

Factors influencing a change in positive health behaviors for older people

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Introduction

Over the last decade, there has been growing concern regarding individuals' health behaviors. Positive health behaviors have been suggested as a potentially effective process in which individuals are encouraged to engage in better health behaviors to promote their health and well-being. Such behaviors include physical exercise, smoking avoidance or cessation, and reduction of alcohol consumption. For example, physical activity has consistently been observed to reduce the risk of certain chronic diseases, strengthen bone and muscle, and improve mental capability. Similarly, smoking cessation may reduce the risk of coronary heart disease, stroke and lung cancer (USDHHS, 2000). The cumulative influences of smoking, drinking alcohol in excess, inactivity, and being overweight are significantly related to the increased risk for chronic illness in later life (World Health Organization, 2002b). Thus, adopting positive health behaviors have been observed as an effective way of improving health status and well-being for individuals.

Despite the understanding of the benefits of choosing positive health behaviors, the research has paid relatively little attention to factors that contribute to favorable changes in health behavior among older people. Research has suggested that older people do make changes to their behaviors (Shone & Weinick, 1998; Newsom, Kaplan, Huguet, & McFarland, 2004; & Wray, Alwin, & McCammon, 2005). More specifically, changes in health behaviors

vary due to the type and timing of different life events. Also, depending on individuals' health beliefs and expectations, people are likely to change behaviors.

The purpose of this paper is to examine changes in health behaviors from negative behaviors to positive behaviors in adults aged 50 and older. Positive health behaviors include physical exercise, smoking avoidance or cessation, and reduction of alcohol consumption. While social and demographic factors (e.g., age, gender, socioeconomic status) will be considered, the main focus of this study is whether various major life events (e.g., marriage, divorce, retirement, death of spouse or family members, and contraction of diseases) impact a positive change in health behaviors. The research question that guides this study is; do stressful life events predict favorable changes in the health behaviors of older people? This study will use data from the 2000 and 2002 Waves of the Health and Retirement Study (HRS).

Literature Review

Definition

Health behaviors are defined as “any behavior that people engage in spontaneously or that can be induced with the intention of alleviating the impact of potential health risks and hazards in their environment” (Zanjanji, Schaie, & Willis, 2006). This paper will focus on positive health behaviors. Several studies have explained the components of positive health behaviors. Positive health behaviors typically include performing regular physical activity, having regular checkups by medical service providers, having good dietary habits, not smoking

cigarettes, and not drinking alcoholic beverages in excess (Shone & Weinick, 1998; Newsom, Kaplan, Huguet, & McFarland, 2004; & Wray, Alwin, & McCammon, 2005).

With the growing influences of health promotion and recognition of benefits of practicing positive health behaviors, people are trying to adopt positive behaviors in order to improve their quality of life and well-being. A change in positive health behaviors is defined as “the shift from risky behaviors to the initiation and maintenance of healthy behaviors” (Nieuwenhuijsen, Semper, Miner, & Epstein, 2005). This study will focus on the behaviors of physical exercise, smoking avoidance or cessation, and reduction of alcohol consumption.

Life Course Perspective and Change in Health Behavior

Quadagno (2002) noted that the life course perspective entailed the interaction of historical events, individual decisions, and life experiences or events (Quadagno, 2002). According to the life course perspective, the likelihood of behavior change will depend on events that have occurred across the life time. Trajectories of changes are diverse due to variation in the timing of events such as marriage, divorce, death of spouse or family member, retirement or unemployment, and the contraction of diseases (Dannefer & Uhlenberg, 1999; Wethington, 2005). Older people are likely to engage in positive health behaviors depending on the timing of specific life events.

Being married is associated with positive health behaviors. Shone and Weinick (1998)

focused on the relationship between marital status and health behaviors for older men and women. They used data from the 1987 National Medical Expenditure Survey. The sample was consisted of 1,800 of older men (275 widowed and 1,525 married) and 2,643 of older women (1,445 widowed and 1,198 married). They concluded that marriage improved the odds of engaging in positive health behaviors such as physical activity, eating breakfast, wearing seat belts, using hearing aids, and not smoking cigarettes compared to similar older widows. The authors speculated that the differences between married and widowed respondents may be the result of wives being more likely to encourage their husbands to become involved in positive health behaviors (Shone & Weinick, 1998).

In addition, Nysted (2005) investigated how marital life events (getting married, divorced, and widowed) affected change in smoking behavior. He collected data from 81,209 respondents of the Swedish Longitudinal Micro-Level data base for 1980-2000. Overall, this study found that being married was protective against smoking in both men and women. Divorced persons were more likely to smoke, compared to similar married people. Specifically, for men, the change to smoking cessation was strongly related to having a partner or being married (Nysted, 2005).

Acquiring disease or illness can have a positive affect on health behaviors. Rabin and Pinto (2006) studied 65 people diagnosed with cancer. The authors reported that patients with a diagnosis of cancer often increase their frequency of exercise and adopt better nutritional habits.

Cancer survivors were likely to adopt positive health behaviors to prevent other diseases in the future (Rabin & Pinto, 2006).

Falba (2005) examined longitudinal data from Health and Retirement Study (HRS) to study the relationships between health events and smoking cessation. Health events in this study included heart attacks, strokes, cancers, chronic lung disease, chronic heart failure, diabetes. She collected data from Wave 1 (1992) through Wave 4 (1998) and measured health events between each of the four waves. She found that health events were associated with lower likelihood of smoking and concluded that health events had potential impacts on smoking cessation for older people (Falba, 2005).

Furthermore, Alfano and colleagues (2009) studied how cancer was associated with changes in exercise and diet among breast cancer survivors. They recruited 1,572 breast cancer survivors who participated in Cancer and Leukemia Group B (CLGB # 79804) from 1985 to 1991. At beginning of study, they found that only 314 of participations had survived. Among those surviving people, 245 those people completed a mail survey. Their results showed that overall 58% of people who had breast cancer engaged in positive changes in exercise and dietary habits (Alfano et al., 2009). Thus, the experience of having certain illnesses may motivate people to adopt positive health behaviors.

Another study investigated the relationship between life events and health behaviors- namely the relationship between retirement and smoking. Lang and colleagues (2007)

conducted a longitudinal study of people aged 50 and older. They measured the relationship between the transition into retirement and smoking cessation. The authors observed that individuals who were employed at base line and retired at follow-up were more likely to have quit smoking compared to others who were employed at baseline and employed at follow-up as well as those retired at baseline and retired at follow-up (Lang et al., 2007).

Model of Change in Health Behaviors

Furthermore, several empirical studies addressed similar questions and developed models or theories which sought to explain a change in positive health behaviors among older people. Three major models or theories about changes in health behaviors are discussed.

The “Health Belief Model” is a psychological model that attempts to explain and predict health behaviors by focusing on the attitudes and beliefs of individuals (Rosenstock, Strecher, & Becker, 1988). The emphasis in the health belief model is on individuals’ beliefs about diseases and health. By using the health belief model, Ferrini and colleagues (1994) studied the relationship between health beliefs and changes in positive health behaviors (diet, exercise, and an individual’s willingness to spend money for healthful products) among 2,426 people aged 50 and older in Southern California. They found that respondents who had positive health beliefs were more likely to report changes in positive health behaviors compared to similar people with negative health beliefs. For example, people who believed physical exercise resulted in better health status were more likely to engage in physical activity. On the other hand, those people

who were confused in their health beliefs were less likely to report changes in positive health behaviors (Ferrini, Edelstein, & Barrett-Connor, 1994).

Other psychologists developed the “Transtheoretical Model” (or the stages of change model) for understanding behavior changes that result from beliefs in their effectiveness (DiClemente & Prochaska, 1983). This model was an explanatory model of intentional behavior changes and was based on the observation that people tend to move through a variety of stages in their attempt to change a behavior (Burbank, Cynthia, & Nigg, 2000). A number of studies have used this model in order to predict and describe behavior change in many different domains of health behaviors. For example, Nigg and colleagues (1999) examined the tendency of older people who engage in risky behaviors to move through stages of change toward positive health behaviors. They interviewed 19,266 older people via mail and telephone who were in the managed care system. The behaviors included using seatbelts, avoiding fat, eating fiber, losing weight, exercising, avoiding sun, using sunscreen, reducing stress, smoking cessation, and self-checking of cancer symptoms. They found that older people entered different stages of change in health behaviors depending on engaging in different risks of health behaviors at base line (Nigg, et al., 1999). These findings indicate that although older people change their health behaviors, they do not do so all at once.

The “Self-Efficacy Model,” based on the central concept of Bandura’s social cognitive theory (or Social Learning Theory), describes a person’s belief or competence to perform a

specific behavior successfully (Redding et al., 2000). Grembowski and colleagues (1993) applied this theory to examine how older people change toward positive health behaviors. They drew on a sample of 2,524 Medicare beneficiaries enrolled in Group Health Cooperative of Puget Sound from the state of Washington. They examined the associations between the level of personal self-efficacy and risk behaviors including exercise, dietary fat intake, weight control, alcohol intake and smoking. They found that older people who had a higher level of self-efficacy were more likely to engage in positive health behaviors and changes in positive health behaviors as well (Grembowski et al., 1993).

Psychological models have been widely used to study how an individual's health attitude and belief impact their health behaviors. Three theoretical models have been reviewed that help explain change in positive health behaviors: the Health Belief Model, Transtheoretical Model, and Self-Efficacy Model of change in behaviors. Although several studies have utilized these models to explain why older people adopted positive health behaviors, there are limitations in applying these models. These models focus on an individual's belief and expectation about health and change in health-related behavior, but do not take into consideration other factors such as environmental factors, economic factors, and life events that may influence change in health behaviors (Victoria Department of Human Services, 2004). Furthermore, "beliefs" are measured by self-report and individual definitions vary. Many of the studies using a psychological conceptualization of change in positive health behavior used cross-sectional data,

which cannot predict causation. Lastly, sample sizes for most of these studies are relatively small and unrepresentative of the national population.

The Life Course perspective is useful in addressing some of the limitations noted about psychological models and assists in enhancing the existing knowledge on changes in positive health behaviors. A major theoretical advantage of the Life Course perspective is the acknowledgment of individuals' characteristics and life events that impact health and health behaviors. Several studies have demonstrated how certain life events affect change in positive health behaviors among older people. In summary, these studies suggest that changes in health behaviors occur as a result of the type and timing of specific life events such as marriage, divorce, retirement, and contraction of diseases. This study investigates how specific life events affect a change in positive health behaviors among older people based on the life course perspective by analyzing longitudinal data from the HRS.

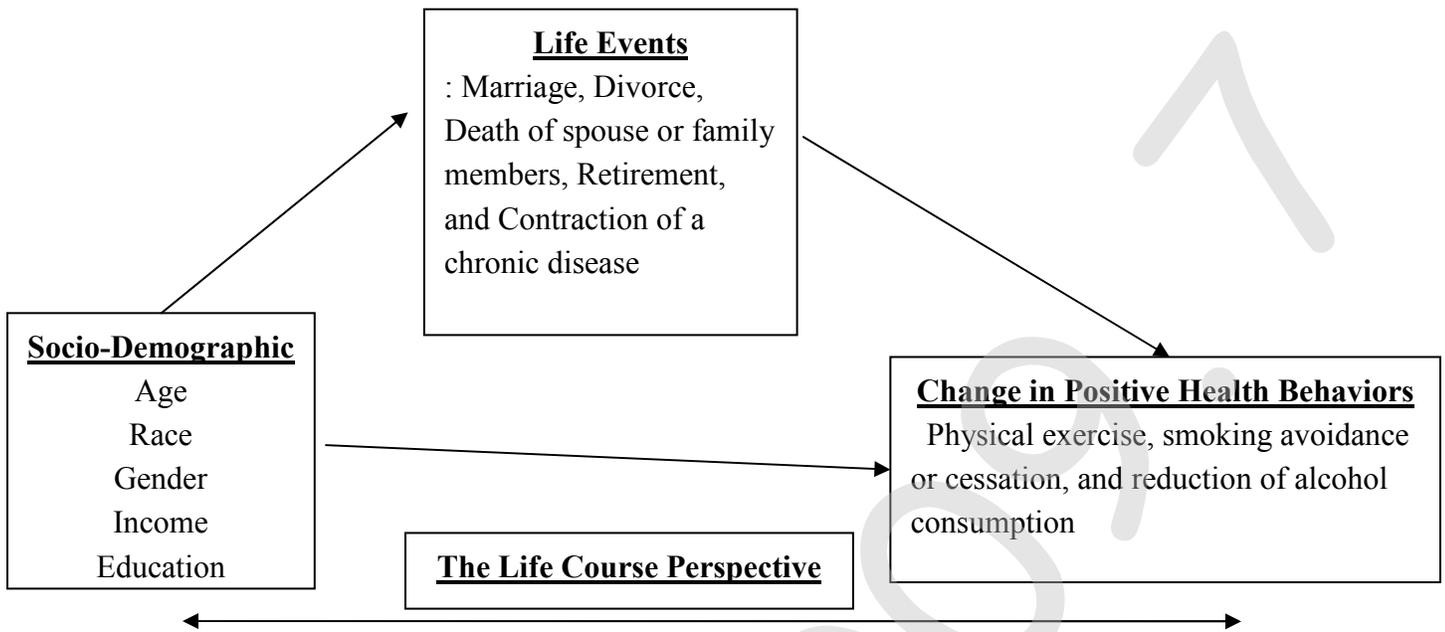
Conceptual Framework

The conceptual framework used to explore the change in health behavior among older people is based on the Life Course perspective. The Life Course perspective integrates individual differences in health and health behavior across the life span. Thus, the Life Course perspective can be used to explain why different individuals engage in different health behaviors. During an individual's life time, certain socio-economic factors such as age, gender, race, education, and income may affect whether one engages in good or poor health behaviors. The

Life Course perspective also focuses on transitions and turning points in the life span.

Transitions can include role changes in family and personal development. Such life events provide potential turning points for change in health behaviors from either positive to negative or the reverse. Life events are discretely identifiable transitions that are an important component to the Life Course perspective (Wethington, 2005; Quadagno, 2002). For older people, these include widowhood, retirement, death of spouse or family member, and contracting disease. The literature suggests that these life events stimulate the likelihood of change in positive health behavior.

Based on the Life Course perspective, the conceptual model for the present study has two major components regarding the outcome of change in health behavior (Figure 1). The first component includes socio-demographic factors (e.g., age, race, gender, income, and education) that impact life events and changes in health behavior. The second component includes the impact of life events (e.g., marriage, divorce, death of spouse or family members, retirement, and contraction of a chronic disease) on change in positive health behaviors (e.g., adopting physical exercise, smoking avoidance or cessation, and reduction of alcohol consumption). Each relationship is considered 'over time' as the Life Course perspective arrow indicates.



(Figure 1. the Life Course Perspective Change in Health Behaviors)

This study focuses on the relationships between life events and changes in positive health behaviors. It is hypothesized that diverse personal characteristics and socio-economic factors will affect whether people engage in negative or positive health behaviors. For example, people who have low education and low income may have higher risks of poor health behaviors, but they may change their health behaviors due to specific transitions or life events that occur. Certain events are more likely to occur for older people than younger people, such as death of a spouse or family member, retirement, and contraction of a chronic disease. These events can be triggers that stimulate change in positive health behavior. For example, older people may view their retirement with great joy and make numerous plans after retirement so that older retired people are likely to engage in physical activity after retirement. Another

example includes older people that experience a death in the family due to chronic disease. These older people may take actions toward positive health behavior to prevent the disease. Therefore, older people who experience certain life events are increasingly more likely to have a change in their health behaviors.

Methods

Data Source

This present study uses data from Wave 5 (2000) and Wave 6 (2002) of the Health and Retirement Study (HRS). The HRS is a longitudinal and nationally representative survey of community dwelling middle-aged and older individuals in the United States. The biannual survey, which began in 1992, includes an over sampling of African Americans, Hispanic Americans, and residents of Florida. The HRS data contains information regarding demographics, work, retirement, income, assets, self-reported health status, and physician-diagnosed health conditions. Detailed information is available on the HRS website: <http://hrsonline.isr.umich.edu> (Juster & Suzman, 1995).

Sample Selection

Subjects for this study were 19,580 respondents from Wave 5 of the HRS. The study sample was first restricted to respondents age 50 and older in 2000 who engaged in at least one negative health behaviors at baseline, leaving 12,488 respondents. An additional 1,810 respondents, who were either lost to the 2002 HRS due to attrition (n=1,219) or had missing data

(n=591) on health behaviors in 2002, were excluded resulting in sample size 10,678. Another 912 respondents with missing data on one or more independent variable were dropped. Thus, the final sample is 9,766. Sample means on all study variables for the dropped respondents (n=2,722) from the sample were compared to those of retained respondents (n=9766) in the study sample. The dropped respondents were more likely to be older ($t=23.37$, $p<0.000$), less likely to be educated ($t=-16.00$, $p<0.000$), more likely to have poor/fair self-reported health status ($t=19.87$, $p<0.000$), more likely to have higher numbers of ADL and IADL limitations (respectively $t=17.64$, $t=24.96$, $p<0.000$), and more likely to stay in a hospital ($t=8.54$, $p<0.000$) compared to the retained sample.

Measures

Table 1 contains a summary of the dependent variable and all independent variables.

Dependent Variable

In the HRS, physical exercise is determined from a self-reported response whether individuals participated in vigorous physical activity or exercise three times a week or more over the last 12 months. Smoking cessation is determined from self-reported current smoking status. Alcohol consumption is measured by drinks per day. Moderate consumption is 3 or fewer drinks per day. Heavy consumption is more than 3 drinks per day. The study dependent variable, a 'change in positive health behavior', is computed by comparing self-reports about these health behaviors in 2000 and 2002.

At baseline and follow-up waves, each of the three potential negative health behaviors is first coded as 1 for not engaging in exercise, smoking, and drinking excessively and 0 for otherwise, and then summed to produce counts of negative health behaviors. The dichotomous dependent variable is coded 1 for respondents who exhibited a net decrease in negative health behaviors between waves, and zero otherwise. Note that to be classified as making a change in positive health behavior a respondent must only exhibit a net increase in positive health behaviors. A respondent could engage in a new negative health behavior in 2002 and still be classified as making a change in positive health behavior as long as he/she no longer engaged in at least two negative health behaviors in 2002.

Independent Variables

Life Events Factors

In this study, life events are proposed to have a significant effect on one's likelihood of adopting positive health behaviors. Life events including marriage, divorce, death of family member, new health event, retirement were only counted if they occurred between 2000 and 2002. **Marriage** is specified with a dummy variable coded as 1 for yes and 0 for otherwise. **Divorce** is specified with a dummy variable coded as 1 for yes and 0 for otherwise. **Death of family** is assessed by a dummy variable coded as 1 for death of spouse or parents and 0 for otherwise. **New health events** is a count (0-5) of diseases contacted such as diabetes, cancer, lung disease, heart disease, and stroke based on a respondent's self-report of a doctor telling

him/her that he/she has the condition. **Retirement status** is specified with a dummy variable coded as 1 for respondents who reported to be not retired at all in 2000 but either partially retired or fully retired in 2002 and 0 for otherwise. Many previous studies suggested that life events were associated with changes in positive health behaviors. It is expected that older people who get married between waves will have a positive association with change in positive health behaviors. Keenan (2009) found that older people who had a newly diagnosed disease had increased odds of smoking cessation compared to older people who did not have a disease. Contracting a new disease is associated with change in positive health behaviors. According to Lang (2009), retired older people were more likely to quit smoking than those who still were working. (Shone & Weinick, 1998; Nysted, 2005; Rabin and Pinto, 2006; Keenan, 2009; Alfano, et al., 2009; & Lang et al., 2007). However, it is expected that older people who experience death of family members have less likely to make a change in positive health behaviors, compared similar older people who do not experience death of family members (Wilcox, et. al, 2003). Older people who contract chronic diseases are expected to be associated with change in positive health behaviors (Falba, 2005).

Demographics

This study has several demographic variables: age, gender, race, marital status, education level, and household income measured at baseline in 2000. While past research has examined relationships between these variables and prevalence rates of positive or negative

health behaviors, there is relatively little research to guide our expectations about their relationships specifically with changes in positive health behaviors.

Age is measured in number of years. Palmore (2007) compared positive health behaviors between the younger (aged 55-75) and older individuals (aged 76 and older) and reported that older people engaged in more positive health behaviors compared to younger people (Palmore, 2007). It is expected that in the current study increasing age is associated with change in positive health behaviors. **Gender** is assessed with a binary variable: coded as 1 for male and 0 for female. According to Ross and Bird's study, males were more likely to have risky health behaviors than females (Ross and Bird, 1994). Also, according to Ai, Peterson, and Dunkle (1997), women were more likely to have preventative health behaviors than men. Men adopted more risky behaviors such as smoking, bad diets, and alcohol abuse (Ai, Peterson, & Dunkle, 1997). Therefore, males are expected to be less likely to change towards positive health behavior than otherwise similar females. **Race** is specified with categorical dummy variables: 'non-Hispanic Whites', 'non-Hispanic Blacks', 'Hispanics', and 'others'. Compared to Whites, African Americans and Hispanics are more likely to engage in negative health behaviors such as smoking, excessive drinking, and being obesity (USDHH, 2000). It is expected that older White people are positively associated with adopting positive health behaviors. **Marital status** is also specified with categorical dummy variables: 'married', 'separated/divorced', 'widowed', and 'never married', coded as 1 for yes and 0 for no. Several

studies found that married people were more likely to have better healthier behaviors than those who were divorced, widowed, and never married (Shone & Weinick, 1998; Nysted, 2005). It is expected that being married is associated with change in positive health behaviors relative to other marital status categories. **Education** (0-17) is a continuous variable measured by years of schooling. Based on a previous study, education was the most consistent factor associated with positive health behaviors including more physical activity, less heavy drinking, and less smoking (Newsom, Kaplan, Huguet, & McFarland, 2004). Also, higher levels of education may increase the likelihood of obtaining or understanding the health-related information needed to develop a change in positive health behaviors. Higher education is expected to increase the likelihood of change in positive health behaviors. **Household income** is specified with categorical dummy variables corresponding to quartiles of the distribution of annual household income for all HRS households in 2000. The household income variable employed contains imputed values for respondents with missing data that were assigned by the HRS. The boundary point for each quartile is indicated in Table 1. Higher income is expected to be associated with change in positive health behaviors (Cornaz, Taffe, & Santos-Eggimann, 2009).

Health Related Factors

Health related factors are also based on baseline responses. **Self-rated health** is specified as a set of categorical dummy variables based on responses to the question: “Would you say your health is excellent, very good, good, fair, or poor?” A dummy variable is coded as

‘excellent’ (coded as 1 for excellent or very good and 0 otherwise), ‘good’ (coded as 1 for good and 0 otherwise), and ‘fair/poor’ (coded as 1 for fair or poor and 0 otherwise). Based on a previous study, older people who reported their health as good/excellent were 32% more likely to quit smoking and to reduce body weight than older people who reported fair/poor (Keenan, 2009). It is expected that older people who reported very good or excellent health at baseline will be more likely to have at least one change in positive health behaviors at follow-up year.

Chronic health condition is specified with a dummy variable coded as 1 for having one or more prevalent diseases such as diabetes, cancer, lung disease, heart disease, and stroke based on a respondent’s self-report of a doctor telling him/her that he/she has the condition and zero for none. Falba (2005) found that serious health events including heart attack, stroke, cancer, lung disease, diabetes, and heart disease impacted smoking cessation rates among older people (Falba, 2005). It is expected that older people will be more likely to make a change in positive health behaviors when they acquire a chronic condition. As health problems occur, older people become more concerned with their health. **Days of hospitalization** are actual counts of staying in the hospital in response to the question: “How many nights were you a patient in the hospital in the last two years?” While an individual is staying in hospital, they are not permitted to smoke and drink and medical doctors and nurses may encourage patients to adopt healthier behaviors. It is hypothesized therefore that the greater the numbers of days in stay in hospital, the higher the likelihood of adopting change in positive health behaviors.

Depression (0-8) is assessed by eight items created by the Center of Epidemiological Studies Depression Scale (CESD). This short version of the scale is intended to assess depressive symptoms (Soldo, Hurd, Rodgers, & Wallace, 1997). In the HRS, the CESD items include felt depressed, effort, restless sleep, happy, felt lonely, enjoyed life, felt sad, and could not get going. Based on each response, each item is coded as 1 for yes and 0 for no and is summed up. Due to sentence structure, two items (happy and enjoyed life) are reverse coded. A prior study suggested that individuals who had better mental health were more likely to engage in positive health promotion activities (Resnick, 2003). An increase in depressive symptoms is expected to have a negative impact on an individual's potential to make a change in positive health behaviors. In the HRS, proxy respondents are not asked the CESD items, and in order to retain these respondents for analysis imputed that **proxy respondent** is specified with a dummy variable coded as 1 for proxy respondents 0 for otherwise.

Activities of daily living (ADL) difficulty is a count (0-6) of self reports of difficulty in performing the following activities: dressing, walking across a room, bathing, eating, getting in/out bed, and toileting. "Because of health or memory problem, do you have any difficulty with....?" Each item is coded as 1 for yes, can't do, or don't do and 0 for no. **Instrumental Activities of daily living (IADL) difficulty** is a count (0-5) of reports of difficulty performing the following activities: cooking, shopping for grocery, making a call, taking medicine, and managing money. Each item has a similar structure of questions; "Because of a health or

memory problem, do you have any difficulty preparing a hot meal?" Each item is coded as 1 for yes or can't do and 0 for no. Respondents who answered 'don't do' were coded as having difficulty if this was due to the health or memory problem. It is expected that higher counts of ADL difficulties and IADL difficulties are negatively associated with changes in positive health behaviors because having difficulty in performing daily activities may increase the likelihood of sedentary life (Clark, Stump, & Hui, 1998). BMI is calculated as weight in kilograms divided by height in meters squared. Based on BMI, categorical dummy variables for 'underweight', 'normal BMI', 'overweight', and 'obesity' are created. **Underweight** is coded as 1 for below 18.5 and 0 for otherwise. **Normal weight** is coded as 1 for between 18.5 and 24 and 0 for otherwise. **Overweight** is coded as 1 for between 25 and 29 and 0 for otherwise. **Obesity** is coded as 1 for 30 and over 0 for otherwise. It is expected that older people who are underweight, overweight, or obese are less likely to make a change in positive their behaviors, compared to similar older people who are normal weight.

Finally, **negative health behaviors** are specified with a dummy variable coded as 1 for engaging in two or more negative health behaviors including not exercising, smoking, and excessive drinking at baseline and 0 for engaging in any one of that at baseline. It is expected that older people who engage in more than one negative health behavior at baseline have more possibilities to make a change in positive their behaviors.

Statistical Analysis

This study used logistic regression to estimate the effects on change in positive health behaviors, controlling for demographic characteristics, ADL difficulty, IADL difficulty, and life events. Logistic regression is the appropriate technique for this study because the dependent variable is dichotomous. Statistical analysis was conducted by using STATA IC version 10.

Empirical Results

Descriptive Statistics

Table 1 summarizes the sample's descriptive statistics at base line. The average age of the sample was approximately 67 years (sd=10). The sample was predominately non-Hispanic whites (76%), but also included non-Hispanic blacks (15%), Hispanics (8%) and other races (2%). There were more females (60%) than males (40%), and approximately 61% of the sample was married. About 48% of individuals in this sample had at least one chronic health condition among diabetes, heart diseases, cancer, lung diseases, and stroke. Self-reported health statuses including poor/fair, good, and very good/excellent of the samples had fairly equal distributions, respectively 31%, 32%, and 37%. In 2002, almost 24% of sample experienced a net increase in positive health behaviors (sd=0.42).

Bivariate Analysis

Table 2 shows the results of bivariate analysis. The first column consists of life event variables and the number of respondents who experienced each. The next column presents the result of dependent variables, whether the respondents had a net increase in positive health

behaviors or not. Among the respondents (n=72) who got married between 2000 and 2002, 33% (n=24) had a net increase in positive health behaviors. However, among the respondents (n=9,694) who did not get married, 23.5% (n=2,278) had a net increase in positive health behaviors. The result of chi-square suggested that marriage as a life event is statistically significant in predicting a change in positive health behaviors (Chi-Square=3.84, p=0.05).

Multivariate Logistic Regression Results

Table 3 presents multivariate logistic regression results. A modest pseudo R squared of 0.05 was observed for regression model fit. Nevertheless, a number of coefficient's estimates were statistically significant. Also, the Hosmer-Lemeshow test for logistic regression model fit was conducted by various 'n-tiles' groups. The results of this test accepted the null hypothesis for goodness of model fit (p>0.05).

The table contains the odds ratios transformations of the logistic regression coefficient and the 95% confidence intervals to assist in the interpretation of the results.

Specific life events were associated with changes in positive health behaviors. The odds of change in positive health behaviors were estimated to be 1.82 times greater for individuals who got married between waves compared to otherwise similar individuals who did not get married. However, the odds of change in positive health behaviors for respondents who divorced between waves were decreased by 47% compared to other similar individuals who did not recently divorce (OR 0.53, p < 0.05).

Consistent with expectations laid out previously (p16), being separated/divorced or widowed at baseline had a significant effect on change in positive health behaviors. Compared to persons who were never married, the expected odds of change in positive health behaviors were 35% less for separated/divorced person and 27% less for widowers ($p < 0.05$). Relative to persons with income in the lowest quartile, respondents in the second, third, and fourth income quartiles had 18%, 18%, and 21% greater odds of making a change in positive health behaviors, respectively.

Consistent with the expectations, people who reported poor or fair health status were less likely to make changes in positive health behaviors compared to otherwise similar respondents reporting good health status (OR 0.86, $p=0.03$). Persons self-reporting their health status as very good or excellent were more likely to make a change in positive health behaviors compared to the respondents reporting good health status (OR 1.28, $p < 0.001$). The odds of change in positive health behaviors were decreased by approximately 16% with each unit increase in IADL difficulties (OR 0.84, $p < 0.001$). Older people who were obese at baseline had decreased odds of 18% for making a change in positive health behaviors at follow-up year compared to similar individuals who were normal weight (OR 0.82, $p < 0.01$). Also, older people who were underweight at baseline were observed to have a decrease in odds of 43% for making a change in positive health behaviors at follow-up year compared to similar individuals who were normal weight (OR 0.57, $p=0.013$). However, older people who were overweight at baseline had

increased odds of 12% for making a change in positive health behaviors at follow-up year compared to similar individuals who were normal weight (OR 1.12, $p < 0.5$). Lastly, compared to persons who engaged in only one negative health behavior at baseline, the odds of change in positive health behavior were significantly greater for individuals who had two or more negative health behaviors at baseline (OR 2.46, $p < 0.001$). Therefore, individuals who have a greater number of negative health behaviors are more likely to increase the opportunity of making a change in positive health behaviors.

However, contrary to expectations, as age increased, the likelihood of a change in positive health behavior decreased (OR 0.989, $p < 0.001$). Also contrary to expectation, males had 1.15 times greater odds of change in positive health behaviors compared to otherwise similar females ($p < 0.05$).

To conduct a sensitivity analysis, an alternative dependent variable was created, coded as 1 for making change in positive health behaviors as well as not engaging in any negative health behaviors and 0 for otherwise. The outcomes of sensitivity analysis were very similar to those reported above. Also, several interaction terms including gender and marital status, gender and income, functional status and chronic health conditions, and income and chronic conditions were created for the sensitivity analysis. These modifications did not change the empirical results in any notable way.

Discussion

The purpose of this paper was to examine whether life events affect making changes in positive health behaviors among people aged 50 and older between 2000 and 2002. In this study, life events were specified as marriage, divorce, retirement, and contraction of a chronic disease between 2000 and 2002. Changes in positive health behavior were specified as engaging in exercise, reducing alcohol consumption, and smoking cessation. The results of this study suggest that older people who got married after baseline (2000) were more likely to make a change in positive health behaviors compared to similar older people who did not get married. Older people who divorced after baseline were less likely to make a change in positive health behaviors compared to similar older people who did not divorced.

In contrast to expectations, contracting a chronic condition, experiencing death of a family member, and retiring were not associated with changes in positive health behaviors. Further, men were less likely than similar women to make a change in positive health behaviors (Ross and Bird, 1994; Ai, Peterson, & Dunkle, 1997). However, in this study, the opposite was observed. Males were more likely to make positive changes. This may be due to 'positive change' being associated with higher levels of self-efficacy, and the tendency for males to have higher levels of self-efficacy (Gerbowski et al., 1993).

This study has a few limitations. Due to the measurement of variables, this study cannot measure whether older people experience specific life events first or changes in positive health behavior occur first. In other words, this study cannot investigate the order of events.

For example, older people may quit smoking before contracting a new chronic condition. Also, limiting this study, older people may be less likely than younger counterparts to experience certain life events. Older people are less likely to get married or divorced compared to younger people. The finding of this study cannot rule out the possibility that life events also affect making a change in negative health behaviors. Older people who experienced stressful life events may start engaging in negative health behaviors such as excessive drinking or smoking.

In spite of these limitations, the results of this study provide an important finding which is consistent with previous studies. Among older people, marriage has a significant effect on both engaging in positive health behaviors and making a change toward positive health behaviors. Shone and Weinick (1998) speculated that wives may be more likely to encourage their husbands to become involved in positive health behaviors. Further, marriage appears to be helpful in the adoption of positive health behaviors and in the change toward positive health behaviors, whereas divorce or separation is related to a decrease in the likelihood of changes in positive health behaviors. This study found a relationship between certain life events and changes in positive health behavior, but this study cannot examine how life events affect individuals' motivation to make a change in positive health behaviors. Therefore, future research should try to investigate how life events could be an individual's motivation to make a change in positive health behaviors.

In conclusion, among the respondents who were 50 and older who engaged in at least

one negative health behavior, 24% of the respondents have experiences to change in positive health behaviors at follow-up year. Based on the conceptual framework of this study, certain life events would affect a change in positive health behaviors. Individuals who got married between 2000 and 2002 have increased the odds of making a change in positive health behaviors. Future research should consider combinations of the Life Course model and the psychological models which focus on the relationships between individuals' health beliefs and expectations. Psychological models have advanced the knowledge about individuals' health behaviors and change in health behaviors. As noted above, males and females have different levels of self-efficacy. Individuals who experienced certain life events may have various self-efficacy or health beliefs that affect health behaviors. Thus, the combination of the Life Course perspective and psychological models provide better explanation of change in health behaviors.

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Table 1 Description of Variables with Expectation Signs**(Total N=9,766)**

Variables	Definition and Coding	N	Mean (SD)	Exp. Signs
Dependent				
Change in positive health behaviors	A net increase in positive health behaviors: exercise ¹ , smoking ² , and drinking ³ (1 for net increase and 0 for otherwise)	2,302	.2357(.42)	
Independent				
Demographics (Based on 2000)				
Age	Actual numbers in years (50 and older)	9,766	67.13 (10)	+
Gender	Dummy: male (1)	3,924	.4018 (.49)	
	:female (0)	5,842	.5982	-
Race	Categorical dummy variables			
Non-Hispanic whites	Yes (1), No (0)	7,405	.7582 (.43)	+
Non-Hispanic blacks	Yes (1), No (0)	1,418	.1452 (.35)	-
Hispanics	Yes (1), No (0)	746	.0764 (.27)	-
Others	Yes (1), No (0) ; reference	197	.0202 (.14)	?
Marital Status	Categorical dummy variables			
Married	Yes (1), No (0)	6,403	.6188 (.49)	+
Separated / Divorced	Yes (1), No (0)	1,218	.1247 (.33)	-
Widow	Yes (1), No (0)	2,196	.2249 (.42)	-
Never married	Yes (1), No (0) ; reference	309	.0316 (.17)	-
Education	Years of schooling completed (0-17)	9,766	11.92 (3.34)	+
Household Income	Annual household incomes (Categorical dummies)			
1 st quartile	Less than \$16,548 (1), No (0) ; reference	2,590	.2652 (.44)	-
2 nd quartile	Between \$16,548 and \$33,272 (1), No (0)	2,541	.2602 (.44)	+/-
3 rd quartile	Between \$33,272 and \$62,460 (1), No (0)	2,388	.2445 (.43)	+/-
4 th quartile	Over \$62,460 (1), No (0)	2,247	.2301 (.42)	+
Self-rated health status	Categorical dummy variables			
Poor / fair	Yes (1), No (0)	3,052	.3125 (.46)	-
Good	Yes (1), No (0) ; reference	3,135	.3210 (.47)	+
Very / Excellent	Yes (1), No (0)	3,579	.3665 (.48)	+
Chronic health conditions Baseline (2000)	Having one or more prevalent diseases such as diabetes, heart disease, cancer, lung disease, stroke (1), None (0)	4,567	.4769 (.50)	+
Days of hospital	Count of days in hospital	9,766	2.22 (8.2)	+
Depression	Count (0-8) of CESD ⁴ symptoms	9,766	1.60 (2.00)	-
Proxy respondents	Dummy: Proxy respondents (1), No (0)	774	.0793 (.27)	

¹ Exercise is either engaging in exercise or not.² Smoking is current smoking status, either smoking or not.³ Moderate drinking is 3 or less drinks per day.⁴ CESD is the Center of Epidemiological Studies Depression Scale, including felt depressed, effort, restless sleep, happy, felt lonely, enjoyed life, felt sad, and could not get going.

Table 1 continued

ADL difficulty	Count (0-6) of deficits in dressing, walking, bathing, eating, getting in/out bed, and toileting	9,766	.3109 (1.03)	-
IADL difficulty	Count (0-5) of deficits cooking, shopping for grocery, making a call, taking medicine, and managing money	9,766	.2922 (.85)	-
Body Mass Index	Categorical dummy variables			
Underweight	Dummy: Yes (1), No (0)	176	.0180 (.49)	-
Normal weight	Dummy: Yes (1), No (0); reference	3,122	.3197 (.47)	
Overweight	Dummy: Yes (1), No (0)	3,783	.3874 (.49)	-
Obesity	Dummy: Yes (1), No (0)	2,685	.2749 (.45)	-
Negative health behaviors (2000)	Dummy: Engaging in two or more negative health behaviors: not exercising, smoking, and excessive drinking (1), No (0)	1,781	.1823 (.39)	+
Life Events (Between 2000 and 2002)				
Marriage	Dummy: Getting married (1), No (0)	72	.0074 (.09)	+
Divorce	Dummy: Divorced (1), No (0)	93	.0095 (.10)	-
Death of family members	Dummy: Death of spouse or parents (1), No (0)	1,009	.1033 (.30)	-
New health events	Count (0-5) of new prevalent diseases: diabetes, heart disease, cancer, lung disease, stroke	9,766	.1641 (.41)	+
Retirement	Dummy: Not retired at all in 2000 but partially or completely retired in 2002 (1), No (0)	1,266	.1296 (.34)	+

Table 2 Bivariate Relationship between Life Events and the Likelihood of Change in Positive Health behaviors

Life Events between 2000 and 2002		% of Making a Positive Change in Health Behaviors		Chi-Square	P-Value
		Yes (n)	No (n)		
Marriage	Yes (n=72)	33% (24)	67% (48)	3.837	0.050*
	No (n=9,694)	23.5% (2,278)	76.5% (7,416)		
Divorce	Yes (n=93)	16% (15)	84% (78)	2.887	0.089
	No (n=9,673)	24% (2,287)	76% (7,386)		
Death of Family members	Yes (n=1,009)	24% (243)	76% (766)	0.164	0.686
	No (n=8,757)	23.5% (2,059)	76.5% (6,698)		
New health events ⁵	0 (n=8,307)	24% (1,962)	76% (6,345)	0.186	0.980
	1 (n=1,325)	23% (308)	77% (1,017)		
	2 (n=124)	24% (30)	76% (94)		
	3 (n=10)	20% (2)	80% (8)		
Retirement (n)	Yes (n=1,266)	25% (311)	75% (955)	0.798	0.372
	No (n=8,500)	23% (1,991)	77% (6,509)		

* P-value=0.05

⁵ It includes diabetes, heart disease, cancer, lung disease, and stroke. There were no respondents who acquired over three of any disease.

Table 3 Multivariate Logistic Regression Predicting Change in Positive Health Behaviors

				Total N=9,766
Independent	Odds Ratio	P	95% CI	
Age (>50)	0.989	0.000**	0.983	to 0.995
Male	1.15	0.012*	1.031	to 1.275
Race				
Non-Hispanic whites	0.854	0.354	0.612	to 1.192
Non-Hispanic blacks	0.939	0.726	0.659	to 1.337
Hispanics	0.872	0.482	0.595	to 1.278
Others (reference)				
Marital Status				
Married	0.786	0.079	0.601	to 1.028
Separated / Divorced	0.650	0.004**	0.485	to 0.870
Widow	0.729	0.030*	0.548	to 0.970
Never Married (reference)				
Education	1.016	0.095	0.997	to 1.035
Household Incomes				
1 st quartile (reference)				
2 nd quartile	1.178	0.033*	1.014	to 1.370
3 rd quartile	1.177	0.049*	0.996	to 1.390
4 th quartile	1.214	0.041*	1.008	to 1.461
Self-reported Health status (2000)				
Poor / Fair	0.857	0.030*	0.747	to 0.985
Good (reference)				
Very / Excellent	1.275	0.000**	1.134	to 1.435
Health Status (2000)				
Chronic health conditions	0.944	0.288	0.848	to 1.050
Days of hospital	0.993	0.094	0.985	to 1.001
Depression	1.012	0.405	0.983	to 1.042
Proxy respondents	0.997	0.981	0.808	to 1.231
ADL difficulty	0.939	0.094	0.873	to 1.011
IADL difficulty	0.837	0.000**	0.760	to 0.922
Body Mass Index				
Underweight	0.567	0.013*	0.363	to 0.888
Normal weight (reference)				

Overweight	1.123	0.044*	0.791 to 0.997
Obesity	0.817	0.001**	0.723 to 0.925

Table 3 continued

Negative health behaviors (2000)	2.457	0.000**	2.184 to 2.763
Life events between 2000 & 2002			
Marriage	1.815	0.023*	1.085 to 3.024
Divorce	0.535	0.032*	0.301 to 0.944
Death of family members	0.962	0.633	0.821 to 1.127
New health events	1.030	0.621	0.915 to 1.161
Retirement	1.096	0.208	0.950 to 1.263
Pseudo R-squared		0.05	

* P-value < 0.05

** P-value < 0.01