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CHARACTER STRENGTHS AND HEALTH

BY

JAEJOON SONG

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE

REQUIREMENTS FOR THE DEGREE OF

MASTER OF ARTS

IN

BEHAVIORAL SCIENCE

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ABSTRACT

The purposes of this study were (a) to examine the relationship between character strengths and physical health and (b) to examine the moderating role of character strengths in the relationship between income and physical health. This study used nationally representative data from a sample of German adults ($N > 1000$) which included information about demographics, socioeconomic status, physical health, and character strengths. Physical health was assessed in two ways: doctor-diagnosed diseases and self-diagnosed chronic illnesses. Results showed that the character strengths of hope and zest were related to fewer doctor-diagnosed diseases and lower levels of self-diagnosed chronic illness. The character strengths of bravery, forgiveness, prudence, appreciation of beauty, gratitude, spirituality, social intelligence, fairness, and teamwork moderated the relation between income and physical health for different gender and age groups. In general, the moderation effects showed that individuals high on character strengths benefited more from higher income and suffered more from the adverse effect of lower income.

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DEDICATION

I would like to dedicate this work to my family for all of their support throughout the process. I am thankful for my wife Junghi, my parents, and my parents-in-law.

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1. INTRODUCTION

In recent years, systematic research on character strengths has significantly increased in the field of psychology. The increased attention to good character has been fostered by the advent of positive psychology (Seligman & Csikszentmihalyi, 2000). Positive psychology emphasizes the importance of studying scientifically what makes life worth living. Its focus is on building a good and fulfilling life, in addition to treating problems in life, by identifying individual strengths of character and fostering them (Peterson, 2006; Peterson & Park, 2003). Recently, researchers have created a classification and developed various ways to measure character strengths that will facilitate the further scientific study of good character (Park & Peterson, 2006a, 2006b, 2006c; Peterson & Seligman, 2004). So far, various studies have shown that character strengths, when exercised, not only prevent undesirable life outcomes but also play an important role in their own right as markers of individual well-being, and indeed promote healthy life-long development (see Park, 2004, for a review).

For example, certain character strengths are related to better academic achievement among children and youth, good leadership, teacher effectiveness, better life and work satisfaction, fewer symptoms of depression, longevity, and resilience in the wake of adversity (Park & Peterson, 2006c; Park, Peterson & Seligman, 2004; Peterson, Park & Seligman, 2006; Matthews, Eid, Kelly, Bailey, & Peterson, 2006). Lately, there has been increasing interest in understanding the pathways between character strengths and health and well-being outcomes. Despite increasing attention to the correlates and consequences of character strengths, only a few studies have

examined the role of character strengths with respect to physical health, which is an obviously important aspect of the good life.

The purpose of the present study was to examine the relationship between character strengths and health outcome. Specifically, how character strengths moderate the effect of socioeconomic status (SES) on individual health was investigated. The present study is unique because it takes account of demographic and socioeconomic variables to understand the effects of character strengths to health outcomes, using a large and nationally-representative sample of German adults.

1.1 Character Strengths

Good character plays an important role in individual and societal well-being (Park & Peterson, 2006a; 2006c; 2008). Character strengths are those aspects of personality that are morally valued. Good character is at the core of life-long positive development. Good character is not simply the absence of deficits, problems, and pathology but rather a well-developed family of positive traits. Through the ages, conceptualizing character strengths (virtues) and cultivating them have been among the main interests of philosophers, theologians, and educators.

However, these topics have been mostly neglected among psychologists. This state of affairs is now changing with the emergence of positive psychology. Positive psychology has refocused scientific attention on character, identifying it as key to the psychological healthy and thriving life. Positive psychology emphasizes scientific studies of what makes life worth living (Seligman & Csikszentmihalyi, 2000). Positive psychology focuses on building strengths and encouraging wellness as much as on remedying weaknesses and repairing deficits (Peterson, 2006).

Values-in-Action (VIA) Project

From the perspective of positive psychology, Peterson and colleagues led scientific studies of character strengths (Park & Peterson, 2006a; Peterson & Seligman, 2004). Their resulting project, called *The Values in Action (VIA) Classification of Strengths*, focuses on what is right about people and specifically on the strengths of character that contribute to optimal development. They identified components of good character and then developed ways to measure these components as individual differences. The VIA Classification identifies 24 widely-valued character strengths and organizes them under six broad virtues (see Table 1).

Researchers have argued that good character is not singular, but plural, and it must be measured as a multidimensional construct (Park, 2004; Park & Peterson, 2006b; Peterson & Seligman, 2004). Accordingly, the VIA project approaches character as a family of positive characteristics reflected in feelings, thoughts, and actions, each of which exists in degrees, with some people having more and some people having less of any given strength of character (Park, 2004). *Character* is the entire set of positive traits that have emerged across cultures and throughout history as important for good life. *Character strengths* are “the psychological ingredients—processes or mechanisms—that define the virtues” (Peterson & Park, 2006b).

Correlates and Consequences of Character Strengths

Evidence concerning the role of the character strengths in human life is accumulating. Certain positive traits are more robustly associated with well-being and positive outcomes than others (Park & Peterson, 2006a). Studies have shown that certain strengths of character can mitigate or prevent the negative effects of stress and

trauma and further are associated with positive life outcomes such as success, health and well-being.

Various studies have shown that character strengths have sizable effects on the flourishing of individuals. According to Park, Peterson, and Seligman (2006), the character strengths of love, gratitude, hope, curiosity, and zest are particularly related to the benefits of increased life satisfaction, happiness, and subjective well-being. Also, Benson, Leffert, Scales, and Blyth (1998) found that developmental assets such as commitment to learning, positive values, social competence, and sense of purpose are associated with reduced drug and alcohol abuse. In these cases, character strengths work in the service of disease and disorder prevention.

In addition, there is evidence that character strengths have effects on decreased symptoms and faster recovery from illness. In a retrospective web-based study of 2087 adults, a history of physical illness and the character strengths such as appreciation of beauty, bravery, curiosity, fairness, forgiveness, gratitude, humor, kindness, love of learning, and spirituality were significantly and positively associated (Peterson, Park & Seligman, 2006). Also, individuals with the character strengths of bravery, kindness, and humor sacrificed life satisfaction to a lesser degree as a result of physical illness. In the case of mental health, significant and positive associations were found between a history of psychological disorders and the character strengths of appreciation of beauty and love of learning, as well as smaller decreases in life satisfaction following episodes of mental illness. Finally, character strengths affect the academic performance of students. In a longitudinal study, perseverance, love, and gratitude

predicted academic performance of school children measured end-of-year GPA (grade point average) (Park & Peterson, 2006c).

Although many studies have investigated the role of character strengths in well-being, few studies have examined the relationship between character strengths and physical health. However, the relatively well established relation between personality factors and health may shed light on potential relationships between character strengths and health.

1.2 Personality and Health

The association between personality and health has been studied by many researchers over the years. Studies show that individual differences such as neuroticism, depression, anxiety, hostility, and optimism all have significant relationships with physical health and longevity (e.g., Andresen & Nobel, 1995; Helmer, Ragland, & Syme, 1991; Peterson, Seligman, & Vaillant, 1988).

Five-Factor Model of Personality and Health

The most widely-investigated personality trait model is the Five-Factor Model of McCrae and Costa (2003). According to this model, personality can be described in terms of five independent dimensions: Neuroticism (N), Extraversion (E), Openness to Experience (O), Agreeableness (A), and Conscientiousness (C).

Relations between personality traits N, E, and C and health have been well-documented. For example, Phillips, Carrol, Burns and Drayson (2005) found that Neuroticism was related to suppression of immune responses, which may lead to poorer health. Also, Neuroticism promotes risky behaviors (Booth-Kewley & Vickers, 1994; Terracciano & Costa, 2004), and may lead I turn to more negative subjective

health experiences (e.g., Benyamini, Idler, Leventhal, & Leventhal, 2000; Quinn, Johnson, Poon, & Martin, 1999; Hooker, Monahan, Shifren, & Hutchinson, 1992; Moor, Zimprich, Schmitt, & Kliegel, 2006). Studies have also found that people who are high in Neuroticism also report more physical symptoms of illness (e.g., Feldman, Cohen, Doyle, Skoner, & Gwaltney, 1999; Neitzert, Davis, & Kennedy, 1997).

Higher levels of Extraversion are known to be beneficial and detrimental at the same time. Booth-Kewley and Vickers (1994) found that Extraversion may promote exercising behaviors. In contrast, Spielberger and Jacobs (1982) reported that individuals with higher levels of Extraversion may have a higher likelihood of smoking. In terms of subjective health, individuals with higher Extraversion typically report higher better global health (Jerram & Coleman, 1999; Korotkov & Hannah, 2004).

Conscientiousness has been studied in terms of its relation to exercise and diet. Studies have found that individuals with higher Conscientiousness exercise more (Bogg & Roberts, 2004; Courneya & Hellsten, 1998). Also, Conscientiousness and Openness to Experience predict healthier eatings (Goldberg & Strycker, 2002).

Positive Psychological Variables and Health

A growing number of studies have examined positive constructs such as optimism, hope, self-control (or self regulation), religiosity/spirituality, altruism and humor in terms of their relationship to physical health.

Optimism

Many studies have identified robust relationship between optimism and health. Individuals with higher optimism experience lower distress (Carver & Gaines, 1987;

Scheier et al., 1989; Chamberlain, Petrie, Azariah, 1992; Taylor et al., 1992), suffer less physical illness (Scheier & Carver, 1985; Peterson, Seligman, & Valliant, 1988), and recover faster from both mental and physical illness (Scheier et al., 1989; Petersen et al., 2008). Especially, in recent years, researchers have found that optimism is related to a lower risk of cardiovascular disease and to increased longevity (Giltay, Geleijnse, Zitman, Hoekstra, & Schouten, 2004; Giltay, Kamphuis, Kalmijn, Zitman, & Kromhout, 2006).

Relationships between optimism and health can be described as having three pathways- strengthening the immune system, engaging in a healthier lifestyle, and speeding recovery from illness as a benefit of positive future goal setting. First, optimism may affect the human immune system to reduce the risk of illness. In a study of dispositional and situational optimism on mood and immune changes, Segerstrom, Taylor, Kemeny, and Fahey (1998) found that optimism was related with higher numbers of helper T cells, and higher natural killer cell cytotoxicity. T cells are an essential part of immunoregulation, and they mediate immune reactions to infection. Second, optimism may promote a healthier lifestyle. Giltay, Geleijnse, Zitman, Buijsse, and Kromhout (2007) reported that dispositional optimism was associated with greater physical activity, being a nonsmoker, and consuming more vegetables and whole-grain breads. Third, optimism may accelerate recovery from illness. According to Scheier and colleagues (1989), among patients who underwent coronary artery bypass surgery, dispositionally more optimistic individuals were more likely to cope with their mental and physical stress by focusing on postoperative goals.

Altruism, Giving, and Helping

Studies have shown that kindness, volunteerism, giving, and helping others are associated with health and well-being. Individuals who volunteer, experience fewer major illnesses (Moen, Dempster-McCain, & Williams, 1993), and have lower overall mortality (Musick, Herzog, & House, 1999; Oman, Thoresen, & McMahon, 1999). A study by Brown, Nesse, Vinokur, and Smith (2003) examined both sides of the story: giving and receiving support. Interestingly, whereas giving support to friends, relatives, and neighbors significantly reduced mortality, no effect was found for receiving support. As the saying goes, it appears as if it is more blessed to give than to receive. Also, Schwartz and Sendor (1999) found positive psychosocial effects for helping others. Participants who helped others showed pronounced improvement on confidence, self-awareness, self-esteem, depression, and role functioning. Research also suggests that altruistic activity may contribute to better health by causing physiological changes such as lower levels of stress hormones (Field, Hernandez-Reif, Quintino, Schanberg, & Kuhn, 1998; Lewis, Amini, & Lannon, 2000; Post, 2005).

Religiosity/Spirituality and Health

Religiosity/spirituality is known to be related with a lower incidence of various chronic diseases (Levin & Schiller, 1987; Levin & Vanderpool, 1987), increased longevity (Comstock & Partridge, 1972), and faster recovery from illness (Andreasen, 1972; Oxman et al., 1995; Pressman, Lyons, Larson, & Strain, 1990; Propst, Ostrom, Watkins, Dean, & Mashburn, 1992). Also, studies have suggested that religiosity reduces the incident of substance abuse (Koenig, George, Meador, Blazer, & Ford, 1994; Moore, Mead, & Pearson, 1990). In addition, religiosity/spirituality may work as a buffer against stress. Studies have reported associations between

religiosity/spirituality and coping with illness (Saudia, Kinney, Brown, & Young-Ward, 1991; Siegel & Schrimshaw, 2002; Williams, Larson, Buckler, Heckmann, & Pyle, 1991).

1.3 Demographic Variables and Health

In the past two decades, economists have accumulated substantial amount of empirical evidence on the association between various demographic variables and health (Adler & Ostrove, 1999). Income, education, occupation, age, gender, marital status, and ethnicity are typically associated with physical health (Fuchs, 2004).

Income

Income is the most frequently used measure of Socioeconomic Status (SES). Many studies have investigated the relation between income and health. For example, Townsend and Davidson (1982) showed that SES was closely related to health among individuals in the United Kingdom. Following this groundbreaking study, evidence on the relationship between health and SES has been accumulated around the world. Lower SES was related to low health outcomes. SES has been found to have an effect on health even when people in a society where citizens are provided with universal health care, such as Canada (e.g., Frohlich & Mustard, 1996; Hay, 1988; McLeod, Lavis, Mustard, & Stoddart, 2003; Roberge, Berthelot, & Wolfson, 1995; Roos & Mustard 1997; Roos, Magoon, Gupta, Chateau, & Veugelers, 2004; Smith & Frank, 2005; Veugelers, Yip, & Kephart, 2001; Wilkins, Adams, & Brancker, 1991).

Gender

Health differences in gender have been reported by many researchers (e.g., Macintyre, Hunt, & Sweeting, 1996). Consistent findings across developed countries

report that although the death rate is generally higher for males compared to females, females self-report poorer health, and show higher rates of acute and chronic illness. Also, females use more medical services, and consume more prescription and non-prescription drugs.

Age

As a law of nature, human health generally deteriorates with age. Thus, age is the single most important factor to be considered when testing for any association between health and individual and social differences. Interplay between age and other socioeconomic factors has been postulated in two models: the accumulation hypothesis and the divergence-convergence hypothesis (Prus, 2007). According to the accumulation hypothesis, difference in factors that influence health are stratified by SES and accumulate with age, systematically widening the health gap between members of different SES over the lifetime (Berney et al., 2000; Brunner et al., 1999; Holland et al., 2000; Ross & Wu 1995; 1996; van de Mheen, Stronks, & Mackenbach, 1998). On the other hand, according to the divergence-convergence hypothesis, differences in health caused by SES widen up to middle age and early-old age, and then converge afterwards (House et al., 1990; 1994).

1.4 Purposes of the Study and Hypotheses

There has been increasing interest in the role of individual character strengths on personal and societal health and well-being. Accumulated evidence supports the vital role of character strengths in a healthy and thriving life. However, empirical evidence with large samples on the role of individual character strengths on health status is scarce. The present study adds meaningful evidence of the relation between

the character strengths and health and especially role of character strengths as a moderating factor.

The purpose of this study, therefore, was to examine the relationship between demographic variables and individual character strengths and health, as well as the moderating effect of individual character strengths on the link between demographic variables and health.

The main hypotheses were:

- 1) Income, gender, and age are related to health status.
- 2) Higher levels of character strengths such as optimism, spirituality, and humor are related to better health.
- 3) Character strengths such as optimism, spirituality, and humor moderate the relationship between demographic variables and physical health.

2. METHOD

The current study utilized an existing database from a 2007 pretest of the German Socio-economic Panel Study (GSOEP). The German Socio-economic Panel Study (GSOEP) is a nationally representative on-going longitudinal annual panel study of private households and individuals in Germany since 1984. The pretest was a pilot study that consisted of a smaller sample, collected at a single point in time as part of a survey development process. Participants were asked 59 questions on a broad range of socio-economic, health, personality, and character strengths indicators.

2.1 Procedure

Participants

Household members living in Germany as of year 2007, above 16 years of age were eligible for this survey. Individuals from minority groups were oversampled to achieve national representativeness. The representativeness of GSOEP has been previously reported (Holst, Lillard, & DiPrete, 2001). As mentioned, the data reported here are from a pretest version of GSOEP which only included cross-sectional data from 1,066 nationally representative, randomly selected individuals in Germany. In this study, only the individuals who reported their household income were included in the analysis. The number of individuals who reported either exact or approximate household income was 1,004.

Data Collection

Assessment was administered by a professional data collection company in Germany using a structured interview.

2.2 Measures

Character Strengths

Eighteen character strengths were available in the database: 1) curiosity, 2) perspective, 3) bravery, 4) perseverance, 5) zest, 6) love, 7) social intelligence, 8) fairness, 9) leadership, 10) teamwork, 11) forgiveness, 12) prudence, 13) self-regulation, 14) appreciation of beauty and excellence, 15) gratitude, 16) hope, 17) humor, and 18) spirituality. Each character strength was measured by a single question. For example, curiosity was assessed with the following question: "Please think of situations where you have the opportunity to explore a new thing. How many times do you show curiosity and interest?" Participants responded on a "0" to "10" scale, where "0" represented "very rare" and "10" represented "very often."

Measures of Health

Two physical health variables were used in the present study: 1) a count of doctor diagnosed diseases, and 2) a count of self-diagnosed chronic illness. First, participants were asked to indicate their history of official diagnosis by a medical doctor with nine disease categories. The categories were: 1) diabetes, 2) asthma, 3) heart disease, 3) cardiac insufficiency, 4) cancer, 5) breast cancer, 6) stroke, 7) migraine, 8) hypertension, and 9) other diagnosed disease. Overall, 59.6% of the participants reported having no disease, and 40.4% of the participants reported having at least one or more diseases diagnosed by a doctor.

Second, participants were asked to report their other chronic illness or physical impairments in fifteen categories. The categories were: 1) chronic allergies or sinus complaints, 2) seasonal allergies such as hay fever, 3) chronic back pain, 4) visual

impairment (e.g., eyeglass wearers), 5) chronic lung diseases (chronic bronchitis), 6) chronic skin diseases, 7) depression, 8) other mental disorders, 9) ulcers of the stomach or duodenum, 10) other digestive organs (e.g., sigmoid diverticulitis, colitis ulcerative, Crohn's disease), 11) diseases of urinary tract or kidney (e.g. Renal insufficiency), 12) deafness or other hearing, 13) hemorrhoids, 14) physical disability of the arms or legs, and 16) other chronic illness or physical impairments. In this study, response to the chronic illness categories was used for analysis. Categories of physical impairments (categories 4, 12 and 14, as numbered above) were not used, because these represent a lack of function more related to conditions that are beyond an individuals' control. Overall, 61.25% of the participants reported having no chronic illnesses, and 38.75% of the participants reported having at least one chronic illness or physical impairment.

Demographic Variables

Participants' self-reported gross and net household income in the previous month, gender, and age were used in the analyses. Out of the total 1,066 participants, 1,004 participants (94.18 percent) reported their income. So, we included only the individuals who reported their household income (N = 1004). Participants' income were categorized as: 1) Income < €750, 2) €750 ≤ Income < €1500, 3) €1500 ≤ Income < €2500, 4) €3500 ≤ Income < €5000, 4) Income > €5000. Median net income for participants were 2000 Euro (SD=1141.41). Participants' ages ranged from 16 to 92, and the mean age was 53 (SD=18.84). For age group specific analysis, age was categorized as: 1) Age < 35, 2) 35 ≤ Age < 50, 3) 50 ≤ Age < 65, 4) Age ≥ 65. There were 473 females (47.11%) in this sample.

Other measures were available in the database, but not included in the analyses for this study. These measures were concerned with: 1) nationality, citizenship status and native language, 2) family and household status, 3) personality, 4) level and content of formal education, 5) employment status including worksite environment, and 6) subjective measure of positive emotions.

3. RESULTS

3.1 Descriptive Statistics

Descriptive statistics for character strengths and number of diseases and chronic illnesses are reported in Table 2.

Correlations among Character Strengths

Pearson correlations among character strengths are reported in Table 3. All eighteen character strengths were significantly correlated at $p < .05$ level, except for the correlations between spirituality and teamwork and between spirituality and humor. The lowest significant correlation was between curiosity and spirituality ($r = 0.06, p < .05$), and the highest was between love and social intelligence ($r = 0.57, p < .0001$). Also, notably high correlations were observed between curiosity and perspective (.53), perseverance and zest (.55), leadership and teamwork (.52), and love and gratitude (.52).

3.2 Demographic Variables and Character Strengths

Age and Character Strengths

Associations between character strengths and age were examined using standard multiple regression analysis using SAS (Version 9.2). Many character strengths were significantly associated with aging ($p < .05$). The full model including all eighteen character strengths variables explained a small but significant amount of variance in the independent variable income (adjusted $R^2 = .13$), $F(18, 893) = 5.568.30$, $p < .0001$. The character strengths of curiosity, perspective, and teamwork were lower for older participants, whereas the character strengths of perseverance, forgiveness, appreciation of beauty and excellence, and spirituality were higher for older

participants (see Table 4). The effect of humor was close to significance, $t(1) = -1.70$, $p = 0.0904$.

Income and Character Strengths

Associations between character strengths and income were also examined using standard multiple regression analysis. The full model including all eighteen character strengths variables explained a small but significant amount of variance in dependent variable income (adjusted $R^2 = .08$), $F(18, 893) = 5.56$, $p < .0001$. Results showed that the significant predictors of income were the character strengths of humor $t(1) = 2.57$, $p = 0.0103$, and leadership $t(1) = 3.33$, $p = 0.0009$. Individuals with higher levels of humor and leadership were more likely to have higher income.

Gender and Character Strengths

A logistic regression analysis was performed to examine the relationship between gender and character strengths. All eighteen character strengths were entered into the model as predictors. As expected, there were significant differences in some character strengths by gender (see table 5). The overall logistic regression model was significant ($\chi^2(18, N = 912) = 99.1835$, $p < .0001$). Results showed that females were higher on love, social intelligence, gratitude, and spirituality, and that males were higher on bravery, leadership, and self-regulation.

3.3 Demographic Variables and Physical Health

All models of physical health were examined using negative binomial regression model due to the overdispersion of data that could not be accommodated by a Poisson model. In these data, more than half of the participants reported no doctor diagnosed disease (63.84%) or self-diagnosed chronic illness (61.25%). The

distribution of these two variables: 1) doctor diagnosed disease (skewness = 1.70, SE : 0.03), 2) self-diagnosed chronic illness (skewness = 2.02, SE = 0.03) were highly skewed. A negative binomial regression model assumed a discrete dependent variable and a nonnegative zero mode, which characterized the data well in this case.

Age and Physical Health

In negative binomial regression model, age had a significant effect on the number of doctor diagnosed disease ($\beta = 0.04$, $SE = 0.003$, $p < .0001$), and self-diagnosed chronic illnesses ($\beta = 0.02$, $SE = 0.003$, $p < .0001$). In both cases, aging was associated with higher prevalence of doctor diagnosed disease and self-diagnosed chronic illnesses.

Income and Physical Health

In negative binomial regression model, income had a significant effect on the number of doctor diagnosed disease ($\beta = -0.20$, $SE = 0.04$, $p < .0001$), and self-diagnosed chronic illnesses ($\beta = -0.20$, $SE = 0.04$, $p < .0001$). In both cases, higher income was associated with lower prevalence of doctor diagnosed disease and self-diagnosed chronic illnesses.

Gender and Physical Health

In negative binomial regression model, gender had a significant effect on the number of doctor diagnosed disease ($\beta = 0.21$, $SE = 0.10$, $p = 0.03$). Male participants reported more diseases diagnosed by the doctor. No significant gender differences were observed with the number of self-diagnosed chronic illnesses.

3.4 Variables of Physical Health and Character strengths

We examined a negative binomial regression models to test: 1) relationship

between character strengths and health in general, and 2) relationship between character strengths and health for each gender and age groups separately. Summaries of four models tested are presented in Table 6.

Model 1. Number of Disease Diagnosed by Doctor and Character Strengths

When age and income were accounted for, the character strength of zest ($\beta = -0.05$, $SE = 0.02$, $p = 0.02$) and hope ($\beta = -0.05$, $SE = 0.02$, $p = 0.02$) were significantly associated with the number of disease diagnosed by the doctor. In both cases, higher levels of zest and hope were associated with lower number of disease diagnosed by doctor.

Model 2. Number of Disease Diagnosed by Doctor and Character Strengths by Age and Gender

Overall, moderator effects of character strengths between demographic variables and health were not found. However, character strengths as a moderator between demographic variables and health were found in certain age and gender groups.

In this model, data were partitioned into eight groups that share the same gender and age category. For example, there were four age groups of males: 1) Age < 35, 2) $35 \leq \text{Age} < 50$, 3) $50 \leq \text{Age} < 65$, 4) $\text{Age} \geq 65$. Also, there were four female groups: 1) Age < 35, 2) $35 \leq \text{Age} < 50$, 3) $50 \leq \text{Age} < 65$, 4) $\text{Age} \geq 65$.

Certain character strengths moderated the effect of income on the number of diseases diagnosed by the doctor, when analyzed by these separate age groups. For example, bravery moderated the effect of income on the number of disease in age group of 35 to 50 in females ($\beta = -0.17$, $SE = 0.07$, $p = 0.01$), and age group 50 to 65

in males ($\beta = 0.12$, $SE = 0.05$, $p = 0.01$). In other words, the patterns of relationship between the number of disease and income differed as a function of levels of individual's bravery. In addition, moderation effects were observed with forgiveness in age group 50 to 65 for females ($\beta = 0.11$, $SE = 0.05$, $p = 0.03$), with prudence in age group of over 65 for males ($\beta = -0.08$, $SE = 0.03$, $p = 0.01$), with appreciation of beauty in age group over 65 for females ($\beta = -0.11$, $SE = 0.05$, $p = 0.02$), with gratitude in age group less than 35 for females ($\beta = 0.52$, $SE = 0.22$, $p = 0.02$), and with spirituality in age group over 65 for females ($\beta = -0.11$, $SE = 0.04$, $p = 0.01$) (see Table 7). Plots of interactions between income and some character strengths variables are presented in Figure 1. Patterns of moderation effects were observed by plotting the relation between income and the count of doctor diagnosed diseases for different levels of certain character strengths. In plots, particular character strengths were classified into low ($0 \leq \text{character strength} < 6$), medium ($6 \leq \text{character strength} < 8$), and high ($8 \leq \text{character strength} \leq 10$) for better visualization. For example, the high forgiveness group at the lowest income category had the most reported diseases, compared to individuals in lower forgiveness group. However, individuals in the high forgiveness group at the highest income category reported the least diseases. A negative relation was observed between income and count of disease for high forgiveness group, whereas the low and medium forgiveness group showed a relative consistency of count of disease over different income categories. A similar pattern of moderation effect was observed for character strengths of prudence, appreciation of beauty, gratitude, and spirituality.

Model 3. Number of Self-diagnosed Chronic Illness and Character Strengths

When age and income were accounted for, the character strengths of zest ($\beta = -0.07$, $SE = 0.02$, $p = 0.003$), hope ($\beta = -0.07$, $SE = 0.02$, $p = 0.0008$) and perspective ($\beta = 0.05$, $SE = 0.02$, $p = 0.05$) were significantly associated with self-diagnosed chronic illnesses. For zest and hope, higher levels of these characters were associated with lower number of self-diagnosed chronic illnesses. Interestingly, higher perspective was associated with higher number of self-diagnosed chronic illnesses.

Model 4. Number of Self-diagnosed Chronic Illness and Character Strengths by Age and Gender

In this model, the data were partitioned into eight groups that share the same gender and age category. For example there were four male groups in age groups: 1) Age < 35, 2) $35 \leq \text{Age} < 50$, 3) $50 \leq \text{Age} < 65$, 4) Age ≥ 65 . Also, there were four female groups in age groups: 1) Age < 35, 2) $35 \leq \text{Age} < 50$, 3) $50 \leq \text{Age} < 65$, 4) Age ≥ 65 .

Certain character strengths moderated the effect of income on the number of self-diagnosed chronic illnesses, when analyzed within different age groups. For example, bravery moderated the effect of income on the number of diseases in age groups under 35 in females ($\beta = 0.19$, $SE = 0.09$, $p = 0.04$). In other words, the patterns of relationship between the number of chronic illnesses and income were different as a function of levels of individual's bravery. In addition, moderation effect of character strengths was observed with social intelligence (age group 50 to 65, males, $\beta = -0.18$, $SE = 0.07$, $p = 0.01$), with fairness (age group 35 to 50, females, $\beta = -0.15$, $SE = 0.06$, $p = 0.01$), with teamwork (age group 35 to 50, females, $\beta = 0.14$, $SE = 0.07$, $p = 0.04$), with prudence (age group 50 to 65, females, $\beta = 0.16$, $SE = 0.06$, $p = 0.01$),

and with appreciation of beauty (age group over 65, males, $\beta = 0.08$, $SE = 0.04$, $p = 0.04$). The results are presented in Table 8. Plots of interactions between income and character strengths variables are presented in Figure 2. Patterns of moderation effects were observed by plotting the relation between income and the count of self-diagnosed chronic illnesses for different levels of certain character strengths. In plots, character strengths were classified into low ($0 \leq \text{character strength} < 6$), medium ($6 \leq \text{character strength} < 8$), and high ($8 \leq \text{character strength} \leq 10$) for better visualization. For example, the high fairness group in the lowest income category had the highest mean count of diseases, compared to individuals in lower fairness group. However, individuals in high fairness in the highest income category had the least mean count of disease. A negative relation was observed between income and count of chronic illness for high fairness group, whereas the low and medium fairness group showed a relative consistency of count of chronic illness over different income categories. Similar patterns of moderation effect were observed for character strengths of teamwork, social intelligence, and bravery.

4. DISCUSSION

The major aim of this study was to examine the relationship between character strengths and physical health. Few previous studies examined the relationship between character strengths and physical health (cf. Peterson et al., 2006). Although studies have investigated the relation between specific positive constructs and physical health such as optimism, research findings are inconclusive and require more studies with larger and more representative samples.

4.1 Character Strengths and Physical Health

The current study found that certain character strengths were related to health outcomes. Higher level of the character strengths of hope and zest were related to lower incidence of disease and chronic illness. The relationship between hope and zest and physical health outcomes were strong even after accounting for the effects of age and income which are strong contributors to health. The association between physical health and hope and zest is consistent with findings from previous studies. In previous studies, high hope was related with lower distress (Carver & Gaines, 1987; Scheier et al., 1989; Chamberlain, Petrie, & Azariah, 1992; Taylor et al., 1992), less physical illness (Scheier & Carver, 1985; Peterson, Seligman, & Valliant, 1988), faster recovery from physical illness (Scheier et al., 1989; Petersen, 2008), and longevity (Giltay, Geleijnse, Zitman, Hoekstra, & Schouten, 2004; Giltay, Kamphuis, Kalmijn, Zitman, & Kromhout, 2006). Researchers have speculated that optimism may affect health through multiple mechanisms such as: 1) strengthening the immune system by increased number of helper T cells in the immunoregulatory system (Segerstrom et al., 1998), 2) promoting healthy behaviors such as greater physical activity or consuming

more vegetables and whole grain foods (Giltay et al., 2007), and 3) facilitating coping skills and healthier goal settings (Scheier et. al., 1989).

In previous studies, zest was associated with work satisfaction and general life satisfaction (Peterson, Park, Hall, & Seligman, 2009) and also with physical and mental health such as experience of job strain, risk of poor health, and periods of sick leave (Josephson & Vingård, 2007). Researchers have also reported that related psychological constructs such as cheerfulness in childhood predict better physical health in adulthood and longevity (Martin, Friedman, Tomlinson-Keasey, Criqui, & Schwartz, 2002; Friedman, Tucker, Tomlinson-Keasey, Schwartz, Wingard, & Criqui, 1993). In addition, there is evidence that people with higher levels of zest engage in more physical activities that may relate to higher levels of subjective physical health (Waliczek, Zajicek, & Lineberger, 2005). More research is needed to clarify the nature of the relationship between zest and physical health.

Interestingly, higher perspective was related to a greater number of chronic illnesses. We do not know the meaning of this finding. Previous research studies do not shed light on it. The relationship between perspective and health was found only with self-reported chronic illnesses, not with the number of diseases diagnosed by a doctor, which is a more objective index. There is a possibility that people who have higher perspective also more accurate in terms of memory in counting how many chronic illness they have. Or perhaps those with perspective—defined as the offering of wise counsel to others—are more burdened as a function of their style, and this takes a toll on their perceived health. In any event, because this is first study to report this particular finding, more research is needed to clarify whether the finding has real

significance or is an artifact.

4.2 Character Strengths as Moderators between Income and Physical Health

The current findings also suggest that certain character strengths moderate the relationship between income and health outcomes within certain age and gender groups. The character strengths of bravery, forgiveness, prudence, appreciation of beauty, gratitude, spirituality, social intelligence, fairness, teamwork, and prudence moderate the effect of income on health in certain age and gender groups. It is important to note that no moderation effect was found for any character strength when all age and gender groups were combined. This suggests that the role of specific character strengths as a moderator is specific to certain age and gender groups. Thus, future research on character strengths and health outcomes should separately examine different age and gender groups.

In addition, different sets of character strengths were found to be moderators of income and health for different measures of health. Fairness, social intelligence and teamwork moderated effect of income on self-reported chronic illnesses. However, moderator effects of these strengths were not found with diseases diagnosed by doctor. Diseases diagnosed by doctor are a more objective measure that includes serious illnesses like cancer, heart disease, and cardiac insufficiency, whereas self-diagnosed chronic illnesses are more subjective and less serious, e.g., chronic allergies, back pain, and skin disease. Further studies are necessary to clarify the relationship between character strengths and different measures of health.

Certain character strengths, such as forgiveness, prudence, appreciation of beauty, gratitude, spirituality, bravery, social intelligence, fairness, and teamwork

shared similar patterns of moderation effects to the relation between income and physical health. There was a negative association between levels of income and physical health for individuals with high levels of the character strengths of forgiveness, prudence, appreciation of beauty, gratitude, bravery, social intelligence, fairness, and teamwork. For example, individuals with high spirituality in higher income categories reported a fewer diseases. Individuals with lower levels of spirituality showed little association between physical health and income. For example, among women 65 or older, higher spirituality increased the benefit of higher income on health, while increasing the risk of lower income on health.

The existing literature on spirituality/religiosity and health is inconclusive. Some studies have reported that high spirituality/religiosity is related to better health (Idler & Kasl, 1997; Koenig, Kvale, & Ferrel, 1988; Krause, 1998; Levin & Schiller, 1987; Seeman, Kaplan, Knudsen, Cohen, & Guralnik, 1987; Strawbridge, Cohen, Shema, & Kaplan, 1997), while taking account of important health behaviors such as tobacco and alcohol use significantly decreased the effect of religiosity/spirituality to health (Clark, Friedman, & Martin, 1999). Also, the nature of religiosity/spirituality behaviors (such as organizational or non-organizational religiousness) had significantly different effect on health behaviors (Roff, Klemmack, Parker, Koenig, Sawyer-Baker, & Allman, 2005; Anson, Levenson, Maoz, & Bonne, 1991). Perhaps, the current findings suggest that the relationship between religiosity/spirituality and health varies according to the demographic background of an individual such as income, gender and age.

Although the current findings on the moderating role of character strengths on

health are new, relationships between some of character strengths such as gratitude and forgiveness and health have been previously studied. Studies found that people with higher forgiveness have fewer physical illness symptoms, use less medication, experience better sleep, and have less fatigue and fewer somatic complaints (Lawler et al., 2005; Krause & Ellison 2003), and better cardio-vascular health (Krause & Ellison, 2003; Witvliet, 2001). Also, persons with high gratitude reported better health compared to those with low gratitude (Emmons & McCullough, 2003). Character strengths of appreciation of beauty, bravery, fairness have shown associations with a history of physical illness (Peterson et al., 2006). People who recovered from physical illness reported higher level of these character strengths.

In sum, the current findings suggest that character strengths are important for health and mitigate negative effects and maximize positive effects of income and aging. Further studies are needed to understand underlying mechanisms of each character strength role in mitigating the effect of income on health for people of different ages and genders.

4.3 Demographic, Socioeconomic Variables and Physical Health

Relationship between age, income and character strengths were also interesting. As expected, many character strengths were related with aging. Strengths such as curiosity, perspective, and teamwork were lower for older participants, whereas strengths such as perseverance, forgiveness, appreciation of beauty and excellence, and spirituality were higher. In contrast, only a few character strengths were related to income. Of all the predictors used in this study (age, income, gender, and eighteen character strengths), income had the strongest effect on physical health. Previous

studies documented the adverse impact of poverty on health and well-being (Townsend & Davidson, 1982; Frohlich & Mustard, 1996; Hay, 1988; McLeod et al., 2003, Roberge et al., 1995; Roos & Mustard, 1997; Roos et al., 2004; Smith & Frank, 2005; Veugelers et al., 2001; Wilkins et al., 1991). Continued efforts on research, developing programs, and establishing new policies to improve quality of life and reduce health disparity based on income, age, and gender are necessary.

For higher income groups, individuals with high level of hope or zest experience significantly better health compared to individuals with low hope or zest. The difference in health between high and low character strengths group is even more pronounced for higher income groups. This suggests that certain character strengths may help maximize health benefits of higher socioeconomic resources, individually and perhaps as a society as a whole. Perhaps these findings suggest that professionals need to develop better ways to build and strengthen individual's character strengths to maximize the health benefits of positive social conditions as well as improve the social conditions for all.

The current study is significant in that it is the first investigation to examine multiple character strengths and physical health with a large sample. Most of the previous studies on character strengths and physical health had limitations for generalization due to relatively small samples. Previous studies also often did not account for the effect of socioeconomic status, which has been numerous documented as one of the strongest effects on physical health. In this study we have examined the association between the character strengths and physical health in nationally representative German data. As a benefit of using data from a

socioeconomic study, we were able to fully account for the demographic and socioeconomic effect to physical health. Thus, the effects of character strengths on physical health found in this study provide a more general picture of their effect for individuals in different demographic and socioeconomic situations. In addition, while most studies looked at one or a few positive variables and its relationship to health in a study, the current study examined multiple, eighteen, important character strengths and its relationship to health in one study.

A few limitations of this present study deserve consideration. First, the sample of current study consists of residents in Germany, which may have limitation for generalizations of findings to people in different culture and social system. Greater inequality of income is observed in United States (Gini coefficient: 0.408, for 2000; World Bank, 2004) compared to Germany (Gini coefficient: 0.283, for 2000; World Bank, 2004). As a result, the effect of income on physical health could be stronger in the US (Staudinger, Fleeson, & Baltes, 1999). Also, the German health care system is highly state-organized compared to the United States. The health insurance fees in Germany are regulated by the government to provide comparable health care to every German citizen. Public expenditure on health is 8.2% of gross domestic product (GDP) in Germany, compared to 6.9% in the United States (UNDP, 2008). These differences in social welfare system between the two countries suggest that individual planning of behaviors related to well-being and individual access to health care is more important in the United States. Also there are indications that personality characteristics of individuals in United States and Germany may differ. Germany is more homogeneous and structured society (Inkeles, 1997; Triandis, 1995). Staudinger

et al. (1999) reported that there were a fewer number of unique correlates to subjective well-being in Germany compared to the United States.

Second, this study was based on a cross-sectional data that may limit the interpretation of causal relationships among character strength, income, gender, age and physical health. Longitudinal studies are necessary in the future to examine whether being high in certain character strengths lead to better physical health.

4.4 Future Directions

In the current study, character strengths were examined individually as predictors of physical health. The current study examined each character strength and its relationship to health as a first step. Character strengths are multidimensional construct (Park & Peterson, 2006c). Character strengths and its impact on health can be best understood using multivariate approach. Future studies examining multiple character strengths simultaneously such as individual's profile of character strengths and its relationship to health is necessary using a multivariate analysis methods such as latent class models.

Table 1. Values in Action (VIA) Classification of Virtues and Character Strengths.

A. Wisdom and Knowledge

- Creativity: thinking of novel and productive ways to do things
- Curiosity: taking an interest in all of ongoing experience
- Open-mindedness: thinking things through and examining them from all sides
- Love of learning: mastering new skills, topics, and bodies of knowledge
- Perspective: being able to provide wise counsel to others

B. Courage

- Authenticity: speaking the truth and presenting oneself in a genuine way
- Bravery: *not* shrinking from threat, challenge, difficulty, or pain
- Perseverance: finishing what one starts
- Zest: approaching life with excitement and energy

C. Humanity

- Kindness: doing favors and good deeds for others
- Love: valuing close relations with others
- Social intelligence: being aware of the motives and feelings of self and others

D. Justice

- Fairness: treating all people the same according to notions of fairness and justice
- Leadership: organizing group activities and seeing that they happen
- Teamwork: working well as member of a group or team

E. Temperance

- Forgiveness: forgiving those who have done wrong
- Modesty: letting one's accomplishments speak for themselves
- Prudence: being careful about one's choices; *not* saying or doing things that might later be regretted
- Self-regulation: Regulating what one feels and does

F. Transcendence

- Appreciation of beauty and excellence: noticing and appreciating beauty, excellence, and/or skilled performance in all domains of life
 - Gratitude: being aware of and thankful for the good things that happen
 - Hope: expecting the best and working to achieve it
 - Humor: liking to laugh and joke; bringing smiles to other people
 - Religiousness/Spirituality: having coherent beliefs about the higher purpose and meaning of life
-

Table 2. Descriptive Statistics.

Variable	N	Mean	SD
Curiosity	998	6.89	2.24
Perspective	993	6.52	2.04
Bravery	964	5.85	2.26
Perseverance	993	6.8	2.1
Zest	995	6.56	2.05
Love	990	7.38	2.04
Social Intelligence	991	7.12	1.85
Fairness	989	7.46	1.81
Leadership	981	6.23	2.51
Teamwork	977	7.35	2.25
Forgiveness	992	6.84	2.14
Prudence	990	7.13	1.86
Self-regulation	987	6.54	2.01
Appreciation of Beauty	991	7.1	2.37
Gratitude	997	7.92	1.79
Hope	996	7.15	2.07
Humor	999	7.47	1.96
Spirituality	979	4.72	3.03
Count of Disease	1004	0.53	0.84
Count of Chronic Illness	1004	0.64	1.02

Table 3. Correlations between character strengths

	CUR	PSP	COU	PSV	ZST	LOV	SOC	FAI	LEA	TEM	FOR	PRU	REG	BEA	GRA	HPE	HMR	REL
CUR	—																	
PSP	0.53***	—																
BRV	0.38***	0.41***	—															
PSV	0.44***	0.47***	0.49***	—														
ZST	0.46***	0.41***	0.39***	0.55***	—													
LOV	0.33***	0.29***	0.21***	0.33***	0.41***	—												
SOC	0.36***	0.43***	0.31***	0.37***	0.41***	0.57***	—											
FAI	0.28***	0.27***	0.21***	0.33***	0.33***	0.39***	0.46***	—										
LEA	0.45***	0.42***	0.4***	0.4***	0.44***	0.25***	0.30***	0.24***	—									
TEM	0.43***	0.37***	0.35***	0.44***	0.45***	0.42***	0.44***	0.35***	0.52***	—								
FOR	0.15***	0.14***	0.09**	0.19***	0.25***	0.32***	0.33***	0.40***	0.11***	0.20***	—							
PRU	0.28***	0.28***	0.16***	0.34***	0.29***	0.35***	0.36***	0.40***	0.27***	0.40***	0.30***	—						
REG	0.27***	0.27***	0.29***	0.36***	0.36***	0.32***	0.36***	0.38***	0.30***	0.37***	0.36***	0.41***	—					
BEA	0.28***	0.32***	0.23***	0.26***	0.24***	0.39***	0.42***	0.32***	0.26***	0.33***	0.20***	0.33***	0.25***	—				
GRA	0.30***	0.30***	0.24***	0.34***	0.33***	0.52***	0.49***	0.43***	0.20***	0.42***	0.28***	0.39***	0.35***	0.51***	—			
HPE	0.35***	0.34***	0.34***	0.35***	0.46***	0.38***	0.38***	0.31***	0.34***	0.37***	0.33***	0.30***	0.41***	0.29***	0.38***	—		
HMR	0.37***	0.31***	0.29***	0.32***	0.41***	0.40***	0.36***	0.33***	0.33***	0.43***	0.24***	0.28***	0.29***	0.32***	0.43***	0.51***	—	
SPR	0.06*	0.13***	0.07*	0.08*	0.09**	0.10**	0.17***	0.13***	0.12***	0.049	0.10**	0.09**	0.11***	0.20***	0.15***	0.13***	0.14	—

Note: CUR = Curiosity; PSP = Perspective; BRV = Bravery; PSV = Perseverance; ZST = Zest; LOV = Love; SOC = Social Intelligence; FAI = Fairness; LEA = Leadership; TEM = Teamwork; FOR = Forgiveness; PRU = Prudence; REG = Self-regulation; BEA = Appreciation of Beauty and Excellence; GRA = Gratitude; HPE = Hope; HMR = Humor; SPR = Spirituality.
 * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$.

Table 4. Standard Regression Analysis of Age and Character Strengths.

Variables	<i>B</i>	<i>SE</i>	<i>t</i>
Curiosity	-1.59	0.34	-4.65***
Perspective	-0.87	0.38	-2.27*
Perserverance	1.33	0.38	3.47***
Teamwork	-1.80	0.36	-5.03***
Forgiveness	0.90	0.32	2.79**
Apprec. of Beauty	0.71	0.30	2.35*
Gratitude	0.89	0.45	1.98*
Spirituality	0.68	0.20	3.4***

Note. Only significant predictors ($p < .05$) were reported in this table.

* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$.

Table 5. Odds Ratios of Logistic Regression of Gender and Character Strengths.

Variables	OR	95% CI	<i>p</i>
Bravery	0.87	0.80, 0.95	0.0003
Love	1.21	1.10, 1.33	< .0001
Social Intelligence	1.15	1.03, 1.28	0.0123
Leadership	0.93	0.86, 1.00	0.0486
Self-Regulation	0.91	0.83, 0.99	0.0248
Gratitude	1.14	1.02, 1.27	0.0192
Spirituality	1.08	1.03, 1.13	0.0019

Note. OR = odds ratio; CI = confidence interval

^aEighteen character strengths variables were entered simultaneously.

Table 6. Summary of Models Examined.

Model	Analysis	Population	DV	IV	Interaction Effect Examined
1	NB	Total	Count of Disease	Age, Income, CS	N/A
2	NB	By Age and Gender	Count of Disease	Income, CS	Income and CS
3	NB	Total	Count of Chronic Illness	Age, Income, CS	N/A
4	NB	By Age and Gender	Count of Chronic Illness	Income, CS	Income and CS

Note. NB = Negative Binomial Regression, CS = Character Strength

DV = Dependent Variable, IV = Independent Variable

Table 7. Summary results of negative binomial regression:

Interaction effect of character strengths on count of disease.

Group	Gender	Age	Interaction Effect with Income
1	Male	Age < 35	N/A
2	Male	$35 \leq \text{Age} < 50$	N/A
3	Male	$50 \leq \text{Age} < 65$	Bravery
4	Male	Age ≥ 65	Prudence
5	Female	Age < 35	Gratitude
6	Female	$35 \leq \text{Age} < 50$	Bravery
7	Female	$50 \leq \text{Age} < 65$	Forgiveness
8	Female	Age ≥ 65	Apprec. Of Beauty, Spirituality

Table 8. Summary results of negative binomial regression: Interaction effect of character strengths on count of chronic illness.

Group	Gender	Age	Interaction Effect with Income
1	Male	Age < 35	N/A
2	Male	$35 \leq \text{Age} < 50$	N/A
3	Male	$50 \leq \text{Age} < 65$	Social Intelligence
4	Male	Age ≥ 65	Apprec. Of Beauty
5	Female	Age < 35	Bravery
6	Female	$35 \leq \text{Age} < 50$	Fairness, Teamwork
7	Female	$50 \leq \text{Age} < 65$	Prudence
8	Female	Age ≥ 65	N/A

Figure 1. Interaction plot of count of disease and income by character strengths.

Figure 2. Interaction plot of count of chronic illness and income by character strengths.

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