An examination of the role of self-control in the health and wealth connection

by

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ABSTRACT

Obesity and consumer debt have drastically risen in the last 30 years. A recent longitudinal study of children and young adults demonstrated that Self-Control (SC: the ability to delay gratification, control emotions and behaviors, and persist despite set-backs) may underlie these health-wealth trends. More research is needed to better understand the possible mediators of the SC and health-wealth relationship and the effects on quality of life (QOL) in adults. The purpose of this dissertation was to examine personality and behavioral management practices underpinning the relationship between health, wealth, and QOL. A series of three studies were conducted: 1) a comparison of SC among adults with different health and wealth statuses, independent of income, age, and education, 2) an examination of the relationships between SC, exercise behaviors and financial behaviors, and, 3) testing of a model of SC, behaviors, and outcomes as predictors of QOL related to health and personal finance. Data were collected with an online survey sent via email to 40,000 alumni from a Midwest university. Completed responses were received from 1,115 participants (age = 54.5 ± 11.4; 58.2 % male). SC was measured using the International Personality Item Pool and the Impulsivity Questionnaire. Health outcomes were measured by body mass index (weight kg/height m^2) and self-rated health (Behavioral Risk Factor Surveillance System Survey). Wealth outcomes were assessed by calculating net worth (sum of assets - sum of debt). QOL was measured by the health-related QOL question (Behavioral Risk Factor Surveillance System Survey) and the Financial Satisfaction Questionnaire. Study one demonstrated (as hypothesized) that SC was significantly higher among healthier (F (2, 1293) = 17.5, d = .31) and higher net worth groups (F (2, 1318) = 11.36, d = .23, p < .001) when controlling for income, age, and education. Study two showed

that SC positively and significantly predicted exercise behavior (β = .11, $t(1,315) = 3.54$, $p <$ .001) and financial behavior (β = .40, $t(1,315) = 15.37$, $p < .001$). Study three showed that SC significantly and indirectly predicted financial QOL. The relationship was significantly mediated by financial behaviors and net worth (R^2 = .35, $p < .001$). SC also significantly, indirectly and directly, predicted health-related QOL. This relationship was significantly mediated by exercise and physical health (R^2 = .03, $p < .001$). The results of this research demonstrated that people with higher SC, who set goals, make a plan, and execute it despite setbacks, reported that living intentionally corresponds with greater exercise participation and more positive financial behaviors. Furthermore, these positive health and financial behaviors predicted better health-wealth outcomes and ultimately higher QOL. The results of this research could be used to aid public programs that target health and personal finance related concerns.

CHAPTER 1

INTRODUCTION

Health and wealth are major components of a person's quality of life (QOL). Improvements in objective measures (like health status and net worth) increases satisfaction in that particular area (Felce & Perry, 1995). Specifically, obesity is associated with a decrease in QOL (Kolotkin, Crosby, & Williams, 2002; Oreopoulos et al., 2010) and poor financial practices and low net worth are associated with decreases in financial satisfaction (Titus, Fanslow, & Hira, 1989). Furthermore, obesity and personal indebtedness are two of the most prominent and rapidly growing public issues in the United States today. Research shows a relationship between these health and wealth variables, although the cause of the relationship is not completely clear (Zagorsky, 2004; Zagorsky 2005; Bloom & Canning, 2003; Goldman & Smith, 2002; Michaud & Soest, 2008; Kennickell, 2008). Traditional arguments explaining the health and wealth connection contend that a lower income causes the disparity by giving high-income earners access to health promoting goods such as healthy food, gym memberships, and health care. However, recent studies have found a health-wealth relationship that is independent of income and education, which shows that this relationship extends into the high-income population (Zagorsky, 2004; Zagorsky, 2005). This relationship suggests that those with a low income are not necessarily doomed to a life of poor health, nor do those with a high income have a ticket to good health. It is important to understand the cause of the health-wealth relationship in order to accurately design health-wealth interventions as well as provide insight into a mechanism that determines a large component of individual QOL.

In addition to the effects of obesity on QOL, medical research shows that obesity is dangerous to one's health, because it is strongly associated with diabetes, heart disease, stroke,

and some cancers (Must, Spadano, Coakley, Field, Colditz, & Dietz, 1999). With an increasing number of adults classified as obese and overweight, the condition is considered an epidemic (Center for Disease Control, 2009). The rise in body weight of the American public in the last 40 years has been accompanied by a rise in total personal debt (Bucks, Kennickell, & Mach, 2009; Bucks, Kennickell, & Mach, 2006; Avery, Elliehausen, & Kennickell, 1986).

Personal indebtedness is related to economic hardships and a decreased sense of general well being (Brown, Taylor, & Wheatley-Price, 2005). Bankruptcies and foreclosures are on the rise posing major problems for individuals and the U.S. economy (U.S. Courts, 2009). The dramatic rise in both obesity and consumer debt in the last four decades is a fascinating pattern. The fact that these trends moved together indicates that there may be a connection between the drastic changes in both dimensions.

A link between health, measured by BMI and self-rated health, and wealth has been shown in a number of studies (Zagorsky, 2004; Bloom & Canning, 2003; Goldman & Smith, 2002; Michaud & Soest, 2008; Aittomaki, Martikainen, Laaksonen, Lehlma, & Rhkonen, 2010), yet there is little agreement about the cause of the relationship due to problems with the measurement of health and economic variables. Studies that focus mainly on financial behaviors and outcomes are not typically designed to evaluate health, and therefore, the assessments of health-related factors in their surveys typically do not gather as rich information about health as those studies that have health as a main focus. The same is true that studies focused on health (found mainly in health-related journals) do not often include detailed assessments of financial constructs. Therefore, researchers have not yet come to an agreement as to the primary cause of this relationship, although many have suggested possible variables such as income, occupational

status, and education (Rablen, & Oswald, 2008; Marmot, 2004; Werner, Malaspina, &

Rabinowitz, 2007; Johnson, & Krueger, 2005).

Two variables that have been consistently suggested as causal factors in the health-

wealth relationship are income and education. It is therefore important to differentiate between

wealth (i.e. net worth), which is an actual measure of monetary resources a person has

accumulated, and income, which is an indicator of potential wealth. Wealth is a function of

income, age, and behavior (Titus, Fanslow, & Hira, 1989). Research has shown an inverse

relationship between health and net worth even when controlling for income, age, race, and

education (Kennickell, 2008; Moffitt et al., 2011; Zagorsky, 2004; Zagorsky, 2005). This means

that the health and wealth connection extends beyond the income and educational resources of an

individual, which suggests that there are other variables underlying this relationship that have not

yet been examined.

One explanation for this phenomenon that has not been examined in much depth is the

personality and behavioral practices among individuals. Individual personality differences that

impact health and wealth behaviors may shed light on the unexplained variance in the health-

wealth connection. More specifically, research indicates that Self-Control (SC) may lead a

person to manage their health and wealth behaviors more effectively.

SC has been traditionally investigated as the effortful inhibition of temptations (Fujita,

2011). However, the development of SC Theory in the last decade suggests that a broader

conceptualization, which also includes preventative regulation, may add additional insights into

the SC process (Fujita, 2011). According to Hofmann and Kotabe's (2012) SC taxonomy, SC is

made up of two components, namely preventive (i.e., anticipatory strategies) and interventive

(i.e., the use of will power in the moment) mechanisms. The Conscientiousness trait (the state of

being thorough, careful, or vigilant) from the Big Five Factor Model measures broad differences in desire for, implementation of, and success with SC (Goldberg, 1999). Additionally, according to Gottfredson and Hirschi's SC Theory (1990) people with low SC tend to pursue immediate pleasures as measured by Impulsivity, a variant of Conscientiousness. Impulsivity and the facets of Conscientiousness (i.e., Self-efficacy, Orderliness, Dutifulness, Achievement-striving, Self-discipline, Cautiousness) overlap to a degree, but Impulsivity measures to a greater degree the extent to which an individual intentionally prepares for the future verses focuses on pleasure in the short run. The degree to which a person is Conscientious and Impulsive are good predictors of whether or not a person will have success in implementing SC (Moffitt et al., 2011; Piquero & Rosay, 1998).

Research shows that those who practice SC are more likely to engage in positive health behaviors, such as exercise and healthy eating, which would increase caloric expenditure and help balance body weight as well as decrease risk for disease (Bogg & Roberts, 2004; Brummett, Babyak, Williams, Barefoot, Costa, & Siegler, 2006; Hagger-Johnson & Whiteman, 2007). In addition, individuals who are more self-controlled may take time to balance their checkbook, which would make them less likely to incur overdraft fines, abuse credit cards, and spend beyond their means. Research shows that self-controlled financial behaviors are also positively related to financial preparedness and financial status (Ameriks, Caplin, Leahy, & Tyler, 2010; Hershey & Mowen, 2000; Tanaka & Murooka, 2012). There is a finite amount of time, energy, and resources, so it is plausible that those who are better at managing their resources through planning and implementing are more likely to be both physically and financially fit (Titus, Fanslow, & Hira, 1989; Haskell et al., 1992). If one's personality dispositions influence both

health and wealth behaviors, it is possible the relationship between health and wealth is influenced by this third variable.

Purpose

The purpose of this dissertation was to examine personality and behavioral management practices underpinning the relationship between health, wealth, and QOL. Based on empirical research, a series of three studies individually examined the following:

1) the differences in SC among adults who have different health and wealth statuses independent of income, age, and education,

2) the relationships between, a) SC and exercise behaviors and b) SC and financial behaviors, and,

3) a model of SC, behaviors, and outcomes as predictors of QOL related to health and personal finance.

In these respective studies, it was hypothesized that independent of income, age, and education:

1) people with better health would report higher SC than those with poorer health, and that people with higher net worth would report higher SC than those with lower net worth,

2) SC would predict both exercise and financial behaviors, and

3) SC would predict a) financial QOL in a relationship mediated by financial behaviors and financial outcomes, and b) health-related QOL in a relationship mediated by health behaviors (exercise) and health outcomes.

Significance of Research

The aim of these studies was to examine the personality and behavioral management practices that underlie the difference in health and wealth circumstance among individuals

earning the same income as well as examine the effects of SC, behaviors, and outcomes on QOL. The results of this research could be used to aid public programs that target health and personal finance related concerns. In addition, corporate wellness programs may use the results in recommendations for company wide wellness initiatives. Finally, if the hypotheses are supported, the results could be used to design individualized interventions instead of using a blanket intervention for all personality types. Ultimately, gaining a better understanding of predictors of health and wealth will help take steps toward promoting societal prosperity and improving QOL.

CHAPTER 2

STUDY 1

Self-control and health-wealth outcomes: Sacrifice today for rewards tomorrow

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Abstract

Obesity and consumer debt have drastically risen in the last 30 years. A recent longitudinal study suggests that self-control (SC: the ability to delay gratification, control emotions and behaviors, and persist despite set-backs) may underlie these health-wealth trends, showing that childhood SC predicted young adult health and wealth. More research is needed to determine whether these associations remain in later adulthood. The purpose of the present study was to examine whether SC in adults varies depending upon health-wealth status, when controlling for age, education and income. A total of 40,000 alumni from a Midwest university were contacted via email to complete a survey. Completed responses included 1,320 men (61.5 %) and women (38.5 %). Health outcomes were measured by body mass index (weight kg/height m^2) and self-rated health (Behavioral Risk Factor Surveillance System Survey). Wealth outcomes were assessed by calculating net worth (sum of assets - sum of debt). SC was measured using the International Personality Item Pool and the Impulsivity Questionnaire. As hypothesized, an ANCOVA determined SC was significantly higher among healthier $F(2, 1293) = 17.5$ and higher net worth groups $F(2, 1318) = 11.36$, $p < .001$ when controlling for income, age, and education. The results showed that people who choose to sacrifice today in order to reap the benefits tomorrow have a better health and wealth status throughout adulthood.

Self-control and health-wealth outcomes: Sacrifice today for rewards tomorrow

Introduction

In recent decades the health and wealth status of Americans has become progressively worse with a drastic increase in both obesity and consumer debt across all socioeconomic statuses, races, and ages. Specifically, obesity rates have more than doubled since the 1970's (Center for Disease Control, 2012). Saving rates have steadily declined from 14% in 1975 to 1.4% in 2007, while the average consumer debt-to-income ratio by household has more than doubled from 60% in 1980 to 133% in 2007 (Kish, 2006). A growing body of research supports that health and wealth are related (Aittomäki, Martikainen, Laaksonen, Lahelma, & Rahkonen, 2010; Zagorsky, 2004; Zagorsky, 2005), yet the cause of the relationship is unclear. One possible causal mechanism that has recently been linked to health and wealth outcomes is Self-Control (SC; Miller, Barnes, & Beaver, 2011; Moffitt et al., 2011). Thus, SC, the ability to delay gratification for the sake of the future, control emotions and behaviors, and persist despite set-backs, has been suggested as a potential target for large-scale prevention interventions because of the malleability of cognitive skills (Doyle, Harmon, Heckman, & Tremblay, 2009). However, in order to more effectively design and implement SC interventions, more research is needed to fully understand it's impact on health-wealth outcomes as well as the effects across all age ranges, socioeconomic statuses, and education levels.

Theoretical issues surrounding the health-wealth relationship

Studies on inequalities in health and financial resources have traditionally focused on the association between income and health outcomes. However, recent research has shown even stronger associations between health and wealth independent of income (Aittomäki, Martikainen, Laaksonen, Lahelma, & Rahkonen, 2010; Zagorsky, 2004; Zagorsky, 2005), demonstrating that

the association between health and economic resources extends beyond income. To date, the causal mechanism underlying the relationship between economic position and health is unclear.

One possibility is that the association could be a result of poor health that causes a low economic position by preventing individuals from securing employment. Research by Aittomäki et al. (2010) examined the health-wealth relationship while including employment status in the analysis. Employment status five to seven years prior made no contribution to the association between wealth and health and a marginal contribution to income and health. Thus, it is unlikely that employment status as a result of poor health is a major explanation for the cause of low income and wealth.

Another possible causal mechanism commonly suggested as an explanation of health and income inequality is consumption power, in that people who have higher income can more easily afford health related expenditures than those with lower incomes. However, studies of obesity and the broader economy have found that obesity increases with upturns in the economy (Ruhm, 2000). The consumption power explanation argues that people with higher income can afford healthier food, yet while obesity rates continue to climb, the inflation adjusted cost of food has dropped (Philipson & Posner, 1999). Furthermore, a study by Zagorsky (2004) showed no difference in food expenditure by body mass index, meaning that yearly food spending in normal, overweight, and obese individuals were relatively the same. Additionally, several studies have found weaker associations between health and disposable income than between health and gross income (Fritzell, Nermo, & Lundberg, 2004; Rahkonen, Arber, Lahelma, Martikainen & Silventoinen, 2000), which suggests there are likely other variables that explain the association (Martikainen, Valkonen, & Moustgaard, 2009).

This article is concerned with another mechanism that may explain the health-wealth

relationship. SC was found to be higher among people with good health and high wealth status in children and young adults (< 30 years; Moffitt et al., 2011), yet this connection has not yet been investigated in those older than 30. Although the aim of this paper was not to examine health and wealth behaviors, we assume based on extensive previous research of health and wealth behaviors and outcomes in independent studies (Pate et al., 1995; Stanley & Danko, 1996; Titus, Fanslow, & Hira, 1989) that SC causes changes in health and wealth outcomes to some extent via the modification of health and wealth *behaviors* (e.g., engaging in regular physical activity, money management competencies, etc). Thus, SC may directly or indirectly cause health and wealth outcomes.

Self-Control Theory

The ability to delay gratification for the sake of the future, control emotions and behaviors, and persist despite set-backs constitute the components of SC. SC has been traditionally investigated as the effortful inhibition of temptations (Fujita, 2011). However, the development of SC Theory in the last decade suggests that a broader conceptualization, which also includes preventative regulation, may add additional insights into the SC process (Fujita, 2011). According to Hofmann and Kotabe's (2012) SC taxonomy, SC is made up of two components, namely preventive (i.e., anticipatory strategies) and interventive (i.e., the use of will power in the moment) mechanisms. The Conscientiousness trait (the state of being thorough, careful, or vigilant) from the Big Five Factor Model measures broad differences in desire for, implementation of, and success with SC (Goldberg, 1999). Additionally, according to Gottfredson and Hirschi's SC Theory (1990) people with low SC tend to pursue immediate pleasures as measured by Impulsivity, a variant of Conscientiousness. Impulsivity and the facets of Conscientiousness (i.e., Self-efficacy, Orderliness, Dutifulness, Achievement-striving, Self-

discipline, Cautiousness) overlap to a degree, but Impulsivity measures to a greater degree the extent to which an individual intentionally prepares for the future verses focuses on pleasure in the short run. The degree to which a person is Conscientious and Impulsive are good predictors of whether or not a person will have success in implementing SC (Moffitt et al., 2011; Piquero & Rosay, 1998).

SC is a predictor of criminal and deviant behavior and has also been shown to relate to a range of other outcomes, such as health and wealth (Moffitt et al., 2011; Sutin, Ferrucci, Zonderman, & Terracciano, 2011; Tanaka & Murooka, 2012). To date, research of associations between SC and health-wealth outcomes in the same sample has been limited. However, there is a growing body of evidence supporting the strength of the relationship between health and SC as well as wealth and SC independently.

Specifically, research shows high trait SC is an important predictor of health outcomes such as BMI (Sutin, Ferrucci, Zonderman, & Terracciano, 2011; Terracciano et al., 2009) and weight loss (Crescioni et al., 2011), fitness (Kinnunen, Suihko, Hankonen, Absetz, & Jallinoja, 2012), HDL and triglycerides (Sutin et al., 2010) and physical health symptoms of immune functioning (Boals, vanDellen, & Banks, 2011). Higher SC is also related to better mental health, which includes lower rates of depression, alcohol abuse and perceived stress, and higher levels of satisfaction with life (Boals, vanDellen, & Banks, 2011). Likewise, financial research shows high SC has been related to reaching financial goals and avoiding accrual of debt (Haws, Bearden, & Nenkov, 2012). Furthermore, a lack of SC was positively associated with non-payment of consumer debt and self-report excessive financial burdens of debt (Gathergood, 2012). Due to the lack of SC research that examines health and wealth simultaneously and the

increasing societal concern of these outcomes, the focus of the current study is whether SC differs based on both health and wealth outcomes.

Empirical research on self-control, economic position, and health

Although the research is limited, recent studies have examined alternative causes of health-wealth outcomes such as personality and behavioral differences. Specifically, SC predicts a range of health and wealth outcomes. Longitudinal research by Moffitt et al. (2011) demonstrated that levels of childhood SC predict young-adult health and wealth independent of children's intelligence, social class, and home lives. The authors followed an entire birth cohort of over 1,000 children from birth until age thirty-two. Not only was high SC related to better health outcomes measured by physician examinations, but also improvements in SC predicted improvements in health over time. The same was true for young-adult wealth status such that improvements in SC predicted an increase in wealth. Similar health related results were found in a study by Miller, Barnes, and Beaver (2011), which also found that adolescent SC predicted a variety of physical and mental health outcomes in young adulthood. Reports from approximately 12,000 participants were examined from the National Longitudinal Study of Adolescent Health over the course of seven years. Results showed that adolescents with low levels of SC were twice as likely to report a diagnosis of asthma, cancer, high cholesterol, high blood pressure, and mental health issues, and eight times more likely to report a diagnosis of depression than adolescents with high SC. Furthermore, Bruce et al. (2011) used an ecologically valid measure of delay of gratification, a facet of SC, and found adolescents with high ability to delay gratification had lower rates of obesity. Even with nonfood rewards, children with higher BMIs preferred the immediate reward to a delayed, larger reward.

Likewise, research by Tanaka and Murooka (2012) shows people with higher SC, who

were able to delay gratification financially, accumulated more wealth. People who put especially high value on immediate consumption compared to any time in the future reported higher rates of excessive credit card use and an over accumulation of debt. Due to the increase in interest spending, people with low SC were unable to accumulate money for future purchases, emergencies, and retirement.

Most of the research examining SC effects on health and wealth has been done with adolescent and young-adult populations. Furthermore, few studies have examined the effects of SC on both health and wealth in the same population. More research is needed to determine whether the SC to health-wealth gradient exists among people in later adulthood and senior years.

Objectives of the study

It is important to gain an understanding of SC among differing health-wealth statuses in order to test interventions that influence public policy and benefit society by reducing a number of costs, saving tax payer dollars, promoting prosperity and improving quality of life. The primary purpose of this study was to examine the differences in SC among adults who have different health and wealth statuses, while controlling for income, age, and education. It was hypothesized that people with better health would report higher SC than those with poorer health. Likewise, it was hypothesized that people with higher net worth would report higher SC than those with lower net worth.

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Method

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Participants

Participants were recruited from a database of alumni at a large mid-west university. A power analysis (G*Power 3.1 Software) determined that a sample size of 483 would be sufficient

to detect a statistically significant difference in SC ($p < .05$) between groups (high, average, low health-wealth groups) with a small effect size. According to the sample database center, a 5% response rate could be anticipated from the sample. Therefore, a total of 40,000 people were invited to participate in the study via email. The sample was made up of a random selection of 1,000 alumni from each of the graduating classes from 1963-2003 in order to target individuals 30 years of age or older who were most likely to be financially independent, as well as to include a range of ages. The response rate was 6.1% (N =2,455). Participants were included in the analyses if they completed all the questions that were included in the survey. Thus, the final sample included 1,320 participants (61.5 % men and 38.5 % women) for the wealth analyses and 1,295 participants for the health analyses (61.9 % men and 38.1 % women).

Approval from the Institutional Review Board was obtained prior to data collection at the university from which the sample was collected and the research was conducted. Participants were informed of any risks associated with participation in the study as well as the voluntary nature of the study. According to the Institutional Review Board, completing and submitting an electronic survey is considered implied consent when participants are informed that the study is voluntary and there is no coercion of any kind involved. Therefore, the requirement for documentation of consent for this study was waived.

Procedure

Participants were invited via email in the fall of 2011 to participate in the study by completing a series of questionnaires measuring SC, health and wealth status, and demographic information. Participants also received a cover letter explaining the voluntary and confidential nature of the study. The survey was closed and data were downloaded from the website three weeks after the email was sent.

Measures

     Conscientiousness. The International Personality Item Pool (IPIP), an online version of the Neuroticism Extroversion Openness Personality Inventory-Revised (NEO PI-R; McCrae & Costa, 1987; McCrae & Costa, 1992), measures the five broad dimensions of personality and each facet of the dimensions (Goldberg, 1999; Goldberg et al., 2006). The dimension of Conscientiousness and its facets were the focus of the present study. The NEO PI-R has been determined a valid and reliable measure of personality (McCrae & Costa, 1992). Participants scored each item on a four step (1-5 point) Likert type scale ranging from disagree strongly (1) to agree strongly (5) with the degree to which the statement represents perceptions of themselves.

     Impulsivity. The Impulsivity construct in Grasmick et al.'s Self-Control Scale (Grasmick Tittle, Bursik, & Bruce, 1993) was also used to measure SC. Participants scored four items on a four-step (1-4 point) Likert type scale ranging from strongly disagree (1) to strongly agree (4) with the degree to which the statement represents perceptions of themselves. Items included the following statements: 1) acts on the spur of the moment without stopping to think, 2) devotes much thought and effort to planning for the future, 3) often does whatever brings me pleasure here and now, even at the cost of some distant goal, and 4) is more concerned with what happens to me in the long run than the short run. Items two and four were reverse scored. The Impulsivity questions have been shown to be valid and reliable measure of the impulsivity dimension of SC (Piquero & Rosay, 1998).

Self-Control. Based on the framework of SC, the facets of Conscientiousness and the Impulsivity factor from the Grasmic SC Scale were combined to form a composite SC score. In the current study, the Conscientiousness subscale and the Impulsivity questions were found to be highly reliable (64 items; α = .921).

Self-Rated Health. Self-rated health was measured using the self-rated health question from the state-based Behavioral Risk Factor Surveillance System (BRFSS). The question asked participants, "Would you say that in general your health is: 1 = Excellent, 2 = Very Good, 3 = Good, 4 = Fair, 5 = Poor." This self-rated health question is considered a valid and reliable source of personal health perceptions (Nelson, Holtzman, Bolen, Stanwyck, & Mack, 2001) and has been shown to correlate with objective measures of health as well as to predict mortality (Idler & Benyamini, 1997; Jylhä, Volpato, & Guralnik, 2006; Mackenbach, Simon, Looman. & Joung, 2002).

Body Mass Index (BMI). BMI is a ratio of height to weight (height m^2/weight kg) and classifies individuals into the following categories: normal < 24.9, overweight = 25-29.9, and obese > 30. Participants were asked to self-report their height and weight, from which BMI was calculated.

Net Worth. Net worth equals the value of one's assets minus the value one owes. The following two-part question was used to assess one's net worth: "Enter on the line your best estimate to the following questions. Thinking of your total assets (home value, value of your car, checking accounts, savings accounts, money markets, certificates of deposit (CD), mutual funds, retirement accounts, stocks/bonds, and cash value life insurance) combined, what would you estimate their total value to be? Now think about your financial obligations, approximately what is the total amount that your household owes (mortgages, credit card balances, student loans, car

loans, other personal loans, and medical bills)?" This method of obtaining one's net worth was developed and used in consumer finance research (Hira & Loibl, 2008).

Demographic variables. Pre-tax annual household income is a measure of potential wealth and was assessed using a nine-point scale where $1 < \$15,000$, $2 = 15,000\text{-}29,999$, $3 = 30,000\text{-}44,999$, $4 = 45,000\text{-}59,999$, $5 = 60,000\text{-}74,999$, $6 = 75,000\text{-}89,999$, $7 = 90,000\text{-}99,999$, $8 = 100,000\text{-}149,999$, and $9 > 150,000$. Age was assessed by subtracting the answer to the following question from 2011, "In what year where you born?" Highest level of education was assessed using a five-point scale where $1 = $ Grade School, $2 = $ High School, $3 = $ Bachelor's, $4 = $ Master's, and $5 = $ PhD/MD/equivalent.

Data Reduction and Statistical Analyses

Only participants with completed responses were included in the final analyses. A t-test was used to compare differences in SC among participants with completed responses and those with missing data. There was no significant difference in SC between the participants with completed responses ($M = 270.31 \pm 25.08$) and participants with missing data ($M = 269.67 \pm 24.97$; $t(2,453) = .769$, $p = .442$).

SC is an umbrella term that encompasses constructs from different disciplines (e.g. psychology, neuroscience, behavioral genetics, and behavioral economics) such as impulsivity, conscientiousness, self-regulation, delay of gratification, executive function, willpower, and intertemporal choice (Moffitt et al., 2011). Therefore, the current study used a SC composite score with measures from recent psychology and health-wealth research that used the Conscientiousness facets in the IPIP (Goldberg, 1999) and the Impulsivity measure in the Self-Control Scale (Grasmick, Tittle, Bursik, & Bruce, 1993). Each Conscientiousness facet (Self-efficacy, Orderliness, Dutifulness, Achievement Striving, Self-discipline, and Cautiousness)

score ranged from 10-50 points (10 questions each with a five-point Likert scale). The

Impulsivity measure included four questions with a four-point Likert scale (range 4-16). In order

for the Impulsivity facet to have a similar weighting in the SC score as the Conscientiousness

facets, the Impulsivity score was multiplied by three and therefore ranged from 12-48. Each of

the facets were added together to sum the total SC score, which ranged from 42 (low SC) to 348

(high SC).

The composite health score included BMI (kg/m^2) and self-rated health. BMI score was

calculated based on clinical BMI categories (Center for Disease Control, 2011) and were coded

as follows: $1 = < 25$, $2 = 25$-29.9, $3 = 30$-32.4, $4 = 32.5$-35, and $5 = > 35$. Self-rated health

scores were reported on a five-point Likert scale and were coded as $1 =$ Excellent, $2 =$ Very

Good, $3 =$ Good, $4 =$ Fair, $5 =$ Poor. Composite health scores were computed by adding the BMI

coded variable and the self-rated health score (BMI + SRH = composite health score). Thus,

composite health scores ranged from 2-10. The sample was then split into three groups based on

their composite health score (EH = excellent health; score = 2-3, GH = good health; score = 4,

AH= average health; score > 4). Participants were divided into these groups based on clinically

significant BMI markers and self-reported health categories.

The wealth score was based on net worth (sum of assets – sum of debts). Participants

were split into three groups based on their net worth relative to the sample population, which

were values in the highest tertile (HW = high wealth; > $899,700), middle tertile (AW = average

wealth; $321,000 to $899,250), and lowest tertile (LW = low wealth; < $320,000).

Income, age, and education are demographic variables that have been shown in the past

to be related to health and wealth, so they could potentially confound the results of the study.

Therefore, they all were measured and controlled for as covariates in each analysis. Descriptive

statistics (mean ± *SD*) for each of the three health groups (EH, GH, AH), wealth groups (HW, AW, LW), and sample population were computed for income, age, education, BMI, self-rated health, and net worth.

A 3 x 3 ANCOVA was used to examine the following: a) SC differences between health groups (EH, GH, AH), when controlling for income, age, and education, b) SC differences between wealth groups (HW, AW, LW), when controlling for income, age, and education, and, c) an interaction between health and wealth groups on SC. Pairwise comparisons were made between the three (EH, GH, AH) health groups and between the three (HW, AW, LW) wealth groups. The Bonferroni technique was used in interpreting the data from each ANCOVA to control for family wise error associated with multiple comparison tests ($\alpha = 0.05/3 = 0.017$). All statistical analyses were performed using IBM SPSS Statistics 19 (IBM Corporation, Somers, NY).

Results

Before performing the ANCOVAs it was determined that basic assumptions for linear models were met. Specifically, after checking for extreme values, illegitimate outliers (e.g. a height of 5") were removed. When data points are suspected of being legitimate, some authors argue that extreme values should be included because it is more representative of the population (Orr, Sackett, & DuBois, 1991). Therefore, legitimate outliers were retained. All variables and groups were normally distributed except BMI and net worth, which had slight negative skewness and leptokurtosis. Levene's test indicated homogeneity of variances for the wealth groups, but heterogeneity of variances for the health groups. Simulation studies have demonstrated that the ANCOVA is not very sensitive to moderate deviations from normality (Harwell, Rubinstein, Hayes & Olds, 1992; Lix, Keselman & Keselman, 1996). Havelick and Peterson (1974)

demonstrated an ANCOVA is robust even with heterogeneity of variance when distributions have similar shapes. Therefore, because the deviations from normality were small and the distributions of the health groups had similar shapes, the decision was made to proceed with the ANCOVA.

Descriptive Analyses

Participants in the final analyses included 1,320 men (61.5 %) and women (38.5 %) and represented a range of ages (29-91) with a mean age of 55.3 ± 11.8 years. For education, 43% reported earning a bachelor's degree, 35% a master's degree, and 20% a PhD/MD or equivalent. Since the sample was taken from a pool of university alumni, it was expected participants would be highly educated. Participants reported high pre-tax gross annual household incomes ($M =$ $95,000, $SD =$ $35,000) relative to the average national income ($51,914; U.S. Census Bureau, 2010) with 0.5% earning < $15,000, 13% earning $15,000-60,000, 27% earning $60,000-100,000, 30% earning $100,000-150,000, and 29% earning > $150,000. Based on self-reported height and weight, 40% were categorized as overweight (25 < BMI > 29.9), 27% were categorized as obese (BMI > 30), and the remaining 33% were categorized as healthy (BMI = 18.5-24.9). Participants reported that they were generally healthy, with 24% 'very good', 47% 'good', 25% 'average', 4.5% 'poor', and 0.5% 'very poor.' The average net worth was $996,900 ± 1,561,338, with 6.5% worth $-180,000 to $0, 26% $1 to $300,000, 38.5% $300,001 to $999,900, 17.5% $1,000,000 to $2,000,000, and 11.5% $2,000,001 to $16,965,000.

Analyses of Health and Wealth Groups

The two way ANCOVA yielded a significant main effect for the three health groups (F (2, 1293) = 17.5, p <.001). Pairwise comparisons of the three groups indicate that the GH group ($M =$ 269.8 ± 23.3) scored significantly higher on SC than the AH group ($M =$ 265.3 ± 27.5), $p <$

.01, $d = .31$. Additionally, the EH group ($M = 274.7 \pm 23.0$), scored significantly higher than the

GH group, $p < .01$, $d = .30$. The main effect for the wealth groups was also significant (F (2,

1318) $= 11.36$, $p < .001$). Pairwise comparisons of the three groups indicate that the AW group

($M = 270.3 \pm 24.4$) scored significantly higher on SC than the LW group ($M = 265.6 \pm 26.1$), $p <$

.01, $d = .23$. Additionally, the HW group ($M = 274.9 \pm 23.2$), scored significantly higher than

the AW group, $p < .01$, $d = .23$. The interaction effect was not significant ($F(4, 1{,}292) = .365$, p

$= .83$), indicating that the effects of health and wealth status are independent. Descriptive

statistics (mean $\pm$ SD) for each health group are reported in Table 1 and for each wealth group

are reported in Table 2.

Discussion

The purpose of this study was to examine SC across the health-wealth spectrum in an

adult population. It was hypothesized that people with better health would report higher SC than

those with poorer health. Likewise, it was hypothesized that people with higher net worth would

report higher SC than those with lower net worth. The results showed a significant main effect

of health and a significant main effect of wealth in that those who prospered in their health and

finances reported higher SC than those who struggled in these domains across income level,

across six decades of life, and independent of education level. The findings are in agreement

with previous SC and health-wealth research in youth and young adult populations (Miller,

Barnes, & Beaver, 2011; Moffitt et al., 2011) and are the first to demonstrate like results in a

middle age and older adult population.

The results also showed that there was no interaction between health and wealth status on

SC. Thus, even if you have not accumulated much wealth, there were still increases in SC as

health went up. The opposite was also true in that even if one's health was not in the top

percentile, there were still increases in SC as wealth went up. Thus, there was no magnification of the effect, but rather the effects were additive.

People who report high levels of SC are characterized by the ability to delay pleasure for the sake of the future, control emotions and behaviors, and persist despite set-backs (Moffitt et al., 2011). Many of life's decisions involve sacrifice of some kind whether it's sacrifice today for the sake of future health and wealth or sacrifice of future health and wealth for pleasure today. Today's decisions about health and finances have consequences that have an exponential effect on the future. As an example from personal finance, a person can live paycheck to paycheck without saving any and experience the pleasure of their money immediately. Upon retirement, they may experience the hardship of regret, because they will not have the financial ability to retire. A health related example might be that a person sacrifices 30 minutes of today from something else they might rather do in order to exercise, increasing the likelihood of a lifetime of good health. Alternatively, they could spend their time on more immediately gratifying activities like sleeping late or watching television, and consequently sacrifice their future health. These examples are in line with the results of this study in that individuals with high SC report a preference in life to sacrifice now for pleasure later, which was also related to reports of better health and higher wealth.

Although the purpose of the current study was not to examine health and wealth behaviors, it is probable that the effects of SC on health-wealth outcomes are mediated by health and wealth behaviors. Research has shown that negative health outcomes (e.g. chronic disease and obesity) are often the result of negative health behaviors like inactivity and poor nutrition (Cutler, Glaeser, & Shapiro, 2003; Bhargava & Guthrie, 2002). Likewise, negative financial behaviors (e.g. over-spending and under-saving) often result in a negative financial position

(Hershey & Mowen, 2000; Ameriks, Caplin, Leahy, & Tyler, 2010). Thus, it is reasonable to suggest that positive health-wealth behaviors may explain the effects of SC on health-wealth outcomes. The present study statistically controlled for several possible confounding variables, namely income, age, and education. However, the ANCOVA results do not explain the cause of the differences in SC between people with differing health-wealth statuses. Future research into the effects of SC on health-wealth outcomes, including behaviors that may mediate that relationship, could provide evidence to strengthen inferences about the influence of SC on health-wealth outcomes.

Although the study had a cross-sectional design, the IPIP and Impulsivity Questionnaires asked participants to reflect on their previous behavior. Therefore, the SC measure is retrospective in nature while the health-wealth outcomes are representative of their present status. Including retrospective measures of SC in the analyses reduces to a certain degree problems related to a cross-sectional design and possibility of reverse causation (i.e. higher reports of SC due to a better health and wealth status). Furthermore, personality has been shown to be stable over time, so after the age of 25 it is not likely that SC will change substantially without an intervention (McCrae & Costa, 1990). Therefore, due to the temporal nature of the questionnaires and since participants in the present study were age 30 and older, it is unlikely that health and wealth outcomes, as a cause of SC differences, would be a major explanation of the results observed. Thus, the results of this study combined with previous research of SC and health-wealth outcomes (Moffitt et al., 2011) provide a foundation for targeting SC as the basis for prevention efforts.

A drawback to the health (BMI and self-rated health) and SC measures is that they are individual level assessments where as the wealth measure (net worth) is a family level

assessment. This is not a problem for singles nor it is of concern for married couples if spouses marry individuals similar in body type and personality. Research of married couples has found that couples tend to marry those with a similar body mass index (Katzmarzyk, Perusse, Rao, & Bouchard, 1999) and the longer couples are married, the more similar their body mass becomes (Katzmarzyk, Hebebrand, & Bouchard, 2002).

The results of the 30-year prospective cohort study by Moffitt et al. (2011) showed that improvements in SC corresponded with improvements in health and wealth over time in a sample of children and young adults. The results of the present study indicate there is a relationship in adults that is consistent with Moffitt et al. (2011) and is worthy of further investigation. Future research should examine the effects of SC on health and wealth in a prospective cohort design in middle aged and older adults in order to determine with more certainty the extent to which a causal relationship between SC and health-wealth out comes exists in adults. Eventually, interventions targeting SC strategies may be worthwhile investments that lead to a better financial status and more positive health outcomes. Preventative strategies that help people to delay gratification, control emotions and behaviors, and follow through with intentions despite setbacks could potentially lead to behaviors such as increased exercise and healthy eating, as well as saving money and refraining from over borrowing. Some people may argue that they prefer pleasure today, because tomorrow may never come. However, the results of the current study showed that people who choose to sacrifice today in order to reap the benefits tomorrow have a better health and wealth status throughout each decade of adulthood.

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Table 1

Descriptive statistics for health groups

	Excellent Health (EH)		Good Health (GH)		Average Health (AH)	
	Mean	SD	Mean	SD	Mean	SD
Income ($)	7.1	2.1	7.0	2.1	6.9	2.1
Age (yr)	55.1	11.5	56.8	12.1	54.3	11.7
Education (yr)	3.8	0.8	3.8	0.8	3.8	0.9
BMI (kg/m^2)	23.6	2.3	26.8	2.4	32.1	4.8
Self-Rated Health	1.4	0.5	2.1	0.4	2.8	0.7
Net Worth ($)	1,126,085	1,732,048	983,356	1,424,559	890,127	1,487,878
Totals (N = 1295)	497		334		464	

Table 2

Descriptive statistics for wealth groups

	High Wealth (HW)		Average Wealth (AW)		Low Wealth (LW)	
	Mean	SD	Mean	SD	Mean	SD
Income ($)	7.8	1.7	7.0	2.0	6.3	2.3
Age (yr)	61.5	8.5	55.4	10.7	49.1	12.4
Education (yr)	3.9	0.9	3.8	0.8	3.7	0.8
BMI (kg/m^2)	27.0	4.3	27.1	7.0	28.3	5.7
Self-Rated Health	1.9	0.8	2.1	0.9	2.3	0.9
Net Worth ($)	2,344,961	2,120,667	563,540	158,149	98,708	176,258
Totals (N = 1320)	431		442		447	

CHAPTER 3

STUDY 2

Predicting physical and financial behaviors in adults: Does the modern environment reward Self-Control?

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Abstract

The last 30 years has witnessed a drastic increase in obesity and consumer debt. Research has shown that level of self-control (SC) may underlie this trend. Health and financial environmental opportunities are quite different than just a few decades ago and may reward a different personality profile; i.e. those with higher SC. The purpose of this study was to examine the relationships between a) SC and exercise behaviors and b) SC and financial behaviors. A total of 40,000 alumni from a large Midwest university, were invited via email to complete an electronic survey. Completed responses included 1,320 men (61.5 %) and women (38.5 %) and represented a range of ages ($M= 55.28 \pm 11.76$). SC, exercise behavior, and financial behaviors were measured using the International Personality Item Pool (IPIP), the International Physical Activity Questionnaire (IPAQ), and Financial Behavior Questionnaire (FBQ), respectively. The SC variable was a composite score of facets from the IPIP measure (Self-efficacy, Orderliness, Dutifulness, Achievement-Striving, Self-Discipline, Cautiousness) and the Impulsivity Scale. When controlling for income, age, and education, the results of the multiple regression analyses showed that SC positively and significantly predicted exercise behavior ($\beta = .11$, $t(1,315) = 3.54$, $p < .001$) and financial behavior ($\beta = .40$, $t(1,315) = 15.37$, $p < .001$). These results are consistent with growing evidence in health psychology research that SC may be a predictor of the health-wealth connection. The results of this study indicate that strategies to enhance SC hold promise for the improvement of health and wealth-related behaviors.

Key words: health, wealth, exercise, financial behaviors, self-control

Introduction

Modern-day life looks quite different than it did just a half-century ago and, as such, may reward a different personality profile. Technology advancements have decreased the need for physical activity, food is more readily available and affordable, and consumer credit is more easily attainable (Church et al., 2011; Hand & Henley, 2007; Philipson & Posner, 1999). While many societal changes are seen as improvements, they also bring a new set of health and financial challenges. Specifically, the current environment requires resisting an abundance of high calorie foods and the will to plan and implement an exercise regimen in order to maintain body weight and health (Thomas, Martin, Heymsfield, Redman, Schoeller, & Levine, 2010). Financially speaking, credit cards have been shown to weaken impulse control and therefore, necessitate the ability to resist over-spending (Thomas, Desai, & Seenivasan, 2010). As the shift has been made to an efficient society with more potential temptations to stray from positive health and financial behaviors, recent decades have also witnessed a down turn in health and financial status. Specifically, increases in both obesity (Center for Disease Control, 2012) and consumer debt (Federal Reserve Board, 2012) have become a public crisis. Furthermore, a growing body of research has shown a relationship between these health and wealth outcomes (Aittomäki, Martikainen, Laaksonen, Lahelma, & Rahkonen, 2010; Zagorsky, 2004; Zagorsky, 2005). Thus, as environmental cues present new challenges and public health and finance problems rise to the top of societal concerns, it becomes important to understand how people can best adapt to the changing environment in order to provide insights to the causes and treatments of physical and financial health.

One area of personality research that has consistently been linked to physical and financial health is Self-Control (SC). SC is an umbrella term that encompasses constructs from

different disciplines (e.g. psychology, neuroscience, behavioral genetics, and behavioral

economics) such as impulsivity, conscientiousness, self-regulation, delayed gratification,

executive function, willpower, and intertemporal choice (Moffitt et al., 2011). The ability to

delay gratification for the sake of the future, control emotions and behaviors, persist despite set-

backs, to be planful, and to be task- and goal-driven constitute the components of SC.

Furthermore, personality research suggests that SC may directly or indirectly effect health and

wealth outcomes through behaviors patterns and lifestyle (Moffitt et al., 2011; Sutin, Ferrucci,

Zonderman, & Terracciano, 2011; Terracciano et al., 2009).

SC has been traditionally investigated as the effortful inhibition of temptations (Fujita,

2011). However, the development of SC Theory in the last decade suggests that a broader

conceptualization, which also includes preventative regulation, may add additional insights into

the SC process (Fujita, 2011). According to Hofmann and Kotabe's (2012) SC taxonomy, SC is

made up of two components, namely preventive (i.e., anticipatory strategies) and interventive

(i.e., the use of will power in the moment) mechanisms. The Conscientiousness trait (the state of

being thorough, careful, or vigilant) from the Big Five Factor Model measures broad differences

in desire for, implementation of, and success with SC (Goldberg, 1999). Additionally, according

to Gottfredson and Hirschi's SC Theory (1990) people with low SC tend to pursue immediate

pleasures as measured by Impulsivity, a variant of Conscientiousness. Impulsivity and the facets

of Conscientiousness (i.e., Self-efficacy, Orderliness, Dutifulness, Achievement-striving, Self-

discipline, Cautiousness) overlap to a degree, but Impulsivity measures to a greater degree the

extent to which an individual intentionally prepares for the future verses focuses on pleasure in

the short run. The degree to which a person is Conscientious and Impulsive are good predictors

of whether or not a person will have success in implementing SC (Moffitt et al., 2011; Piquero & Rosay, 1998).

Personality, the environment, and health behaviors

Obesity rates have more than doubled since the 1970's (Center for Disease Control, 2012). The sharp increases in obesity and the associated health consequences have been clearly documented (Flegal, Graubard, Williamson, & Gail, 2005). The behaviors contributing to obesity, including physical inactivity and poor diet, are the second leading controllable cause of death in the United States (Mokdad, Marks, Stroup, & Gerberding, 2004). Thus, it has been suggested that a combination of increased food intake and decreased physical activity are responsible for the obesity epidemic (Church et al., 2011; Swinburn, Sacks, & Ravussin, 2009).

Advancements in technology have made it easy to remain inactive. Fifty years ago, nearly half the jobs in private industry required moderate physical activity compared to today less than 20% call for this amount of energy expenditure (Church et al., 2011). It is estimated that occupationally related energy expenditure has decreased by more than 100 calories per day, which totals over seven pounds worth of calories per year (Church et al., 2011). Thus, in today's environment, in order to acquire the recommended amount of physical activity to achieve health benefits, many people must intentionally make time for regular exercise as a part of their day.

Likewise, refraining from an overconsumption of calories has become a task requiring intention as well. More readily available and affordable food presents an opportunity for indulgence that many Americans find tempting (Philipson & Posner, 1999). Once a sign of affluence, obesity was later associated with low-income (Marmot, 1999). It was suggested that the lack of ability to buy healthy foods might explain the relationship. Most recent research has found that the cost of food is not likely a barrier to healthy eating, because obesity increases with

upturns in the economy (Ruhm, 2000). According to the Center for Diseases Control (2012) obesity rates have increase in all socioeconomic classes, ages, and races. Additionally, while obesity rates continue to climb, the inflation-adjusted cost of food has dropped (Philipson & Posner, 1999). Furthermore, research shows no difference in food expenditure by body mass index, meaning that yearly food spending in normal, overweight, and obese individuals were relatively the same (Zagorsky, 2004). Therefore, with an abundance of affordable food, it is logical that over consuming calories has become a temptation.

Research shows high trait SC is a significant predictor of health outcomes such as BMI and weight loss (Crescioni et al., 2011; Sutin, Ferrucci, Zonderman, & Terracciano, 2011; Terracciano et al., 2009), fitness (Kinnunen, Suihko, Hankonen, Absetz, & Jallinoja, 2012), HDL and triglycerides (Sutin et al., 2010) and physical health symptoms of immune functioning (Boals, vanDellen, & Banks, 2011). SC is also associated with better mental health, including lower rates of depression, alcohol abuse and perceived stress, and higher levels of satisfaction with life (Boals, vanDellen, & Banks, 2011). Furthermore, in a study of overweight and obese women, SC had an effect on body mass even after controlling for genetics and demographic variables (Terracciano et al., 2009). Longitudinal studies have found that childhood SC predicted young-adult health independent of children's intelligence, social class, and home lives (Moffitt et al., 2011). Similarly, adolescents with low SC have been shown to be twice as likely to be diagnosed with cancer, asthma, high cholesterol, high blood pressure, and mental health issues, and eight times more likely to experience depression than adolescents with high SC (Miller, Barnes, & Beaver, 2011). Bruce et al. (2011) used an ecologically valid measure of delay of gratification, a facet of SC, and found that adolescents with high ability to delay

gratification were less likely to be obese. It is clear that SC plays an active role in maintenance of body weight and related health consequences.

In a review of general health behaviors, Bogg and Roberts (2004) established that Conscientiousness, used synonymously with SC (Ameriks, Caplin, Leahy, & Tyler, 2010; Moffiitt et al., 2011), was negatively related to risky health-related behaviors and positively related to beneficial health-related behaviors. Research has also demonstrated a relationship between SC and exercise (Courneya, Bobick, & Schinke, 1999; Ingledew, Markland, & Sheppard, 2004; Rhodes, Courneya, & Bobick, 2001). Ingledew et al. (2004) suggests that it is unlikely that many health-related behaviors are fulfilling initially, but that individuals with high SC may either force themselves to persist with activities in spite of finding them difficult or have the ability to transform mundane activities into enjoyable tasks. More research is needed to fully understand the mediators of the SC and health relationship in order to clearly identify how SC translates to health outcomes.

Personality, the environment, and financial behaviors

In the last 50 years, spending and borrowing practices have changed drastically. Decades ago nearly all consumer transactions were made with cash. It was not until 1966 that the first general purpose credit card was introduced (Sienkiewicz, 2001). In a relatively short period, credit cards have become the preferred method of payment for travel, entertainment, retail purchases, and even bill payment (Evans, & Schmalensee, 2005). In 1970 only 16% of people had credit cards compared to today 75% of households have at least one credit card (Federal Reserve Board, 2012; Sienkiewicz, 2001).

Currently, the average household credit card debt of those who have credit cards is about $15,600 (United States Census Bureau, 2010). Consumer debt per household steadily climbed

until the economic crisis of 2008 where it reached its peak in 2009 at about $19,000 per indebted household. Consumer debt rates dropped from 2009 to 2010 and plateaued in recent years. The cause of the decrease in debt rates is not completely clear. Ideally, decreased debt would be a result of a decrease in borrowing or an increase in principal payments. However, defaults and charge-offs soared in 2009 and 2010, which indicates the decrease in credit card debt was likely a result of debt forgiveness and not an increase in principal payments (Federal Reserve Board, 2012; Sherlund, 2010). Thus, with an increase in easily available credit, consumer debt has continued to climb. Debt ratios that are too high threaten long-term financial security when they prevent people from saving for future purchases, emergencies, and retirement.

Shortly after the wide spread use of the credit card, savings rates in the U.S. began to decline from 6-12% in the 1970's to a rate close to zero during the first decade of the twenty-first century (Sherlund, 2010). Although a cause and effect relationship cannot be determined by the sequential occurrence of these events, it does raise the possibility that the advent of credit cards contributed to the downward trend in savings. In addition to excess consumer debt potentially hampering the ability to save, observations by Brown, Taylor, and Wheatley-Price (2005) suggested that consumer debt may be detrimental to one's psychological well-being (or, less precisely, 'happiness') as well. Specifically, they demonstrated an inverse correlation between unsecured debt, including credit card debt, and psychological well being and no comparable relationship between secured debt, such as a mortgage, and well-being.

Research has shown that paying with a credit card as opposed to cash or a debt card is relatively painless and reduces impulse control. A study by Thomas, Desai, and Seenivasan (2010) compared the quantity and quality of food purchases in a sample of college age adults when using three different payment methods (credit card, debit card, and cash). The results

showed that when people paid with credit cards as opposed to cash, they were engaged in impulsive food buying behavior and bought unhealthier foods. Additionally, empirical research has demonstrated that people spend more with credit cards as opposed to cash (Hirschman, 1979). Prelec and Lowenstein (1998) explain that the use of credit cards decreases sensitivity to pain of purchase by decoupling the cost from the benefit, because the pain of the payment is not immediate. They further explain that using a credit card allows consumers to experience instant gratification of desires because the nature of the credit card allows them to invoke a buy-now-pay-layer mentality. Conversely, paying with cash is more memorable than paying by credit card, because it involves handing over a visible amount of cash, solidifying the understanding that the benefits come at a cost (Raghubir & Srivastava, 2008; Soman, 2001). Interestingly, research of American millionaires showed that individuals who accumulated a substantial amount of wealth tended to make purchases with cash instead of credit (Stanley & Danko, 1996). This suggests that those who have financial success may have adapted SC strategies, like paying in cash, that helps them avoid over excessive debt from consumption.

Research has linked SC to various financial behaviors and outcomes. Tanaka and Murooka (2012), in their review of SC problems and financial decisions, explain that people with higher SC accumulate more wealth. Specifically, people who put especially high value on immediate consumption compared to any time in the future reported higher rates of excessive credit card use, under-saving, and an over accumulation of debt. In a longitudinal study, Moffitt et al. (2011) found that childhood SC predicted adult wealth independent of intelligence, social class, and home lives. Furthermore, children who improved their rank in overall SC had more wealth by adulthood even after controlling for initial SC levels.

It is evident that although recent decades have brought efficiency and convenience, these improvements also present opportunities for over-spending, over-eating, and physical inactivity. Due to this changing environment, SC may be becoming a more valuable personality characteristic. Previous research has demonstrated that SC predicts health and wealth outcomes. Few studies have examined the effects of SC on exercise behaviors and even fewer have examined SC on financial behaviors. To our knowledge, there are no studies examining the effects of SC on health-wealth behaviors in the same population. The purpose of this study was to examine the relationships between a) SC and exercise behaviors, and, b) SC and financial behaviors. It was hypothesized that SC would predict both exercise and financial behaviors independent of income, age, and education.

Method

Participants

Study participants were recruited from a database of alumni at a large mid-west university. A power analysis (G*Power 3.1 Software) determined that a sample size of 148 would be sufficient to detect a statistically significant relationship between SC and the outcome behavior variables ($p < .05$) with a small effect size. According to the sample database center, a 5% response rate could be anticipated from the sample. In order to ensure an adequate sample of completed responses, a total of 40,000 people were invited to participate in the study. The recruitment sample was made up of a random selection of 1,000 alumni from each of the graduating classes from 1963-2003 in order to target individuals 30 years of age or older who were likely financially independent, as well as to include a range of ages. The response rate was 6.1% (N =2,455). Participants were included in each analysis if they completed the survey

questions that were tested (i.e. SC, exercise behaviors, and financial behaviors). Thus, completed responses included 1,320 men (61.5 %) and women (38.5 %).

Approval from the Institutional Review Board at the university from which the sample was collected and research was conducted was obtained prior to data collection. Participants were informed of any risks associated with participation as well as the voluntary nature of the study. Completing and submitting an electronic survey is considered implied consent when participants are informed that the study is voluntary and there is no coercion of any kind involved.

Procedure

Participants were invited via email in the fall of 2011 to participate in the study by completing a series of questionnaires measuring SC, exercise behaviors, financial behaviors, and demographic information. Participants also received a cover letter explaining the voluntary and confidential nature of the study. The survey was closed and data were downloaded from the website three weeks after the email was sent.

Measures

Conscientiousness. The International Personality Item Pool (IPIP), an online version of the Neuroticism Extroversion Openness Personality Inventory-Revised (NEO PI-R; McCrae & Costa, 1987; McCrae & Costa, 1992), measures the five broad dimensions of personality and each facet of the dimensions (Goldberg, 1999; Goldberg et al., 2006). The dimension of Conscientiousness and its facets were the focus of the present study. The NEO PI-R has been determined a valid and reliable measure of personality (McCrae & Costa, 1992). Participants scored each item on a four step (1-5 point) Likert type scale ranging from disagree strongly (1) to agree strongly (5) with the degree to which the statement represents perceptions of themselves.

Impulsivity. The Impulsivity construct in Grasmick et al.'s Self-Control Scale (Grasmick Tittle, Bursik, & Bruce, 1993) was also used to measure SC. Participants scored four items on a four-step (1-4 point) Likert type scale ranging from strongly disagree (1) to strongly agree (4) with the degree to which the statement represents perceptions of themselves. Items included the following statements: 1) acts on the spur of the moment without stopping to think, 2) devotes much thought and effort to planning for the future, 3) often does whatever brings me pleasure here and now, even at the cost of some distant goal, and 4) is more concerned with what happens to me in the long run than the short run. Items two and four were reverse scored. The Impulsivity questions have been shown to be valid and reliable measure of the impulsivity dimension of SC (Piquero & Rosay, 1998).

Self-Control. Based on the framework of SC, the facets of Conscientiousness and the Impulsivity factor from the Grasmic SC Scale were combined to form a composite SC score. In the current study, the Conscientiousness subscale and the Impulsivity questions were found to be highly reliable (64 items; $\alpha = .921$).

Exercise behaviors. Exercise behaviors were measured using the International Physical Activity Questionnaire (IPAQ). The questionnaire includes four items related to amount of minutes per day and days per week that the individual engages in walking, moderate intensity activity, vigorous intensity activity, and sitting. The IPAQ is considered a valid and reliable measure of exercise behavior and has been shown to correlate well with objective measures of physical activity (Craig et al., 2003).

Financial behaviors. The Financial Behavior Questionnaire is an assessment of individuals' spending, saving, borrowing, and investing behaviors. Specifically, participants indicated the extent to which they make plans on how to use/spend money, carry a balance on

credit cards, evaluate spending on a regular basis, keep bills and receipts where they are easy to find, pay for yearly expenses out of current income or savings, save regularly, pay bills as they are due, contribute to a retirement fund, and make financial goals. The 9-items in the questionnaire have been used to measure financial planning behaviors in several studies concerning financial management (Garrison & Hira, 1992; Titus, Fanslow, & Hira 1989). Participants answered each item on the questionnaire on a four step (1-5 point) Likert type scale ranging from seldom (1) to most of the time (5) with the degree to which they engage in the behaviors. In the current study, the Financial Behavior Questionnaire was found to be reliable (9 items; α = .71).

Demographic variables. Pre-tax annual household income is a measure of potential wealth and was assessed using a nine-point scale where 1 < $15,000, 2 = 15,000-29,999, 3 = 30,000- 44,999, 4 = 45,000- 59,999, 5 = 60,000-74,999, 6 = 75,000-89,999, 7 = 90,000-99,999, 8 = 100,000-149,999, and 9 > 150,000. Age was assessed by subtracting the answer to the following question from 2011, "In what year where you born?" Highest level of education was assessed using a five-point scale where 1 = Grade School, 2 = High School, 3 = Bachelor's, 4 = Master's, and 5 = PhD/MD/equivalent.

Data Reduction and Statistical Analyses

Only participants with completed responses were included in the final analyses. A t-test was used to compare differences in SC among participants with completed responses and those with missing data. There was no significant difference in SC between the participants with completed responses (M = 270.31 ± 25.08) and participants with missing data (M = 269.67 ± 24.97; $t(2,453)$ = .769, p = .442).

The current study used a SC composite score with measures from recent psychology and health-wealth research that used the Conscientiousness facets in the IPIP (Goldberg, 1999) and the Impulsivity measure in the Self-Control Scale (Grasmick, Tittle, Bursik, & Bruce, 1993). Each Conscientiousness facet (Self-Efficacy, Orderliness, Dutifulness, Achievement-Striving, Self-Discipline, and Cautiousness) score ranged from 10-50 points (10 questions each with a five-point Likert scale). The Impulsivity measure included four questions with a four-point Likert scale (range 4-16). In order for the Impulsivity facet to have a similar weighting in the SC score as the Conscientiousness facets, the Impulsivity score was multiplied by three and therefore ranged from 12-48. Each of the facets were added together to sum the total SC score, which ranged from 42 (low SC) to 348 (high SC).

Exercise behavior was calculated as the sum of minutes per week of moderate, vigorous, and walking activity multiplied by the metabolic equivalent (MVMETmin/week). The IPAQ defined moderate activity (4 METs) as activities that take moderate physical effort and make you breathe somewhat harder than normal. Vigorous activity (8 METs) was defined as activities that take hard physical effort and make you breathe much harder than normal. Walking (3.3 METS) was included at work and at home, walking to travel from place to place, and any other walking that might be done solely for recreation, sport, exercise, or leisure. Participants were asked to report only those physical activities that they did for at least 10 minutes at a time.

Financial behaviors were assessed using a 9-item questionnaire with answers ranging from 1-5 (1 being never and 5 being most of the time). Items were added together to compute a financial behavior composite score that ranged from 9 (poor financial behaviors) to 45 (good financial behaviors).

Income, age, and education are demographic variables that have been shown in the past to be related to health and wealth, so they could confound the results of the study (Smith, 2004; Titus, Fanslow, & Hira, 1989). Therefore, they were controlled for in each analysis. Descriptive statistics (mean ± *SD*) for the sample population were computed for income, age, and education. Basic assumptions for linear models were checked and met.

Two separate linear regression analyses were used to examine the following: a) whether SC predicts exercise behavior when controlling for income, age, and education and b) whether SC predicts financial behavior when controlling for income, age, and education. All statistical analyses were performed using IBM SPSS Statistics 19 (IBM Corporation, Somers, NY).

Results

Before performing the multiple linear regression it was determined that basic assumptions for linear models were met (linearity, independence and homoscedasticity of the errors, and normality of the error distribution[1]).

Descriptive Analyses

Participants in the final analyses included 1,320 men (61.5 %) and women (38.5 %) and represented a range of ages (29-91) with a mean age of 55.3 ± 11.8 years. Regarding education, 43% reported earning a bachelor's degree, 35% a master's degree, and 20% a PhD/MD or equivalent. Since the sample was taken from a pool of university alumni, it was expected participants would be highly educated. Participants reported high pre-tax gross annual household incomes (*M* = $95,000, *SD* = $35,000) relative to the average national income ($51,914; U.S. Census Bureau, 2010) with 0.5% earning < $15,000, 13% earning $15,000-

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[1] The exercise variable was positively skewed, so, a log transformation was used to normalize the distribution. The linear regression was rerun using this new variable and the significance of the relationship between the predictor and criterion variables did not change.

60,000, 27% earning $60,000-100,000, 30% earning $100,000-150,000, and 29% earning >
$150,000.

SC and exercise behavior

The results of the multiple regression analysis showed that SC (β = .11, t(1,315) = 3.54, p
< .001) positively and significantly predicted exercise behavior when controlling for income,
age, and education (Figure 1). Tests indicated that multicollinearity was not present (tolerance =
.98, .97, .99, and .98 for SC, income, age, and education). Age was a significant correlate of
exercise behavior (r(1,318) = -.06, p < .01). Table 1 provides details of these results.

SC and financial behavior

The results of the multiple regression analysis showed that SC (β = .40, t(1,315) = 15.37,
p < .001) positively and significantly predicted financial behavior when controlling for income,
age, and education (Figure 2). Tests indicated that multicollinearity was not present (tolerance =
.97, .95, .94, and .94 for SC, income, age, and education). Income was a significant correlate of
financial behaviors (r(1,318) = .20, p < .001). Table 2 provides details of these results.

<div align="center">

Discussion

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The trait examined in the present study was SC, which is characterized by the ability to
control emotions and behaviors, be task- or goal-driven, be planful, delay gratification, and
persist despite set-backs (Miller, Barnes, & Beaver, 2011; Moffitt et al., 2011). The purpose of
this study was to examine the relationships between a) SC and exercise behaviors and b) SC and
financial behaviors within the same population. It was hypothesized that SC would predict both
exercise and financial behaviors independent of income, age, and education. The results
supported this hypothesis, demonstrating that reports of higher SC were related to engagement in
more exercise in every income bracket, regardless of age, and independent of education. The

strength of the relationship between SC and exercise behavior in the current study was similar to previous personality and exercise research (Ingledew et al., 2004). The results of the present study demonstrated a small effect where SC accounted for 3.3% of the variance in exercise behavior, which constitutes a meaningful relationship according to Cohen (1988).

The results also showed that reports of higher SC predicted engagement in more positive financial behaviors when controlling for income, age, and education. In this case, SC accounted for 21% of the variance in financial behavior, which is considered a medium-large effect (Cohen, 1988). This meant that for every one-unit increase in SC there was a corresponding 0.2% improvement in financial behavior.

The findings in this research suggest that SC is linked to financial behaviors to a greater extent than exercise behavior. However, it is possible that the physical activity measure prevented the true amount of intentional exercise from being revealed, because it measured general physical activity and not exercise explicitly. The physical activity questionnaire used in the present study would categorize people who have sedentary jobs, but exercise daily, as less physically active than a person who does not intentionally exercise, but has a very active job. The purpose of the present study was to examine the extent to which SC would be related to exercise behavior. Therefore, it is recommended that future research examining SC and exercise should use an exercise questionnaire that measures leisure time exercise and not total physical activity accumulated throughout the day.

These results are in agreement with previous SC and health behavior research (Bogg & Roberts, 2004) and SC and financial behavior research (Tanaka & Murooka, 2012) and indicate that SC underlies a portion of the health-wealth connection. Specifically, Rhodes et al. (2001) found a positive relationship between SC and exercise participation in a sample of breast cancer

patients. In agreement with the results of the current study, the authors suggest that SC may be an important determinant of exercise behavior. Financially speaking, Tanaka and Murooka (2012) in their review of SC problems and financial behaviors showed that individuals who report low SC also participate in harmful financial behaviors such as spending their earnings instantaneously on consumption using credit cards excessively and do not save enough for the future. Like the current study, these results showed that individuals high in SC are able to resist the temptation of immediate gratification and save for purchases and the future. The results of the current study are inline with previous SC research and are the first to demonstrate a relationship between SC and both health and wealth behaviors within the same population.

A shift in the way society operates both physically and financially has changed the environmental demands on individuals, and while the environment has changed it appears that most people have not adapted (Church et al., 2011; Evans, & Schmalensee, 2005). Physical activity was once acquired continuously throughout the day. Today, technology advancements have eliminated the need for manual labor with many tasks in the home and at work (Church et al., 2011). Thus, the current environment may reward a different personality profile than decades ago. The results of the current study suggest that SC may be an important individual level characteristic to combat the present day temptation to succumb to the status quo of a sedentary lifestyle by increasing the likelihood that a person will plan and implement an exercise program despite environmental obstacles and distractions.

Likewise, the financial industry operates much differently than just a half century ago. In those days, people had to save money and make most purchases with their money in hand. Today, it is much easier to finance consumption and pay it back later. With an increase in financing options via credit cards, in-store financing, and payday lending, consumer debt among

people in all income brackets has steadily trended up since the early 1970's (Gross & Souleles, 2002). In the current environment, a healthy financial status requires avoiding over-spending and over-borrowing with conscious inhibition of consumption until it can be paid for out of one's current income. The results of the present study are consistent with this concept in that people who reported higher SC also reported fewer negative financial behaviors such as carrying a balance on their credit card, spending impulsively, and paying bills late. Individuals with high SC also reported more positive financial behaviors such as making plans on how to use their money, paying for yearly expenses out of current income, higher saving rates, contributing to a retirement fund, evaluating spending, and making financial goals. Present day financing opportunities may present temptations that conflict with an individual's financial well being. Therefore, SC may be a valuable characteristic in the current financial environment to help individuals reach short- and long-term goals of financial security.

The study sample consisted mostly of those who had higher than average incomes and educational statuses. This potential bias may actually work against the hypotheses by restricting the variability of responses. Had the sample been more variable and thus representative of the general population, it is plausible that the results may have been even more profound and generalizable to a broader population.

The results of the 30-year prospective cohort study by Moffitt et al. (2011) showed that increases in SC predicted improvements in health and wealth over time in a sample of children and young adults. The results of the present study indicate there is a relationship in adults that is consistent with Moffitt et al. (2011) and is worthy of further investigation. Because SC cannot be randomly assigned, future research should use this type of prospective cohort design in order to examine the effects of SC on health and wealth in middle aged and older adults. This type of

study design would help determine with more certainty the extent to which a causal relationship between SC and health-wealth outcomes exists in adults. Although personality is generally thought of as stable, research of individuals with anxiety and depression has shown that with training, SC can be improved in children, adolescents, and adults (Febbraro & Clum 1998; Francis, Mezo, & Fung, 2012). Self-monitoring, self-evaluating, and self-reinforcing are basic SC skills (Bandura, 1991) that may be effective in combating the present day temptations and distractions that compete with health and financial well being. Eventually, interventions targeting general SC strategies may empower all individuals to engage in more positive health *and* financial behaviors. In conclusion, the present study demonstrates that people with higher SC, who set goals, make a plan, and execute it despite setbacks report that living intentionally in the areas of health and finance corresponds with greater exercise participation and positive financial behaviors. Further research examining the effects of SC on exercise and financial behaviors is clearly warranted.

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Table 1.

Results of Regression Analysis: Variables Predicting Exercise Behavior

	B	*SE B*	B
Income	-64.05	50.48	-.03
Age	22.59	9.95	-.06*
Education	-9.10	138.71	-.01
Self-Control	16.48	4.57	.11**

Note: R^2 = .033 (N = 1,320, *p* < .001).

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

Table 2.

Results of Regression Analysis: Variables Predicting Financial Behavior

	B	*SE B*	B
Income	.46	.06	.20**
Age	-.01	.01	-.01
Education	-.10	.15	-.02
Self-Control	.08	.01	.40**

Note: R^2 = .21 (N = 1,320, p < .001).

**p < .001
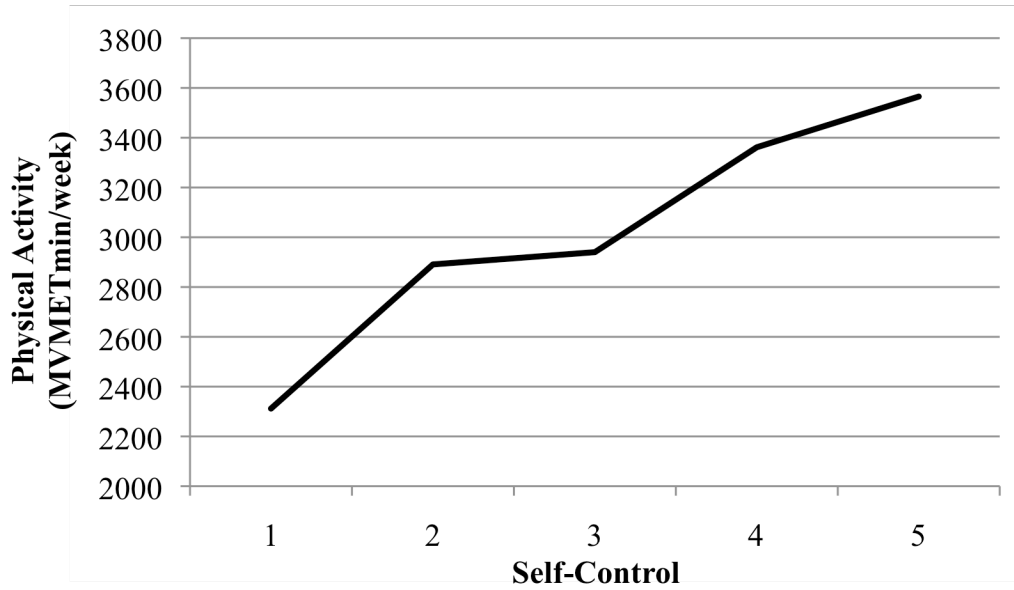
Figure 1. A gradient of SC positively and significantly predicted exercise behavior ($t(1,316) = 3.74$, $p < .001$) when controlling for income, age, and education.
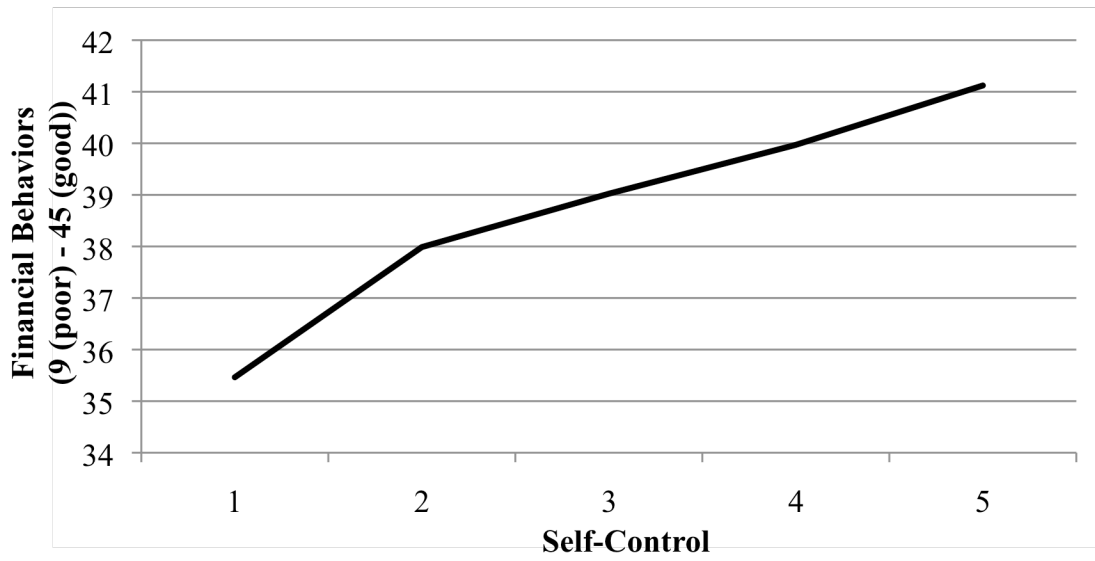
Figure 2. A gradient of SC positively and significantly predicted financial behaviors ($t(1,316) = 15.37$, $p < .001$) when controlling for income, age, and education.

CHAPTER 4

STUDY 3

Evidence that self-control predicts quality of life in a health-wealth mediation model

Abstract

Quality of life (QOL) is a multifaceted construct that includes perceptions of health and financial statutes. Given that obesity and bankruptcy rates have both increased drastically in recent decades, QOL is an area of increasing concern for public leaders, policy makers, and society alike because the well-being of the nation is at risk. Self-Control (SC), the ability to control attention and emotions in order to achieve a goal, has been shown to predict both health and wealth, but little is known about how these factors interact with QOL. The purpose of this study was to examine a model with SC, behaviors, and outcomes as predictors of QOL. A total of 40,000 alumni from a Midwest university were contacted via email to complete a survey. Completed responses included 1,115 men (58.2 %) and women. Conscientiousness and Impulsivity were combined to form a SC score. Variables also measured were health outcomes (body mass index and self-rated health), wealth outcomes (net worth) and QOL (health-related and financial). As hypothesized, the financial model showed that when controlling for income, age, and education, SC predicted financial behaviors ($t(1,110) = 15.37$, $p < .001$), financial behaviors predicted net worth ($t(1,110) = 3.40$, $p < .001$), and net worth predicted financial QOL ($t(1,110) = 6.60$, $p < .001$). The health model showed that when controlling for income, age, and education, SC predicted exercise behavior ($t(1,110) = 3.57$, $p < .001$), exercise behavior predicted health ($t(1,110) = 6.30$, $p < .001$), and SC ($t(1,109) = 3.00$, $p < .01$), and health predicted health-related QOL ($t(1,110) = 4.15$, $p < .001$). Significant paths also emerged when testing the model such that financial behavior predicted financial QOL ($t(1,109) = 19.40$, $p < .05$) and SC predicted health ($t(1,110) = 3.82$, $p < .001$) and health-related QOL ($t(1,109) = 3.00$, $p < .01$) These results are the first to demonstrate a mediation model in which SC predicts both health and financial QOL through behaviors and outcomes.

Introduction

For decades it has been suggested that the connection between physical and financial health runs from income to health such that high income equals good health and low income equals poor health. With this hypothesis accompanies a potentially discouraging underlying message to half the population, which is that those with a lower socioeconomic status may be doomed to a lifetime of poor health and poor quality of life (QOL). It also extends a potential false promise to those in upper income brackets, implying they are guaranteed good health. On the contrary, recent health and personal finance research (Zagorsky, 2004; Zagorksy, 2005) has shown that a high income cannot necessarily purchase assurance against negative health and financial consequences. Specifically, in the last 30 years obesity rates have increased drastically in all income ranges, education levels, ages, and races (Center for Disease Control, 2012). Additionally, the last decade has seen a shift in the income profile of those who declare bankruptcy in that higher income earners have steadily increased their filing rates (Institute for Financial Literacy, 2011). With these trends in mind, it is logical that recent health and personal finance research has found a relationship between health and wealth (i.e. the sum of assets minus debts) even when controlling for income and education (Zagorsky, 2004; Zagorsky, 2005). Broadly stated, the health-wealth relationship extends beyond income, which suggests that an additional causal variable may underlie this relationship.

Recent research has found that Self-Control (SC), the ability to control emotions and behaviors, be task- or goal-driven, be planful, delay gratification, and persist despite set-backs (Miller, Barnes, & Beaver, 2011), predicted health (Bogg & Roberts, 2004) and wealth (Tanaka & Murooka, 2012) behaviors and outcomes (Moffitt et al., 2011). To date, no published studies have examined SC, behaviors, and outcomes of both health and wealth in the same sample, or

the relationship between these factors and QOL. However, this study is a part of a larger study (manuscript under review), which found that SC predicted health and wealth behaviors in the same sample. Ultimately, gaining a greater understanding of SC in the health-wealth relationship may aid in the design of interventions as well as improve QOL in the health and financial domain.

SC has been traditionally investigated as the effortful inhibition of temptations (Fujita, 2011). However, the development of SC Theory in the last decade suggests that a broader conceptualization, which also includes preventative regulation, may add additional insights into the SC process (Fujita, 2011). According to Hofmann and Kotabe's (2012) SC taxonomy, SC is made up of two components, namely preventive (i.e., anticipatory strategies) and interventive (i.e., the use of will power in the moment) mechanisms. The Conscientiousness trait (the state of being thorough, careful, or vigilant) from the Big Five Factor Model measures broad differences in desire for, implementation of, and success with SC (Goldberg, 1999). Additionally, according to Gottfredson and Hirschi's SC Theory (1990) people with low SC tend to pursue immediate pleasures as measured by Impulsivity, a variant of Conscientiousness. Impulsivity and the facets of Conscientiousness (i.e., Self-efficacy, Orderliness, Dutifulness, Achievement-striving, Self-discipline, Cautiousness) overlap to a degree, but Impulsivity measures to a greater degree the extent to which an individual intentionally prepares for the future verses focuses on pleasure in the short run. The degree to which a person is Conscientious and Impulsive are good predictors of whether or not a person will have success in implementing SC (Moffitt et al., 2011; Piquero & Rosay, 1998).

QOL is made up of both objective and subjective components. Improvements in objective measures (like health status and net worth) increases satisfaction in that particular area

(Felce & Perry, 1995). Specifically, obesity is associated with a decrease in QOL (Kolotkin et al., 2001; Oreopoulos et al., 2010) and poor financial practices and low net worth are associated with decreases in financial satisfaction (Titus, Fanslow, & Hira, 1989). Thus, it is important to understand modifiable antecedents of health-wealth outcomes that will likely improve QOL. Because SC is a lifestyle factor that is malleable (Febbraro & Clum 1998; Francis, Mezo, & Fung, 2012), meaning that people can learn SC strategies used by the highly self-controlled, it is a promising target for health-wealth interventions.

Self-Control and wealth

Financial research has shown that SC predicts financial behaviors. Specifically, Tanaka and Murooka (2012) in their review of SC problems and financial decisions, explain that people with higher SC accumulate more wealth by avoiding excessive credit card use, under-saving, and an over accumulation of debt. The defining characteristics of people with high SC are that they are deliberate, goal directed, and able to delay gratification. Therefore, people with higher SC make a financial plan and follow it despite temptations and setbacks. Those with low SC are less intentional about their financial practices and instead do what feels good in the moment without considering the future consequences of their expenditures such as running out of money at the end of the month and acquiring debt as a result.

Research has also shown that intentional financial behaviors predict net worth (Titus, Fanslow, & Hira, 1989). Specifically, the sum of focused, goal directed financial behaviors over time results in an accumulation of wealth independent of income. Individuals who make plans on how to use their money, evaluate their spending, set financial goals, save regularly, and avoid excessive credit card use accumulate more wealth (Titus, Fanslow, & Hira, 1989).

Self-Control and health

In a review of general health behaviors, Bogg and Roberts (2004) established that Conscientiousness (used synonymously with SC; Ameriks, Caplin, Leahy, & Tyler, 2010; Moffiitt et al., 2011) was negatively related to risky health-related behaviors and positively related to beneficial health-related behaviors. Research has also demonstrated a relationship between Conscientiousness and regular exercise (Courneya, Bobick, & Schinke, 1999; Ingledew, Markland, & Sheppard, 2004; Rhodes, Courneya, & Bobick, 2001). Individuals higher in Conscientiousness are more goal-directed, planful, and able to delay gratification. Thus, the results suggest that highly Conscientious people plan and follow through with their exercise regimen and resist the immediate rewards of physical inactivity, for rewards that are further away temporally.

Furthermore, health behaviors are the main factors that contribute to poor health outcomes, namely cardiovascular disease, cancer, and obesity (Mokdad, Marks, Stroup, & Gerberding, 2004; Struber, 2004). Just behind tobacco use, physical inactivity and poor diet are the second leading actual cause of death in the United States (Mokdad, Marks, Stroup, & Gerberding, 2004). Therefore, individuals who consistently execute an exercise regimen have substantially lower risk for obesity and disease.

To date, there are no known studies examining SC and health-related QOL. However, research has shown that people who have higher control of their attention, emotions, and behaviors report higher satisfaction in several areas of their general wellness. Specifically, people with higher SC have more satisfying and longer lasting relationships, higher levels of educational and occupational achievement (independent of intelligence), and more positive marriage prospects (Evans, Cullen, Burton, Dunaway, & Benson, 1997; Shoda, Mischel, & Peake, 1990).

Objectives of the study

The present study aims to gain a deeper understanding of the health and wealth connection and the effects on QOL by examining SC as a mechanism that may explain a part of the variance in both domains. The purpose of this study was to propose and examine a model of SC, behaviors, and outcomes as predictors of QOL related to health and personal finance. Based on previous empirical research, it was hypothesized that independent of income, age, and education, SC would predict 1) financial QOL in a relationship mediated by financial behaviors and financial outcomes (Figure 1), and 2) health-related QOL in a relationship mediated by health behaviors (exercise) and health outcomes, (Figure 1). To date, there are no combined health and wealth studies that examine the effects of SC, behaviors, and outcomes on QOL in the same sample.

Method

Participants

Participants were recruited from a database of alumni at a large mid-west university. A power analysis (G*Power 3.1 Software) determined that a sample size of 232 would be sufficient to determine the goodness-of-fit of the predicted models ($p < .05$). According to the sample database center, a 5% response rate could be anticipated from the sample. In order to ensure an adequate sample of completed responses, a total of 40,000 people were invited to participate in the study. The recruitment sample was made up of a random selection of 1,000 alumni from each of the graduating classes from 1963-2003 in order to target individuals 30 years of age or older who were likely financially independent, as well as to include a range of ages. The response rate was 6.1% (N =2,455). Participants were included in each analysis if they completed the survey questions that were tested (i.e. SC, exercise behaviors, and financial behaviors, net worth, health,

health-related QOL, and financial QOL). Thus, completed responses included 1,115 men (58.2 %) and women (41.8 %).

Approval from the Institutional Review Board at the university from which the sample was collected and research was conducted was obtained prior to data collection. Participants were informed of any risks associated with participation as well as the voluntary nature of the study. Completing and submitting an electronic survey is considered implied consent when participants are informed that the study is voluntary and there is no coercion of any kind involved. Therefore, the Institutional Review Board waived the requirement for documentation of consent for this study.

Procedure

Participants were invited via email in the fall of 2011 to participate in the study by completing a series of questionnaires measuring SC, exercise behaviors, financial behaviors, health, net worth, health related QOL, financial QOL, and demographic information. Participants also received a cover letter explaining the voluntary and confidential nature of the study. The survey was closed and data were downloaded from the website three weeks after the email was sent.

Measures

Conscientiousness. The International Personality Item Pool (IPIP), an online version of the Neuroticism Extroversion Openness Personality Inventory-Revised (NEO PI-R; McCrae & Costa, 1987; McCrae & Costa, 1992), measures the five broad dimensions of personality and each facet of the dimensions (Goldberg, 1999; Goldberg et al., 2006). The dimension of Conscientiousness and its facets were the focus of the present study. The NEO PI-R has been determined a valid and reliable measure of personality (McCrae & Costa, 1992). Participants

scored each item on a four step (1-5 point) Likert type scale ranging from disagree strongly (1) to

agree strongly (5) with the degree to which the statement represents perceptions of themselves.

Impulsivity. The Impulsivity construct in Grasmick et al.'s Self-Control Scale (Grasmick

Tittle, Bursik, & Bruce, 1993) was also used to measure SC. Participants scored four items on a

four-step (1-4 point) Likert type scale ranging from strongly disagree (1) to strongly agree (4)

with the degree to which the statement represents perceptions of themselves. Items included the

following statements: 1) acts on the spur of the moment without stopping to think, 2) devotes

much thought and effort to planning for the future, 3) often does whatever brings me pleasure

here and now, even at the cost of some distant goal, and 4) is more concerned with what happens

to me in the long run than the short run. Items two and four were reverse scored. The

Impulsivity questions have been shown to be valid and reliable measure of the impulsivity

dimension of SC (Piquero & Rosay, 1998).

Self-Control. Based on the framework of SC, the facets of Conscientiousness and the

Impulsivity factor from the Grasmic SC Scale were combined to form a composite SC score. In

the current study, the Conscientiousness subscale and the Impulsivity questions were found to be

highly reliable (64 items; $\alpha = .921$).

Exercise behaviors. Exercise behaviors were measured using the International Physical

Activity Questionnaire (IPAQ). The questionnaire includes four items related to amount of

minutes per day and days per week that the individual engages in walking, moderate intensity

activity, vigorous intensity activity, and sitting. The IPAQ is considered a valid and reliable

measure of exercise behavior and has been shown to correlate well with objective measures of

physical activity (Craig et al., 2003).

Financial behaviors. The Financial Behavior Questionnaire is an assessment of

individuals' spending, saving, borrowing, and investing behaviors. Specifically, participants

indicated the extent to which they make plans on how to use money, carry a balance on credit

cards, evaluate spending on a regular basis, keep bills and receipts where they are easy to find,

pay for yearly expenses out of current income or savings, save regularly, pay bills as they are

due, contribute to a retirement fund, and make financial goals. The 9-items in the questionnaire

have been used to measure financial planning behaviors in several studies concerning financial

management (Garrison & Hira, 1992; Titus, Fanslow, & Hira 1989). Participants answered each

item on the questionnaire on a four step (1-5 point) Likert type scale ranging from seldom (1) to

most of the time (5) with the degree to which they engage in the behaviors. In the current study,

the Financial Behavior Questionnaire was found to be reliable (9 items; $\alpha = .71$).

Self-Rated Health. Self-rated health was measured using the self-rated health question

from the state-based Behavioral Risk Factor Surveillance System (BRFSS). The question asked

participants, "Would you say that in general your health is: 1 = Excellent, 2 = Very Good, 3 =

Good, 4 = Fair, 5 = Poor." This self-rated health question is considered a valid and reliable

source of personal health perceptions (Nelson, Holtzman, Bolen, Stanwyck, & Mack, 2001) and

has been shown to be highly correlated ($r = .87$) with other measures of health as well as to

predict mortality (Idler & Benyamini, 1997; Jylhä, Volpato, & Guralnik, 2006; Mackenbach,

Simon, Looman. & Joung, 2002).

Body Mass Index (BMI). BMI is a ratio of height to weight (height m^2/weight kg) and

classifies individuals into the following categories: normal < 24.9, overweight = 25-29.9, and

obese > 30. Participants were asked to self-report their height and weight, from which BMI was

calculated. This method of obtaining BMI has been deemed valid (heigh (r) = .80-.97, weight (r)

= .95) and reliable (height (r) = .98, weight (r) = .90; Nelson, Holtzman, Bolen, Stanwyck, & Mack, 2001).

Net Worth. Net worth equals the value of one's assets minus the value one owes. The following two-part question was used to assess one's net worth: "Enter on the line your best estimate to the following questions. Thinking of your total assets (home value, value of your car, checking accounts, savings accounts, money markets, certificates of deposit (CD), mutual funds, retirement accounts, stocks/bonds, and cash value life insurance) combined, what would you estimate their total value to be? Now think about your financial obligations, approximately what is the total amount that your household owes (mortgages, credit card balances, student loans, car loans, other personal loans, and medical bills)?" This method of obtaining one's net worth was developed and used in consumer finance research (Hira & Loibl, 2008).

Health-related QOL. Health-related QOL was measured using the physical and mental health question from the state-based Behavioral Risk Factor Surveillance System (BRFSS). The question asked, "During the past 30 days, for about how many days did poor physical or mental health keep you from doing your usual activities, such as self-care, work, or recreation? 1 = number of days, 2 = none." Number of poor physical days in the last 30 days measured by this BRFSS question has been shown to correlate well (r = .85) with the overall health-related QOL deficits question from the SF-36 (Newschaffer, Jackson-Thompson, & Counte, 1998) and has been deemed a valid measure of health-related QOL (Nelson, Holtzman, Bolen, Stanwyck, & Mack, 2001).

Financial QOL. The Financial QOL Questionnaire is an assessment of individuals' satisfaction with their financial position. Specifically, participants indicated the extent to which they were satisfied with their current financial situation, the size of their credit card balances,

preparation to meet long-term goals, ability to stay out of debt, amount currently in savings, current level of assets, ability to control financial situation, spending habits, ability to meet large unexpected expenses, and ability to make investment decisions with the money they have saved. Participants answered each item on the questionnaire on a four step (1-5 point) Likert type scale ranging from very satisfied (1) to very dissatisfied (5) with their current financial situation. The 10-items in the questionnaire have been used to measure financial satisfaction in studies concerning financial management (Titus, Fanslow, & Hira, 1989). In the current study, the Financial QOL Questionnaire was found to be highly reliable (10 items; α = .94).

Demographic variables. Pre-tax annual household income is a measure of potential wealth and was assessed using a nine-point scale where 1 < \$15,000, 2 = 15,000-29,999, 3 = 30,000- 44,999, 4 = 45,000- 59,999, 5 = 60,000-74,999, 6 = 75,000-89,999, 7 = 90,000-99,999, 8 = 100,000-149,999, and 9 > 150,000. Age was assessed by subtracting the answer to the following question from 2011, "In what year where you born?" Highest level of education was assessed using a five-point scale where 1 = Grade School, 2 = High School, 3 = Bachelor's, 4 = Master's, and 5 = PhD/MD/equivalent.

Data Reduction and Statistical Analyses

Only participants with completed responses were included in the final analyses. A t-test was used to compare differences in SC among participants with completed responses and those with missing data. There was no significant difference in SC between the participants with completed responses ($M = 270.31 \pm 25.08$) and participants with missing data ($M = 269.67 \pm 24.97$; $t(2,453) = .769$, $p = .442$).

SC is an umbrella term that encompasses constructs from different disciplines (e.g. psychology, neuroscience, behavioral genetics, and behavioral economics) such as impulsivity,

conscientiousness, self-regulation, delay of gratification, executive function, willpower, and intertemporal choice (Moffitt et al., 2011). The current study used a SC composite score with measures from recent psychology and health-wealth research that used the Conscientiousness facets in the IPIP (Goldberg, 1999) and the Impulsivity measure in the Self-Control Scale (Grasmick, Tittle, Bursik, & Bruce, 1993). Each Conscientiousness facet (Self-efficacy, Orderliness, Dutifulness, Achievement Striving, Self-discipline, and Cautiousness) score ranged from 10-50 points (10 questions each with a five-point Likert scale). The Impulsivity measure included four questions with a four-point Likert scale (range 4-16). In order for the Impulsivity facet to have a similar weighting in the SC score as the Conscientiousness facets, the Impulsivity score was multiplied by three and therefore ranged from 12-48. Each of the facets was added together to sum the total SC score, which ranged from 42 (low SC) to 348 (high SC).

Exercise behavior was calculated as the sum of minutes per week of moderate, vigorous, and walking activity multiplied by the metabolic equivalent (MVMETmin/week). The IPAQ defined moderate activity (4 METs) as activities that take moderate physical effort and make you breathe somewhat harder than normal. Vigorous activity (8 METs) was defined as activities that take hard physical effort and make you breathe much harder than normal. Walking (3.3 METS) was included at work and at home, walking to travel from place to place, and any other walking that might be done solely for recreation, sport, exercise, or leisure. Participants were asked to report only those physical activities that they did for at least 10 minutes at a time.

Financial behaviors were assessed using a 9-item questionnaire with answers ranging from 1-5 (1 being never and 5 being most of the time). Items were added together to compute a financial behavior composite score that ranged from 9 (poor financial behaviors) to 45 (good financial behaviors).

The composite health score included BMI (kg/m^2) and self-rated health. BMI score was calculated based on clinical BMI categories (Center for Disease Control, 2011) and were coded as follows: $1 = < 25$, $2 = 25\text{-}29.9$, $3 = 30\text{-}32.4$, $4 = 32.5\text{-}35$, and $5 => 35$. Self-rated health scores were reported on a five-point Likert scale and were coded as $1 = $ Excellent, $2 = $ Very Good, $3 = $ Good, $4 = $ Fair, $5 = $ Poor. Composite health scores were computed by adding the BMI coded variable and the self-rated health score (BMI + SRH = composite health score). Thus, composite health scores ranged from 2-10. The wealth score was based on net worth and was computed as follows: sum of assets – sum of debts.

Health related QOL was equal to the number of days reported that poor physical or mental health prevented them from doing their usual activities, such as self-care, work, or recreation. Participants were asked to consider the last 30 days when answering this question. Thus, scores ranged from 0-30. Financial QOL was assessed using a 10-item questionnaire with answers ranging from 1-5 (1 being very satisfied and 5 being very unsatisfied). Items were added together to compute a financial QOL composite score that ranged from 10 (poor financial quality of life) to 50 (good financial QOL).

Prior to testing the hypothesis, descriptive statistics (mean ± *SD*) were calculated for all measures included in the current study. Correlations between the financial model variables (Table 1) and between the health model variables were calculated (Table 2). Causal model testing was conducted using two steps: predicted model testing and modified model testing. First, chi-square tests were used to determine the goodness-of-fit of the predicted models (Figure 1) based on the R^2 value results of the fully recursive model. Secondly, the predicted models were modified (Figure 2) and again compared to R^2 values of the fully recursive model using chi-square tests (Pedhazur, 1982). Income, age, and education are demographic variables that

have been shown in the past to be related to health and finance, so they could confound the results of the study. Therefore, these were controlled for in each analysis. Basic assumptions for linear models were checked and met. The regression analyses were performed using IBM SPSS Statistics 19 (IBM Corporation, Somers, NY).

Results

Descriptive Statistics

Participants in the final analyses included 1,115 men (58.2 %) and women (41.8 %) and represented a range of ages (29-91) with a mean age of 54.5 ± 11.4 years. Regarding education, 44% reported having earned a bachelor's degree, 35% a master's degree, and 20% a PhD/MD or equivalent. Since the sample was taken from a pool of university alumni, it was expected participants would be highly educated. Participants reported high pre-tax gross annual household incomes ($M =$ \$95,000, $SD =$ \$35,000) relative to the average national income (\$51,914; U.S. Census Bureau, 2010).

Correlations Among Model Variables

Pearson correlations were used to examine whether there was an association among variables for the predicted models: 1) SC, financial behavior, net worth, financial QOL, income, age, and education, and 2) SC, exercise, composite health, health-related QOL, income, age, and education. All correlations were significant for the relationships hypothesized in the model. Specifically, SC was significantly correlated with financial behaviors ($r(1,113) = .42, p < .001$), net worth ($r(1,113) = .10, p < .001$), and financial QOL ($r(1,113) = .20, p < .001$). Financial behavior was significantly correlated with net worth ($r(1,113) = .16, p < .001$) and financial QOL ($r(1,113) = .16, p < .001$). Net worth and financial QOL were significantly correlated ($r(1,113) = .15, p < .001$). Furthermore, SC was significantly correlated with exercise behavior ($r(1,113) =$

.11, $p < .001$), health ($r(1,113) = .18$, $p < .001$), and health-related QOL ($r(1,113) = .15$, $p < .01$).

Health was significantly correlated with exercise behavior ($r(1,113) = .20$, $p < .001$) and health-related QOL ($r(1,113) = .22$, $p < .001$).

Analyses for Models

The present study involved a test of two models: a financial model predicting the effects of SC on financial QOL mediated by financial behaviors and financial outcomes, independent of income, age, and education, and a health model testing the effects of SC on health-related QOL mediated by health behaviors (exercise) and health outcomes, independent of income, age, and education (Figure 1). Before testing these models, it was determined that the basic assumptions underlying linear models were met (linearity, independence and homoscedasticity of the errors, and normality of the error distribution[2]). Regression analyses were conducted to evaluate the ability of the two hypothesized models to account for the associations among the variables. Chi-square tests of the fit of the predicted models to the data were performed to examine whether the observed associations among the variables could be accounted for by the predicted financial and health model (Pedhazur, 1982).

Financial Model. The results of the regression analyses for the predicted financial model revealed that all hypothesized paths were statistically significant ($p < .001$). Specifically, after controlling for income, age, and education, SC significantly predicted financial behaviors ($t(1,110) = 15.37$, $p < .001$), financial behaviors significantly predicted net worth ($t(1,110) = 3.40$, $p < .001$), and net worth significantly predicted financial QOL ($t(1,110) = 6.60$, $p < .001$). The chi-square test determined there was a significant difference between the predicted and

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[2] The exercise and health-related quality of life variables were positively skewed and the financial QOL variable was negatively skewed, so a log transformation was used to normalize the distribution. The linear regression was rerun using these new variables and the significance of the relationship between the predictor and criterion variables did not change. The log transformation of the exercise variable was used for the analyses.

observed covariance matrices for the financial model (χ^2 (3, $N = 1,115$) = 303.27, $p < .05$).

There was a significant chi-square value indicating that the model did not fit the data. While

each path in the predicted model was significant, an additional significant path emerged when

testing the fully recursive model (i.e. including all of the direct links allowed by the causal

ordering). Specifically, financial behavior directly and significantly predicted financial QOL

($t(1,109) = 19.40, p < .05$) when holding constant income, age, education, and net worth. The

model was modified by adding this causal pathway.

The chi-square test was re-run with the modified model and the fully recursive model and

showed no significant difference (χ^2 (2, $N = 1,115$) = 2.64, $p > .05$) indicating the modified

model fits the observed data well. Figure 2 displays the final modified financial model with the

standardized *beta* weights and R^2 values. The model demonstrates that SC predicted Financial

QOL through the mediating variables financial behaviors and net worth. Financial behaviors

directly predicted financial QOL as well as indirectly predicted financial QOL in a relationship

mediated by net worth.

Health Model. The results of the regression analyses for the predicted health model

revealed that all hypothesized paths were statistically significant ($p < .001$). Specifically, after

controlling for income, age, and education, SC significantly predicted exercise behavior ($t(1,110)$

= 3.57, $p < .001$), exercise behavior significantly predicted health ($t(1,110) = 6.30, p < .001$), and

health significantly predicted health-related QOL ($t(1,110) = 4.15, p < .001$). The chi-square test

determined there was a significant difference between the predicted and observed covariance

matrices for the health model (χ^2 (3, $N = 1,115$) = 23.75, $p < .05$). There was a significant chi-

square value indicating that the model did not fit the data. While each path in the predicted

model was significant, two additional significant paths emerged when testing the fully recursive

model. Specifically, SC directly and significantly predicted health ($t(1,110) = 3.82, p < .001$) and health-related QOL ($t(1,109) = 3.00, p < .01$) when holding constant income, age, education, and exercise behavior. The model was modified by adding these causal pathways.

The chi-square test was re-run with the modified model and although there was a significant improvement over the predicted model, there was still a significant difference between the modified model and the fully recursive model (χ^2 (1, $N = 1,115$) = 6.68, $p < .05$). Figure 2 displays the final modified health model with the standardized *beta* weights and R^2 values. The model demonstrates that SC predicted health-related QOL through the mediating variables exercise behavior and health. SC also directly predicted health and health-related QOL.

Discussion

The psychological trait examined in the present study was Self-Control, which is characterized by the ability to control emotions and behaviors, be task- or goal-driven, be planful, delay gratification, and persist despite set-backs (Miller, Barnes, & Beaver, 2011; Moffitt et al., 2011). The purpose of this study was to examine a new model of SC as a predictor of QOL, mediated by behaviors and outcomes related to health and personal finance. Based on previous empirical research, it was hypothesized that independent of income, age, and education, SC would predict 1) financial QOL in a relationship mediated by financial behaviors and financial outcomes, and 2) health-related QOL in a relationship mediated by health behaviors (exercise) and health outcomes (see Figure 1). The findings supported the predicted paths in the hypothesized models as well as three additional significant paths that emerged in the model of best fit (see Figure 2). Specifically, these additional paths demonstrated that financial behaviors predicted financial QOL, SC predicted health, and SC predicted health-related QOL.

As hypothesized, SC directly predicted financial behaviors (explaining 21% of the variance in financial behaviors when controlling for income, age, and education), which is a relationship that has been demonstrated in previous research (Tanaka, & Murooka, 2012). SC also indirectly predicted 18% of the variance in net worth in a relationship mediated through financial behaviors. These results are also in agreement with previous research that has shown that financial behaviors predict financial outcomes, i.e. net worth (Titus, Fanslow, & Hira, 1989). However, the current study is the first to demonstrate that SC predicts net worth in a relationship mediated by financial behaviors. Furthermore, as hypothesized, net worth directly predicted financial QOL, which supports findings in previous research (Hansen, Slagvold, & Moum, 2008; Titus, Fanslow, & Hira, 1989) Lastly, an additional path emerged, which was that financial behaviors directly predicted financial QOL. Financial behaviors and net worth combined explained 35% of the variance in financial QOL when controlling for income, age, and education, which is considered a large effect (Cohen, 1988). The direct relationship that emerged from financial behaviors to financial QOL demonstrates that (independent of the effects on net worth, and independent of peoples' income, age, and education), people who practice positive and intentional financial behaviors report that they are more satisfied with their financial status. It is quite possible that people who are intentional about their finances by making a plan, saving regularly, and avoiding debt are more satisfied with their financial status regardless of their net worth, because they have decided to 'tell their money where to go instead of wonder where it went.' This finding suggests that people who make a plan with how to use their money and follow through with it are ultimately more satisfied with the outcome than people who do not think about their financial future. The current study is the first to demonstrate a link between SC and financial QOL via the mediating variables financial behaviors and net worth.

As expected, SC also directly predicted exercise behavior (explaining 3% of the variance in exercise behavior) when controlling for income, age, and education, which is a relationship that has been demonstrated in previous research (Courneya, Bobick, & Schinke, 1999; Ingledew, Markland, & Sheppard, 2004). Additionally, SC directly predicted health and indirectly predicted health in a relationship mediated through exercise behavior (explaining 6% of the variance in health). These results are in agreement with previous research that has shown that exercise predicted health outcomes (Lee & Skerrett, 2001). It is logical that SC also directly predicted health because there are a number of other important health behaviors besides exercise that were not measured in the current study. There are a wide range of habits that were not measured related to diet, drug use, sexual behaviors, and other behaviors that have been shown to predict health outcomes (Mokdad, Marks, Stroup, & Gerberding, 2004) and could further explain the direct path from SC to health. Nonetheless, the present study is the first to demonstrate a mediation relationship between SC, exercise behaviors, and health outcomes. However, the entire health model demonstrated a small effect for the health-related QOL outcome variable (explaining only 3% of the variance in health-related QOL), but one that constitutes a meaningful relationship according to Cohen (1988). Although the results determined that the modified health model was still significantly different from the fully recursive model, the fit of the modified model was much improved from the hypothesized model. The current study is the first to demonstrate that SC predicts health-related QOL via the mediating variables exercise behavior and health.

Though these results are encouraging and provide useful information about the complex relationship between SC, health, wealth, and QOL, there were several limitations in the present study that need to be considered when interpreting the results. Firstly, the homogeneous nature

of the sample, in that participants were all college graduates with a relatively high income, restricts the variability of the responses and may result in a decrease in the amount of variance predicted. The results may be even more insightful if the study was replicated with a sample more representative of the general population. Secondly, the current study measured exercise behavior as the only behavior included as a predictor of health. Future research should measure additional health behaviors in order to explain a larger amount of the variance in health. Finally, because the health-related QOL question only measured the extent to which people were limited, it may not have captured the variance in other dimensions of health-related QOL associated with facets such as vitality, social functioning, or physical functioning. Therefore, measuring additional dimensions of health-related QOL may have uncovered a greater range in responses and more clearly differentiate between individual levels of health-related QOL.

The findings in this research suggest that SC is linked to financial behaviors to a greater extent than exercise behavior. However, it is possible that the physical activity measure prevented the true amount of intentional exercise from being revealed, because it measured general physical activity and not exercise explicitly. The physical activity questionnaire used in the present study would categorize people who have sedentary jobs, but exercise daily, as less physically active than a person who does not intentionally exercise, but has a very active job. The purpose of the present study was to examine the extent to which SC would be related to exercise behavior. Therefore, it is recommended that future research examining SC and exercise should use an exercise questionnaire that measures leisure time exercise and not total physical activity accumulated throughout the day.

Furthermore, it is possible that the health-related QOL measure did not fully capture the extent to which a person with high SC experienced health problems. The health-related QOL

measure assessed the number of days a person was unable to perform their regular activities due to poor physical or mental health. One of the defining characteristics of individuals with high SC is that they persist despite setbacks. Therefore, it is possible that if they had poor health problems, they did not report them because they do not allow such things to stop them from their usual activities. Future research should use a more in-depth health related QOL measure that assesses a persons perceptions of their health related QOL in addition to the number of days that they were limited.

The results of the present study support that it is not likely that a person can compartmentalize their life and have success in one area while neglecting another. Instead, the tendency to be self-controlled in one area of life likely spills over into other areas. Therefore, interventions that aim to improve general SC, in addition to domain specific SC, could lead to benefits in several areas of life. In addition to health and finance, future research should examine the effects of SC in other areas of life such as relationships and career success.

Since SC cannot be randomly assigned, a prospective cohort design is the ideal method to examine the effects of SC on health and wealth outcomes over time. Moffitt el al. (2011) found that increases in SC predicted improvements in health and wealth over time in a 30-year prospective cohort study of children and young adults. The results of the present study indicate there is a relationship in adults that is consistent with Moffitt et al. (2011) and is worthy of further investigation. Future research should examine the effects of SC on health and wealth longitudinally in middle aged and older adults in order to determine the extent to which a causal relationship between SC and health-wealth out comes exists in adults. If the results hold true in an adult sample, it is possible that SC initiatives aimed at improving health and financial behaviors may lead to increased health and financial outcomes and improved QOL. In the

present study, the results demonstrated that people who reported living intentionally and being goal directed in the areas of their health and finances also reported that they practiced more positive health and financial behaviors. Furthermore, those that reported healthier behaviors had a better health and financial status. Ultimately, individuals with better health and wealth status reported higher QOL.

In addition to SC interventions aimed at increasing individual level SC, policy makers could consider the SC obstacles faced by most people and design public policies in ways that encourage people to make better decisions. Behavioral economics research by Thaler and Sunstein (2009) explains that it is possible to 'nudge' people in the direction that will result in a better QOL by designing programs that aid SC and better decisions. Programs can increase positive behaviors through decreasing the need for effortful SC by carefully designing default options, incentives, and giving feedback. An example of a program design that has increased positive financial behaviors is employer sponsored retirement plans that are 'opt-out' verses 'opt-in.' Since most people choose the path of least resistance requiring the least amount of SC, default options can be very powerful. To date, there has been some research to support choice architecture and the effects on wealth related out comes and a limited amount of research examining the effects on health related outcomes (Thaler & Sunstein, 2009). Future research should examine the effects of program design on health related decisions and behaviors that have an ultimate influence on outcomes determining QOL.

In conclusion, the present study demonstrated that people with higher SC, who set goals, make a plan, and execute it despite setbacks, reported that living intentionally in the areas of health and finance corresponds with greater exercise participation and positive financial behaviors. Furthermore, these positive health and financial behaviors predicted better health-

wealth outcomes and higher QOL, though this relationship may be stronger for financial behaviors than for health behaviors. Further research with the assessment of a broader range of health behaviors, and the assessment of SC strategies and environments that increase Self-Controlled behaviors, is warranted.

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Table 1

Correlations Between Financial Predictors and Criterion Variables

Measures	Age	Education	SC	Financial Behaviors	Net Worth	Financial QOL
Income	-.11**	.11**	.11**	.24**	.25**	.11**
Age		.20**	.10*	-.01	.29**	.20**
Education			.02	.01	.06	.08*
SC				.42**	.10**	.20**
Financial Behavior					.16**	.15**
Net Worth						.15**

*Note *p < .01, ** < .001*

Table 2

Correlations Between Health Predictors and Criterion Variables

Measures	Age	Education	SC	Exercise Behavior	Health Composite	Health-Related QOL
Income	-.11**	.11**	.11**	-.06	-.06	.20**
Age		.20**	.10*	.14**	-.06	-.04
Education			.02	.03	.03	.00
SC				.11**	.18**	.15*
Exercise Behavior					.20**	.10
Health Composite						.22*

*Note *p < .01, ** < .001*
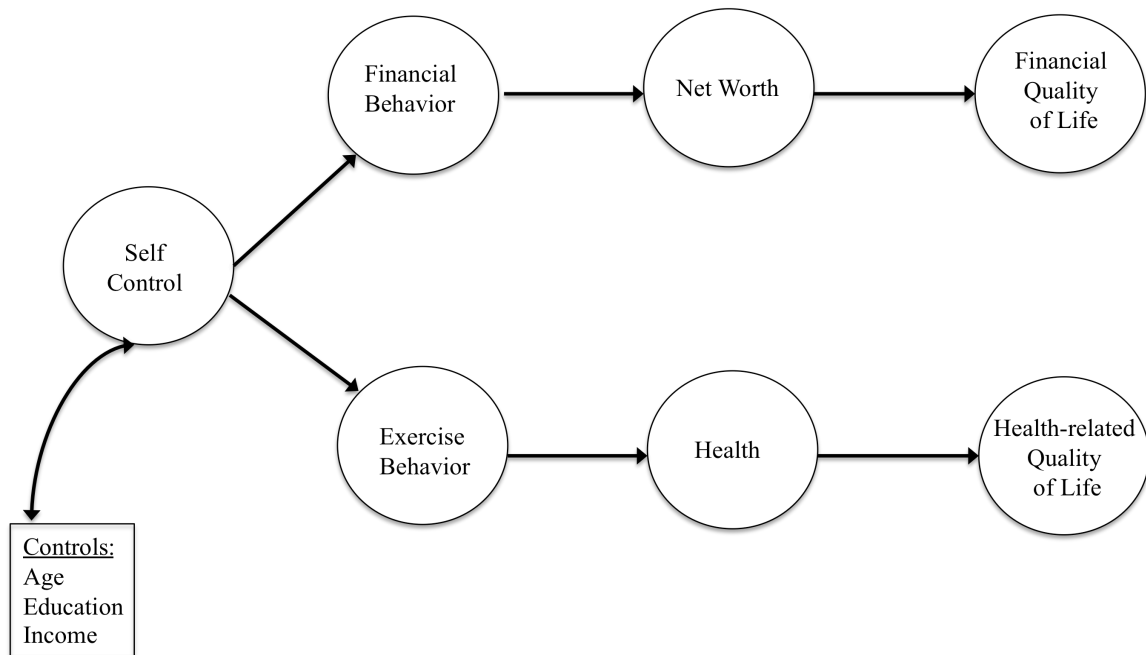
Figure 1. Predicted Financial and Health Model
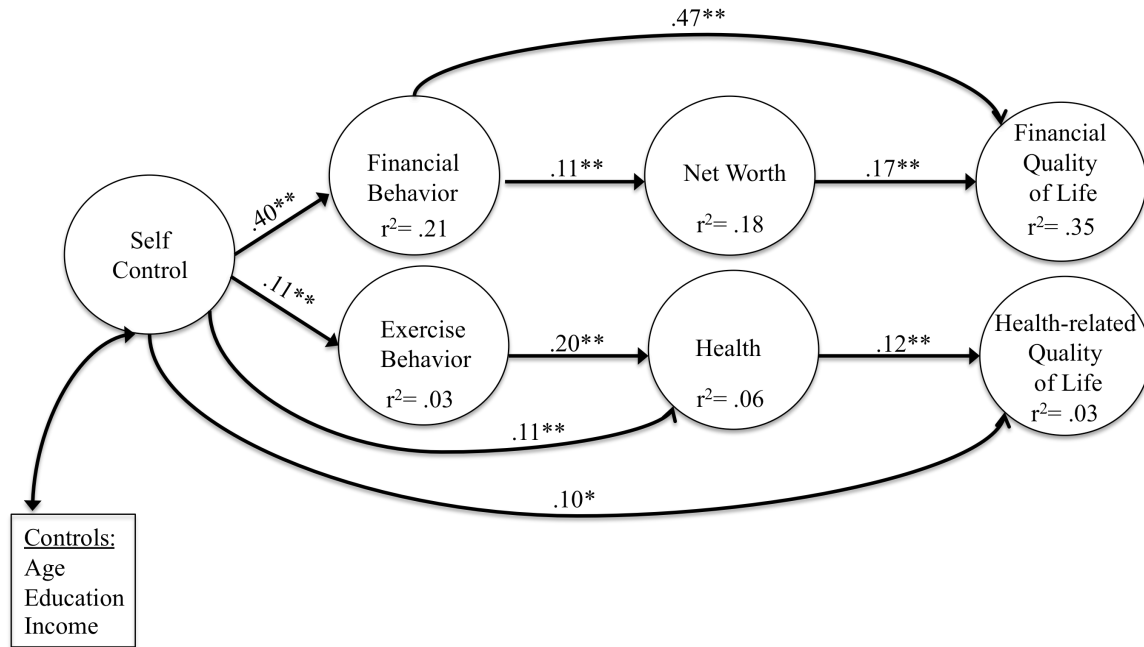
Figure 2. Modified Financial and Health Model, *p < .01, ** < .001.*

CHAPTER 5

GENERAL DISCUSSION

The last 30 years has witnessed a drastic increase in obesity and consumer debt. Recent research has shown that level of Self-Control (SC), the ability to control emotions and behaviors, be goal-driven, delay gratification, and persist despite set-backs (Miller, Barnes, & Beaver, 2011; Moffitt et al., 2011), may underlie this trend and the relationship between health and wealth. A series of three studies were conducted to examine the role of SC in the health-wealth relationship in a sample of 1,115 college alumni (age = 54.5 ± 11.4; 58.2 % male).

The results of the first study showed that SC was significantly higher among healthier (F (2, 1293) = 17.5, d = .31) and higher net worth groups (F (2, 1318) = 11.36, d = .23, p < .001) when controlling for income, age, and education. Broadly stated, those who prospered in their health and finances reported higher SC than those who struggled across income level, across six decades of life, and independent of education level. The second study aimed to examine behaviors that may underlie this trend. The results demonstrated that SC positively and significantly predicted exercise behavior (β = .11, t(1,315) = 3.54, p < .001) and financial behavior (β = .40, t(1,315) = 15.37, p < .001). Thus, people who reported higher SC, engaged in more positive health and financial behaviors. This suggests that SC may lead to positive behaviors that result in more favorable health and financial outcomes. The third study built on the results of study one and two by testing a mediation model examining the effects of SC on QOL through health-wealth behaviors and outcomes. The results showed that SC significantly and indirectly predicted financial QOL in a relationship that was significantly mediated by financial behaviors and net worth (R^2 = .35, p < .001). SC also significantly, directly and indirectly, predicted health-related QOL in a relationship that was significantly mediated by

exercise and physical health. However, this model explained a much smaller amount of the variance in QOL than the financial model did ($R^2 = .03, p < .001$). Upon first evaluation it may be interpreted that SC has a stronger relationship with financial QOL (and its mediators) than it does with health related QOL. However, it is also plausible that measurement limitations influenced the health-related results (e.g., only one health behavior was measured). These methodological issues need to be addressed in future research before conclusions can be drawn about the strength of the relationship between SC and health-related behaviors and outcomes.

Overall, the results of this project demonstrated that people with higher SC, who set goals, make a plan, and execute it despite setbacks, reported that living intentionally corresponds with greater exercise participation and more positive financial behaviors. Furthermore, these positive health and financial behaviors predicted better health-wealth outcomes and ultimately higher QOL. The findings of this research build upon Zargorsky's (2004, 2005) health-wealth research, which demonstrated a relationship between body mass index (BMI) and wealth (independent of income, age, and education), by examining a common factor (SC) that may underlie both health and wealth. Furthermore, the current research expanded the health measure used in Zagorsky's research (i.e., BMI) to also include perceived general health, which makes the health measure more comprehensive. The current research also builds on Moffitt et al.'s (2011) study, which demonstrated that SC predicted health and wealth of young people in a 30-year longitudinal design. The present research demonstrates that this predictive relationship continues in middle and late adulthood. In addition to measuring SC, health, and wealth outcomes, the current research also extended previous research by demonstrating behavioral mediators (physical activity and financial behaviors) that provided some explanation for the relationship that SC has with both health and wealth. This research is the first demonstrate a

common variable (SC) that predicts health and wealth outcomes in adults over 30, independent of age and socioeconomic status, in a relationship mediated by domain specific behaviors.

Explaining the relationship between health and wealth has been an ongoing challenge for social scientists. It has traditionally been suggested that causation has run from health to wealth or from wealth to health. The results of this research demonstrated that a historically under-observed common factor, i.e. SC, may drive health and wealth in similar ways. Although a cause and effect relationship cannot be determined by the relationships demonstrated in the results of this research, the data did fit the proposed model that SC influences health and wealth outcomes. This research highlights the importance of including SC alongside education, income, and age as a factor that may influence the health-wealth relationship. Omitting SC from research concerning health and wealth disparities would overlook an important piece of the puzzle. Furthermore, the results of this research suggest a holistic approach to the problem, meaning that it is not likely a person can compartmentalize their life and do well in one area while neglecting another. Instead, this research supports that the tendency to be self-controlled in one area of life spills over into other areas. These findings demonstrate the need for more interdisciplinary work in the field of health and wealth.

The results of the current research suggest that health and financial success is not about a one-time grandiose decision, but rather the accumulation of small seemingly insignificant choices that are made every day. Like choosing to wake up and go on a run when the alarm goes off versus sleep for another 30 minutes. Individuals with high SC tend to believe that there is a long-term cost to taking short cuts. There are a number of reasons why a highly self-controlled individual might choose to delay gratification. It could be that they prefer to sacrifice in the short-term in order to reap the benefits in the long term. Perhaps more likely, it could be that

they see discipline in the short term not as a sacrifice, but as a deposit into a rich future.

Regardless, in the current society where immediate gratification is just a credit card swipe away,

individuals with high SC separate themselves because they think differently, behave differently,

and have different results.

Future Research

The observed data in the present research were consistent with the proposed conceptual

model that SC predicts health and wealth in a relationship mediated through behaviors.

However, in order to determine a cause and effect relationship with certainty, future research

should use a prospective cohort design to compare the effects of SC on health and wealth over

time between individuals who are high verses low SC. Because SC cannot be randomly

assigned, a prospective cohort study would be ideal to take steps closer to understanding the true

role of SC in the health and wealth relationship. Moffitt et al. (2011) examined the effects of SC

on health and wealth outcomes in a prospective cohort design over the course of 30 years in a

sample of children. A similar design using a sample of adults and measuring behaviors in

addition to outcomes would further clarify the potential causal effects of SC and the behavioral

mechanisms driving health and wealth outcomes. Such research should also seek to include more

measures of health behaviors and outcomes that were included in the present research, in order to

address whether SC really is a stronger predictor of financial behaviors and outcomes than

health-related factors.

Although personality is generally thought of as stable, research of individuals with

anxiety and depression has shown that, with training, SC can be improved in children,

adolescents, and adults (Febbraro & Clum 1998; Francis, Mezo, & Fung, 2012). Self-

monitoring, self-evaluating, and self-reinforcing are basic SC skills (Bandura, 1991) that may be

effective in combating the present day temptations and distractions that compete with health and financial well-being. In order to best design SC interventions, future research should further examine specific practices and thought processes of individuals with high and low SC, so that SC strategies can be more clearly defined. Specifically, highly self-controlled individuals may avoid engagement in thought processes such as rationalization, moral licensing, self-sabotaging coping mechanisms, self-criticism, and deceptive fatigue, because they are likely to lead to compromising one's commitments (McGonigal, 2012). For example, when individuals with low SC break their commitments for something easier, they may have engaged in rationalizing their procrastination or indulgence by telling themselves 'that it will only happen this one time.' Whereas, the individual with high SC may be more self-aware of such self-defeating thoughts, and as a result are able to combat temptations and remember what they *really* want. Future research should take a qualitative approach to uncovering best practices of the highly self-controlled, and self-defeating habits of those with low SC, in order to best design SC interventions and understand the thought processes behind daily decisions.

In addition to SC interventions aimed at increasing individual level SC, policy makers could consider the SC obstacles faced by most people and design public policies in ways that encourage people to make better decisions. Behavioral economics research by Thaler and Sunstein (2009) explains that it is possible to 'nudge' people in the direction that will result in a better QOL by designing programs that aid SC and better decisions. Programs can increase positive behaviors through decreasing the need for effortful SC by carefully designing default options, incentives, and giving feedback. An example of a program design that has increased positive financial behaviors is employer sponsored retirement plans that are 'opt-out' verses 'opt-in.' Since most people choose the path of least resistance requiring the least amount of SC,

default options can be very powerful. To date, there has been some research to support choice architecture and the effects on wealth related out comes and a limited amount of research examining the effects on health related outcomes (Thaler & Sunstein, 2009). Future research should examine the effects of program design on health based decisions and behaviors that have an ultimate influence on outcomes and QOL.

Should future research determine a cause-effect relationship between SC and both health and wealth, interventions targeting SC strategies would be a valuable investment leading to a better financial status, more positive health outcomes, and better QOL. Increasing the ability to delay gratification, control emotions and behaviors, and follow through with intentions despite setbacks could potentially lead to behaviors such as increased exercise and healthy eating, as well as saving money and refraining from over borrowing.

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APPENDIX A: E-MAIL INVITATION LETTER

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

College of Human Sciences
Department of Kinesiology
235 Barbara E. Forker Building
Ames, Iowa 50011-1160
515 294-8009

Dear [NAME],

The United States has a growing need for improvement of community health and financial literacy education programs. Researchers at Iowa State University are asking for your help in learning about the thoughts of ISU Alumni related to their health and financial status. The goal of this research is to learn more about the personalities and practices of individuals in their health and finances.

The results may be used for publications, future research, and fund-seeking initiatives related to community health and personal finance related issues.

As an ISU Alumni, you have been contacted to participate in this important study, to examine the thoughts and behaviors of college graduates. Please click on the link and complete the survey as soon as possible. It should take less than 15 minutes of your time. The survey is located at the following link: http://humansciences.iowateachers.sgizmo.com/s3/.

Your participation in this study is completely voluntary and you may refuse to participate. If you decide to not participate in the study, it will not result in any penalty. You can skip any questions that you do not wish to answer. Additionally, there are no foreseeable risks at this time for participating in this study.

Although your participation in this study is voluntary, it is important that your opinions and experiences are included so that we obtain an accurate understanding of current health and financial service needs. No identifying information will be collected or retained. The data will be retained until the analysis is complete whereupon, the data will then be destroyed. If the results are published, your identity will remain anonymous.

If you have any questions about the survey, please contact the Principal Researcher at **(515) 294-2953.** You may also email me at **kira@iastate.edu.**

Thank you very much for your help.

Sincerely,

Kira Werstein, MA   Amy Welch, PhD
Principal Researcher   Advising Professor
Kinesiology Department   Kinesiology Department
kira@iastate.edu   amywelch@iastate.edu
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APPENDIX B: STUDY 3 REGRESSION TABLES

The following tables were added to the appendices to supplement the dissertation, but are not intended to be included in the manuscript when submitted for publication.

Modified Models

Table 3.

Regression Analysis Summary for Variables Predicting Financial Behavior

	b	SE b	Beta	t
Income	.46	.06	.20**	7.635
Age	-.01	.01	-.01	-.057
Education	-.10	.15	-.02	-.653
Self-Control	.08	.01	.40**	15.37

Note: R^2 = .21 (N = 1,115, $p < .001$)

**$p < .001$

Table 4.

Regression Analysis Summary for Variables Predicting Net Worth

	b	SE b	Beta	t
Income	191561.98	20080.95	.26**	9.561
Age	42478.90	3526.08	.32**	12.15
Education	-64358.71	48906.61	-.04	-1.32
Financial Behaviors	31814.20	9350.78	.11**	4.04

Note: R^2 = .18 (N = 1,115, $p < .001$)

**$p < .001$

Table 5.

Regression Analysis Summary for Variables Predicting Financial Quality of Life

	b	SE b	Beta	t
Income	.54	.12	.12**	.99
Age	.16	.02	.21**	8.26
Education	.42	.30	.38	1.90
Net Worth	1.337E-6	.00	.23**	6.60
Financial Behaviors	.88	.05	.47**	19.40

Note: $R^2 = .35$ (N = 1,115, $p < .001$)

**$p < .001$

Table 6.

Regression Analysis Summary for Variables Predicting Exercise Behavior

	b	SE b	Beta	t
Income	-.03	.02	-.06	-1.85
Age	.01	.01	.13**	4.11
Education	.02	.04	.02	.61
Self-Control	.01	.001	.11**	3.54

Note: $R^2 = .03$ (N = 1,115, $p < .001$)

**$p < .001$

Table 7.

Regression Analysis Summary for Variables Predicting Health

	b	SE b	Beta	t
Income	-.03	.02	-.04	-.74
Age	-.01	.01	-.04	-1.06
Education	.04	.06	.02	.45
Exercise Behavior	.32	.05	-.20**	6.303
Self-Control	.01	.00	.11**	3.82

Note: R^2 = .06 (N = 1,115, $p < .001$)

**$p < .001$

Table 8.

Regression Analysis Summary for Variables Predicting Health-Related Quality of Life

	b	SE b	Beta	t
Income	.11	.05	-.07*	2.02
Age	-.02	.01	-.08*	-2.18
Education	.20	.11	.06	1.70
Health	.28	.06	.12**	3.53
Self-Control	.01	.00	.09*	3.00

Note: R^2 = .03 (N = 1,115, $p < .001$)

**$p < .001$, *$p < .05$

Table 9.

R² Values for the Predicted, Fully Recursive, and Modified Financial Model

	Financial Behaviors	Net Worth	Financial QOL
Predicted	.213	.175	.149
Fully Recursive	.213	.175	.352
Modified	.213	.175	.350

Table 10.

R² Values for the Predicted, Fully Recursive, and Modified Health Model

	Exercise Behavior	Health	Health-Related QOL
Predicted	.033	.044	.027
Fully Recursive	.033	.057	.036
Modified	.033	.057	.028

APPENDIX C: REVIEW OF LITERATURE

The following section contains a review of literature pertaining to QOL, health outcomes, wealth outcomes, personality, and behavior management practices that relate to health and wealth.

Quality of Life

Broadly defined, QOL is a combination of objective indicators and subjective perceptions in a range of areas of life and individual values (Felce & Perry, 1995). One's overall life satisfaction is multidimensional and is made up of major domains relevant to QOL including physical wellbeing, material wellbeing, social wellbeing, development and activity, and emotional wellbeing (Stark & Goldsbury, 1990). Each domain is comprised of more specific facets. Each area also has a specific objective measure, such as BMI or net worth, and a subjective measure, such as one's perceptions of their BMI or net worth.

Health and wealth components make up a large part of the QOL model. Health is a major determinant of the physical wellbeing domain and wealth is a determinant of one's material wellbeing. Additionally, research shows that changes in objective facets of life may change satisfaction in that particular area (Felce & Perry, 1995). Therefore, it appears that if one improves objective health indicators such as BMI and objective wealth indicators such as net worth, this will improve their QOL.

A growing body of research has demonstrated this improvement of QOL in health related interventions (Kolotin, Meter, & Williams, 2001). In a study by Blissmer et al. (2006), health related quality of life (HRQL), specifically the physical components, significantly improved following a 24-month weight loss intervention of 144 men and

women, where the average participant lost and maintained 5% of body weight.

Additionally, higher degrees of BMI are related to greater impairment in HRQL

(Fontaine & Barofsky, 2001).

Research has also shown that financial interventions improve QOL. A study by

Postmus, Plummer, and Murshid (2010) examined a financial literacy curriculum for

survivors of domestic abuse. Their longitudinal evaluation of 121 survivors, found that

this curriculum significantly improved individual perceptions of economic

empowerment, self-efficacy, and QOL. This research highlights the evidence that an

improvement in one's objective financial circumstance may improve one's perceptions of

their financial circumstance, and thus improve QOL.

Research on obesity and wealth interventions has found improvements in QOL with

independent studies (Kolotin, Meter, & Williams, 2001; Postmus, Plummer, and

Murshid, 2010). Currently, there is no research on the combined influence of obesity and

wealth on QOL. Since research has shown a relationship between obesity and wealth

variables, as well independent relationships between the obesity and wealth effects on

QOL, this suggests that it may be valuable to examine the combined influence of obesity

and wealth on QOL.

Obesity Epidemic

Research shows that obesity is detrimental to one's health, because it increases

the likelihood of incurring several major diseases including diabetes, heart disease, and

some cancers (Must, Spadano, Coakley, Field, Colditz, & Dietz, 1999). The wide spread

growth of adults in the United States classified as obese and overweight is considered an

epidemic (Center for Disease Control, 2009). According to the CDC, over weight and

obesity has increased exponentially since the mid seventies. In 1960 less than half of the population was over weight (31.5%) and obese (13.3%) totaling 44.8%. However, since then rates have increased drastically. Over two thirds of adults in the current US population are overweight (32.1%) and obese (35.2%) totaling 67.3% (Center for Disease Control, 2006). These increases in obesity are in all ages, races, education levels, and both genders (Mokdad, Ford, Bowman, Dietz, Vinicor, Bales, & Marks, 2003).

Obesity is an important public health issue, because it is detrimental to health, decreases QOL, and causes extra health care related expenses both to the individual and to the public (Kolotkin, Crosby, & Williams, 2002; Wolf & Colditz, 1998; Wolf, 1998). Excess body fat increases one's risk for high blood pressure, type two diabetes, high cholesterol, coronary heart disease, gallbladder disease, and osteoarthritis (Must et al., 1999). In addition to the increased risk of fatal health conditions, research shows excess body fat resulting in overweight and obese conditions decreases one's QOL (Kolotkin et al., 2002). These decreased ratings of QOL due to obesity are a result of a decline in general health, physical, social and emotional functioning, and vitality (Fontaine, Cheskin, & Barofsky, 1996). Doctors and insurance companies have long known that medical bills are higher for the obese, but there is more to the cost of obesity than simply the diagnosis and treatment of this condition (Wolf & Colditz, 1998; Wolf, 1998). The real-life cost of obesity also includes things like employee sick days and lost productivity (Wolf, 2002). US citizens are paying a high price as a society for obesity in terms of higher insurance premiums, loss of productivity, and earlier deaths (Wolf & Colditz, 1996).

Evidence suggests that obesity has multiple causes. Genetic, environmental, psychological, and lifestyle may each be a component of an individual's body weight (Clark, 2007). While genetics may contribute to a person's body weight, genes do not necessarily destine people to lifetime of obesity. Many people who are genetically predisposed to obesity do not become obese or manage to lose weight and keep it off through maintaining a healthy calorie balance (Clark, 2007).

Body Mass Index (BMI)

Body composition is not the sole indicator of health, but it is influenced by health behaviors such as diet and exercise and it is a risk factor for developing major diseases such as diabetes and heart disease (Must, Spadano, Coakley, Field, Colditz, & Dietz, 1999). One measure of body composition is BMI, which is a ratio of height to weight (height in meters squared divided by weight in kilograms). BMI classifies individuals in to four different categories, which are underweight (<18.5), normal (= 18.5-24.9), overweight (= 25-29.9), and obese (>30). There are limitations of using BMI as a measure of body composition, because BMI is a simple ratio of weight and height, which makes assumptions about lean mass and fat mass. Therefore, it may overestimate body fat percentage on those with a high percentage of lean, muscular body mass, such as athletes, and underestimate body fat percentage for those with a low percentage of lean body mass. However, BMI is considered a reliable indicator of body composition for the general population (Center for Disease Control, 2009).

Consumer Debt Trends

Personal indebtedness is related to economic hardships and a decreased sense of general well being (Brown, Taylor, & Wheatley-Price, 2005). By definition, consumer

debt is credit card debt, payday loans, and other debts used to fund consumption rather than investments. Consumer debts frequently have higher interest rates than long term secured loans such as a mortgage (Calem & Mester, 1995). In today's economy, many US consumers are facing financial challenges. Credit has become easily accessible and has found many consumers deep in debt, leading to record high individual bankruptcy filings, an increased demand for credit counseling, and an increased number of debt consolidations (Xiao, 2008). In a review, Kish (2006) explained that recent trends in consumer credit outstanding, which excludes mortgage debt, totaled more than $2.1 trillion at the end of 2005. This is equal to an average of $9,710.69 in consumer debt for each American age 18 and over. This is up from an average of $4,500 in 1971, $5,000 in 1985, and $6,500 in 1995. Kish further explained that personal bankruptcy filings rose together with the continued rise in consumer debt. In 2005 more than 1.6 million Americans filed for bankruptcy. This is double the number of filings one decade prior and quadrupled since 1985.

The Federal Reserve Board, who administers the Survey of Consumer Finance, has reported surprising trends concerning consumer credit card use since the 1980's. Not only have consumer credit card usage and debt rates risen dramatically since the 1970's, but there is also a linear relationship in consumer debt rates and credit card usage that increases as age decreases. This trend indicates a possible difference in attitude toward debt by generation.

Net Worth

Personal finances or wealth are affected both by one's own decisions and the current status of the country's economy. Net worth equals the assets and liabilities

(assets - debt = net worth) that are considered under the direct control of an individual and is a measurement of actual wealth (Kennickell, 2008). An important distinction is that income, on the other hand, is a potential resource, but not actual wealth. The net worth equation can be used to indicate a person's economic behaviors given their income and age.

The net worth equation is listed as follows:

Net worth = home value - mortgage - property debt+ cash saving+ stock+ trusts + business/farm/re equity –business/farm/re debt+ car value -car debt + possessions - other debt + IRA+ 401K +CD

Interestingly, the rise in consumer debt has followed a rise in net worth, which may seem counterintuitive. The rise in net worth alongside increased levels of debt can be explained by an increase in home ownership and increased value in real-estate (Bucks, Kennickell, & Mach, 2006). Although home equity is typically an asset added into net worth, it may also be an artificial indicator of wealth, in the case that the market value of homes drops, and may be left out of the net worth calculation in order to give a more true measure of wealth (Stanley, 2009).

Health and Wealth

It has been discussed that obesity and personal indebtedness are two major public issues concerning the US today. Interestingly, research shows an inverse relationship between these issues in that as BMI increases, wealth decreases (Zagorsky, 2004; Zagorsky, 2005). Furthermore, a 15-year longitudinal study by Zagorsky (2005) showed that those who lost small amounts of weight experience little change in net worth, but those who lost large amounts of weight dramatically improved their financial position.

Expanding beyond BMI, research has also shown an inverse relationship between self-rated health and wealth (Aittomaki et al., 2010).

Few studies have shown evidence about the cause or the direction of the relationship between health and wealth, although traditional arguments include high income individuals can afford good food and exercise, which lowers their body mass. However, a study by Michaud and Soets (2008) found that the health-SES gradient runs the opposite direction, from health to wealth. Similarly, Hamermesh and Biddle (1994) found that overweight individuals may experience prejudice in the labor market due to company's beliefs that they will increase health insurance costs, or because companies want to present a pleasing face to the public. If companies discriminate in the work place, an increased body mass lowers earnings, which indirectly reduces wealth. However, more recent research has examined the health-wealth connection and found a relationship independent of income (Zagorsky, 2004; Zagorsky, 2005; Aittomaki et al., 2010).

Furthermore, a recent study by Aittomaki et al. (2010) noted the majority of health and economic research focuses primarily on income as a measure of household resources and there is little research on health and household wealth. Their study of 6,509 employed men and women 45-67 years of age found that self-rated health and wealth were strongly associated. They further explained that although income and wealth are related, merely examining health and income did not show the whole picture. Although the cause of the relationship could not be determined in their study, Aittomaki et al. suggests that the association could be an effect of one's wealth on health due to

living conditions or a result of social comparison mediated through psychological states caused by a lower social status.

Zagorsky (2004) examined the health and wealth connection by surveying 7,699 US baby boomers from 1985 to 2000. The results of this study indicate that in addition to obesity being dangerous to one's health, it is also dangerous for one's wealth. When controlling for income and education, Zagorsky (2004) found the net worth of the obese to be roughly half that of those with normal BMI. As the young baby boomers aged, peak net worth gradually shifted toward those with lower BMI. From 1985 to 2000, for every one-point BMI increase, net worth on average fell $1,000. Whether or not an increase in food spending lowered BMI was not clear. In some years increased food spending lowered BMI and in other years there was no relationship. The analysis also determined that health insurance did not determine the health-wealth relationship as coverage was a relatively equal percentage of each group (underweight: 84%, normal weight: 86.1%, overweight: 86.7%, obese: 86.2%). The regression analysis determined that causation ran from body mass to wealth, not the other way. This meant that two six-foot-tall males with similar income, age, education, and racial characteristics, but different weights, on average had different net worth.

In another study examining the health and wealth connection, Zagorsky (2005) investigated obesity's relationship to individuals' wealth with a comparison by race (white compared to black). He analyzed data from a large US longitudinal socio-economic survey, the National Longitudinal Survey of Youth. The same group of people, born between 1957 and 1964, were surveyed 19 times from 1985-2000 in order to provide an in-depth view of socio-economic development. The results showed a large

negative association between BMI and net worth for the group as a whole with the strongest relationship between white females, followed by white males and black females. There was no relationship found between BMI and wealth for black males.

In addition, Zagarosky (2005) found that weight changes and dieting were also associated with wealth changes. Individuals who lost small amounts of weight (change in BMI of 1) showed only slight changes in net worth, however those who lost large amounts of weight (change in BMI of 5-10) considerably improved financial position (increase by $4,000-12,000). Interestingly, whites showed larger changes than Blacks. The data in the regression were not from a controlled experiment, therefore, the direction of causality between weight loss (dieting) and wealth cannot be determined.

As mentioned previously, a traditional argument of the obesity-wealth disparity is that the less wealthy cannot afford good food, which raises BMI through an increase in calorie consumption. However, economic research, that is also in agreement with Zagorsky's studies, does not support this argument. Philipson and Posner (2003) found that the inflation-adjusted cost of food has been falling while the average job has become more sedentary. Therefore, it has become cheaper to eat and fewer calories are burned during the workday, which creates a positive balance in the individual's calorie equilibrium. This may explain the unclear food spending results in Zargorsky's study. Additionally, Ruhm (2000) found an association between economic conditions and obesity in that obesity increased during good economic times in the US. Therefore, this study further goes against the explanation that an increase in resources will allow people to spend more money in health related areas that improve their body mass such as gym memberships. Instead, this study shows that an increase in resources is associated with

an increase in BMI. If food spending and economic hard times do not provide an answer,

the question as to the cause of the health-wealth relationship remains.

Personality

Previous research indicates that factors such as SES, specifically education,

provide some explanation for the health-wealth connection (Smith, 1998; Smith, 2004).

However, because the health-wealth connection extends into the high-income population,

SES does not explain the relationship in entirety. Therefore, as detailed in this section,

there is reason to believe that personality factors may also play a role in the relationship

between health and wealth.

An individual's personality can be described as a set of characteristics possessed

by a person that uniquely influences his or her cognitions, motivations, and behaviors in

various situations (Mischel, 1968). These cognitions, motivations, and behaviors have

consequences and over time strongly determine the current circumstance of an individual.

If one's personality tendencies influence both health and wealth behaviors, it is possible

that the cause and effect relationship between health and wealth is influenced by a third

variable, personality.

Personality traits have been described as somewhat stable, cross-situational

individual differences, or a tendency to think and act in a particular way unique from

others (McCrae & Costa, 1990). It has long been debated as to whether personality is

determined by genetics or the environment. However, research has shown that both

genetics and the environment work together to produce personality (Krueger & Johnson,

2008). Furthermore, it has been shown that personality may be at its core influenced by

genetic factors, but that it is changed by environment factors (McGue, Bacon, & Lykken,

1993). This suggests that targeted interventions could change negative health and financial practices to more desirable behaviors.

Currently, the most common approach to studying personality is the Big Five dimensions of personality (Paunoneon & Ashton, 2001). The five dimensions were a result of a factor analysis of a large number of self- and peer-reports on personality-relevant adjectives and questionnaire items. The Big Five Model is solely a description of personality and does not suggest mechanism by which personality is determined, for example, heredity or the environment.

According to the Big Five Model, personality has five main dimensions that include: Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism (Goldberg, 1993). The Big Five Personality Dimensions have been examined in many health related studies concerning both health indicators and health behaviors, with Conscientiousness emerging as perhaps the most important personality factor in determining health behaviors and consequences (Booth-Kewley & Vickers, 1994). On the other hand, although many financial behaviors have characteristics similar to Conscientiousness (Ameriks et al., 2007; Titus, Fanslow, & Hira, 1998), which have been widely researched, the Big Five approach to examining individual's finance related behaviors and financial indicators have not been examined. The findings of these studies are detailed in the next section, but first, it is important to explain Conscientiousness and its subcomponents.

Paunonen and Ashton (2001) describe Conscientiousness as the degree of organization, persistence, control and motivation in goal directed behaviors which can be broken down into six facets: competence, order, dutifulness, achievement-striving, self-

discipline, and deliberation.   Specifically, competence is a belief in one's own self-efficacy. Order refers to one who has personal organization. Dutifulness is an emphasis placed on importance of fulfilling moral obligations and one who is not careless. Achievement-striving is a need for personal achievement and sense of direction. Self-discipline is the capacity to begin tasks and follow through to completion despite boredom or distractions. Deliberation is the tendency to think things through before acting or speaking. Each factor is on two extremes of a continuum, so people vary on the spectrum, with most people falling between the extremes.

Self-Control (SC) is an umbrella term that encompasses constructs from different disciplines (e.g. psychology, neuroscience, behavioral genetics, and behavioral economics) such as impulsivity, conscientiousness, self-regulation, delay of gratification, executive function, willpower, and intertemporal choice (Moffitt et al., 2011). The ability to delay gratification for the sake of the future, control emotions and behaviors, persist despite set-backs, to be planful, and to be task- and goal-driven constitute the components of SC. SC Theory of Crime is a criminological theory suggesting the main factor behind criminal behavior is lack of individual SC, stemming from ineffective parenting during early childhood (Gottfredson & Hirschi, 1990). SC is a predictor of criminal and deviant behavior and has also been shown to relate to a range of other outcomes, such as health and wealth (Moffitt et al., 2011; Sutin, Ferrucci, Zonderman, & Terracciano, 2011; Tanaka & Murooka, 2012).

The ability of an individual to forego short-term wants for the sake of the future is the defining feature of SC (Costa, McCrae, and Dye, 1991). A psychological phenomenon very much related to this characteristic is time discounting (or time

preference). Time discounting occurs when a desired result in the future is perceived as less valuable than one in the present (Koing & Kleinmann, 2007). Compared to an average person, an individual with a high time preference is concerned primarily with their well-being in the present and the immediate future, while an individual with low time preference values their well-being in the further future. The higher the time preference, the higher the discount placed on benefits or costs to one's circumstance in the future. With this higher time preference, individuals are less likely to persevere through boredom, distractions, and set backs in the present in order to have a greater gain in the future.

Personality and Health Indicators. In health-related literature, specific personality dimensions have been shown to more strongly affect one's health than others. For example, Brummett et al. (2006) showed that Neuroticism was associated with higher BMI in females, Extraversion was related to a higher BMI for men but not for women, Openness showed a weak negative association with BMI, and Agreeableness was negatively associated with BMI for both males and females. Conscientiousness was significantly related to BMI independent of gender and predicted change in BMI in middle age adults. Individuals lower in Conscientiousness showed greater weight gain as they got older.

Extending beyond BMI, studies have shown a relationship between Conscientiousness and other health indicators. A study by Lodi-Smith et al. (2010) examined 617 males and females ages 19-86 years of age and found a relationship between Conscientiousness and self-rated health that was mediated through education and health behaviors. In addition to self-rated health, a study by Goodwin and Friedman

(2006) also found that Conscientiousness was inversely related to illnesses including diabetes, hypertension, and arthritis.

Longitudinal research by Moffitt et al. (2011) demonstrated that levels of childhood SC predict young-adult health and wealth independent of children's intelligence, social class, and home lives. The authors followed an entire birth cohort of over 1,000 children from birth until age thirty-two. Not only was high SC related to better health outcomes measured by physician examinations, but also improvements in SC predicted improvements in health over time. The same was true for young-adult wealth status such that improvements in SC predicted an increase in wealth. Similar health related results were found in a study by Miller, Barnes, and Beaver (2011), which also found that adolescent SC predicted a variety of physical and mental health outcomes in young adulthood. Reports from approximately 12,000 participants were examined from the National Longitudinal Study of Adolescent Health over the course of seven years. Results showed that adolescents with low levels of SC were twice as likely to report a diagnosis of asthma, cancer, high cholesterol, high blood pressure, and mental health issues, and eight times more likely to report a diagnosis of depression than adolescents with high SC. Furthermore, Bruce et al. (2011) used an ecologically valid measure of delay of gratification, a facet of SC, and found adolescents with high ability to delay gratification had lower rates of obesity. Even with nonfood rewards, children with higher BMIs preferred the immediate reward to a delayed, larger reward.

Personality and Health Management. Calorie balance represents the difference between the total amount of calories one consumes minus the total number of expended calories (Cutler, Glaeser, & Shapiro, 2003; Dodd, 1960). If a person is overweight or

obese, it means that on a daily average, they over consume and under expend calories.

Over consuming calories is a result of either eating too much food or eating too much

food that is high in calories. If a person does not expend enough calories, this is a result

of too much sedentary time. Therefore, one's body composition indicates either an over

consumption or under expenditure of calories. For most people, an over consumption of

calories resulting in obesity is a result of doing or not doing health related behaviors that

balance the calorie equilibrium (Cutler, Glaeser, & Shapiro, 2003; Bhargava & Guthrie,

2002; Dodd, 1960).

Of the Big Five Factors, Conscientiousness has shown to be the strongest and

most consistent predictor of health related behaviors (Booth-Kewley & Vickers, 1994).

As Conscientiousness increases, health related behaviors improve, and BMI decreases

(Brummett et. al, 2006; Fontaine & Cheskin, 1999; Holt, Clark, & Krueter, 2001).

Booth-Kewley & Vickers (1994) in their study of personality and health related behaviors

specifically examined diet, exercise, drug usage, and risk taking behaviors. They found

Conscientiousness to be the strongest predictor of health behaviors. Agreeableness, the

tendency to be pleasant and accommodating in social situations, and Neuroticism, the

tendency to experience negative emotional states, were also predictive of health

behaviors in this study, but the strength of these relationships were weaker than those

found with Conscientiousness. In this particular study, Conscientiousness accounted for

29% of the variance even with the effects of all four of the other personality variables

controlled.

The Conscientiousness facet self-discipline was also shown to influence health

behaviors such as drug usage and other risky behaviors, diet, exercise, accident control,

and wellness behaviors (Roberts, Walton, & Bogg, 2005; Hagger-Johnson & Whiteman, 2007). Self-discipline is characterized by the ability to complete a task that one sets out to accomplish regardless of distractions. People high in self-discipline are more likely to complete health related tasks that they plan for themselves, such as an exercise regimen (Weiss & Costa, 2005). In addition to preventative behaviors, research has shown correlation between need for achievement, another facet of Conscientiousness, and eating practices in both men and women (Heaven, Mulligan, Merrilees, Woods, & Fairooz, 2001). Those who are Conscientious are more likely to practice more preventative health-related behaviors.

A meta-analysis by Bogg and Roberts (2004) of Conscientiousness traits and leading behavioral contributors to mortality in the United States contained 194 studies and established Conscientiousness as a predictor of health behaviors. The results showed that Conscientiousness was positively related to beneficial health-related behaviors including diet, level of physical activity, drug use, and other risky behaviors. Bogg and Roberts (2004) suggest that those low in Conscientiousness are more likely to engage in unhealthy eating behaviors that have immediate gratifying effects and are more likely to discount future outcomes for the sake of the present. Consistent with this hypothesis, Komlos, Smith, and Bogin (2004) showed that people are more and more focused on immediate gratification and consumption while increasingly devaluing future consequences both health and economic. Komlos et al. (2004) suggest that time discounting may be an explanation for the rapid increase in obesity in the US today. Time discounting is seen in various behaviors ranging from money, health, management, and organization (Borghans & Golsteyn, 2005; Frederick, Loewenstein, & O'Donoghue,

2002). Those high in Conscientiousness and time preference are able to endure pain in the present for a better tomorrow (Hershey & Mowen, 2000; Kewley & Vickers, 1994).

Personality and Wealth Indicators. Research examining personality and personal finances demonstrates a relationship between financial behaviors and self control, a personality disposition much related to facets of Conscientiousness (Ameriks et al., 2007). Additional studies have shown that Conscientiousness correlates with perceived financial preparedness for retirement (Hershey & Mowen, 2000).

Stanley and Danko (1996) in their research showed that 80% of millionaires in the US are first generation rich. These individuals did not inherit their wealth. This indicates that they may have had a set of beliefs or tendency to behave in a common way that resulted in their fit financial outcome. These individuals did not come from affluent (millionaire status) families, and interestingly they typically did not worry about whether their parents were wealthy. Stanley and Danko explained that these individuals believed in their own abilities and had confidence that their behaviors determined their circumstance. On the other hand, Stanley and Danko suggested that people who believe that one must come from a wealthy family in order to become wealthy, may be predetermining themselves to remain non-affluent. This belief in personal abilities is congruent with competence, a facet of Conscientiousness.

Personality and Wealth Management. The main factors that determine a family's level of net worth include, age, net income, household size, and level of financial planning. Households are more likely to have a higher level of net worth with optimal financial management and planning behaviors (Titus, Fanslow, & Hira, 1989).

These financial behaviors include one's saving, spending, and money management practices that contribute to one's financial position.

A relationship exists between facets of SC and financial behaviors. Ameriks, Caplin, Leahy, and Tyler (2010) showed that low SC was related to higher consumption rates and lower wealth in their study of 1,520 TIAA-CREF participants. Hershey and Mowen (2000) showed a relationship between Conscientiousness and perceived financial preparedness for retirement in older adults. Conscientiousness was significantly related to future time perspective and financial planning knowledge. A high score in Conscientiousness was found to be predictive of perceived financial preparedness for retirement, which is a strong indicator of actual financial preparedness.

Research by Tanaka and Murooka (2012) shows people with higher SC, who were able to delay gratification financially, accumulated more wealth. People who put especially high value on immediate consumption compared to any time in the future reported higher rates of excessive credit card use and an over accumulation of debt. Due to the increase in interest spending, people with low SC were unable to accumulate money for future purchases, emergencies, and retirement.

Researchers also explain that deliberation may be one of the biggest factors for creating wealth. Research examining US millionaires by Stanley and Danko (1996) began in 1973, and has shown that those who accumulate wealth tend to be more frugal, make purchases with cash instead of credit, and live less of a high consumption lifestyle than their peers even though they can afford it. Instead of impulsively buying things they cannot pay for, individuals who save and make purchases with cash they have saved are more likely to result in a more fit financial status (Hershey & Mowen, 2000; Ameriks,

Caplin, Leahy, & Tyler, 2007). Likewise, as mentioned previously, those who think about the food they eat before consuming it are less likely to over consume calories and thus have a lower BMI (Heaven, Mulligan, Merrilees, Woods, & Fairooz, 2001). These parallels indicate that the thoughts and behaviors underpinning SC may contribute to positive financial and health consequences.

Summary

The causal relationship between health and wealth continues to be highly debated. Traditional explanations generally suggest the causal link between health and income run from income to health, because the higher income gives greater opportunity to quality health services and opportunities (Marmot, 2004). More recent research shows that the health-wealth correlation is partly explained by a causal link running the other way, from health to income (Smith, 2004). Others contend that the health and wealth connection extends beyond income and suggests further research examining the cause of this relationship is warranted (Zagorsky 2004; Zagorsky 2005; Aittomaki et al., 2010).

Research has shown a positive relationship between health behaviors, health outcomes, and SC. Individuals high in SC have better health management behaviors and a lower BMI (Bogg & Roberts, 2004; Booth-Kewley & Vickers, 1994; Brummett et. al, 2006; Fontaine & Cheskin, 1999; Holt, Clark, & Krueter, 2001). Likewise, a positive relationship between wealth management and SC has also been observed (Hershey & Mowen, 2000). Individuals higher in SC are more likely to have better financial management practices and a more positive perception of their wealth status (Titus, Fanslow, & Hira, 1989). However, research has not yet examined if the health-wealth relationship is driven by the same personality and behavior management variables.

Certainly, more research is needed to explore the relationships between health, wealth, personality, and behavior management mechanisms. It is important to have a clear understanding of the health-wealth connection in order to more effectively implement social policies driving public health and public poverty programs. Additionally, more knowledge of this relationship may help clarify the health disparities among those with a high-income yet different net worth.

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