

Original Investigation

Earlier Joint Trajectories of Cigarette Smoking and Low Perceived Self-control as Predictors of Later Poor Health for Women in their Mid-60s

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Abstract

Introduction: The current study was designed to assess the prospective relationship between the earlier joint trajectories of cigarette smoking and low perceived self-control (\bar{X} age = 40–48) and later health problems (\bar{X} age = 65.2) within a community sample of understudied females.

Methods: The participants were given self-administered questionnaires.

Results: The results of the growth mixture model suggested 5 joint trajectories of cigarette smoking and perceived self-control, which consisted of 1 at-risk group (chronic smoking and low perceived self-control), 1 low-risk group (infrequent or nonsmoking and high perceived self-control), and 3 intermediate groups (i.e., high on one factor and low on the other). The results from logistic regression analyses supported a model by which (a) women in the at-risk group, in comparison with the low-risk group, were more likely to report 5 or more diseases (adjusted odds ratio [AOR] = 4.81; $p < .001$) and poor or very poor general health (AOR = 5.98; $p < .001$); (b) women in the at-risk group as compared with women in the intermediate groups were also more likely to report 5 or more diseases (AOR = 2.36; $p < .05$) and poor or very poor general health (AOR = 2.86; $p < .01$); and (c) women in the intermediate group were more likely to report 5 or more diseases (AOR = 2.04; $p < .05$) and poor or very poor general health (AOR = 2.09; $p < .05$) than women in the low-risk group.

Conclusions: The findings highlight the significance of targeting dispositional factors (e.g., perceived self-control) in conjunction with smoking in designing programs for promoting the health of women in midlife.

Introduction

Life-span investigators have focused on the association between perceived self-control and health, such as cardiovascular

diseases (Krause, 2007; Magnusson & Cairns, 1996; Rowe & Kahn, 1987; Uchino, 2006). Perceived self-control acts as an adaptive behavior that is characterized by reflection, forethought, and consideration of the consequences of an act and/or the avoidance of risk-taking behavior (Rutter, 2002). Skaff (2007) notes that perceived self-control is highly related to health, particularly in the aging population when diseases become more chronic and serious. As regards smoking, the long-term adverse health consequences of smoking have been documented (Centers for Disease Control and Prevention [CDC], 2008a, 2008b; U.S. Department of Health and Human Services, 2010). In addition, trajectories of smoking over time have also been found to be related to poor health (Frosch, Dierker, Rose, & Waldinger, 2009).

The goal of this research is to examine the joint trajectories of perceived self-control and smoking as they relate to poor physical health in women in midlife. Individuals, who smoke and report low self-control, may be at increased risk for poor health. Therefore, the co-occurrence of smoking and perceived poor self-control is an important target for intervention. Besides the significance for intervention, the combined trajectories of perceived self-control and smoking are of theoretical importance. Lending strength to the theoretical importance of the combined trajectories is the following. On the one hand, personality predispositions (i.e., perceived lack of self-control) can lead to the behavioral patterns of smoking. On the other hand, low perceived self-control as a predictor is likely to be related to the addictive aspects of patterns of smoking since unsuccessful cessation of smoking is related to low perceived self-control.

The present study is unique in two ways. First, this is the only study to our knowledge, which simultaneously examines two major risk factors embodied in the joint trajectories of perceived self-control and smoking as they relate to physical health. Second, this study examines the co-occurrence embodied in the joint trajectories, which covers midlife from ages 40–48 using growth mixture modeling (Muthén & Muthén, 2010). Identifying multiple trajectories within an overall developmental process

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provides a number of advantages. First, the group-based approach is well suited to analyzing research questions about developmental trajectories (Nagin & Tremblay, 2005). Second, the group-based approach enables one, in a probabilistic fashion, to follow particular individuals who belong to relatively homogeneous groups over several developmental periods. In contrast, in a variable-centered approach, the focus is on examining statistically different sets of individuals that may contribute to an association between relevant variables at different points in time. Third, in the present study, the group-based approach enables one to examine the frequency and length of time of smoking and perceived self-control simultaneously and their associations with later health. Therefore, the trajectory approach used in this study has an advantage over an analysis that only examines how early smoking or perceived self-control predict later health.

Perceived Self-control and Health

Life-span studies have documented the relationship between a behavioral predisposition (i.e., perceived self-control) and longevity (Friedman et al., 1993; Wilson, Mendes de Leon, Bienas, Evans, & Bennett, 2004). Individuals who are high in self-control appear to be less likely to develop certain diseases (e.g., Femia, Zarit, & Johansson, 1997; Ostbye, Taylor, & Jung, 2002; D. W. Brook, Zhang, Brook, & Finch, 2010). Individuals who exhibit more perceived self-control are likely to have less behavioral impulsivity (Hofmann, Friese, & Strack, 2009). Two attributes related to perceived self-control are (a) a behavioral predisposition, self-efficacy and (b) an emotional correlate, self-confidence. These two attributes are related to physical health (Caplan & Schooler, 2003; Seeman, Unger, McAvay, & Mendes de Leon, 1999). Seeman et al. (1999) reported that low self-efficacy is related to low physical functioning. Similarly, Caplan and Schooler (2003) in their follow-up study of adults in midlife reported that self-confidence was protective of declines in physical functioning.

Smoking and Health

There is extensive evidence indicating that there are a number of adverse consequences of smoking including lung cancer, coronary artery disease, chronic lung disease, and other major life-threatening diseases (CDC, 2008a, 2008b). Findings from prospective studies have demonstrated a temporal ordering to smoking and health suggesting that there is a causal relationship between earlier smoking and later disease, such as lung disease and cardiovascular disease (Frosch et al., 2009). To our knowledge, there are no studies examining the relationship of trajectories of smoking to later health outcomes in women in midlife.

Perceived Self-control and Smoking

Perceived self-control and smoking have been found to be associated in both cross-sectional and longitudinal studies (e.g., Wills & Dishion, 2004). A number of research investigations have demonstrated that perceived self-control predicts decreased smoking as well as other substance use (Quinn & Fromme, 2010). The findings of other studies also indicate that smoking is a predictor of less personal control (J. S. Brook, Pahl, & Brook, 2008). Taking into account the suggestion from these studies that there is a reciprocal association between cigarette smoking and low perceived self-control, the existence of both low perceived self-control and chronic cigarette smoking may have greater detrimental effects than either one examined separately. Therefore, we propose to examine the association between the

joint trajectories of cigarette smoking and perceived self-control as related to later health.

Covariates

In order to determine whether the relationship of the joint trajectories of lower perceived self-control and tobacco use with adverse health outcomes is reflective of a third variable, we included some of the factors, which have been found to be related to perceived self-control, smoking, and health. Since educational level is related to trajectories of perceived self-control, tobacco use, as well as health, we controlled for earlier educational level. Studies, such as Rodin (1986) and Lodi-Smith et al. (2010), found strong correlations among some of these variables. Another control variable is unconventionality, which is related to low perceived self-control, smoking, and adverse health outcomes (J. S. Brook et al., 2008; J. S. Brook, Pahl, & Rubenstone, 2008). Social support from friends and family is also associated (Berkman, Glass, Brissette, & Seeman, 2000) with psychosocial factors, smoking, and health. Since age and marijuana use are related to smoking and health (Bachman, Wadsworth, O'Malley, Johnston, & Schulenberg, 1997; Han, Gfroerer, & Colliver, 2010), we also controlled for these factors at an earlier period of time. In addition, we also controlled for earlier problems resulting from alcohol and drug use, which are correlated with smoking and therefore could serve as a proxy variable for cigarette smoking before midlife. Therefore, a major advantage of this study is that when examining the association of joint trajectories of lower perceived self-control and cigarette smoking and health, we controlled for the following conditions: age, educational level, unconventionality, marital harmony and its correlate social support, marijuana use, and problems resulting from alcohol and drug use.

Data from this investigation were drawn from an ongoing long-term longitudinal investigation of women beginning in early midlife and extending to late midlife. Operating within a life-span developmental framework, we examined the joint trajectories of low perceived self-control and smoking as they relate to health in late midlife. We hypothesize that there is one joint trajectory group, the at-risk group, which is characterized by chronic cigarette smoking and low perceived self-control. Another group, the low-risk group, is characterized by infrequent or low cigarette smoking and high perceived self-control. There are intermediate groups, which are characterized by either chronic cigarette smoking or low perceived self-control but not both. Our conceptual model hypothesized that (a) women in the at-risk group, in comparison with the low-risk group, report a greater number of diseases and poorer general health; (b) women in the at-risk group report a greater number of diseases and poorer general health than women in the intermediate groups; and (c) women in the intermediate groups report a greater number of diseases and poorer general health than women in the low-risk group.

Methods

Participants and Procedure

The participants in this study came from a community-based random sample residing in one of two upstate New York counties, first assessed in 1975 (T1). These women are mainly White (92%) and span the full range of socioeconomic statuses. The sampled families were generally representative of the population

in the northeastern region of the United States in 1975. The distributions of gender, family intactness, family income, education, and family structure are in accord with the 1980 census (Cohen & Cohen, 1996). We did not obtain cigarette smoking data at T1 but did ask about problems resulting from alcohol and drug use. Interviews of the participants regarding their cigarette smoking behaviors were conducted in 1983 (T2, $N = 749$, \bar{X} age = 40), 1985–1986 (T3, $N = 717$, \bar{X} age = 43), 1992 (T4, $N = 719$, \bar{X} age = 48), and in 2009 (T5, $N = 479$, \bar{X} age = 65). At T5, 75 of the women were known to be deceased and 27 refused to participate. The retention rate of the women who are alive between T2 and T5, when cigarette smoking data were obtained, was 71%. Our retention rate was comparable with other large-scale longitudinal studies of people in midlife, such as the Midlife in the U.S. Study, which had a retention rate of 75% (Turiano et al., 2011).

In the current analysis, we included the 479 mothers who participated at T5 and at least twice between 1983 and 2009. Eighty-eight percent of these participants participated in the longitudinal study at all waves. The mean (SD) age at T5 was 65.3 (6.3). Among these participants, 35.5%, 32.7%, and 27.2% smoked cigarettes at T2, T3, and T4, respectively. The mean (SD) of family annual income at T5 was \$85,826 ($SD = \$66,752$). Thirty-nine percent of the participants had an educational level of some college or greater. We compared the participants at T5 with the nonparticipants at T5 on the T2 measures using t tests. The participants showed higher T2 educational level ($t = 6.5$, $p < .001$), greater T2 marital harmony ($t = 2.3$, $p = .02$), higher T2 perceived self-control ($t = 2.61$, $p = .01$), and lower T2 smoking ($t = -3.18$, $p = .002$). The results of the t tests suggest that the retained sample scored higher on most measures.

Extensively trained and supervised lay interviewers administered interviews in private at T1–T4. At T5, the participants were given self-administered questionnaires. Written informed consent was obtained from the participants at each wave. The Institutional Review Boards of the Mount Sinai School of Medicine, New York Medical College, and New York University School of Medicine approved of the procedures used in this research study. Additional information regarding the study methodology is available in prior publications (e.g., Cohen & Cohen, 1996).

Measures

Cigarette Smoking From T2 Through T4

Cigarette Smoking from T2 through T4 was assessed. At each wave of data collection, the participants were asked to report on the frequency of their cigarette smoking during the last year. The frequency was rated as *none* (0), *less than half pack a day* (1), *half pack to one pack a day* (2), and *more than one pack a day* (3).

Perceived self-control From T2 Through T4

Perceived self-control from T2 through T4 was assessed with an adaptation of scales from Pearlin and Schooler (1978) and J. S. Brook, Brook, Gordon, Whiteman, and Cohen (1990). At each wave of data collection, a scale of self-control consisted of 12 items scored on a 4-point scale: *true* (4) to *false* (1); $\alpha = 0.78$, 0.76, and 0.80, respectively for T2, T3, and T4. The 12 items were whether or not the following statements describe you: (a) you rarely feel like losing your temper at people, (b) you rarely feel like swearing, (c) you can do everything you set your mind

to, (d) you rarely feel that you are about to go to pieces, (e) you are satisfied with everything you do, (f) you are rarely distracted by thoughts of the opposite sex, (g) you generally rely on careful reasoning in making up your mind, (h) you are rarely said to be hotheaded, (i) you rarely act on the spur of the moment without stopping to think, (j) you are not one of those people who blurt out things without thinking, (k) you can solve some of the problems you have, and (l) you almost never feel helpless in dealing with the problems of life.

Health Measures at T5

Two measures related to health at T5 were used. First, the number of different diseases or symptoms of diseases the participants had in the last fifteen years were reported. These diseases or symptoms consisted of diabetes, chronic obstructive pulmonary disease, hypertension, heart disease or any other vascular problems, heart attack, stroke, coughing up phlegm or blood, asthma, chronic bronchitis, emphysema or chronic lung disease, trouble remembering things, difficulty thinking or concentrating, trouble learning new things, trouble sleeping, and osteoporosis. An indicator variable was created and assigned the value of one when the participant reported five or more diseases or symptoms of diseases and was assigned the value of zero otherwise. Second, the participants reported their general health condition, which is a one item scale scored with six options: *very poor* (1), *poor* (2), *fair* (3), *good* (4), *very good* (5), and *excellent* (6). An indicator variable was created with the value of one for poor or very poor general health and the value of zero otherwise.

Analysis

We used the Mplus software (Muthén & Muthén, 2010) to identify the joint developmental trajectories of cigarette smoking and perceived self-control ($N = 479$). We treated the trajectory variables (i.e., cigarette smoking and self control at each point in time) as censored normal variables. The full-information maximum likelihood approach (Schafer & Graham, 2002) was used to treat missing data. We set each trajectory polynomial to be quadratic. We used 400 random sets of starting values to assure finding the maximum of the likelihood function. We used the minimum Bayesian information criterion (BIC) to determine the number of trajectory groups (T). For presentation purpose, we assigned each participant to the trajectory group with the largest Bayesian posterior probability (BPP). The observed trajectories for a group were the averages of cigarette smoking and self-control at each point in time for the participants assigned to the group (see Figure 1).

We conducted partial correlation analyses to examine the associations between cigarette smoking (mean score of smoking T2–T4) and reporting five or more diseases or symptoms (T5) and poor or very poor health rating (T5), partialling out the history of perceived self-control (T2–T4). We also examined the associations between perceived self-control (mean score of smoking T2–T4) and reporting five or more diseases or symptoms (T5) and poor or very poor health rating (T5), when the effect of the history of cigarette smoking (T2–T4) was partialled out.

We then conducted two sets of logistic regression analyses to investigate whether chronic cigarette smoking and low perceived self-control jointly contribute to greater health problems. In each set, there were two dependent variables. Each model included age, T1 problems resulting from alcohol and drug use,

T2 educational level, T2 marijuana use, T2 marital harmony, and T2 unconventionality as independent control variables. Model A, which compared participants in the at-risk group and participants in the intermediate groups with those in the low-risk group, used the BPP of the at-risk group and BPP of the intermediate groups as independent variables. This choice made the BPP of the low-risk group the reference distribution. Model B, which compared participants in the at-risk group and participants in the low-risk group with those in the intermediate groups, used the BPP of the at-risk group and BPP of the low-

risk group as independent variables. This choice made the BPP of the intermediate groups the reference distribution.

Results

Joint Trajectories of Cigarette Smoking and Perceived Self-control

The mean (*SD*) cigarette smoking scores at each point in time were 0.7 (1.1), 0.7 (1.1), and 0.5 (1.0) for T2–T4, respectively.

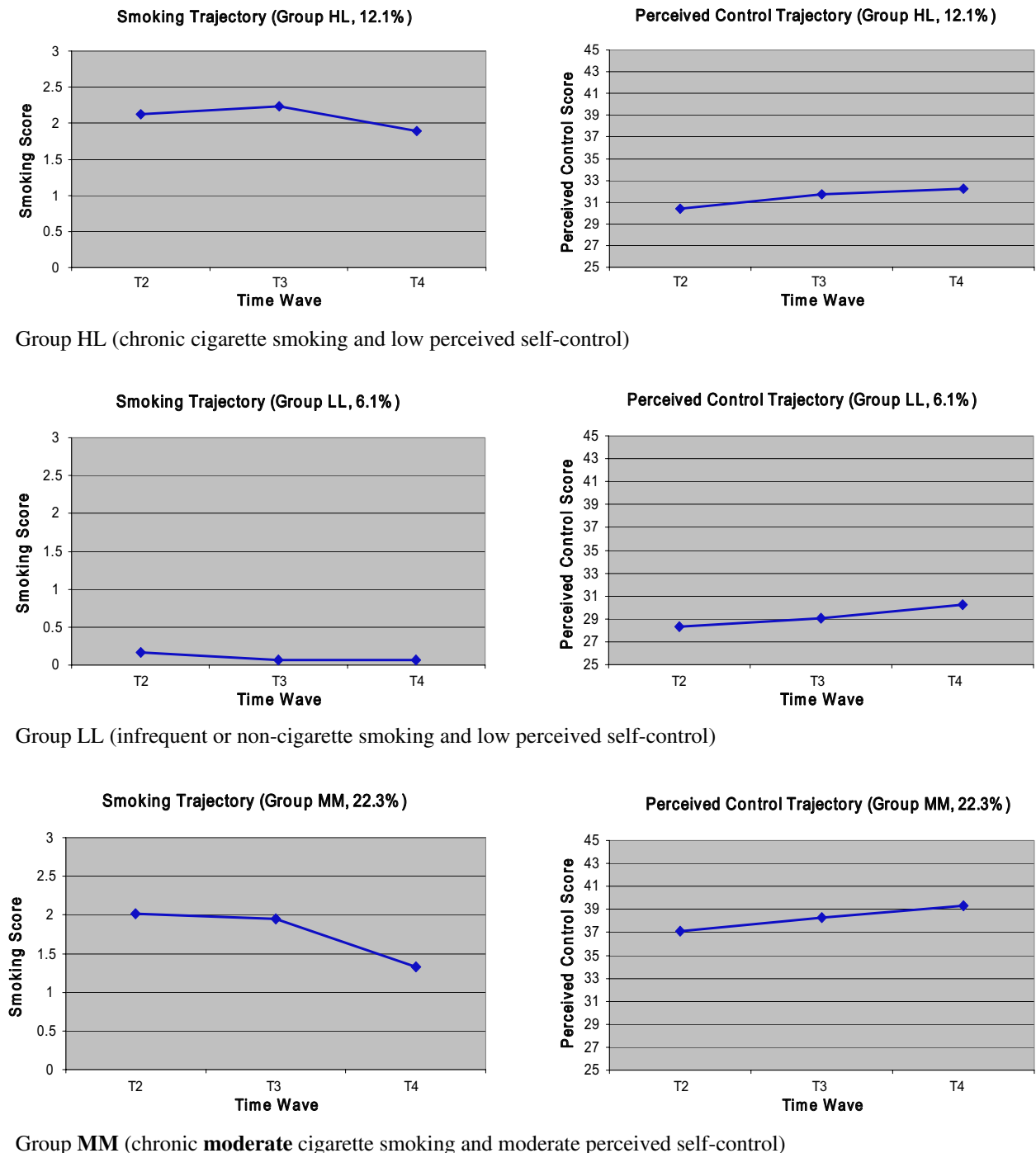


Figure 1. Continued

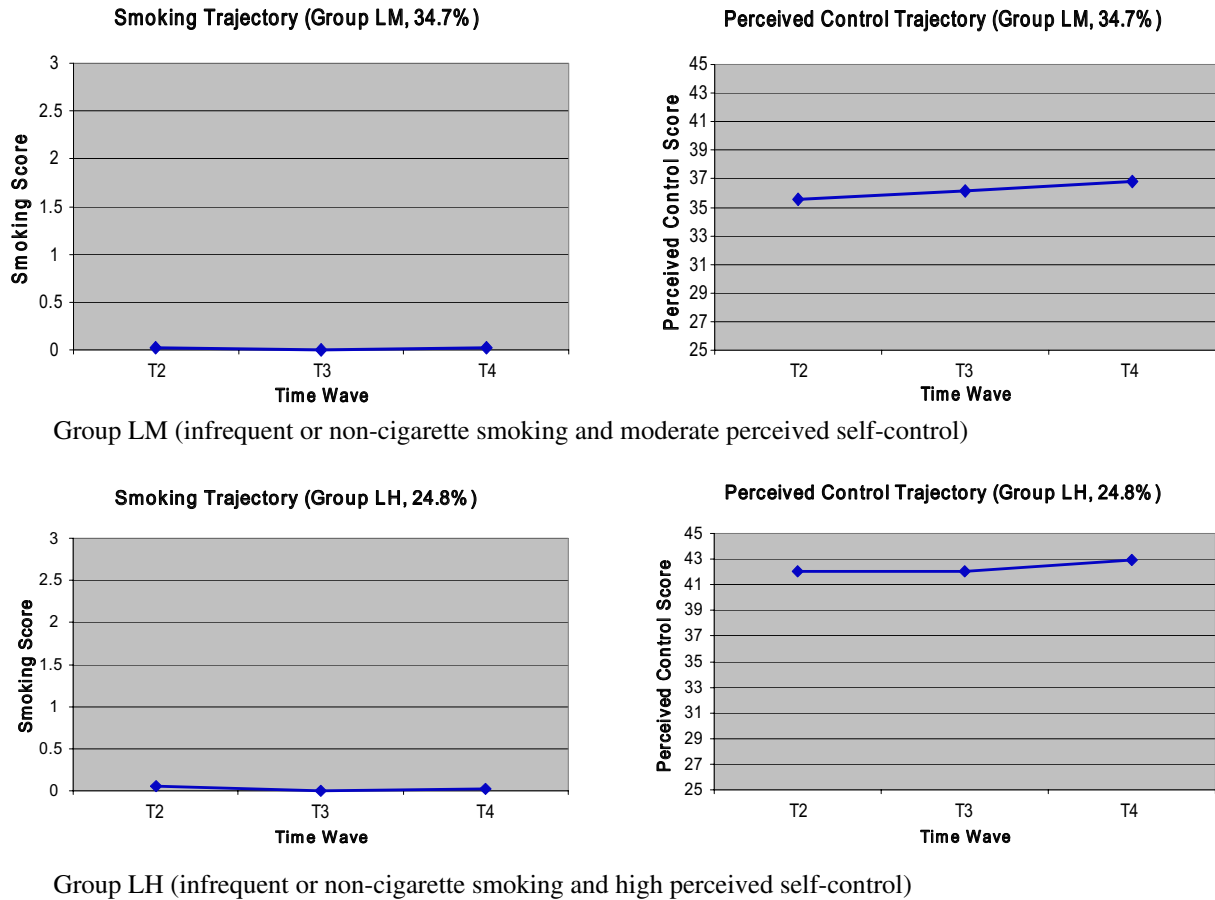


Figure 1. Joint trajectories of smoking and perceived self-control: Group HL (chronic cigarette smoking and low perceived self-control); Group LL (infrequent or non-cigarette smoking and low perceived self-control); Group MM (chronic moderate cigarette smoking and moderate perceived self-control); Group LM (infrequent or non-cigarette smoking and moderate perceived self-control); Group LH (infrequent or non-cigarette smoking and high perceived self-control).

The mean (*SD*) perceived self-control scores were 36.5 (5.3), 37.1 (4.8), and 37.9 (5.1) for T2-T4, respectively.

We calculated solutions for three trajectory groups (BIC = 10,327; Entropy = .85), four trajectory groups (BIC = 10,204; Entropy = .86), and five trajectory groups (BIC = 10,123; Entropy = .87). We were unable to attain convergence for a six-group solution. A five-group model was selected, based on the BIC criterion. **Figure 1** presents the observed trajectories and percentages for each of the five trajectory groups.

As hypothesized in the Introduction section, there was an at-risk group, which had the pattern of chronic cigarette smoking and low perceived self-control (HL, 12.1%, mean BPP = 89.5%, min BPP = 50.6%, max BPP = 100%). There was also a low-risk group, which was characterized by infrequent or non-cigarette smoking and high perceived self-control (LH, 24.8%, mean BPP = 91.5%, min BPP = 55%, max BPP = 100%). In addition, we found three intermediate groups, which consisted of a group of infrequent or non-cigarette smoking/low perceived self-control (LL, 6.1%, mean BPP = 91.8%, min BPP = 33%, max BPP = 100%), a group of chronic moderate cigarette smoking/moderate perceived self-control (MM, 22.3%, mean BPP = 94.5%, min

BPP = 52%, max BPP = 100%), and a group of infrequent or non-cigarette smoking/moderate perceived self-control (LM, 34.7%, mean BPP = 89.6%, min BPP = 49%, max BPP = 99.7%).

As noted in **Figure 1**, the longitudinally completely co-occurring or partially co-occurring participants were from the at-risk group, the low-risk group, and the infrequent or non-cigarette smoking/moderate perceived self-control group. These three groups comprised 71.6% of the sample.

Joint Trajectories of Cigarette Smoking and Perceived Self-control as Predictors of Health Consequences at Mean Age 65

Table 1 presents the frequencies of the health problem variables as related to the joint trajectories of cigarette smoking and perceived self-control. Compared with those in the low-risk group, a significantly greater percentage of the participants in the at-risk group reported having five or more diseases (50% vs. 19.3%; $\chi^2 = 17.7$; $p < .001$) and poor or very poor health (41.4% vs. 12.6%; $\chi^2 = 18.8$; $p < .001$).

Table 1. Frequency of the Health Outcomes by the Joint Trajectories of Cigarette Smoking and Perceived Self-control (N = 479)

	Five or more diseases (%)	Poor general health rating (%)
At-risk group (HL; n = 58)	50	41.4
Intermediate group 1 (MM; n = 107)	33.6	23.4
Intermediate group 2 (LL; n = 29)	31	17.2
Intermediate group 3 (LM; n = 166)	26.5	19.3
Low-risk group (LH; n = 119)	19.3	12.6

Note. HL = chronic cigarette smoking/low perceived self-control; LH = infrequent or non-cigarette smoking/high perceived self-control; LL = infrequent or non-cigarette smoking/low perceived self-control; LM = infrequent or non-cigarette smoking/moderate perceived self-control; and MM = chronic moderate cigarette smoking/moderate perceived self-control.

Partial correlation analyses indicated that a history of cigarette smoking (mean score of smoking T2–T4) was significantly correlated with reporting five or more diseases or symptoms ($r = 0.17$, $p < .001$) and a poor or very poor health rating ($r = 0.16$, $p < .001$) at T5 when the effect of the history of perceived self-control (T2–T4) was partialled out. A history of perceived self-control (mean score of perceived self-control T2–T4) was negatively correlated with reporting five or more diseases or symptoms ($r = -0.16$, $p < .001$) and a poor or very poor health rating ($r = -0.17$, $p < .001$) at T5 when the effect of the history of cigarette smoking (T2–T4) was partialled out.

Table 2 presents the results from the multivariate logistic regression analyses for the joint trajectory group memberships of the at-risk group, the low-risk group, and the intermediate groups. First, the BPP of belonging to the at-risk group compared with the BPP of belonging to the low-risk group using Model A had a positive association with having five or more diseases or symptoms (adjusted odds ratio [AOR] = 4.81; $p < .001$) and of reporting a poor or very poor health rating (AOR = 5.98; $p < .001$).

Table 2. Adjusted Odds Ratios (AOR) of Health Consequences of Joint Trajectories of Cigarette Smoking and Perceived Self-control Over Time (N = 479)

Independent variable	Five or more diseases, AOR (95% CI)	Poor or very poor general health, AOR (95% CI)
At-risk group (HL) vs. low-risk group (LH) ^a	4.81 (2.11–11.00)***	5.98 (2.47–14.46)***
At-risk group (HL) vs. intermediate groups (LL, LM, and MM) ^b	2.36 (1.18–4.70)*	2.86 (1.42–5.77)**
Intermediate groups (LL, LM, and MM) vs. low-risk group (LH) ^a	2.04 (1.09–3.82)**	2.09 (1.02–4.28)*

Note. HL = chronic cigarette smoking/low perceived self-control; LH = infrequent or non-cigarette smoking/high perceived self-control; LL = infrequent or non-cigarette smoking/low perceived self-control; LM = infrequent or non-cigarette smoking/moderate perceived self-control; and MM = chronic moderate cigarette smoking/moderate perceived self-control. Control variables consist of T2 age, T2 educational level, T1 problems resulting from alcohol and drug use, T2 marijuana use, T2 marital harmony, and T2 unconventionality.

^aThe BPP of belonging to the HL group, the BPP of belonging to the LL, LM, or MM group, and the control variables were used as the independent variables. The BPP of belonging to the LH group was used as the reference distribution.

^bThe BPP of belonging to the HL group, the BPP of belonging to the LH group, and the control variables were used as the independent variables. The BPP of belonging to the LL, LM, or MM group was used as the reference distribution.

* $p < .05$. ** $p < .01$. *** $p < .001$ (two-tailed tests).

.001). Second, the BPP of belonging to the at-risk group compared with the BPP of belonging to one of the intermediate groups using Model B had a positive association with having five or more diseases or symptoms (AOR = 2.36; $p < .05$) and reporting a poor or very poor health rating (AOR = 2.86; $p < 0.01$). Third, the BPP of belonging to the intermediate groups compared with the BPP of belonging to the low-risk group using Model A had a positive association with having five or more diseases or symptoms of diseases (AOR = 2.04; $p < .05$) and reporting a poor or very poor health rating (AOR = 2.09; $p < .05$).

Discussion

The present investigation is unique and extends previous research. Operating within a life-span developmental framework, we examined perceived self-control, an important personality predisposition, conjointly with patterns of smoking between the mean ages of 40 and 48 as related to physical health when the women's mean age was 65. To our knowledge, this is the first longitudinal study to examine the health consequences of joint trajectories of cigarette smoking and perceived self-control for this understudied population of women in midlife.

We extend the work of previous studies that have examined either trajectories of cigarette smoking or trajectories of self-control (Chassin, Preson, Pitts, & Sherman, 2000; Frosch et al., 2009). The joint trajectory group approach captured the simultaneous changes over time within the individual's cigarette smoking and perceived self-control. The five joint trajectories identified in this study accounted for individual variations of co-occurrence between cigarette smoking and low perceived self-control for women in their 40s. Three of the five trajectories were co-occurring or partially co-occurring and comprised a total of 71.6% of the sample. Thus, these findings extend the research that has found that cigarette smoking and low perceived self-control are interrelated both concurrently and prospectively (J. S. Brook et al., 2008; Wills & Dishion, 2004).

The results dealing with the trajectories considering smoking are in accord with prior investigations documenting the health benefits of low or no smoking (J. S. Brook, Brook, Zhang,

& Cohen, 2004). Our findings also highlight the significance of perceived self-control as an important predictor of positive health outcomes. More specifically, high perceived self-control was related to fewer physical diseases or symptoms of diseases. Our results further imply that innovative policies should target increasing perceived self-control and abstinence from smoking as protective factors for positive health outcomes. Thus, this study shows that greater perceived self-control in conjunction with infrequent or no smoking are protective factors for women in midlife (see also Caplan & Schooler, 2003; Quinn & Fromme, 2010).

As regards the associations between the joint trajectories and the health consequences, the findings provided support for our hypotheses, even after statistical control for a number of important background factors (i.e., age at T2, educational level at T2, problems resulting from alcohol and drug use at T1, earlier marijuana use at T2, earlier marital harmony at T2, and unconventionality at T2). Our results confirm the detrimental effects on health of chronic cigarette smoking in conjunction with poor perceived self-control. Among the five joint trajectories groups, the participants in the at-risk group characterized by chronic cigarette smoking and poor perceived self-control as compared with either the low-risk or the intermediate groups were the most likely to have five or more diseases and poor general health. Of particular importance is the significant relationship between the joint trajectory of cigarette smoking and perceived self-control with health despite control on earlier marijuana use and earlier problems resulting from alcohol and drug use, two important confounding and baseline factors.

The present study has six limitations. One limitation of the research is its lack of representation of ethnic minorities and males. Second, objective measures of health should be included in future studies. Nevertheless, self-rated health is associated with objective measures of chronic illness (Shadbolt, 1997) as well as age-related diseases (Jylhä, Volpato, & Guralnik, 2006). Our smoking measures were obtained from questionnaires and interviews. We did not biochemically validate the self-reports of tobacco use. Therefore, it is possible that there was some underreporting of cigarette smoking by these women. However, the findings are significant despite the possibility of underreporting of cigarette smoking. Third, health outcomes assessed at T5 were not available at earlier points in time. Therefore, we are limited in our ability to control for earlier health outcomes. Fourth, we examined the associations between earlier joint trajectories of smoking and perceived self-control and later health outcomes. It would be productive to examine the joint trajectories using other variables (e.g., marijuana use) with smoking and/or perceived self-control as they relate to later health. Nevertheless, we statistically controlled for some of the confounding factors (e.g., earlier marijuana use and problem of alcohol and drug use). Fifth, the group-based approach we used is subject to methodological criticism (Nagin & Tremblay, 2005). Because the assignment to trajectory groups is probabilistic, there may be errors in assigning individuals to a particular trajectory group. Furthermore, the number of trajectory groups depends on the nature of the analyses and data. At times, the findings may be difficult to replicate. Sixth, in any observational study, there are a number of models that could explain the data equally or nearly equally well. For example, a variable-centered approach using cigarette smoking and perceived self-control measures may also provide significant findings.

Directions for Future Research

Future research should be designed to investigate the mechanisms that may account for the associations between the co-occurrence of poor perceived self-control and chronic cigarette smoking as related to health. The co-occurrence of the at-risk group and its association with poor physical health may be attributed to the following factors. First, the co-occurrence of the at-risk group may be associated with health-damaging behaviors. Second, low perceived self-control and chronic cigarette smoking may indicate a lack of social support and social integration, which are positively related to poor health. Third, the co-occurrence of low perceived self-control and chronic cigarette smoking may be related to lower immune functioning (Wiedefeld et al., 1990). Maladaptive coping may be expressed in both more frequent smoking and less perceived self-control. That is, maladaptive coping may serve as the common cause of the co-occurrence. Last, it is possible that individuals who are high in perceived self-control foster social relationships, social support, and social integration, which are positively related to health outcomes (J. S. Brook et al., 2008).

Conclusions

Despite the limitations outlined above, the present study shows the significance of examining the joint trajectories of smoking and perceived self-control as predictors of health with the goal of decreasing disease, improving health, and reducing health costs. The findings also highlight the significance of taking into consideration and targeting dispositional factors (i.e., perceived self-control) as well as smoking in designing smoking cessation treatment programs. Interventions that incorporate self-regulatory strategies for the achievement of goals may be used (Schnoll et al., 2011). Such strategies require the individuals to assess cognitively the benefits of the achievement of health as well as the obstacles that hinder the achievement of health. From a policy perspective, given the increasing costs of health care, the results suggest that an increase in perceived self-control in combination with lowered cigarette smoking may result in less expenditure on health care. The current emphasis on cognitive/behavioral therapy is in accord with our findings regarding the significance of perceived self-control in decision making and awareness of the future consequences of low perceived self-control (J. S. Brook et al., 2008).

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Declaration of Interests

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