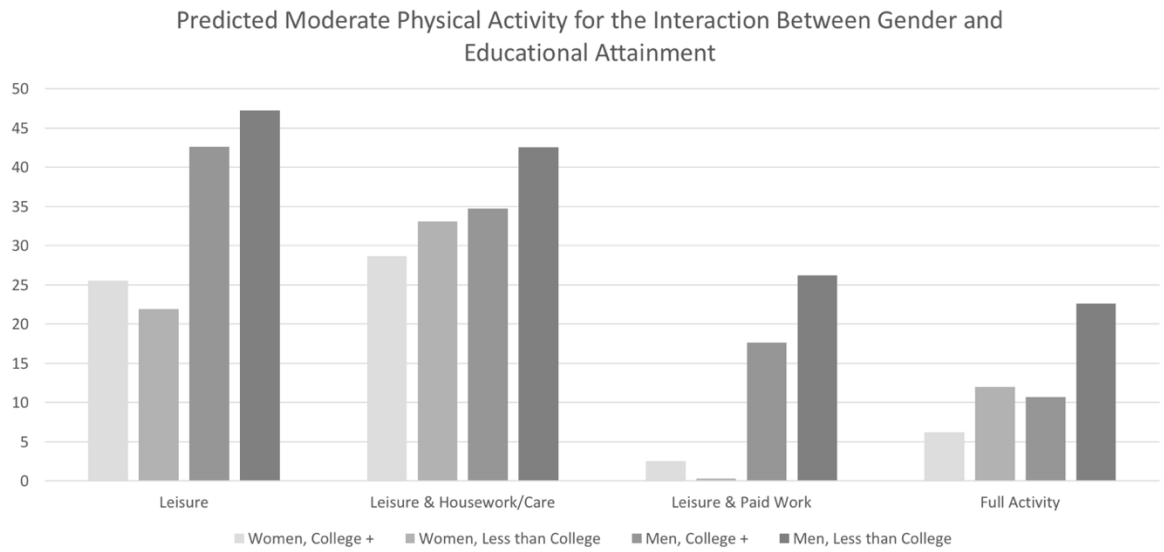
Table 21. Linear Regression of Four Dependent Variables (Leisure Only, Leisure & Housework/Dependent Care, Leisure & Paid Work, Full Activity) and Key Independent Variables and Interactions

	Leisure Only	Leisure & Housework/Care	Leisure & Paid Work	Full Activity
Key Independent Variables				
Gender				
Female	-25.3***	-9.44***	-25.9***	-10.6***
	(1.13)	(1.62)	(1.29)	(1.72)
Socioeconomic Status				
Education (Less than College)	-4.59***	-7.83***	-8.57***	-11.9***
	(1.41)	(1.89)	(2.04)	(2.33)
College or More				
Income (Less than $100K)	2.79	-.122	11.5**	8.64**
	(1.55)	(2.10)	(3.08)	(3.29)
Top 15% ($100K +)				
Occupation (All Else)				
Professional & Managerial	-13.0***	-27.2***	-16.8***	-31.2***
	(1.48)	(1.92)	(1.65)	(2.05)
Maintenance & Agriculture	-9.69**	-19.0***	164.0***	154.5***
	(1.57)	(2.18)	(3.93)	(4.04)
Interactions				
Female x College	8.20***	3.45	10.8***	6.13*
	(1.59)	(2.31)	(2.22)	(2.73)
Female x Income	-1.31	-4.74	-9.70**	-13.1***
	(1.79)	(2.62)	(3.27)	(3.70)
Female x Professional	7.62***	7.05**	10.2***	9.78***
	(1.66)	(2.36)	(1.83)	(2.49)
Female x Maintenance	8.59**	7.64*	-60.9***	-61.4***
	(2.09)	(3.35)	(6.71)	(6.92)
Control Variables				
Age	-.617***	.971***	-.218	1.35***
	(.110)	(.160)	(.175)	(.206)
Age-squared	.007***	-.006***	.003*	-.010***
	(.001)	(.002)	(.003)	(.002)
Race (white)				

Hispanic	-6.28***	-6.75***	.169	-.256
	(.955)	(1.50)	(2.03)	(2.25)
Black	-13.2***	-28.4***	-19.4***	-34.6***
	(.912)	(1.37)	(1.63)	(1.89)
Other non-Hisp.	-4.56**	-10.2***	-5.51*	-10.6**
	(1.66)	(2.38)	(2.67)	(3.19)
Married	3.80***	10.2***	4.77***	11.1***
	(.798)	(1.24)	(1.47)	(1.71)
Parent	2.91**	6.90***	5.79**	9.75***
	(1.06)	(1.81)	(2.07)	(2.36)
Child Under Six	-9.65***	25.8***	-4.89**	30.5***
	(.923)	(1.64)	(1.90)	(2.24)
	Leisure Only	Leisure & Housework/Care	Leisure & Paid Work	Full Activity
Household Size	-.528	-.238	-2.21**	-1.91**
	(.320)	(.623)	(.639)	(.739)
Health	4.62***	6.19***	5.01***	6.63***
	(.335)	(.510)	(.586)	(.683)
Year				
2007	1.82	4.91*	.599	3.61
	(1.28)	(1.99)	(2.32)	(2.67)
2008	2.40	1.69	2.46	1.64
	(1.26)	(1.91)	(2.38)	(2.68)
2010	4.31***	4.02*	2.27	1.91
	(1.22)	(1.82)	(2.17)	(2.51)
2012	3.37**	4.01*	3.61	4.39
	(1.23)	(1.86)	(2.25)	(2.60)
2013	1.48	1.27	.316	.140
	(1.28)	(1.93)	(2.25)	(2.61)
2014	2.21	-.222	.866	-1.51
	(1.20)	(1.80)	(2.21)	(2.53)
Weekday	-11.4***	-25.0***	13.6***	.298
	(.707)	(1.01)	(1.07)	(1.26)
Constant	47.2	42.5	26.2	22.6
Wald Tests				
All Four Interactions	14.99***	28.83***	104.24***	59.25***
Gender x College	50.74***	16.83**	18.73***	5.07*
Gender x Income	8.13**	9.29***	19.67***	26.85***
Gender x Professional	12.84***	96.74***	7.46**	1.95
Gender x Maintenance	0.68	0.05	321.68***	191.2***

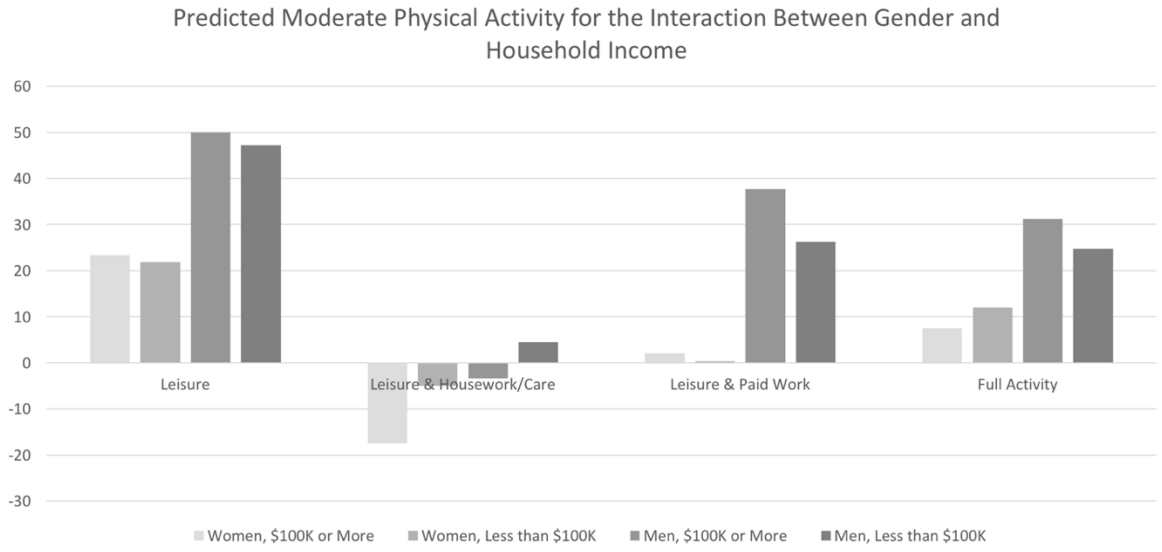
Data: 2006, 2007, 2008, 2010, 2011, 2012, 2013, 2014 Pooled Sample; American Time Use Survey (ATUS), N = 86,954
*p<.05; **<.01; ***<.001

Figure 16. Predicted Moderate Activity for Leisure, Leisure & Housework/Dependent Care, Leisure & Paid Work, and Full Activity by Education and Gender



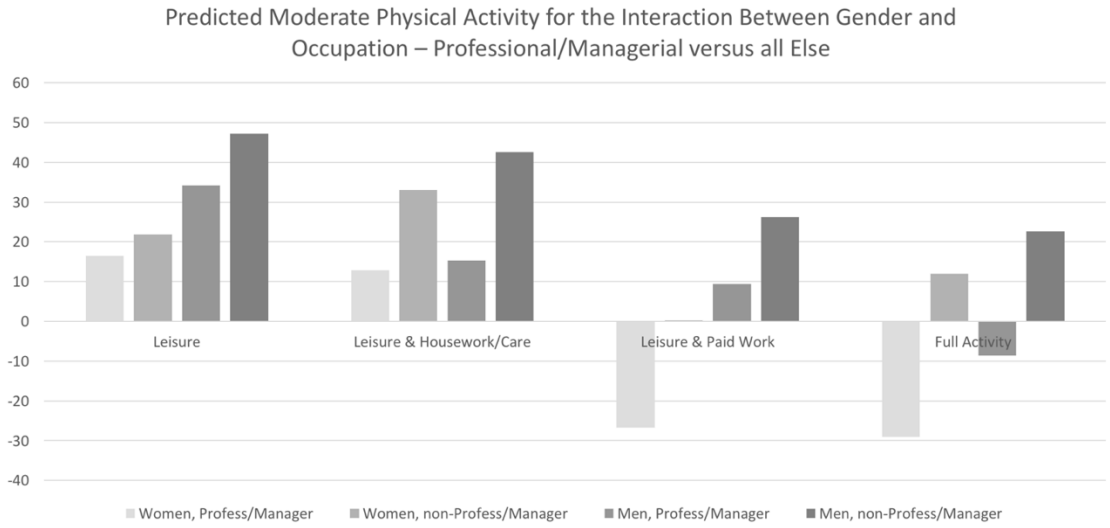
Data: 2006, 2007, 2008, 2010, 2011, 2012, 2013, 2014 Pooled Sample; American Time Use Survey (ATUS), N = 86,954

Figure 17. Predicted Moderate Activity for Leisure, Leisure & Housework/Dependent Care, Leisure & Paid Work, and Full Activity by Income and Gender



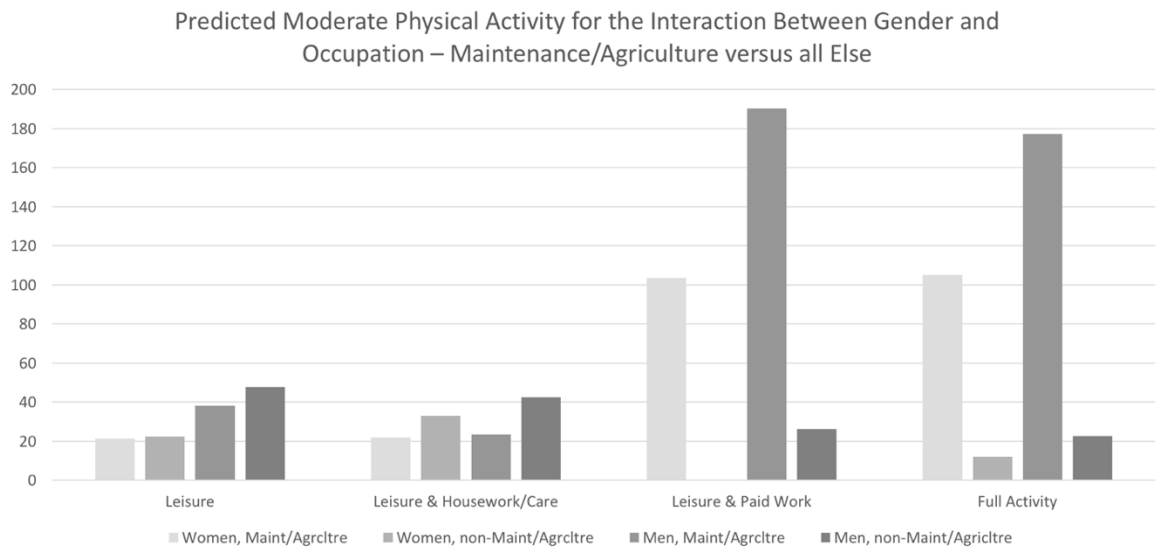
Data: 2006, 2007, 2008, 2010, 2011, 2012, 2013, 2014 Pooled Sample; American Time Use Survey (ATUS), N = 86,954

Figure 18. Predicted Moderate Activity for Leisure, Leisure & Housework/Dependent Care, Leisure & Paid Work, and Full Activity by Professional/Managerial Occupation and Gender



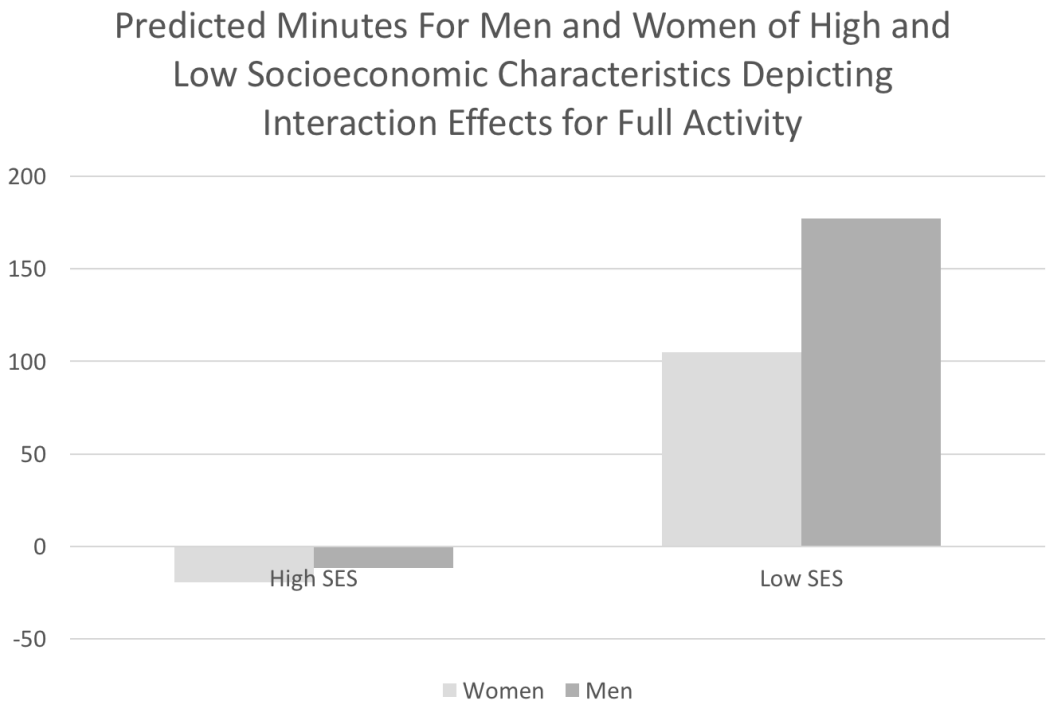
Data: 2006, 2007, 2008, 2010, 2011, 2012, 2013, 2014 Pooled Sample; American Time Use Survey (ATUS), N = 86,954

Figure 19. Predicted Moderate Activity for Leisure, Leisure & Housework/Dependent Care, Leisure & Paid Work, and Full Activity by Maintenance/Agricultural Occupation and Gender



Data: 2006, 2007, 2008, 2010, 2011, 2012, 2013, 2014 Pooled Sample; American Time Use Survey (ATUS), N = 86,954

Figure 20. Predicted Minutes in Moderate Activity for Women and Men from Low-SES and High-SES** Standings for Full Activity*



*Low-SES = Less than College education, Less than $100,000 household income, Maintenance/Manufacturing occupation
**High-SES = College or More, $100,000 or more household income, Professional/Managerial occupation
Data: 2006, 2007, 2008, 2010, 2011, 2012, 2013, 2014 Pooled Sample; American Time Use Survey (ATUS), N = 86,954

Table 22. Descriptive Statistics for the Conditions and Independent Variables from the Mechanical Turk Data Collection (N= 3,652) ***standard errors in parentheses, condition means in self-reported minutes/week***

	ATUS 2014	Full Sample	NHANES (N = 477)	No Prime (N = 473)	Housework (N = 447)	Paid Work (N = 452)	Leisure + Housework (N = 451)	Leisure + Paid Work (N = 471)	Housework + Paid (N = 438)	All Domains (N = 449)
Dependent Variables										
Minutes a Week		587.5 (16.60)	214.6 (15.98)	261.6 (26.31)	923.2 (60.05)	299.0 (25.48)	867.7 (56.03)	319.6 (29.86)	1031.6 (66.79)	860.7 (52.04)
Days a Week		4.000 (.0376)	3.018 (.0870)	3.823 (.0889)	5.180 (.0890)	2.196 (.1014)	4.914 (.0911)	3.007 (.1006)	5.122 (.1000)	4.906 (.0891)
Minutes a Day	93.63 (1.357)									
Independent Variables										
Gender										
Female	55.8	55.3	54.5*	56.2	55.5	56.6	58.1^	55.8	51.6*	54.1*
Male	44.2	44.7	45.5	43.8	44.5	43.4	41.9	44.2	48.4	45.9
Educational Attainment										
H.S. Degree Or Less	40.1	9.9*	11.7*	9.3*	8.7*	10.2*	9.3*	8.7*	11.0*	9.8*
Some College	27.5	37.8^	36.9^	38.7^	38.9^	40.5^	36.1^	38.9^	35.8^	36.1
Bachelor's Degree	21.0	36.6^	33.1^	36.2^	35.6^	34.3^	39.7^	39.1^	35.6^	39.2
Master's or More	13.4	15.8^	18.2^	15.9^	16.8^	15.0^	14.9^	13.4	17.7^	14.9
Household Income	66.5 (.5061)	44.1* (.4501)	44.9* (1.371)	43.4* (1.257)	41.8* (1.208)	44.29* (1.270)	45.6* (1.312)	45.5* (1.255)	44.8* (1.371)	42.3* (1.294)

(in thousands)										
Marital Status										
Married	48.9	38.1*	35.2*	39.9*	37.8*	39.2*	36.1*	41.7*	37.8*	36.7*
Not Married	51.3	61.9	64.8	60.1	62.2	60.8	63.9	58.3	62.2	63.7
Age (std. err.)	48.8 (.1662)	34.8* (.1901)	34.4* (.5104)	34.6* (.5363)	34.9* (.5535)	35.2* (.5631)	34.6* (.5286)	35.5* (.5302)	34.7 (.5508)	34.9* (.5349)
General Health										
Excellent	14.5	12.3	13.7	12.4	13.2	10.1	12.0	12.8	14.5	11.2
Very Good	27.0	40.9	40.4	40.0	40.6	39.3	39.9	38.5	41.8	44.2
Good	25.1	33.1	32.2	32.8	33.0	37.3	31.6	35.5	31.0	32.1
Fair	9.8	11.5	11.8	12.4	10.3	10.8	14.3	10.6	10.4	10.3
	ATUS 2014	**Full Sample**	**NHANES (N = 477)**	**No Prime (N = 473)**	**Housework (N = 447)**	**Paid Work (N = 452)**	**Leisure + Housework (N = 451)**	**Leisure + Paid Work (N = 471)**	**Housework + Paid (N = 438)**	**All Domains (N = 449)**
Poor	3.6	2.3	1.9	2.4	2.9	2.5	2.2	2.6	2.3	2.2
Race										
Hispanic	14.8	7.7*	8.9*	5.5*	11.5*	7.8*	6.9*	8.1*	6.1*	5.4*
White Only	65.4	74.6^	74.4^	74.6^	71.2^	75.8^	74.2^	74.0^	73.7^	78.9^
Black Only	14.1	6.2*	5.7*	5.5*	7.0*	6.0*	7.3*	7.0*	8.6*	3.8*
Other Non Hisp.	5.7	7.8^	7.2^	10.0^	6.3^	6.7^	7.8^	7.9^	7.9^	8.5^
Multiracial		3.7	3.8	4.3	4.1	3.8	3.8	3.0	3.7	3.4
Occupation										
Professional,	36.1	36.5	36.4	36.2	35.9	39.4	34.9	38.9	36.9	33.0

Managerial, & Sales										
Admin & Service	30.8	12.8	11.5	14.5	12.4	11.7	11.7	14.6	12.3	13.2
Educ & Healthcare	22.5	20.2	19.2	19.9	17.0	21.2	22.0	18.5	20.6	23.2
		9.5	8.2	8.3	10.2	10.1	12.9	9.8	7.7	9.0
Manufact, Mainten, & Agricult										
Other	10.6	21.1	24.7	21.2	24.6	17.6	18.6	18.3	22.6	21.4
Caretaker Status										
Not a Caretaker		69.0	73.2	73.7	61.7	74.2	66.2	72.3	61.2	68.8
Caretaker Child < 6		18.1	15.4	14.8	22.7	16.4	20.3	14.3	22.9	18.6
Caretaker Child > 6/Adult		12.9	11.4	11.6	15.7	9.4	13.6	13.4	15.9	12.6

Data: 2016 Mechanical Turk Physical Activity Survey, N= 3,652
*p<.05; **<.01; ***<.001

Table 23. Mean Minutes Engaged in Physical Activity by Conditions from the Mechanical Turk Data Collection (N= 3,652) ***standard errors in parentheses***

	NHANES (N = 473)	No Prime (N = 469)	Housework (N = 467)	Paid Work (N = 456)	Leisure + Housework (N = 470)	Leisure + Paid Work (N = 472)	Housework + Paid (N = 468)	All Three Domains (N = 454)
Physical Activity Engagement								
Minutes a Day	56.0	57.1*	164.3***	75.12**	159.6 ***	77.0*	182.9***	165.0***
	(3.238)	(4.412)	(9.361)	(5.598)	(9.128)	(6.153)	(9.814)	(9.001)
Days a Week	3.0	3.8**	5.2***	2.3***	4.9***	3.0	5.1***	4.9***
	(.0884)	(.0908)	(.0894)	(.1031)	(.0915)	(.1019)	(.0999)	(.0904)
Minutes a Week	216.5	265.2	925.6***	295.7**	870.2***	318.1**	1034.3***	849.0***
	(15.87)	(27.08)	(60.29)	(26.08)	(56.69)	(30.14)	(68.06)	(52.72)
Meet HHS Requirements	43.4%	47.1%	74.8%	35.1%	76.4%	44.8%	75.8%	79.5%

Data: 2016 Mechanical Turk Physical Activity Survey, N= 3,652
*p<.05; **<.01; ***<.001

Table 24. Main Effects of Treatment Conditions (compared to NHANES control condition) for Minutes a Week and Days a Week Reported *(standard errors in parentheses)*

Conditions ***(NHANES baseline)***	**Minutes a Week**		**Days a Week**	
	Coefficient	Percent Difference (compare to NHANES)	Coefficient	Percent Difference (compare to NHANES)
No Prime	.056	+5.7%	.243**	+27.5%
	(.093)		(.074)	
Housework/Dependent Care	1.09***	+196.8%	.551***	+73.4%
	(.093)		(.074)	
Paid Work	.287**	+33.2%	-.298***	-25.7%
	(.105)		(.077)	
Leisure + HW/Care	1.13***	+208.6%	.496***	+64.3%
	(.092)		(.074)	
Leisure + Paid Work	.331**	+39.2%	.008	+0.8%
	(.098)		(.075)	
HW/Care + Paid Work	1.34***	+280.8%	.539***	+71.5%
	(.094)		(.074)	
All Three Domains	1.27***	+255.0%	.490***	+63.2%
	(.093)		(.074)	

Data: 2016 Mechanical Turk Physical Activity Survey, N= 3,652
*p<.05; **<.01; ***<.001

Table 25. Main Effects of Treatment Conditions (compared to No Prime condition) for Minutes a Week and Days a Week Reported *(standard errors in parentheses)*

Conditions *(No Prime baseline)*	**Minutes a Week**		**Days a Week**	
	Coefficient	Percent Difference (compare to No Prime)	Coefficient	Percent Difference (compare to No Prime)
NHANES (control)	-.056	-5.4%	-.243**	-21.6%
	(.092)		(.074)	
Housework/Dependent	1.03***	+180.1%	.308***	+36.1%
Care	(.091)		(.073)	
Paid Work	.231*	+26.0%	-.540***	-41.7%
	(.103)		(.076)	
Leisure + HW/Care	1.07***	+191.5%	.254***	+28.9%
	(.091)		(.073)	
Leisure + Paid Work	.275**	+31.7%	-.234**	-20.9%
	(.097)		(.074)	
HW/Care + Paid Work	1.28***	+259.7%	.297***	+71.5%
	(.093)		(.073)	
All Three Domains	1.21***	+235.3%	.247**	+28.0%
	(.092)		(.073)	

Data: 2016 Mechanical Turk Physical Activity Survey, N= 3,652
*p<.05; **<.01; ***<.001

Table 26. Main Effects of Treatment Conditions (compared to Housework/Dependent Care condition) for Minutes a Week and Days a Week Reported *(standard errors in parentheses)*

Conditions ***(Housework/Care baseline)***	**Minutes a Week** Coefficient	Percent Difference (compare to Housework/Care)	**Days a Week** Coefficient	Percent Difference (compare to Housework/ Care)
NHANES (control)	-1.09***	-66.4%	-.550**	-42.3%
	(.092)		(.074)	
No Prime	-1.03***	-64.3%	-.308***	-.26.5%
	(.091)		(.073)	
Paid Work	-.802***	-55.2%	-.848***	-57.2%
	(.104)		(.076)	
Leisure + HW/Care	.038	+3.87%	-.054	-5.26%
	(.091)		(.073)	
Leisure + Paid Work	-.757***	-53.1%	-.542**	-41.8%
	(.097)		(.074)	
HW/Care + Paid	.249**	+28.3%	-.011	-1.09%
Work	(.093)		(.071)	
All Three Domains	.179	+19.6%	-.061	-5.92%
	(.092)		(.073)	

Data: 2016 Mechanical Turk Physical Activity Survey, N= 3,652
*p<.05; **<.01; ***<.001

Table 27. Main Effects of Experimental Factors for Minutes a Week and Days a Week Reported *(standard errors in parentheses)*

	Minutes a Week		Days a Week	
Experimental Factors	Coefficient	Percent Difference (relative to no prime)	Coefficient	Percent Difference (relative to no prime)
Paid Work	.235***	+26.5%	-.106***	-10.1%
	(.048)		(.017)	
Housework/Dependent	1.04***	+182.3%	.511***	+66.7%
Care	(.048)		(.017)	
Leisure	-.013	-1.3%	-.034*	-3.34%
	(.048)		(.017)	

Data: 2016 Mechanical Turk Physical Activity Survey, N= 3,652
*p<.05; **<.01; ***<.001

Table 28. Interaction Effects of Experimental Factors for Days a Week Reported ***(standard errors in parentheses)***

	Minutes a Week		Days a Week	
Experimental Factors and Interactions	Coefficient	Percent Difference (relative to no prime)	Coefficient	Percent Difference (relative to no prime)
Paid Work	.231*	+26.0%	-.540***	-41.7%
	(.103)		(.076)	
Housework/Care	1.03***	+180.1%	.307***	+36.0%
	(.091)		(.073)	
Paid * HW/Care	.018	---	.593***	+34.5%
	(.139)		(.106)	
Leisure	-.056	---	-.243**	-21.5%
	(.092)		(.074)	
Paid * Leisure	.100	---	.549***	-20.9%
	(143)		(107)	
HW/Care * Leisure	.094	---	.189	+28.9%
	(.130)		(.104)	
Paid * HW/Care * Leisure	-.208	---	-.544***	+28.1%
	(.193)		(.148)	

Data: 2016 Mechanical Turk Physical Activity Survey, N= 3,652
*p<.05; **<.01; ***<.001

Table 29. Mean Days a Week Under Three Experimental Primes: Paid Work, Leisure, and Housework/Dependent Care

	Leisure and Housework/Dependent Care			
	No Leisure Primed		Leisure Primed	
Paid Work	No HW/Care Prime	HW/Care Prime	No HW/Care Prime	HW/Care Prime
No Paid Work Prime	3.82	5.20	3.00	4.92
Paid Work Prime	2.23	5.14	3.02	4.89

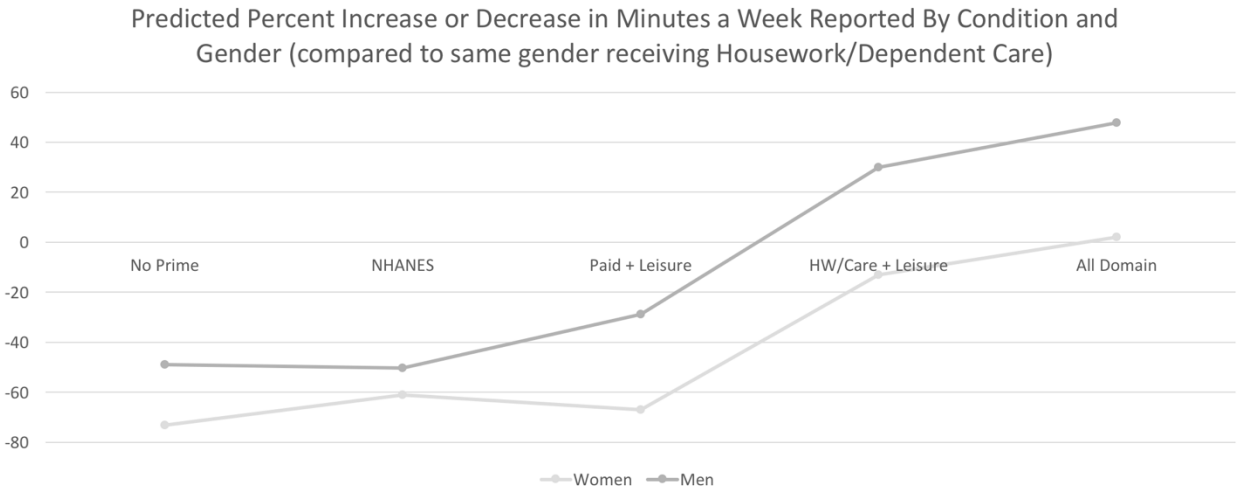
Data: 2016 Mechanical Turk Physical Activity Survey, N= 3,652

Table 30. Interaction Effect of Gender by Treatment Conditions for Minutes a Week and Days a Week *(standard errors in parentheses)*

Gender, Treatment Conditions, and Interactions *(HW/Care baseline)*	Minutes a Week	Days a Week
Female	.482***	.124
	(.129)	(.104)
NHANES	-.699***	-.433***
	(.137)	(.110)
No Prime	-.671***	-.146
	(.136)	(.109)
Paid Work	-.461**	-.682***
	(.137)	(.115)
Leisure+HW/Care	.263	-.001
	(.138)	(.111)
Leisure+Paid	-.340*	-.365**
	(.142)	(.111)
HW/Care+Paid	.367**	-.002
	(.136)	(.108)
All Three Domains	.390**	-.0568
	(.137)	(.120)
Female*NHANES	-.702***	-.199
	(.185)	(.148)
Female*No Prime	-.646***	-.292*
	(.183)	(.147)
Female*Paid Work	-.613**	-.301
	(.207)	(.154)
Female*Leisure+HW/Care	-.402*	-.091
	(.183)	(.147)
Female*Leisure+Paid	-.766***	-.008*
	(.194)	(.147)
Female*HW/Care+Paid	-.187	-.008
	(.186)	(.147)
Female*All Three Domains	-.369*	.001
	(.184)	(.147)

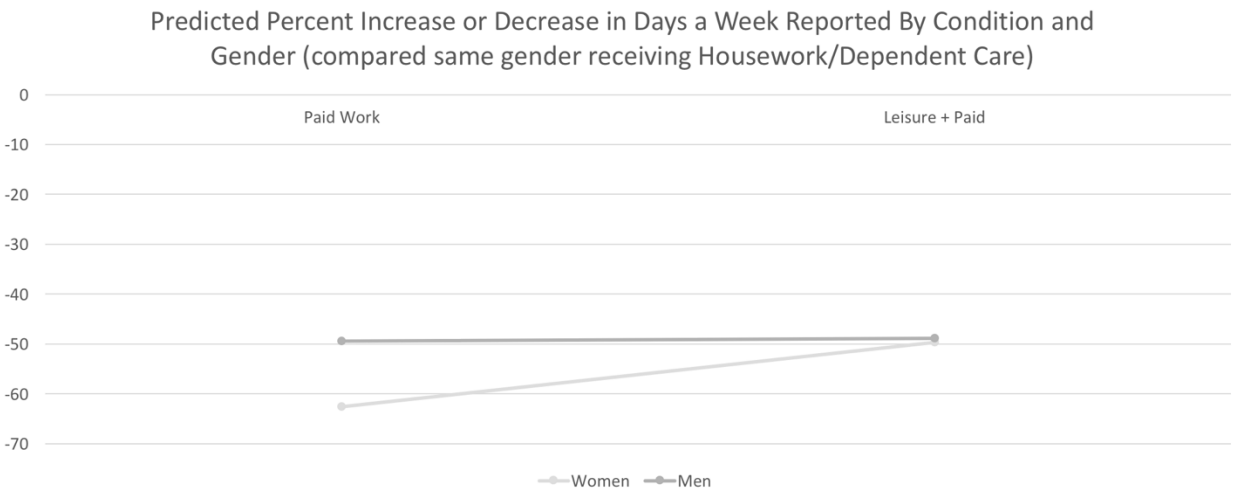
Data: 2016 Mechanical Turk Physical Activity Survey, N= 3,652
*p<.05; **<.01; ***<.001

Figure 21. Predicted Percent Change in Minutes a Week Reported by Condition and Gender (compared to same gender who received Housework/Dependent Care)



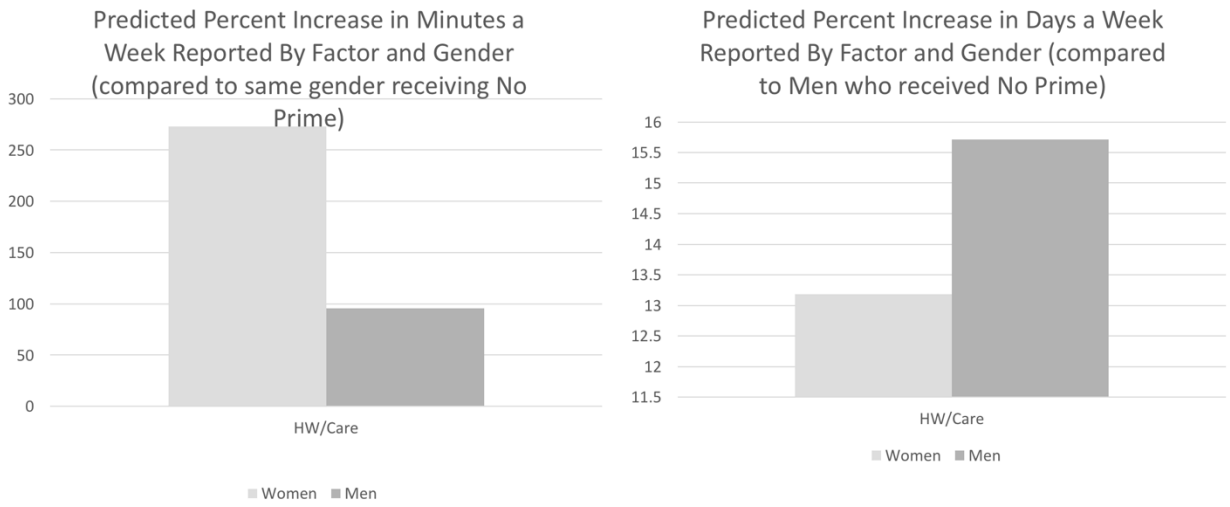
Data: 2016 Mechanical Turk Physical Activity Survey, N= 3,652

Figure 22. Predicted Percent Change in Days a Week Reported by Condition and Gender (compared to same gender who received Housework/Dependent Care)



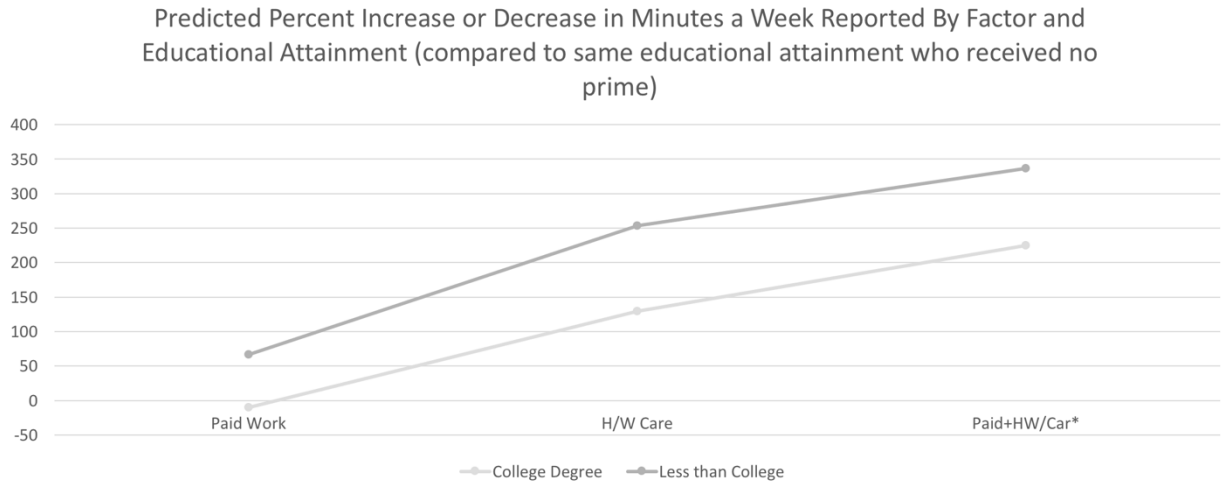
Data: 2016 Mechanical Turk Physical Activity Survey, N= 3,652

Figure 23. Predicted Percent Change in Minutes a Week and Days a Week Reported by Factor and Gender (compared to same gender who received no priming)



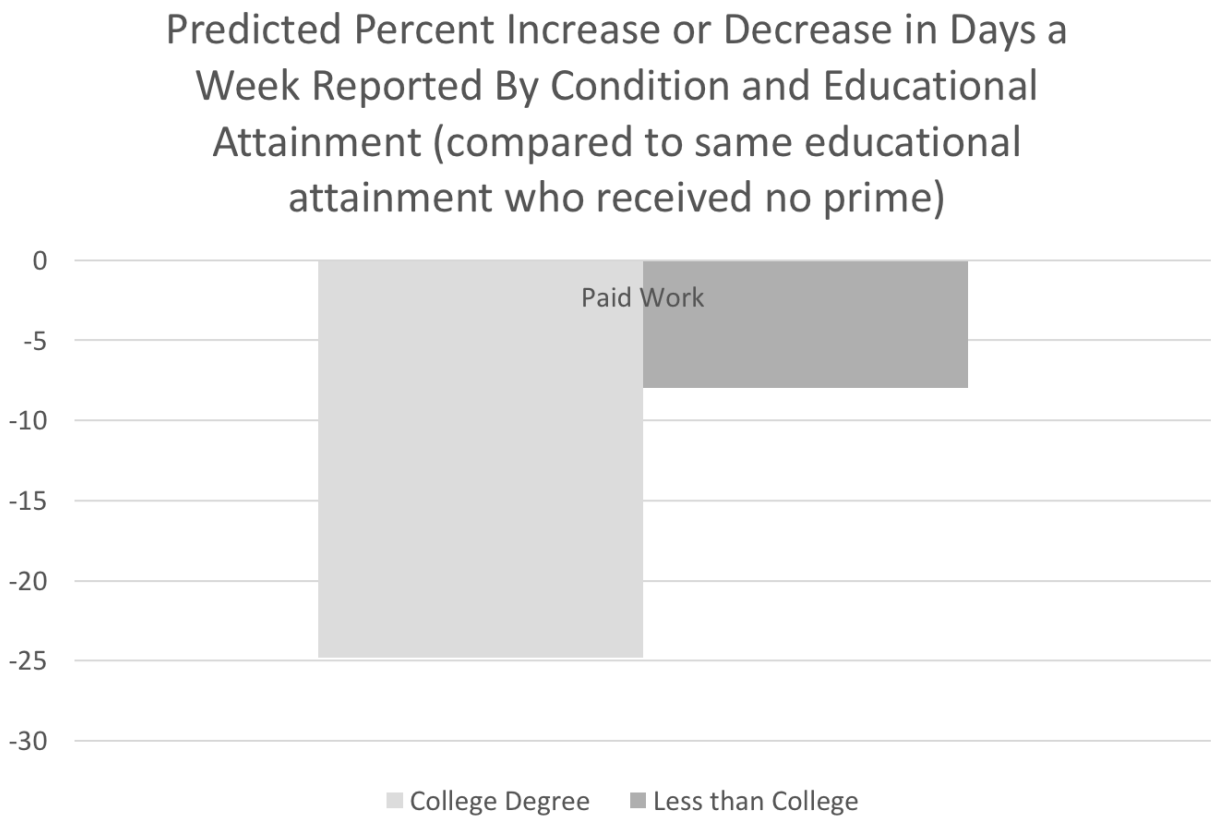
Data: 2016 Mechanical Turk Physical Activity Survey, N= 3,652

Figure 24. Predicted Percent Change in Minutes a Week Reported by Condition and Educational Attainment (compared to same gender who received NHANES)



Data: 2016 Mechanical Turk Physical Activity Survey, N= 3,652

Figure 25. Predicted Percent Change in Days a Week Reported by Condition and Educational Attainment (compared to same educational attainment who received NHANES)



Data: 2016 Mechanical Turk Physical Activity Survey, N= 3,652

Table 31. Interaction Effect of Gender by Experimental Factors for Minutes a Week and Days a Week ***(standard errors in parentheses)***		
Gender, Experimental Factors, and Interactions	**Minutes a Week**	**Days a Week**
Female	-.164	-.169
	(.129)	(.104)
Paid Work	.209	-.536***
	(.153)	(.114)
Female * Paid	.033	-.008
	(.207)	(.154)
Housework/Dependent	.671***	.146
Care	(.137)	(.120)
Female * HW/Care	.646***	.292*
	(.183)	(.145)
Paid * HW/Care	.158	.534**
	(.205)	(.157)
Female * Paid *	-.220	.001
HW/Care	(.278)	(.212)
Leisure	-.028	-.287**
	(.137)	(.120)
Female * Leisure	-.056	.094
	(.185)	(.148)
Paid * Leisure	.150	.604***
	(.185)	(.159)
Female * Paid *	-.097	-.115
Leisure	(.285)	(.215)
HW/Care * Leisure	.291	.287
	(.195)	(.156)
Female * HW/Care *	-.346	-.184
Leisure	(.260)	(.209)
Paid * HW/Care *	-.390	-.659**
Leisure	(.285)	(.222)
Female * Paid *	.317	.215
HW/Care * Leisure	(.387)	(.299)

Data: 2016 Mechanical Turk Physical Activity Survey, N= 3,652
*p<.05; **<.01; ***<.001

Table 32. Interaction Effect of Education by Treatment Conditions for Minutes a Week and Days a Week *(standard errors in parentheses)*

Education, Treatment Conditions, and Interactions *(NHANES baseline)*	**Minutes a Week**	**Days a Week**
College	.123	.173
	(.132)	(.106)
No Prime	.087	.297**
	(.134)	(.107)
Housework/Dependent	1.35***	.640***
Care	(.134)	(.107)
Paid Work	.600**	-.083
	(.145)	(.109)
Leisure+HW/Care	1.29***	.594***
	(.136)	(.108)
Leisure+Paid	.582***	.129
	(.142)	(.108)
HW/Care+Paid	1.56***	.614***
	(.139)	(.108)
All Three Domains	1.30***	.591***
	(.136)	(.108)
College *No Prime	-.071	-.112
	(.184)	(.147)
College * HW/Care	-.501**	-.181
	(.184)	(.148)
College *Paid Work	-.691**	-.458**
	(.210)	(.155)
College	-.316	-.193
*Leisure+HW/Care	(.185)	(.148)
College *Leisure+Paid	-.504*	-.247
	(.196)	(.150)
College *HW/Care+Paid	-.417*	-.153
	(.189)	(.148)
College *All Three	-.049	-.198
Domains	(.186)	(.148)

Data: 2016 Mechanical Turk Physical Activity Survey, N= 3,652
*p<.05; **<.01; ***<.001

Table 33. Interaction Effects of Education by Experimental Factors for Minutes a Week and Days a Week *(standard errors in parentheses)*

Education, Experimental Factors, and Interactions	Minutes a Week	Days a Week
College	.052	.061
	(.128)	(.103)
Paid Work	.512***	-.380***
	(.143)	(.108)
College * Paid	-.619**	-.347*
	(.207)	(.153)
Housework/Care	1.26***	.343**
	(.131)	(.106)
College * HW/Care	-.430*	-.070
	(.181)	(.146)
Paid * HW/Care	-.301	.355*
	(.197)	(.151)
College * Paid * HW/Care	.703*	.375
	(.278)	(.212)
Leisure	-.087	-.297**
	(.134)	(.107)
College * Leisure	.071	.112
	(.184)	(.148)
Paid * Leisure	.070	.509**
	(.201)	(.153)
College * Paid * Leisure	.115	.100
	(.285)	(.215)
HW/Care * Leisure	.029	.251
	(.189)	(.151)
College * HW/Care * Leisure	.114	-.123
	(.259)	(.208)
Paid * HW/Care * Leisure	-.276	-.487*
	(.278)	(.215)
College * Paid * HW/Care * Leisure	.068	-.134
	(.387)	(.298)

Data: 2016 Mechanical Turk Physical Activity Survey, N= 3,652
*p<.05; **<.01; ***<.001

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APPENDICES

APPENDIX A. Assessing OLS Assumptions for ATUS

Prior to running Ordinary Least Squared analysis, it is important to check that the assumptions are met and make any necessary adjustments to the data. First, linearity is assessed by identifying and examining cases with particular leverage or influence. Cook's D statistics are generated because this measure combines information on residuals and leverage. The conventional cut-off point for Cook's D to identify cases that may be influential is 4/n, so in the ATUS sample any case with a Cook's D value of 0.000046 (N = 4,528) or greater is flagged (4/86,954=0.000046). Table 6 explains how these individuals are significantly different than the whole sample across demographic characteristics.

Next, tests for normality are generated. There are several tests for normality, but the one utilized in this analysis is the Shapiro-Wilk W test. The test is based on the assumption that the distribution is normal, therefore, a larger p-value suggests we cannot reject the assumption that the studentized residuals are normally distributed. Below are the results for each of the four dependent variables:

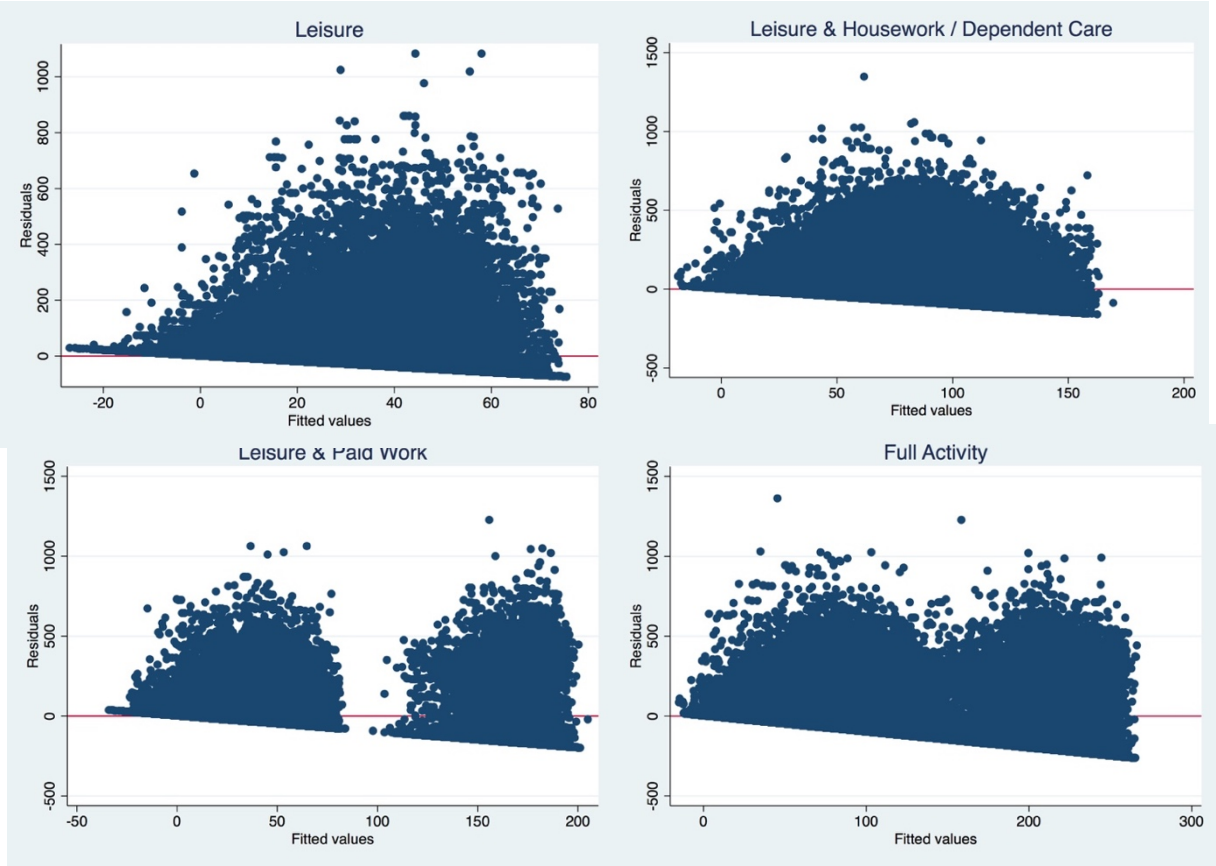
	Shapiro-Wilk W
Leisure Activity	0.5911***
Leisure & Housework/Care	0.7778***
Leisure & Paid Work	0.7363***
Full Activity	0.8517***

Each Shapiro-Wilk W Test is significant, which means I reject the hypothesis that the residuals are normally distributed in favor the the alternative that the data is non-normally distributed.

The next assumption that is assessed is for homoscedasticity. Two tests (White's test and Breusch-Pagan test) are used along with graphical representation of the variance of the residuals. Both of these tests are very sensitive to model assumptions, such as the assumption of normality that is already established to be violated. Therefore, as is often common practice, the tests are combined with graphs to visually check the severity of heteroscedasticity. Similar to the Shapiro-Wilk test, tests for homoscedasticity test a hypothesis that the variance of the residuals are homoscedastic.

	White's Test	Breusch-Pagan Test
Leisure Activity	3634.9***	24628.6***
Leisure & Housework/Care	3312.9***	6308.7***
Leisure & Paid Work	24846.2***	113154.91***
Full Activity	16059.3***	36322.8***

For the four dependent variables, each of the two tests are significant. This means I reject the hypothesis that the variance of the residuals is homoscedastic in favor of the alternative that the variance of the residuals is not normally distributed. Before rejecting the assumption, graphs are plotted to visually check the variance of the residuals:



The graphs confirm the conclusion derived from the tests, the assumption of homoscedasticity is not met in this data.

Finally, tests for multicollinearity were also run on the independent variables of interest. VIF test is used. A VIF over 10 suggests high collinearity.

	VIF
Female	1.15
Educational Attainment	
High School	2.26
Some College	2.36
College	2.45
College +	2.20
Household Income	1.43
Occupation (unemployed)	
Professional/Managerial	1.68
Administrative & Services	1.48

Maintenance & Agriculture	1.50
Other	1.32
Age	38.63
Age-squared	39.12
Race (white)	
Hispanic	1.12
Black Only	1.20
Other Non-Hisp.	1.04
Married	1.59
Parental	2.76
Child Under Six	1.43
Household Size	2.74
General Health	1.20

The only variables that exhibit high multicollinearity are, in fact, the same variable: age and age-squared. Therefore, multicollinearity is not a concern for this data, as none of the independent variables demonstrate large VIFs.

An analysis of assumptions demonstrates that the data does not meet all assumptions for OLS. Normal distribution and Homoscedastic variance in residuals are not met. Transformations can be made to address these concerns. For example, log-transformation of the dependent variables is a key way to address normal distribution concerns. In several regressions (not displayed here), log-transformed versions of the four dependent variables were assessed. The results are essentially the same in terms of the direction and significance for each relationship. Therefore, for interpretability, this analysis will maintain original form of the dependent variables so results can speak to differences in "minutes a day."

Despite assumption violations, analysis will continue with Ordinary Least Squares regression. This is for two main reasons. The first is that previous time use data analysis has successfully made use of OLS and previous research indicates that OLS provides less bias than alternative models (Stewart 2009). Further, patterns in results are qualitatively similar to these alternative models (Foster & Kalenkoski 2013). Secondly, since several current published research projects examining time use data have utilized OLS techniques without transformations of the dependent variables (Chesley & Flood 2013; Craig and Brown 2017; Hook 2017), I want to ensure that my estimates can be more easily compared with previous studies.

APPENDIX B. Cognitive Interviews

There is a growing literature that recognizes cognitive interviewing as an essential aspect of survey development (Desimone and Le Floch 2004; Drennan 2003; Fowler 1995). Therefore, 28 cognitive interviews aided in determining reliability and validity of question wording for the proposed experiment by providing data on the relevance and clarity of each experimental condition (DeVellis 2003). I employed the think aloud strategy for cognitive interviewing, because the goal was to elicit data on participants' thought processes as they respond to questionnaire items (Knafl et al. 2007). Key to think aloud interviews is that they provide insights into the kinds of information participants retrieve from memory as they determine their response (Knafl et al. 2007). This information will confirm what activities respondents are recalling depending on which domains of activities are primed.

The sample was derived from an undergraduate sociology methods course. Students were incentivized to participate with five extra credit points. I stratified according to gender and randomly assigned to one of the five conditions. Immediately after students respond to the web-based two-item survey, I engaged them in a face-to-face interview where we discussed the process they went through to respond, what seemed difficult or easy when responding, how they would describe the techniques they used to arrive at their responses, and a discussion of the specific activities they included or excluded from their calculations.

In addition to assessing validity in question wording, cognitive interviews provide initial evidence for the proposed hypotheses. Below is the quantitative information gathered from the web-survey portion of the cognitive interview. Table 2 provides an overview of descriptives including the sample make up, the ranges, and averages for each condition.

Quantitative Analysis of Cognitive Interviews

As the first three rows suggest, there were more women who participated in the cognitive interviews compared to men, with a fairly even distribution of respondents across each condition. The next two rows illustrate the average number of days a week a respondent reports engaging in moderate physical activity across each condition. Interestingly, the condition with the lowest average is the original NHANES wording where "moderate-intensity sports, fitness or recreational activities" are primed. Contrastingly, Condition 3 demonstrated the highest average number of days a week and is the only condition where not a single respondent reported zero days. These results are consistent with Hypotheses 1 and 2, which recognizes the volatility of physical activity survey responses across each condition.

The next fourth and fifth rows of Table 2 report the range and average number of minutes in a day a respondent reports engaging in moderate physical activity across each condition. Results that may not support current hypotheses are the differences in average minutes a day reported for Condition 4 and Condition 5. The cognitive interviews suggest Condition 4, which primes paid work activities as the highest average number of minutes spent engaged in moderate physical activity in a day. This may be a reflection of the unique sample interviewed. College students are more likely to engage in more labor-intensive low-skill jobs such as service industry and commercial sales paid work. Among the students who explained their professions during the face-to-face interview, this assertion is affirmed. Finally, it is important to note the only

condition to have an average number of minutes per week that is below the HHS guidelines is the original NHANES wording in Condition #1.

Table 3 provides the same information as Table 2, but unpacked with a focus on gender differences. Key takeaways from this table include the gender differences in average minutes spent on moderate-intensity physical activity according to Condition 3 that primes unpaid activity and Condition 4 that primes paid activity. Preliminary results for Condition 3 provide support for Hypothesis 3 that suggests a closing of the gender physical activity gap when unpaid activities are primed. Indeed, the gap is not only decreased, but reversed in this sample. Contrary to Hypothesis 4, however, women in the sample report larger numbers of physical activity at their paid job compared to men. Again, this may likely be an artifact of the unique population sampled, in addition to a very small sample of males for the comparison group, which is why testing a nationally representative sample is critical to adequately test these hypotheses.

Table 2. Ranges and Averages From Cognitive Interview Responses Across Each Condition

	Condition #1 NHANES	Condition #2 No Leisure	Condition #3 Unpaid Activity	Condition #4 Paid Activity	Condition #5 Both Paid and Unpaid
Total Interviews	6	6	5	5	6
Number Women	4	4	4	4	4
Number Men	2	2	1	1	2
Range Days/Week	0 - 5	0 - 7	2.5 - 7	0 - 7	0 - 6
Average Days/Week	1.7	4.5	5.4	3.2	2.9
Range Minutes/Day	0 - 60	0 - 100	15 - 210	0 - 360	0 - 90
Average Minutes/Day	20.8	58.3	62.0	154.0	35.8
Range Minutes/Week	0 - 300	0 - 700	75 - 1470	0 - 1200	0 - 495
Average Minutes/Week	77.9	303.3	388.5	488.0	150.0

Table 3. Ranges and Averages For Cognitive Interview Responses Across Each Condition By Gender

	Women	Men
Condition #1		
Range *Days/Week*	0 - 3.5	0 - 5
Average *Days/Week*	1.25	2.5
Range *Minutes/Day*	0 - 35	0 - 60
Average *Minutes/Day*	16.3	30.0
Range *Minutes/Week*	0 - 122.5	0 - 300
Average *Minutes/Week*	41.9	150.0
Condition #2		
Range *Days/Week*	0 - 5	7
Average *Days/Week*	3.25	7
Range *Minutes/Day*	0 - 90	25 - 100
Average *Minutes/Day*	56.3	62.5
Range *Minutes/Week*	0 - 375	175 - 700
Average *Minutes/Week*	236.3	437.5
Condition #3		
Range *Days/Week*	2.5 - 7	6
Average *Days/Week*	5.25	6
Range *Minutes/Day*	0 - 210	30
Average *Minutes/Day*	70.0	30.0
Range *Minutes/Week*	75 - 1470	180
Average *Minutes/Week*	440.6	180.0
Condition #4		
Range *Days/Week*	0 - 5	7
Average *Days/Week*	2.25	7
Range *Minutes/Day*	0 - 360	30
Average *Minutes/Day*	154.0	30.0
Range *Minutes/Week*	0 - 1200	210
Average *Minutes/Week*	488	210.0
Condition #5		
Range *Days/Week*	0 - 6	4 - 5.5
Average *Days/Week*	2.0	4.75
Range *Minutes/Day*	0 - 30	60 - 90
Average *Minutes/Day*	16.3	75
Range *Minutes/Week*	0 - 120	240 - 495
Average *Minutes/Week*	41.3	367.5

Qualitative Analysis of Cognitive Interviews

Results from the cognitive interviews provided important insight into the methods of recall and activities that were salient for respondents depending on the domain of activities primed. Overall, question wording was confirmed for four of the five conditions. Key findings from the qualitative interviews are highlighted below:

- The biggest deviation from the intended scope of the question was on Condition 4 that asks about paid activities. It became apparent that including specific references to jobs (i.e. carpentry, nursing, and postal delivery) confused respondents and lead to respondents failing to report physical activity. Respondents explained that they would think about their own jobs, but were not sure the activity level would "qualify" and instead would err on the side of reporting zero minutes. To address this

incongruence, the question was reworded to omit specific reference to jobs and, instead, prime a general phrase "moderate-intensity activities at all of your paid jobs."

- Women were more likely to take a literal approach to activities primed and only respond based on habits for *only* the activities primed. On the other hand, men were more likely to include calculations of other activities that were not primed in the condition but that they considered moderate activity.
- Overall, respondents receiving Conditions 3 through 5 were less likely to think about activities like exercising at the gym.
- Almost all respondents on Condition 3 thought about additional household tasks that, according to the metabolic equivalents determined by Tudor-Locke and colleagues (2008), require moderate physical exertion without being primed (namely laundry), ultimately making their reports more accurate.

APPENDIX C. Conditions and Corresponding Question Wording

Actual Question Wording and Description of Stimuli

[Condition #1: Original Wording of NHANES]
For the next two questions, we want you to consider moderate-intensity sports, fitness or recreational activities. These are activities that cause small increases in breathing or heart rate and are done for at least 10 minutes continuously.

(1) In a typical week, on how many days do you do moderate-intensity sports, fitness or recreational activities?
(2) How much time do you spend doing moderate-intensity sports, fitness or recreational activities on a typical day?

[Condition #2: Reworded, without Priming of Leisure]
For the next two questions, we want you to consider moderate-intensity activities. These are activities that cause small increases in breathing or heart rate and are done for at least 10 minutes continuously.

(1) In a typical week, on how many days do you do moderate-intensity activities?
(2) How much time do you spend doing moderate-intensity activities in a typical day?

[Condition #3: Reworded, with reference to Unpaid Work]
For the next two questions, we want you to consider moderate-intensity activities like washing dishes, yard work, and unpaid care for a child or adult. These are activities that cause small increases in breathing or heart rate and are done for at least 10 minutes continuously.

(1) In a typical week, on how many days do you do moderate-intensity activities like washing dishes, yard work, and unpaid care for a child or adult?
(2) How much time do you spend doing moderate-intensity activities like washing dishes, yard work, and unpaid care for a child or adult on a typical day?

[Condition #4: Reworded, with reference to Paid Work]
For the next two questions, we want you to consider moderate-intensity activities that you do at all of your paid jobs. These are activities that cause small increases in breathing or heart rate and are done at least 10 minutes continuously.

(1) In a typical week, on how many days do you do moderate-intensity activities at all of your paid jobs?
(2) How much time do you spend doing moderate-intensity activities at all of your paid jobs?

[Condition #5: Reworded, with reference to Leisure + Housework/Unpaid Care]
For the next two questions, we want you to consider moderate-intensity sports, fitness or recreational activities as well as activities like washing dishes, yard work, and unpaid care for a child or adult. These are activities that cause small increases in breathing or heart rate and are done at least 10 minutes continuously.

(1) In a typical week, on how many days do you do moderate-intensity sports, fitness or recreational activities as well as activities like washing dishes, yard work, and unpaid care for a child or adult?

(2) How much time do you spend doing moderate-intensity sports, fitness or recreational activities as well as activities like washing dishes, yard work, and unpaid care for a child or adult?

[Condition #6: Reworded, with reference to Leisure + Paid Work]
For the next two questions, we want you to consider moderate-intensity sports, fitness or recreational activities as well as moderate-intensity activities at all of your jobs. These are activities that cause small increases in breathing or heart rate and are done at least 10 minutes continuously.

(1) In a typical week, on how many days do you do moderate-intensity sports, fitness or recreational activities as well as moderate-intensity activities at all of your jobs?
(2) How much time do you spend doing moderate-intensity sports, fitness or recreational activities as well as moderate-intensity activities at all of your jobs?

[Condition #7: Reworded, with reference to Housework/Unpaid Care + Paid Work]
For the next two questions, we want you to consider moderate-intensity activities like washing dishes, yard work, and unpaid care for a child or adult as well as moderate-intensity activities at all of your jobs. These are activities that cause small increases in breathing or heart rate and are done at least 10 minutes continuously.

(1) In a typical week, on how many days do you do moderate-intensity activities like washing dishes, yard work, and unpaid care for a child or adult as well as moderate-intensity activities at all of your jobs?
(2) How much time do you spend doing moderate-intensity activities like washing dishes, yard work, and unpaid care for a child or adult as well as moderate-intensity activities at all of your jobs?

[Condition #8: Reworded, with reference to All Three Domains]
For the next two questions, we want you to consider moderate-intensity sports, fitness or recreational activities as well as activities like washing dishes, yard work, and unpaid care for a child or adult, and moderate-intensity activities at all of your jobs. These are activities that cause small increases in breathing or heart rate and are done at least 10 minutes continuously.

(1) In a typical week, on how many days do you do moderate-intensity sports, fitness or recreational activities as well as activities like washing dishes, yard work, and unpaid care for a child or adult, and moderate-intensity activities at all of your jobs?
(2) How much time do you spend doing moderate-intensity sports, fitness or recreational activities as well as activities like washing dishes, yard work, and unpaid care for a child or adult, and moderate-intensity activities at all of your jobs?

APPENDIX D. Introduction Script – Consent to Participation

University of Wisconsin – Milwaukee
Consent to Participate in Online Survey Research Using MTurk

Study Title: American's Physical Activity Habits

Person Responsible for Research: Noelle Chesley, PhD.

Study Description: The purpose of this research study is to examine different ways people engage in physical activity. Approximately 3,500 subjects will participate in this study. If you agree to participate, you will be asked to complete an online survey that will take approximately five minutes to complete. The questions will ask about how often and for how long you spend time in physical activity as well as some basic questions about who you are.

Risks / Benefits: Risks to participants are considered minimal. Collection of data and survey responses using the internet involves the same risks that a person would encounter in everyday use of the internet, such as breach of confidentiality. While the researchers have taken every reasonable step to protect your confidentiality, there is always the possibility of interception or hacking of the data by third parties that is not under the control of the research team.

There will be no costs for participating. Benefits of participating include payment from Amazon where you will be compensated $0.25 for completing the survey. Compensation will be disbursed through the Mechanical Turk website given your status as a Worker completing Human Intelligence Tasks (HITs) once you have completed the task. There is no compensation if you withdraw from the task.

Limits to Confidentiality Researchers will have access to your MTurk worker ID which may be able to be linked to your personal information including your Amazon public profile page. Amazon will have access to your MTurk ID and personal information (social security number, IP address, bank account information, etc...) and would be able to link it to your survey responses if the survey is created using MTurk internal software. MTurk worker IDs will not be shared with anyone and will be used solely for the purposes of distributing compensation. Worker IDs will be removed from the dataset at the end of data collection, roughly at the end of August 2016. Data will be retained on the Amazon and Qualtrics servers for five years and will be deleted by the research staff after this time. However, data may exist on backups or server logs beyond the timeframe of this research project. Data transferred from the survey site will be saved on a password protected computer for five years. Only Noelle Chesley, Dana Garbarski, and Rachel Cusatis will have access to the data collected by this study. However, the Institutional Review Board at UW-Milwaukee or appropriate federal agencies like the Office for Human Research Protections may review this study's records. All study results will be reported without worker ID so that no one viewing the results will ever be able to match you with your responses.

Voluntary Participation: Your participation in this study is voluntary. You may choose to not answer any of the questions or withdraw from this study at any time without penalty. Your decision will not change any present or future relationship with the University of Wisconsin Milwaukee or Amazon.

Who do I contact for questions about the study: For more information about the study or study procedures, contact Rachel Cusatis at rcusatis@uwm.edu or Dana Garbarski at dgarbarski@luc.edu.

Who do I contact for questions about my rights or complaints towards my treatment as a research subject? Contact the UWM IRB at 414-229-3173 or irbinfo@uwm.edu

Research Subject's Consent to Participate in Research:
By entering this survey, you are indicating that you have read the consent form, you are age 18 or older and that you voluntarily agree to participate in this research study. Please make sure that you have read and agree to Amazon's Mechanical Turk participant and privacy agreements as these may impact the disclosure and use of your personal information.

Thank you!

APPENDIX E. Qualtrics Survey Structure and Question Wording

MTurk Survey: What Activities Count?

Q1 Thank you for choosing to take the "Survey of Americans' Physical Activity Habits." You are being asked to take part in a research study that is conducted by Rachel Cusatis, a graduate student in the Department of Sociology at the University of Wisconsin at Milwaukee. The purpose of this study is to look at different ways people spend time in physical activity. Your participation is incredibly important. You will be compensated $0.25 for completing this survey. Compensations will be disbursed through the Mechanical Turk website given your status as a Worker completing Human Intelligence Tasks (HITs). There is no compensation if you withdraw from the task. Thank you again for taking the time to help researchers like me learn more about physical activity habits in the United States.

Q2 For these first two questions, we want you to consider moderate-intensity sports, fitness or recreational activities. These are activities that cause small increases in breathing or heart rate and are done for at least 10 minutes continuously. In a typical week, on how many days do you do moderate-intensity sports, fitness or recreational activities?

Q3 For these first two questions, we want you to consider moderate-intensity sports, fitness or recreational activities. These are activities that cause small increases in breathing or heart rate and are done for at least 10 minutes continuously. How much time do you spend doing moderate-intensity sports, fitness or recreational activities on a typical day?

Q4 You answered ${q://QID3/ChoiceTextEntryValue} to the previous question. Is this answer in minutes or hours?

- ❍ I answered in minutes. (1)
- ❍ I answered in hours. (2)

Q5 For these first two questions, we want you to consider moderate-intensity activities. These are activities that cause small increases in breathing or heart rate and are done for at least 10 minutes continuously. In a typical week, on how many days do you do moderate-intensity activities?

Q6 For these first two questions, we want you to consider moderate-intensity activities. These are activities that cause small increases in breathing or heart rate and are done for at least 10 minutes continuously. How much time do you spend doing moderate-intensity activities on a typical day?

Q7 You answered ${q://QID6/ChoiceTextEntryValue} to the previous question. Is this answer in minutes or hours?

- ❍ I answered in minutes. (1)
- ❍ I answered in hours. (2)

Q8 For these first two questions, we want you to consider moderate-intensity activities like vacuuming, yard work, and unpaid care for a child or adult. These are activities that cause small increases in breathing or heart rate and are done for at least 10 minutes continuously. In a typical week, on how many days do you do moderate-intensity activities like washing dishes, yard work, and unpaid care for a child or adult?

Q9 For these first two questions, we want you to consider moderate-intensity activities like vacuuming, yard work, and unpaid care for a child or adult. These are activities that cause small increases in breathing or heart rate and are done for at least 10 minutes continuously. How much time do you spend doing moderate-intensity activities like washing dishes, yard work, and unpaid care for a child or adult on a typical day?

Q10 You answered ${q://QID9/ChoiceTextEntryValue} to the previous question. Is this answer in minutes or hours?

- ❍ I answered in minutes. (1)
- ❍ I answered in hours. (2)

Q11 For these first two questions, we want you to consider moderate-intensity activities that you do at all of your paid jobs. These are activities that cause small increases in breathing or heart rate and are done for at least 10 minutes continuously.In a typical week, on how many days do you do moderate-intensity activities at all of your paid jobs?

Q12 For these first two questions, we want you to consider moderate-intensity activities that you do at all of your paid jobs. These are activities that cause small increases in breathing or heart rate and are done for at least 10 minutes continuously.How much time do you spend doing moderate-intensity activities at all of your paid jobs on a typical day?

Q13 You answered ${q://QID12/ChoiceTextEntryValue} to the previous question. Is this answer in minutes or hours?

- ❍ I answered in minutes. (1)
- ❍ I answered in hours. (2)

Q14 For these first two questions, we want you to consider moderate-intensity sports, fitness or recreational activities as well as activities like vacuuming, yard work, and unpaid care for a child or adult. These are activities that cause small increases in breathing or heart rate and are done for at least 10 minutes continuously.In a typical week, on how many days do you do moderate-intensity sports, fitness or recreational activities as well as moderate-intensity activities like washing dishes, yard work, and unpaid care for a child or adult?

Q15 For these first two questions, we want you to consider moderate-intensity sports, fitness or recreational activities as well as activities like vacuuming, yard work, and unpaid care for a child or adult. These are activities that cause small increases in breathing or heart rate and are done for at least 10 minutes continuously.How much time do you spend doing moderate-intensity sports, fitness or recreational activities as well as moderate-intensity activities like washing dishes, yard work, and unpaid care for a child or adult on a typical day?

Q16 You answered ${q://QID15/ChoiceTextEntryValue} to the previous question. Is this answer in minutes or hours?

- ❍ I answered in minutes. (1)
- ❍ I answered in hours. (2)

Q17 For these first two questions, we want you to consider moderate-intensity sports, fitness or recreational activities as well as moderate-intensity activities at all of your paid jobs. These are activities that cause small increases in breathing or heart rate and are done for at least 10 minutes continuously.In a typical week, on how many days do you do moderate-intensity sports, fitness or recreational activities as well as moderate-intensity activities at all of your paid jobs?

Q18 For these first two questions, we want you to consider moderate-intensity sports, fitness or recreational activities as well as moderate-intensity activities at all of your paid jobs. These are activities that cause small increases in breathing or heart rate and are done for at least 10 minutes continuously.How much time do you spend doing moderate-intensity sports, fitness or recreational activities as well as moderate-intensity activities at all of your paid jobs on a typical day?

Q19 You answered ${q://QID18/ChoiceTextEntryValue} to the previous question. Is this answer in minutes or hours?

- ❍ I answered in minutes. (1)
- ❍ I answered in hours. (2)

Q20 For these first two questions, we want you to consider moderate-intensity activities like vacuuming, yard work, and unpaid care for a child or adult as well as moderate-intensity activities at all of your paid jobs. These are activities that cause small increases in breathing or heart rate and are done for at least 10 minutes continuously.In a typical week, on how many days do you do moderate-intensity activities like washing dishes, yard work, and unpaid care for a child or adult as well as moderate-intensity activities at all of your paid jobs?

Q21 For these first two questions, we want you to consider moderate-intensity activities like vacuuming, yard work, and unpaid care for a child or adult as well as moderate-intensity activities at all of your paid jobs. These are activities that cause small increases in breathing or heart rate and are done for at least 10 minutes continuously.How much time do you spend doing moderate-intensity activities like washing dishes, yard work, and unpaid care for a child or adult as well as moderate-intensity activities at all of your paid jobs on a typical day?

Q22 You answered ${q://QID21/ChoiceTextEntryValue} to the previous question. Is this answer in minutes or hours?

- ❍ I answered in minutes. (1)
- ❍ I answered in hours. (2)

Q23 For these first two questions, we want you to consider moderate-intensity sports, fitness or recreational activities as well as activities like vacuuming, yard work, unpaid care for a child or adult, and moderate-intensity activities at all of your paid jobs. These are activities that cause small increases in breathing or heart rate and are done for at least 10 minutes

continuously.In a typical week, on how many days do you do moderate-intensity sports, fitness or recreational activities as well as activities like washing dishes, yard work, unpaid care for a child or adult, and moderate-intensity activities at all of your paid jobs?

Q24 For these first two questions, we want you to consider moderate-intensity sports, fitness or recreational activities as well as activities like washing dishes, yard work, unpaid care for a child or adult, and moderate-intensity activities at all of your paid jobs. These are activities that cause small increases in breathing or heart rate and are done for at least 10 minutes continuously.How much time do you spend doing moderate-intensity sports, fitness or recreational activities as well as activities like washing dishes, yard work, unpaid care for a child or adult, and moderate-intensity activities at all of your paid jobs on a typical day?

Q25 You answered ${q://QID24/ChoiceTextEntryValue} to the previous question. Is this answer in minutes or hours?
- ❍ I answered in minutes. (1)
- ❍ I answered in hours. (2)

Q26 In what year were you born? Please enter a four digit number.

Q27 What is your gender?
- ❍ Male (0)
- ❍ Female (1)

Q28 Do you consider yourself to be Hispanic or Latino(a)?
- ❍ Yes (1)
- ❍ No (0)

Q29 Here is a list of five race categories. Please choose one or more races that you identify with:
- ☐ White (1)
- ☐ Black or African American (2)
- ☐ American Indian or Alaska Native (3)
- ☐ Asian (4)
- ☐ Native Hawaiian or Other Pacific Islander (5)

Q30 What is the highest level of school you completed?
- ❍ Less than High School diploma or GED (1)
- ❍ High School diploma or GED (2)
- ❍ Some college, no degree (3)
- ❍ Associate's degree (4)
- ❍ Bachelor's degree (5)
- ❍ Master's degree or higher (6)

Q31 Are you currently married, widowed, divorced, separated, have you never been married, or are you living with a partner?

- ❍ Married (1)
- ❍ Widowed (2)
- ❍ Divorced (3)
- ❍ Separated (4)
- ❍ Never married (5)
- ❍ Living with partner (6)

Q32 Last week, did you do any work for either pay or profit? Include any job from which you were temporarily absent.

- ❍ Yes (1)
- ❍ No (0)

Display This Question:

If Last week, did you do any work for either pay or profit? Include any job from which you were temporarily absent. Yes Is Selected

Q33 About how many hours do you work for pay or profit in a typical week?

APPENDIX F. Power Analysis

The goal of this analysis was to determine what a sufficient sample size would be to detect class and gender differences in time spent in physical activity. The numbers below (see Table 1) document the minimum sample size, while attempting for the highest Cohen's d to produce the largest potential effect size.

I used data from the ATUS to estimate effect sizes for each proposed definition of physical activity (leisure (Condition 1), unpaid work (Condition 3), paid work (Condition 4), both paid and unpaid (Condition 5)) across dichotomous indicators of gender, income, and education. The proposed project contains 5 treatments, with two demographic categories within each condition I am trying to establish significant differences between. A focus on comparisons by SES (low vs. high) and gender reduces leads to 10 different conditions. Weighted means and standard deviation on the ATUS were used to reflect the generalizable national population.

To conduct this analysis, I used STATA's **sampsi** command as detailed here: http://www.ats.ucla.edu/stat/stata/dae/t_test_power2.htm. Means and standard deviations from weighted estimations of the 2010 American Time Use Survey (ATUS) served as population estimations (BLS 2012). I systematically went through gender, income, and education differences in means and standard deviations for each domain of physical activity (leisure, paid work, unpaid work, all activity) to determine the minimum sample size and largest potential effect size.

Table 1. Power Analysis to Determine Minimum Sample Size Required for Highest Effect Size *(Cohen's d in parentheses)*

	Leisure Time Activity	Paid Work Activity	Unpaid Work Activity	All Activity
Gender Differences	N = 232, (.9)	N = 232, (.9)	N = 363, (.6)	N = 196, (.9)
Income Differences	N = 319, (.25)	N = 1000+, (.1)	N = 1000+, (.1)	N = 1000+, (.1)
Education Differences	N = 342, (.45)	N = 360, (.34)	N = 364, (.13)	N = 369, (.45)

Note: Population means and standard deviations used to calculate effect size are according to weighted estimations from the American Time Use Survey (2010); Reported sample sizes reflect the sample size of each dichotomous demographic characteristic within each condition. Therefore, the reported N's should be multiplied by 10 to get the total sample size needed to detect such effect sizes.

Results demonstrate that a sample size of around 3,500 will be more than sufficient for excellent effect size for recognizing gender differences across all domains of physical activity. When it comes to income differences, however, effect size is quite poor and will not be achievable given the sample size allotted by Knowledge Networks. This is a reflection of large standard deviations within the population estimates and not necessarily a reflection of insufficient sample size. Importantly, educational differences demonstrate poor to fair effect size potential given the sample size allotted for a five-unit experiment. In order to speak to previous research, I will operationalize SES similarly by utilizing educational attainment (Becker & Zimmermann-Stenzel 2009; Jones et al. 1998). In sum, the sample size for the proposed experiment will provide fruitful opportunity to recognize significant gender differences and educational differences in physical activity habits.

Curriculum Vitae

RACHEL N. CUSATIS

EDUCATION

(PHD) **UNIVERSITY OF WISCONSIN, MILWAUKEE**, Sociology (Expected: July 2017); Dissertation: "Which Activities Count? Gender and Socioeconomic Differences in the Conceptualization of Physical Activity: The Role of Leisure, Housework and Dependent Care, and Paid Work"

MA **UNIVERSITY OF WISCONSIN, MILWAUKEE**, Sociology (2013)
Thesis: "Self Reports of Physical Activity: Do Different Methods of Data Collection Tell a Different Story?"

BA **UNIVERSITY OF WISCONSIN, MADISON**, Sociology (2010)
Concentration on Analysis and Research

RESEARCH AND TEACHING INTERESTS

Medical Sociology Health Disparities Place-based Health Outcomes
Survey Methodology Quantitative Methodology Statistics Blended/Online Learning

AWARDS

2010 & 2013 Chancellor's Graduate Student Award, UW Milwaukee

WORKS IN PROGRESS

Cusatis, Rachel. "Overweight and Obesity in Children – What's the Difference?: Disentangling the Behavioral and Environment Factors Contributing to Overweight and Obesity."

Cusatis, Rachel and Dana Garbarski. "Which Activities Count?: Using Experimental Data to Understand Conceptualizations of Physical Activity."

Cusatis, Rachel and Noelle Chesley. "Can Housework Help? Gender, Time Use and Disparities in Meeting Physical Activity Requirements."

Fuhrmann, Daniel, **Rachel Cusatis**, and Laura Otto-Salaj. "A Feasibility, Reliability, and Confirmatory Factor Analysis in urban African-American women using the SF-36."

PRESENTATIONS

Cusatis, Rachel and Lindsey Harness. "Understanding the Impact of Instructional Characteristics On Student Outcomes." A presentation at the Annual Educause Learning Initiative (ELI) Conference in Houston, TX February 15, 2017. (Presented by Rachel Cusatis and Lindsey Harness).

Cusatis, Rachel. "What Activities Count?: Using Experimental Data to Understand Conceptualizations of Physical Activity." A Paper presented at the Annual Meeting of the Midwest Association for Public Opinion Research in Chicago, IL November 18-19, 2016. (Presented by Rachel Cusatis).

Joosten, Tanya and **Rachel Cusatis.** "Creating and Diffusing Online Instructional and Institutional Practices From Data & Evidence." A workshop presented at the Annual Online Learning Consortium (OLC) Accelerate in Orlando, FL November 15 - 18. (Presented by Tanya Joosten and Rachel Cusatis).

Joosten, Tanya and **Rachel Cusatis.** "Research in Distance Education and Technological Advancements (DETA)." A two-part presentation at the Annual Online Learning Consortium (OLC) Accelerate in Orlando, FL November 15 - 18. (Presented by Tanya Joosten and Rachel Cusatis).

Joosten, Tanya and **Rachel Cusatis.** "Creating & Diffusing Online Instructional & Institutional Practices From Data & Evidence." A workshop presented at the Annual WICHE Cooperative for Educational Technologies (WCET) in Minneapolis, MN October 12-14. (Presented by Tanya Joosten).

Joosten, Tanya and **Rachel Cusatis.** "Research in Distance Education and Technological Advancements (DETA)." A two-part presentation at the Annual WICHE Cooperative for Educational Technologies (WCET) in Minneapolis, MN October 12-14. (Presented by Tanya Joosten and Rachel Cusatis).

Cusatis, Rachel and Noelle Chesley. "Can Housework Help? Gender, Time Use and Disparities in Meeting Physical Activity Requirements." A Paper presented at the Annual Meeting of the American Sociological Association in Chicago, IL August 21-25, 2015. Medical Sociology: Section on "Rating Health." (Presented by Rachel Cusatis).

Fuhrmann, Daniel, **Rachel Cusatis**, and Laura Otto-Salaj. "A Feasibility, Reliability, and Confirmatory Factor Analysis in urban African-American women using the SF-36." A Paper presented at the Annual Meeting of the Midwest Economics Association in Minneapolis, MN March 26-27, 2015. (Presented by Daniel Fuhrmann).

RESEARCH EXPERIENCE

RESEARCH ASSISTANT

eLearning – Research and Development, Academic Affairs
with Tanya Joosten, UW Milwaukee (Spring 2014- present)

- Assisted in writing the grant proposal for U.S. Department of Education Fund for the Improvement of Post-Secondary Education (FIPSE) Grant – Awarded $1.48 million
  - http://uwm.edu/deta/
- Engage in collaborative design of research projects, coordinate research affiliate meetings, create research briefs for meetings, communicate with research fellows on grant deliverables, and maintain project activities and associated tasks including timelines, documents, notes, and conversations
- Key grant activities coordinator and liaison to the institutional partners supporting research efforts across those institutions working directly with the PIs, institutional researchers, and data analysts.
- Collect data from educational institutions, merge of data sets, and cross-institutional data analysis.
- Developed, reviewed, and edited student and instructor survey instrumentation and codebooks, including shared measures, definitions, and coding.
- Performed quantitative analysis on student and instructor surveys merged with student grade and retention data across institutions to identify key instructional and institutional factors that influence student academic outcomes.

Center for Applied Behavioral Health Research (CABHR)
with Daniel Fuhrmann, UW Milwaukee (Fall 2014- Summer 2016)

- Engaged in data cleaning, management, and quantitative analysis for the "Stories to Tell" project; a longitudinal study on the relationship between risky sexual behaviors, psychological stressors, familial and community environment, and HIV/AIDS risk among low-income African American women in Milwaukee, WI

TEACHING EXPERIENCE

TEACHING ASSISTANT
Advanced Statistical Methods in Sociology (760)
with Gordon Gauchat, UW Milwaukee (Spring 2014)

Advanced Quantitative Analysis (982)
with Nancy Mathiowetz, UW Milwaukee (Fall 2013)

Research Methods in Sociology (361)
with Marcus Britton, UW Milwaukee (Spring 2013)
with Noelle Chesley, UW Milwaukee (Fall 2012)

Introduction to Sociology (101)
with Kent Redding, UW Milwaukee (Fall 2011 & Spring 2012)

LECTURER

Guest Lectured on ANOVA and Multiple Linear Regression
Measuring Crime and Analyzing Crime Data- Criminal Justice (970)
with Daniel Fuhrmann, UW Milwaukee (Fall 2014)

RELEVANT EXPERIENCE

STATISTICAL SKILLS

- Trained in data management techniques (missing data, data cleaning, imputation, merging)
- Experience with complex statistical modeling: proficient in linear, logistic, and multinomial regression
- Knowledge of survey methodology (sampling design strategies, questionnaire design)
- Experience identifying and applying statistical techniques to answer research questions
- Excel in documenting data management procedures, data quality assessment, and coding processes
- Skilled in effectively delivering presentations to both large and small audiences
- Possess strong communication abilities with expertise in crafting communication for specific audiences
- Attention to detail and strong organizational skills used to oversee both large and small projects
- Experience engaging in collaborative research with strong focus on achieving measurable outcomes
- Computer Proficiency: STATA, SPSS, SAS, MS Word, Excel, PowerPoint; Experience working in UNIX operating environment; Some Mplus and Qualtrics programming experience

EXPERIENCE WITH STATA, SAS, AND SPSS SOFTWARE

- Taught STATA to graduate students through teaching assistantship
- Statistical Data Analysis and Management using SAS | UWM Center for Applied Behavioral Health Research | June 2014 - present
- Statistical Data Analyst using SPSS | UWM Learning Technology Center | February 2014 - present