

Self-Control: Influencing Physical and Financial Health Behaviours – An Exploratory Study

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ABSTRACT

The last 30 years have witnessed drastic increases 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 to those just a few decades ago and may reward a different personality profile (i.e. those with higher SC). The purpose of this study is to extend previous research by examining the relationships between a) SC and exercise behaviours, and, b) SC and financial behaviours. 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 (38.5%) women and represented a range of ages ($M = 55.28 \pm 11.76$). SC, exercise behaviour, and financial behaviours were measured using the International Personality Item Pool (IPIP), the International Physical Activity Questionnaire (IPAQ), and Financial Behaviour 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 regression analyses showed that SC positively and significantly predict exercise and financial behaviour.

These results are consistent with growing evidence in health psychology research that SC may be a predictor of the health-wealth connection. Reports in the current study suggest that among individuals with the same resources (i.e. income and education), self-control may help explain why some people prosper while others struggle both physically and financially. The results of this study indicate that strategies to enhance SC may hold promise for the improvement of health and wealth-related behaviours.

Keywords: Exercise, Financial Behaviours, Physical and Financial Health, Self-Control

INTRODUCTION

Modern-day life is quite different than it was just a half-century ago and, as such, may reward a different personality profile. Technological advancements have decreased the need for physical activity, food is more readily available and affordable, consumer credit is more easily attainable, and complex financial products are widespread (Philipson & Posner, 1999; Hand & Henley, 2007; Church *et al.*, 2011). While many societal changes are seen as improvements, they also bring a new set of physical and financial health challenges. Specifically, the current environment requires resisting high calorie foods and making the effort to plan and implement an exercise regimen in order to maintain a healthy body weight and general health (Thomas *et al.*, 2010). Financially speaking, credit cards have been shown to weaken impulse control and therefore, necessitate the ability to resist over-spending (Thomas *et al.*, 2010). As the shift has been to an efficient society with more potential temptations to stray from positive health and financial behaviours, 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 (Zagorsky, 2005; Aittomäki *et al.*, 2010). Thus, as environmental cues present new

challenges and public health and finance problems rise to the top of societal concerns, in order to provide insights to the causes and treatments of physical and financial health, it becomes important to understand how people can best adapt to the changing environment.

THEORETICAL BACKGROUND

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, behavioural genetics, behavioural economics) such as impulsivity, conscientiousness, self-regulation, executive function, willpower, and intertemporal choice (Moffitt *et al.*, 2011). SC is defined as a person's motivation and capacity to refrain from enacting a problematic desire (i.e., a temptation) or to override a problematic desire with a preferred behaviour (Hofmann *et al.*, 2012). Personality research suggests that SC may directly or indirectly effect health and wealth outcomes through behaviour patterns and lifestyle (Terracciano *et al.*, 2009; Moffitt *et al.*, 2011; Sutin *et al.*, 2011).

SC has been traditionally investigated as the effortful inhibition of temptations (Fujita, 2011). However, the development of SC Theory 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 (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 versus focuses on pleasure in the short run. Thus, Conscientiousness and Impulsivity are good predictors of whether or not a person will have success in implementing SC (Piquero & Rosay, 1998; Moffitt *et al.*, 2011).

LITERATURE REVIEW

Physical Health Behaviours and Outcomes.

Obesity rates have more than doubled since the 1970s (Center for Disease Control, 2012). The sharp increases in obesity and the associated health

consequences have been clearly documented (Flegal *et al.*, 2005). The behaviours contributing to obesity, including physical inactivity and poor diet, are the second leading controllable cause of death in the United States (Mokdad *et al.*, 2004). Thus, it has been suggested that a combination of increased food intake and decreased physical activity are responsible for the obesity epidemic (Swinburn *et al.*, 2009; Church *et al.*, 2011). 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 when 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 (i.e. 7 pounds 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, most people must intentionally make time for regular exercise as a part of their day.

Research has linked SC to numerous health outcomes and behaviours. SC has been shown to significantly predict health outcomes such as body mass index (Crescioni *et al.*, 2011), HDL, and triglycerides (Sutin *et al.*, 2011). Relationships have been established between SC and fitness (Kinnunen *et al.*, 2012) and physical health symptoms of immune functioning (Boals *et al.*, 2011). Research has also demonstrated a link

between SC and both body mass and general health, even after controlling for genetics, intelligence, social class, and home life (Terracciano *et al.*, 2009; Moffitt *et al.*, 2011). A recent study by McKee *et al.* (2013) that examined success and failure underpinning weight maintenance may begin to explain the process by which self-control maintains the relationship with important health behaviours. In a comparison of people who lost weight and maintained the weight loss (Maintainers) to those who lost weight and then regained the weight (Regainers), two main themes were highlighted which were: goal regulation and self-control. Maintainers reported long-term, realistic goal setting, consistent use of routines and self-monitoring, avoiding deprivation, and effective coping skills.

Financial Health Behaviours and Outcomes.

The results of McKee *et al.*'s (2013) study are in line with Gottfredson and Hirschi's SC Theory (1990), Hofmann and Kotabe's (2012) SC taxonomy, and Fujita's conceptualization of SC (2011) in that each suggest that SC is a process by which preventative and interventive strategies (e.g. consistent use of routines and self-monitoring) are explicitly implemented in the present in order to achieve a greater desired future goal. Furthermore, research suggests that the SC process may follow a similar course of action in several areas of life, such as financial behaviours and outcomes (Moffitt *et al.*, 2011).

In the last 50 years, spending, borrowing, and saving practices have changed drastically. Until 1966 when the first general purpose credit card was introduced, nearly all consumer transactions were made with cash (Sienkiewicz, 2001). In a 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 75% today (Federal Reserve Board, 2012). Currently, the average household credit card debt of those who have credit cards is about \$15,600 (United States Census Bureau, 2010). Shortly after the widespread use of the credit card, savings rates began to decline from 6-12% in the 1970s to a rate close to zero during the 2000s (Sherlund, 2010). In addition to poor spending practices, an inability to set financial goals negatively affects Americans. It is predicted that over 60 million American households will fail to achieve one or more major life goal, because they do not use a financial plan (Consumer Federation of America, 2012).

Research from the discipline of financial management has linked SC to various financial behaviours and outcomes. In their review paper, Tanaka and Murooka (2012) 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 30-year longitudinal study, Moffitt *et al.* (2011) found that childhood SC predicted adult wealth independent of intelligence, social class, and home lives.

PURPOSE OF THE STUDY

This body of research indicates that SC may be a valuable behavioural characteristic in a modern environment that requires volitional health and wealth-related practices. However, few studies have examined the effects of SC on exercise, and even fewer have examined SC on financial behaviours. Furthermore, no studies have examined the effects of SC on health and wealth behaviours concurrently. As health and wealth trends have become progressively worse in the same time frame, it is clearly important to extend the current research and explore the possible link between SC and the health and wealth connection. Thus, the purpose of this study is to examine the relationships between a) SC and exercise, and, b) SC and financial behaviours. It was hypothesized that SC would explain both exercise and financial behaviours independent of income, age, education, and gender.

METHOD

Participants

Study participants were recruited from a database of alumni at a large Midwest university. The decision to focus on university alumni from a

single institution was based on an effort to control for previously demonstrated educational influences on financial and health behaviours (CDC, 2013). 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 behaviour variables ($p < .05$) with a small effect size. According to the sample database centre, 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 in an effort to exert some control over the degree to which individuals were financially independent, while also keeping a broad age range. 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 behaviours, and financial behaviours). Thus, completed responses included 1,320 men (61.5%) and 1,135 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 to participate in the study by completing a series of questionnaires measuring SC, exercise behaviours, financial behaviours, 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.

Variable Measures

Self-Control

Based on the framework of SC described by Gottfredson and Hirschi (1990) and Hofmann and Kotabe (2012), the facets of Conscientiousness and the Impulsivity factor from the Grasmick 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; $\alpha = .921$).

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 4-step (1-5 point) Likert-type scale ranging from disagree strongly (1) to agree strongly (5) with the degree to which the statement represented perceptions of themselves. The reliability scores of each facet of Conscientiousness were acceptable in the current study (Self-Discipline, 10 items; $\alpha = .73$; Self-Efficacy, 10 items; $\alpha = .74$; Orderliness, 10 items; $\alpha = .78$; Dutifulness, 10 items; $\alpha = .69$; Achievement-Striving, 10 items; $\alpha = .82$).

Impulsivity

The Impulsivity construct in Grasmick *et al.*'s Self-Control Scale (Grasmick *et al.*, 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 represented 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) and were also reliable in the current study (4 items; $\alpha = .71$).

Exercise behaviours

Exercise behaviours were measured using the International Physical Activity Questionnaire (IPAQ). The questionnaire includes four items related to the 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 physical activity and has been shown to correlate well with objective measures of physical activity (Craig *et al.*, 2003).

Financial behaviours

The Financial Behaviour Questionnaire is an assessment of individuals' spending, saving, borrowing, and investing behaviours. 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 nine items in the questionnaire have been used to measure financial planning behaviours in several studies concerning financial management (Titus *et al.*, 1989; Garrison & Hira, 1992). Participants answered each item on the questionnaire on

a 4-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 behaviours. In the current study, the Financial Behaviour Questionnaire was found to be reliable (9 items; $\alpha = .71$).

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 were 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. Gender was assessed using two dichotomous levels where 1 = male, and 0 = female.

Variables Transformation 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 ($M = 269.67 \pm 24.97$; $t(2,453) = .769, p = .442$).

The current study used an 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 *et al.*, 1993). Each Conscientiousness facet (Self-Efficacy, Orderliness, Dutifulness, Achievement-Striving, and Self-Discipline) 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 behaviour 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 behaviours were assessed using a nine-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 behaviour composite score that ranged from nine (poor financial behaviours) to 45 (good financial behaviours).

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

Multiple linear regression analyses are suitable for determining the relationship between one or more explanatory variables and a dependent variable. Therefore, two separate multiple linear regression analyses were used to examine the following: a) whether SC was related to exercise behaviour when controlling for income, age, education, and gender, and, b) whether SC was related to financial behaviour when controlling for income, age, education, and gender. Based on the objectives of the study and the conceptualization of SC as a process, facet level analyses were not run. SC is the broad tendency

for individuals to engage in preventative and interventive regulation as measured by Conscientiousness and Impulsivity, as opposed to independent trait-like facets. 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). 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.

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 (Table 1). 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 \$15,000-60,000, 27% earning \$60,000-100,000, 30% earning \$100,000-150,000, and 29% earning > \$150,000.

Table 1: Descriptive Statistics

	Mean	SD
Income (\$)	95,000	1.7
Age (yr)	55.3	8.5
Education (yr)	5.8	0.9
N =1,320		

SC and Exercise Behaviour

The results of the multiple regression analysis showed that SC ($\beta = .11$, $t(1,315) = 3.54$, $p < .001$) was positively and significantly related to exercise behaviour when controlling for income, age, and education (Figure 1; Figure 3). Tests indicated that multicollinearity was not present (tolerance = .98, .97, .99, .98, and .95 for SC, income, age, education, and gender). Age was a significant correlate of exercise behaviour ($r(1,318) = -.06$, $p < .01$). The R^2 change when adding gender to the exercise behaviour model increased by a value of .005, which was also significant. Table 2 provides details of these results.

Table 2: Results of Regression Analysis: Variables Explaining Exercise Behaviour

	B	SE B	B
Self-Control	16.48	4.57	.11**
Income	-64.05	50.48	-.03
Age	22.59	9.95	-.06*
Education	-9.10	138.71	-.01
Gender	.06	.02	.07*

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

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

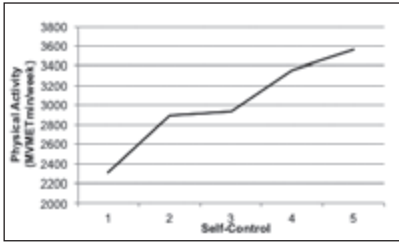


Figure 1: A Gradient of SC positively and significantly predicted exercise behaviour ($t(1,315) = 3.54, p < .001$) when controlling for Income, Age, Education, and Sex.

SC and Financial Behaviour

The results of the multiple regression analysis showed that SC ($\beta = .40, t(1,315) = 15.37, p < .001$) was positively and significantly related to financial behaviour when controlling for income, age and education (Figure 2; Figure 3). 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 behaviours ($r(1,318) = .20, p < .001$). The R^2 change when adding gender to the financial behaviour model increased by a value

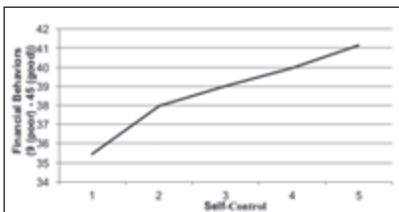


Figure 2: A Gradient of SC positively and significantly predicted financial behaviour ($t(1,315) = 15.37, p < .001$) when controlling for Income, Age, Education, and Sex.

of .004, which was also significant. Table 3 provides details of these results.

Table 3: Results of Regression Analysis: Variables Explaining Financial Behaviour

	<i>B</i>	<i>SE B</i>	<i>B</i>
Self-Control	.08	.01	.40**
Income	.46	.06	.20**
Age	-.01	.01	-.01
Education	-.10	.15	-.02
Gender	-.63	.27	-.06*

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

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

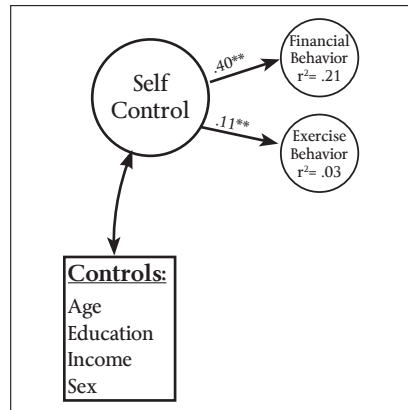


Figure 3: A model depicting the positive and significant relationship between SC and physical and financial-health behaviours when controlling for Income, Age, Education, and Sex.

DISCUSSION

Self-Control (SC) is characterized by the ability to control emotions and behaviours, be task- or goal-driven, be planful, delay gratification, and persist despite set-backs (Miller *et al.*, 2011; Moffitt *et al.*, 2011). The purpose of this study was to examine the relationships

between a) SC and exercise behaviours, and, b) SC and financial behaviours within the same population. It was hypothesized that SC would explain both exercise and financial behaviours independent of income, age, education, and gender. The results supported this hypothesis, demonstrating that reports of higher SC were related to engagement in more exercise for males and females in every income bracket, regardless of gender, age, and independent of education. The strength of the relationship between SC and exercise behaviour in the current study was similar to previous personality and exercise research (Ingledew *et al.*, 2004). Furthermore, for every one-unit increase in SC, there was a corresponding 16.48 METminute increase in weekly exercise behaviour, which is equivalent to about four minutes of brisk walking. This was a small effect (accounting for 3.3% of the variance in exercise behaviour), though this does constitute a meaningful relationship according to Cohen (1988). In addition, the practical importance of the effect can be seen in the magnitude of the change in actual exercise behaviour such that an improvement of 5% (15 units) on the SC scale corresponded with an increase of an hour (61 minutes) of brisk walking per week (an intensity of four METs). Lee and Skerrett's (2001) dose response curve for physical activity and health outcomes indicates that even one hour of walking per week is enough to warrant significant health benefits and decrease risk for all-cause mortality,

especially when a person's starting point is relatively inactive.

The results also showed that reports of higher SC were related to engagement in positive financial behaviours when controlling for income, age, education, and gender. In this case, SC was related to 21% of the variance in financial behaviour, 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 behaviour such that an increase of 5% (15 units) on the SC scale corresponded with an improvement in financial behaviours of 3%. On the financial behaviours questionnaire, an increase of 3% would improve an individual's financial behaviour by one category on one of the items. As an example, a person who saved "seldom" would save "occasionally" or a person who made a plan on how to use money "usually," would plan "most of the time."

The findings in this research suggest that SC is linked to financial behaviours to a greater extent than exercise behaviour. 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. Exercise is physical activity that is planned, structured, repetitive, and purposive in the sense that improvement or maintenance of one or more components of physical fitness

and/or health is the objective. Thus, 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 behaviour, not general physical activity. Therefore, it is recommended that future research examining SC and exercise should use an exercise questionnaire that measures leisure time exercise and not total general physical activity accumulated throughout the day. This will help gain a better understanding of the mechanism that drives purposive exercise as opposed to the accumulation of general physical activity.

These results are in agreement with previous SC and health behaviour research (Bogg & Roberts, 2004) and SC and financial behaviour 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 behaviour. Ingledeew *et al.* (2004) speculate as to the process that which SC translates into positive health behaviours. They suggest that it is unlikely that many

health-related behaviours 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. Research by McKee *et al.* (2013) demonstrated that the process by which SC leads to healthy weight maintenance includes long-term, realistic goal setting, consistent use of routines and self-monitoring, avoiding deprivation, and effective coping skills. It is likely that the SC process unfolds in a similar way regarding exercise behaviour. More research is needed to conclude how the SC process leads to exercise.

Financially speaking, Tanaka and Murooka (2012) in their review of SC problems and financial behaviours showed that individuals who report low SC also participate in harmful financial behaviours 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 in line with previous SC research (Moffitt *et al.*, 2011; Tanaka & Murooka, 2012) and are the first to demonstrate a relationship between SC with both health and wealth behaviours 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 (Evans, & Schmalensee, 2005; Church *et al.*, 2011). Physical activity was once acquired continuously throughout the day. Today, technology advancements have eliminated the need for manual labour 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 of a sedentary lifestyle by increasing participation in a purposive exercise programme despite environmental obstacles and distractions.

Likewise, the financial industry operates much differently than 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. Products are more complex and sales tactics are very aggressive. The mortgage crisis of 2008 is a vivid example of this reality (Hira, 2012). With an increase in financing options via credit cards, in-store financing, and payday lending, consumer debt among people in every income brackets has steadily trended up since the early 1970s (Gross & Souleles, 2002). In the current environment, a healthy

financial status requires avoiding overspending 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 behaviours such as carrying a balance on their credit card, spending impulsively, and paying bills late. Individuals with high SC also reported more positive financial behaviours 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.

LIMITATIONS

An apparent limitation of the study was the low response rate (6%). As a reference point, response rates to email surveys have drastically decreased from 60% in 1986 to 24% in 2000 (Sheehan, 2001) and are likely even lower today. All studies that rely on voluntary participation must consider that there is a potential bias if there is a systematic difference between people who decided to respond and those who did not. Another limitation of the study



is the nature of self-report surveys. As with all self-report studies, answers may be limited by biases related to self-deception and self-enhancement. The study sample also 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.

Based on the results of this study, a recommended next step in the SC and health research is to design an experimental study to include measures of health (disease, blood lipid profile, body composition) and wealth (net worth) and to test general SC strategies that could empower engagement in positive health and financial behaviours.

CONCLUSIONS

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 *et al.*, 2012). Based on this research, it could be suggested that SC is more of a learned and malleable behaviour that can be improved with training and effort than it is an inborn, unchangeable trait. Self-monitoring,

self-evaluating, and self-reinforcing are basic SC skills (Banduara, 1991) that can be learned and may be effective in combating the present-day temptations and distractions that compete with health and financial well-being.

IMPLICATIONS

While this study was not an intervention, the result suggest that such SC strategies may be beneficial for health and financial practitioners to teach and encourage among their clients. As mentioned, self-monitoring, self-evaluating, and self-reinforcing are basic SC skills that likely improve both physical and financial health behaviours and outcomes. Additionally, government investments in SC programmes that teach such strategies at a young age may develop into healthier physical-and financial health behaviours in adulthood. ■

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