



NIH PUBLIC ACCESS

Author Manuscript

J Gerontol B Psychol Sci Soc Sci. Author manuscript; available in PMC 2009 August 15.

Published in final edited form as:

J Gerontol B Psychol Sci Soc Sci. 2008 May ; 63(3): S135–S145.

The Influence of Work Control Trajectories on Men's Mental and Physical Health During the Middle Years: Mediational Role of Personal Control

K. A. S. Wickrama, Florensia F. Surjadi, Frederick O. Lorenz, and Glen H. Elder Jr

¹Department of Human Development and Family Studies, and Institute for Social and Behavioral Research, Iowa State University.²Departments of Statistics and Psychology and Institute for Social and Behavioral Research, Iowa State University.³Carolina Population Center, University of North Carolina at Chapel Hill.

Abstract

Objectives—This study investigates whether increasing health heterogeneity during the middle years is attributed, in part, to the influence of varying levels of, and changes in, work control among members of a rural Midwestern cohort. Specific study objectives are to examine (1) how trajectories of work control influence men's mental and physical health outcomes and (2) how this influence is mediated by the trajectories of personal control during the middle years.

Methods—The study uses four waves of data on 318 employed men across ten years of midlife. Variables include self-reported work control, personal control and mental and physical health.

Results—The results support the hypothesis that both the initial level and change in work control contribute to men's mental and physical health outcomes during the middle years. This influence is mediated by the initial level and change in personal control.

Discussion—By understanding these processes, work can be better designed to promote positive health outcomes, minimize negative health outcomes, and enable more effective implementation of health promotional programs.

Keywords

midlife cohort; work control; personal control; health

Most men experience relatively stable work conditions during the latter middle years. Still, a sizable fraction of men experiences substantial changes in work conditions (Theorell et al., 1998). These changes often stem from individual socioeconomic and personal characteristics, but they may also be due to the historical context of the cohort to which one belongs. Indeed, the baby boom cohort emerges from a historical context in which members experienced tough competition for high quality jobs, the organizational restructuring of the work place, and corporate downsizing (Elder & O'Rand, 1994; Moen & Wethington, 1999). In addition, the chronically low prices of agricultural products since the 'farm crisis' of the 1980s continues to displace many from farms in rural areas. Without new work skills, men of this current middle-aged cohort may lose their jobs and control over work, along with the stability of occupation (Lorenz, Elder, Bao, Wickrama & Conger, 2000).

Work organizational research suggests that adverse work conditions would result in negative health outcomes (Karasek & Theorell, 1990). Previous studies have shown that low work

control has often been associated with depression (Mausner-Dorsch & Eaton, 2000), anxiety (Griffin, Fuhrer, Stansfeld, & Marmot, 2002) and with poor physical health (Wickrama, Lorenz, Fang, Abraham, & Elder, 2005). Several decades ago, work socialization research documented that work control contributes to increased psychological resources such as personal control (Khon & Schooler, 1973). In health psychological research, an increasing number of studies document that personal control contributes to better mental and physical health (Haidt & Rodin, 1999; Marmot et al., 1998). To our knowledge, however, no study has empirically investigated the dynamic associations among work control, personal control and health together as a continuous process in which personal control mediates the association between work control to and health over time.

Instead, most previous research linking these concepts has been based on static, cross-sectional studies or inadequate analytical techniques. As a result, we know very little about how individual *changes* in personal control mediates the association between individual *changes* in work control, and mental and physical health outcomes. In the present study, we first provide the theoretical arguments of why personal control might mediate the association between changes in work control, and mental and physical health outcomes. Then, using four waves of prospective data collected from middle-aged men from rural-midwest during a 10-year period, we extend previous research by examining the change in personal control as an important mechanism that links change in work control to health outcomes in the middle years of men.

Work Control

Karasek and Theorell (1990) define work control as having latitude over one's work decisions and the possibility for use and further development of one's skills (i.e., skill discretion). Thus, the combination of work authority and skill discretion indicators adequately captures work control (Griffin, Fuhrer, Stansfeld, & Marmot, 2002; Karasek & Theorell, 1990). Although early research on work and health has documented adverse multiplicative effect of low work control and high psychological demand on health (Karasek & Theorell, 1990), an increasing number of studies provide supporting evidence for additive effects of work control alone on mental and physical health outcomes (e.g., Mausner-Dorsch & Eaton, 2000; Wickrama et al., 2005).

Work Control and Personal Control

The work socialization perspective contends that work control is associated with positive work qualities such as occupational self-directiveness, substantive complexity, and non-routine work. These positive work characteristics contribute to intellectual and cognitive abilities and habits such as intellectual flexibility and a flexible orientation toward the self and society (Kohn & Slomczynski, 1990; Kramer, Bherer, Colombe, Dong, & Greenough, 2004). In turn, these individual characteristics shape one's general beliefs, attitudes, and values related to personal control (Kohn & Schooler, 1973; Kohn & Slomczynski, 1990). Personal control beliefs (referred to as personal control hereafter) concern the extent to which one feels able to control or influence outcomes or believing that one controls his/her life rather than being at the mercy of powerful others and outside forces (Lachman & Weaver, 1998; Lorenz et al., 1993).

Work control may influence personal control beliefs through processes involving various intra-individual mechanisms. First, the accumulation of experiences in which one successfully controls his/her environment leads to perceptions of mastery (Pearlin, Lieberman, Menaghan, & Mullan, 1981). Second, consistent with the notion of role-person merger (Turner, 1978), skills, habits, beliefs, and values used in one setting tends to generalize or spill over to other situations. Individuals may learn and emulate skills, habits, and beliefs from work and bring them to other life situations in a manner that is consistent with social cognitive theory (Bandura,

2001). Third, according to reflected appraisal notion (reflected appraisals are perceptual and inferred from others' behavior toward the individual), favorable reflected appraisal is predicted to have positive effects on psychological resources such as sense of control (Schwalbe & Staples, 1991). We posit that high level of work control is suggestive of positive assessments of others which in turn would contribute to favorable reflected appraisal.

We further posit that a high degree of work control can significantly and indirectly contribute to increased perceptions of personal control through various social and psychological pathways. Specifically, sense of control at work has been shown to influence social and family relationships through the following mechanisms. First, self-directive work experiences and intellectual flexibility associated with work control carry over into greater problem solving efforts with peers, friends, and family. Better problem solving, consequently, facilitates greater quality and supportiveness in social, marital, and parent-child interactions (Menaghan & Parcel, 1990; Whitbeck, Simons, Conger, Wickrama, & Elder, 1997). Conversely, anger and distress generated by a lack of power and control at work may carry over to social and family relationships through expression of negative affect to peers, friends, and family members (Menaghan, 1991; Whitbeck et al., 1997). Second, people with less control over work generally face more rigid time schedules and greater time pressures, which potentially limit their opportunities for leisure and pleasurable activities with peers, friends, and family members (Wickrama et al., 1997). Intimate marital interactions and high levels of social integration, in turn, promote a sense of meaning, purpose, and beliefs about personal control (Thoits, 1992; Wickrama et al., 1997).

Accordingly, positive changes in work conditions should directly and indirectly contribute to positive changes in general beliefs related to personal control, and negative changes in work conditions tend to erode those beliefs. Although some theorists view control as a relatively stable personality dimension (Kobosa, 1979), increasing evidence suggests that actual experience of life changes contributes to changes in general beliefs about personal control (Merluzzi & Nairn, 1999). Indeed, psychological research suggests that personal control consists of two distinct components including an enduring stable component and a malleable component that vary with changes in context (Pierce, 2005).

Personal Control and Health

Previous research documents that strong personal control is linked to better mental health (Haidt & Rodin, 1999) and physical health (Marmot et al., 1998). In fact, the relationship between personal control and health grows stronger with age (Rodin & Timko, 1992). Previous research suggests that personal control influences mental and physical health directly and indirectly through several pathways.

Numerous studies suggest that lack of personal control and low self-worth associated with persistent absence of work control may directly produce a sense of powerlessness. Mirowsky and Ross (2003) posit that lack of control or self-worth, however, do not exist in a vacuum; instead, one's sense of powerlessness and worthlessness is a form of subjective alienation that generates depressive symptoms and other forms of distress. Impaired mental health also contributes to the development and/or progression of a wide range of medical conditions such as joint pains, pruritus, psoriasis, and urticaria (Carney & Freedland, 2000).

People with high level of personal control are more likely to initiate preventive behaviors such as getting regular check-ups, adhere to health behaviors such as maintaining balanced diets and exercising (Tedesco, Keffer, & Fleck-Kandath, 1991), and quit risky behaviors such as smoking, excessive drinking, and substance use (Seeman & Seeman, 1983). Consistent with a life-span perspective (Baltes & Baltes, 1990), these behavioral adaptations may be important

for the selective optimization processes that compensate for diminishing biological robustness among men during the middle years.

Existing research also links personal control to positive outcome expectancies. Personal control correlates with other positive psychological constructs such as optimism or a generalized expectation that good things will happen in the future (Scheier, Carver, & Bridges, 1994). An increasing body of literature points to the beneficial influence of having a positive view on mental and physical health outcomes. For example, studies demonstrate that optimistic individuals report fewer physical symptoms (Scheier & Carver, 1985) and recover faster following surgery (Scheier et al., 1989).

We also argue that personal control directly reduces the detrimental health influence of stressful life circumstances by decreasing the probability of illness and delaying the onset of health problems. That is, men with high personal control can reduce the health consequences of stressful circumstances through avoidance of and/or disengagement from subsequent stressful activities. Consistent with a life-span perspective, this process reflects a method of secondary control aimed at minimizing the negative effects of failures (Heckhausen, 1997). This may be especially applicable to men at midlife because they are especially likely to experience more stressful life events, losses, or failures in different non-work life domains including self, marriage, children, and parents than do men at younger and older age.

We contend that men's personal control represents a proximal health resource that is enhanced and sustained by work control that serves as an important link between work control and health outcomes. As such, the direct influence of work control on men's health (Griffin et al., 2002; Mausner-Dorsch & Eaton, 2000; Wickrama et al., 2005) may partially operate through men's perceptions of personal control.

Figure 1 outlines a theoretical model beginning with work control trajectory characterized by the level and change over time. Our essential thesis is that work control trajectories contribute to men's physical and mental health outcomes through the trajectories of personal control during the middle years.

Individual trajectories of work control should include growth parameters that reflect both the *initial level* and the *rate of change (slope)* of work control. An examination of trajectories also requires estimation of sample averages of the initial level and slope, as well as estimation of individual variability around the sample averages. We expect that the *level* and *rate of changes* in work control during the middle years differ across individuals. For example, at the time the study began, individuals will differ in their initial levels of work control. During the study period, work control may decrease for some and increase for others. Taken together, there exist work control trajectories that differ across individuals in terms of initial levels and rate of change. This raises the possibility of parallel trajectories (intra-individual changes) of work and personal control over time.

The development of health problems may not correspond simply to the chronic *level* of impaired personal control. Rather, one's development of health problems may also correspond to his or her *rate of change* (growth or decline) in personal control (Wickrama, Beiser, & Kaspar, 2002). Thus, as shown in Figure 2, we hypothesize that

- a. Both the initial level and rate of change in work control influence mental and health outcomes during the middle years.
- b. The initial level and rate of change in work control influence the initial level and rate of change in personal control during the middle years (parallel trajectories).

- c. Thus, the initial level and rate of change of personal control mediate the influences of the initial level and rate of change in work control on mental and physical health outcomes during the middle years.

By controlling for initial levels of health status, we minimize the possibility of an alternative selection hypothesis that healthy men possess higher levels of work and personal control and select into higher quality jobs. Also, because previous social epidemiological studies indicate that education level is the best socioeconomic indicator associated with health status (Mirowsky & Ross, 2003), we include education level in the model as a control. The arrow from education in Figure 1 indicates that all the endogenous constructs are controlled for the education level.

METHODS

Sample and Procedures

Data for this study came from the Iowa Midlife Transition Project (MTP), a study of 390 men who originally participate in the Iowa Youth and Families Project (IYFP) between 1989 and 1994 and those who continued to participate in the MTP. The IYFP involved 451 families from eight counties in Iowa. The site for the research was determined by our interest in rural economic stress and well being. Because many of the outcomes and processes considered in the overall study were concerned with children's development, families selected to participate had at least two children.

At the first wave of IYFP data collection in 1989, 97% of the men were employed. About 97% of the employed men were full-time workers, including farmers (22%), professionals and managers (28%), technicians and skilled workers including sales workers (40%), office workers (3%), and unskilled workers (7%). The median yearly income in 1989 was \$22,000. The average occupational prestige scores for the men in our sample, on a scale of 1 to 100, were 43 (Nakao & Treas, 1990). The median age for men in 1989 was 39. Because there are very few minorities in the rural population studied, all families in the combined sample were white. Participants ($N = 370$) were interviewed again in 2001 as part of the MTP resulting in four waves of data (1991, 1992, 1994, and 2001). The attrition rate for the combined sample was 14% across the 10-year period. We tested our theoretical model with a sample of 318 consistently employed men who provided data for all assessments in 2001. We performed an attrition analysis to examine possible differences between those who dropped out and the analyzed sample. The education level of those who dropped out ($M = 13.02$) was slightly lower than those who remained in the study ($M = 14.12$). Those who dropped out also reported poorer health in 1991 ($M = 2.56$) than people who remained in the study ($M = 2.30$).

Out of the 318 cases in 2001, some cases were unavailable for a specific wave of data collection (about 9%). This study used full information maximum likelihood (FIML) to test the hypotheses using all available data in the analysis. Compare to other procedures such as listwise deletion, pairwise deletion, or imputation of means, maximum likelihood algorithm for use with missing data such as FIML provides a more efficient parameter estimates (Enders, 2001). We further tested the model with and without the inclusion of 9% of the missing cases, and found no differences in the results.

Measures

Work control—Work control of respondents who were consistently employed in each of the three study years (i.e. 1991, 1992, and 1994) was measured by the mean of eight items as indicated in the Appendix A. Each item was scored using 5-point Likert scales ranging from strongly disagree (1) to strongly agree (5) (Karasek & Theorell, 1990). Responses were coded

such that higher scores indicated higher levels of work control. The coefficient alpha for each measurement waves were .83, .84, and .81 for 1991, 1992, and 1994 respectively.

Personal control—Seven items from Pearlin’s mastery scale (Pearlin et al., 1981) were used to assess respondents’ personal control. On a 5-point scale, the respondents were asked to rate how agree or disagree they were with each of the statements as reported in the Appendix A. Responses were coded so that higher scores indicated higher personal control. The coefficient alpha for 1991, 1992, and 1994 were .78, .81, and .81 respectively.

Physical health—Previous research have demonstrated that self-reports of health status correlate highly with physician assessments of morbidity (Romelsjo, Kaplan, Cohen, Allebeck, & Andreasson, 1992; Ferraro & Farmer, 1999). Self-assessments of poor global health were obtained in 1991 and 2001 using two global measures. The first global measure asked participants to indicate on a scale from 1 (“excellent”) to 5 (“poor”), “How would you rate your overall physical health?” The second global health measure asked participants to indicate on a scale from 1 (“much better”) to 5 (“much worse”), “Would you say your overall physical health is better or worse than other people your age?” Self-assessed global physical health was created by taking the mean of these two items, with higher scores representing poorer physical health. The coefficient alpha for self-report of poor physical health in 1991 and 2001 were .78 and .72.

Depressive symptoms—Depressive symptoms were measured in 1991 and 2001 by the 13-item depressive symptomology subscale of the SCL-90-R (Derogatis, 1983). Respondents were asked to indicate on 5-point scale ranging from not at all (1) to extremely (5), how much in the past week they were bothered by symptoms of depressed mood, such as crying easily, feeling trapped or caught, blaming themselves for things, feeling lonely, feeling blue, feeling worthless, and feeling hopeless about the future. Physical symptoms of depression included “feeling low in energy or slowed down” and “feeling everything is an effort”. Scores on the depressive symptoms subscale could potentially range from 1 to 5. Greater scores for this variable represent higher depressive symptoms. The coefficient alpha for depressive symptoms for 1991 and 2001 were .93 and .90.

Control variable—Education, measured by the number of years of formal education for the respondent in 1991, was included as the control variable.

Analysis Plan

We used latent growth curve modeling to estimate individual trajectories and to investigate their correlates. Growth curve estimation begins by describing change over time for each individual in the study. Conceptually, this is done by fitting a regression line (an individual growth trajectory) linking a variable (y) to time (t) for each individual in the study. Individual regression coefficients for the intercept and slope correspond to individual growth parameters for the initial level and rate of change (slope), respectively. We investigated individual growth parameters (trajectories) of work control and personal control that include information about both their average levels and their inter-individual variability.

In the analysis, the growth parameters of work control will be specified as predictors of health outcome (Y) in 2001 by the following equation (hypothesis 1):

$$\text{Health}_{p,t} = \beta_0 + \beta_4(\text{the level of work control}) + \beta_5(\text{slope of work control}) + \text{Error}$$

In the above equation, β_0 is the intercept of the prediction equation, and β_4 and β_5 are regression coefficients linking the growth parameters of personal control to a health outcome variable.

To examine the association between work control and personal trajectories (hypothesis 2), the level and slope of personal control (1991–1994) will be predicted by the level and slope of work control (1991–1994) as shown in the following equations:

$$\text{Level of Personal Control} = \beta_1(\text{the level of Work control}) + \text{Error}$$

$$\text{Slope of Personal Control} = \beta_2(\text{slope of Work control}) + \text{Error}$$

To test the mediational process (hypothesis 3) according to Baron and Kenny (1986), after showing the direct effects of work control growth parameters on health outcomes, both work and personal control growth parameters will be specified as predictors of health outcome. If growth parameters of personal control become significant predictors of health outcomes while the direct influences of growth parameters of work control diminish, the mediational hypothesis is supported (Baron & Kenny, 1986).

RESULTS

Table 1 presents the zero-order correlations, means and the standard deviations of all the study variables. Most of the work control variables and all of the personal control variables were negatively correlated with poor health outcomes. However, the association of personal control variables with poor health outcomes were stronger than the association of work control variables with the physical/mental health outcomes. The mean values of poor global health (2.30 and 2.61), and depressive symptoms (1.29 and 1.38) slightly increased from 1991 to 2001; indicating that on average, there is a slight decline in health during the ten-year-study period. Education was not found to be correlated with any of the study variables. We further tested our theoretical models with the inclusion of education and found that the paths from education were not significant in each model. Thereafter, education was not included in the analyses.

We began latent growth curve analysis by estimating univariate growth curves to describe the patterns of change in work control and personal control variables. Next, we utilized latent growth curves to investigate how individual trajectories of personal control mediate the association between trajectories of work control and mental and physical health outcomes.

Univariate Growth Curves

Before testing the theoretical model, we estimated univariate growth curves for all three waves of work control and personal control variables (1991, 1992, and 1994). The results of the fitted growth curves of work control and personal control variables are summarized in Table 2. The intercept of 3.573 (Table 2) was an estimate of the average work control reported by all respondents in 1991. The nearly significant mean of the linear slope (0.020; $t = 1.95$) indicated that, on average, there was an increasing trend in work control between 1991 and 1994. Results from descriptive statistics (see Table 1) showed, on average, there were slight increases in work control from 1991 to 1994 ($M = 3.60, 3.62, \text{ and } 3.65$ for 1991, 1992, and 1994 respectively). However, the significant variance of the slope of work control (0.025; $t = 3.75$) in Table 2 implies that there was significant interindividual variations in the linear change of work control across time: some individuals experienced increases in work control, while others experienced declines, some more dramatic than others (Lorenz, Wickrama, Conger, & Elder, 2006). This model fit the data ($\chi^2 [1] = .09$).

Similarly, the intercept of 3.817 for personal control in Table 2 was the estimate of average personal control for all participants in 1991. The significant mean of the linear slope (-0.020 ; $t = -2.05$) indicates that overall there was a decreasing trend in personal control between 1991 and 1994, however, the interindividual variation in linear change in personal control did not reach significant level at $p = .05$ (0.009 ; $t = 1.53$).

Latent Growth Curve Models

Three sets of latent growth curve models were fit to the data (Figure 2). The first model investigated the direct influence of work control on health outcomes. We tested the model separately to predict poor physical health and depressive symptoms. Figure 2A presents a summary of the results. In Figure 2A, the initial level of work control in 1991 significantly predicts poor physical health in 2001. The negative sign associated with the coefficient and significant t-ratio ($-.141$; $t = -2.71$) mean that those who had high work control in 1991 tend to report less poorer health in 2001, and vice versa. In addition, those who experience greater increase in work control between 1991 and 1994 tend to report less poorer health in 2001 (-1.54 ; $t = -2.45$). The Root Mean Square Error of Approximation (RMSEA) of .05 indicates that this model has an acceptable fit with the data (Byrne, 1998). The influences of both the level and change of work control on depressive symptoms in 2001 were marginally significant ($t = -1.33$ and -1.87). The RMSEA of .05 for the model predicting depressive symptoms indicates that this model also has an acceptable fit with the data.

For comparison purposes with subsequent incremental models (2B & 2C), the level and slope of personal control were included in Model 2A and the paths from work control constructs to personal control were freed and paths to poor health (2001) was fixed (not shown in the Figure 2A). Figure 2B added the paths from the level of personal control in 1991 to health in 2001, as well as from the change in personal control to health in 2001. For both the model predicting poor physical health, and the model predicting depressive symptoms in 2001, the direct path from work control to health in 2001, as well as the direct path from the change in work control to health in 2001 (which were significant in Model 2A) diminish in Model 2B when we added the indirect paths. These models provide good fit with the data. Compare to Figure 2A, the models in Figure 2B provide a significant reduction in chi-square ($\Delta \chi^2 [2 \text{ df}] = 9.56$ for model predicting poor physical health, and $\Delta \chi^2 [2 \text{ df}] = 8.56$ for model predicting depressive symptoms) which indicate that significant improvement of the model fit was gained by adding the indirect paths from personal control to health in 2001.

Figure 2C omitted the direct influence of the level and change in work control to health in 2001. For both the models predicting poor health and depressive symptoms in 2001, the level of work control in 1991 significantly predicts the level of personal control in 1991 ($t = 5.09$ and 5.14 for models predicting poor health and depressive symptoms, respectively). That is, men who had high work control in 1991 tend to had higher level of personal control in 1991. The significant paths from the change in work control to the change in personal control ($t = 2.69$ and 2.54 for models predicting poor health and depressive symptoms) indicate that those who experienced greater change in work control between 1991 and 1994 also tend to have greater change in personal control between 1991 and 1994. Higher level of work control in 1991, in turn, predicted less poorer health in 2001 ($t = -3.12$) and lower depressive symptoms in 2001 ($t = -5.97$). Both models in Figure 2C provide a good fit with the data (RMSEA < .05). Compare to Figure 2B, the models in Figure 2C provide did not result in significant increase in chi-square ($\Delta \chi^2 [2 \text{ df}] = 3.24$ for model predicting poor physical health, and $\Delta \chi^2 [2 \text{ df}] = 3.91$ for model predicting depressive symptoms) indicating that Figure 2C is the most parsimonious and the best fitting model with the data.

DISCUSSION

The process whereby aspects of work context affect individuals' health indirectly through one's personal control appears to be continuous. Thus, an investigation of health outcomes in the middle years calls for a "long view" so that health consequences of adverse work conditions in early midlife can be documented later, as they emerge in later midlife. Using prospective data of a 10-year period, we find support for the hypothesized pathways whereby dimensions of work control proximally influence the mental and physical health of middle-aged men.

The present study makes several specific contributions to the existing literature. Our contribution to the research literature is methodological. Most previous studies examining associations among work control, personal control, and health outcomes were based on static, cross-sectional studies. These studies provided important, but limited information because research that does not include examination of within-individual changes over time could yield incomplete conclusions concerning certain outcomes (Karney & Bradbury, 1995). The present study focused on within-individual changes, inter-individual variabilities in those changes, and on predictors and consequences of those changes. These methodological advances have two important aspects. First, the prospective correspondence at the individual level or inter-locking trajectories between growth parameters of work control and personal control provides compelling evidence for the systematic association between changes in work and personal control within an individual (Duncan, Duncan, Strycker, Li, & Alpert, 1999). Second, findings that both the initial level and rate of change of personal control uniquely contributed to one's health outcomes provides compelling evidence for the important influence of change in personal control beliefs on health outcomes regardless of the level of personal control.

As previously discussed, pioneer research on work organization and health suggested that low level of work control influences health in combination with high work demand, as a multiplicative effect (Karasek & Theorell, 1990). The findings of the present study add to the increasing evidence for the additive influence of work control, the loss of work control in particular, on both individual mental and physical health. More importantly, these findings point to the vulnerability of the members of current middle-aged cohort who have been subject to lose their control over work without new work skills in the present context of tough competition for high quality jobs, the organizational restructuring of the work place, and corporate downsizing (Elder & O'Rand, 1994; Moen & Wethington, 1999; Lorenz et al., 2000).

Although some theorists view personal control as a relatively stable personality dimension (Kobasa, 1979), the present findings suggest that one's personal control is malleable, and work experiences and changes in work conditions contribute to changes in personal control (Pierce, 2005; Merluzzi & Nairn, 1999). Our findings showed that rate of changes in personal control have significant inter-individual variability. That is, while some men experienced only little decline or stagnation in personal control, others reported steeper decline, and still others reported increases. This suggests that personal control beliefs remain susceptible to change during this stage of the lifespan (Lachman & James, 1997). However, the present study focused only on psychological resources as a mediator to explain the health effect of work condition. Other susceptible individual attributes such as family and marital relations and health behaviors would aid to elucidate more mechanisms through which work experiences contribute to health outcomes over the life course.

Despite important findings of the present study, there are several possible limitations. First, beliefs about lack of personal control may be generated through chronic physical illness or functional impairment. For example, chronic health problems may contribute to erosion of psychological resources such as personal control both directly and indirectly. Second,

socioeconomic failures and lack of achievement due to impaired physical health may also generate beliefs about lack personal control. Again, an example: severely unhealthy individuals might internalized these weakened beliefs about their personal control. Thus, there may be reversed causation or/and reciprocal influences between personal control, and physical and mental health. Although the present findings demonstrated a promising mediational process from work control to health outcomes through personal control, potential reversed causation or/and reciprocal influences can not be discounted.

The observed associations between work control and health, as well as between work control and personal control, may be moderated by the salience of one's work role. Identity perspective suggests that the health effects of life experiences in different role domains are a function of its salience (Thoits, 1992). Thus, the observed associations between work control and personal control, as well as work control and health may be stronger for individuals who posses high levels of salience of work role than for individuals who posses low levels of salience of work role (Wickrama, Conger, Lorenz, & Matthews, 1995). In addition, the salience of work role may differ by gender. Thus, the observed association between work control and health, and work control and personal control may be moderated by gender because women, rural women in particular, posses low level of salience of work role (Wickrama et al. 1995). However, the present study did not investigate women.

Our sample included all whites from rural mid-west counties. Thus, characteristics of the study sample limit the generalizability of the results. Replication with a broader cross-section of the population that includes members of ethnic groups and those living in both rural and urban areas would increase our confidence in the general applicability of the findings presented in this study. Future research should extend this line of research by investigating these moderating influences.

Although subject to potential biases, we used self-reported information regarding work, personal control, and negative health outcomes. Future research should extend this line of research using objective measures of work conditions and clinical measures of health outcomes.

Despite these limitations, the results presented here make an important contribution by demonstrating the long-term indirect health consequences for middle-aged men due to work conditions. This work underscores the importance of including not only current work conditions, but also early changes in work conditions over time when investigating the effects of work on health. In addition, our findings reveal a potential mediating role of personal control trajectories during the middle years. A better understanding of these processes could lead to changes in work environments that promote positive mental and physical health outcomes, minimize negative outcomes, and aid the formulation and effective implementation of mental/physical health promotion programs.

REFERENCES

- Baron RM, Kenny DA. The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology* 1986;51:1173–1182. [PubMed: 3806354]
- Bandura A. Social cognitive theory: An agentic perspective. *Annual Review of Psychology* 2001;52:1–26.
- Baltes, PB.; Baltes, MM. Psychological perspectives on successful aging: The model of selective optimization with compensation. In: Baltes, PB.; Baltes, MM., editors. *Successful aging: Perspectives from the behavioral sciences*. New York: Cambridge University Press; 1990. p. 1-34.
- Byrne, BM. *Structural equation modeling with LISREL, PRELIS, and SIMPLIS: Basic concepts, applications, and programming*. Mahwah, New Jersey: Lawrence Erlbaum; 1998.

- Carney, RM.; Freedland, KE. Depression and medical illness. In: Berkman, LF.; Kawachi, I., editors. *Social epidemiology*. New York: Oxford University Press; 2000. p. 191-212.
- Derogatis, LR. *SCL-90: Administration, scoring, and procedures Manual II*. Vol. Second Edition. Towson, MD: Clinical Psychometric Research; 1983.
- Duncan, TE.; Duncan, SC.; Strycker, LA.; Li, F.; Alpert, AA. Mahwah, NJ: Lawrence Erlbaum; 1999. An introduction to latent variable growth curve modeling: Concepts, issues, and applications.
- Elder, GH., Jr; O'Rand, AM. Adult lives in a changing society. In: Cook, KS.; Fine, GA.; House, JS., editors. *Sociological perspectives on social psychology*. Boston, MA: Allyn & Bacon; 1994. p. 452-475.
- Enders CK. A primer on maximum likelihood algorithms available for use with missing data. *Structural Equation Modeling* 2001;8:128–141.
- Ferraro KF, Farmer MM. Utility of health data from social Surveys: Is there a gold standard for measuring morbidity? *American Sociological Review* 1999;64:303–315.
- Griffin JM, Fuhrer R, Stansfeld SA, Marmot M. The importance of low control at work and home on depression and anxiety: Do these effects vary by gender and social class? *Social Science and Medicine* 2002;54:783–798. [PubMed: 11999493]
- Haidt J, Rodin J. Control and efficacy as interdisciplinary bridges. *Review of General Psychology* 1999;3:317–337.
- Heckhausen J. Developmental regulation across adulthood: Primary and secondary control of age-related challenges. *Developmental Psychology* 1997;33:176–187. [PubMed: 9050402]
- Karasek, RA.; Theorell, T. *Healthy work*. New York: Basic Books; 1990.
- Karney BR, Bradbury TN. Assessing longitudinal change in marriage: An introduction to the analysis of growth curves. *Journal of Marriage and the Family* 1995;57:1091–1108.
- Kobasa S. Stressful life events, personality, and health: An inquiry into. hardiness. *Journal of Personality and Social Psychology* 1979;37:1–11. [PubMed: 458548]
- Kohn ML, Schooler C. Occupational experience and psychological functioning: An assessment of reciprocal effects. *American Sociological Review* 1973;38:97–118.
- Kohn, ML.; Slomczynski, KM. *Social structure and self-direction: A comparative analysis of the United States and Poland*. Cambridge, MA: Blackwell; 1990.
- Kramer AF, Bherer L, Colombe SJ, Dong W, Greenough WT. Environmental influences on cognitive and brain plasticity during aging. *Journal of Gerontology, Medical Sciences* 2004;59A:940–957.
- Lachman, ME.; James, JB., editors. *Multiple paths of midlife development*. Chicago, IL: University of Chicago Press; 1997.
- Lachman ME, Weaver SL. Sociodemographic variations in the sense of control by domain: Findings from the MacArthur studies of midlife. *Psychology and Aging* 1998;13:553–562. [PubMed: 9883456]
- Lorenz FO, Conger RD, Montague RB, Wickrama KAS. Economic conditions, spouse support, and psychological distress of rural husbands and wives. *Rural Sociology* 1993;58:247–268.
- Lorenz FO, Elder GH Jr, Bao WN, Wickrama KAS, Conger RD. After farming: Emotional health trajectories of farm, nonfarm, and displaced farm couples. *Rural Sociology* 2000;65:50–71.
- Lorenz FO, Wickrama KAS, Conger RD, Elder GH Jr. The short-term and decade-long effects of divorce on women's midlife health. *Journal of Health and Social Behavior* 2006;47:111–125. [PubMed: 16821506]
- Marmot MG, Fuhrer R, Ettner SL, Marks NF, Bumpass LL, Ryff CD. Contribution of psychosocial factors to socioeconomic differences in health. *Milbank Quarterly* 1998;76:403–448. [PubMed: 9738169]
- Mausner-Dorsch H, Eaton WW. Psychosocial work environment and depression: Epidemiologic assessment of the demand-control model. *American Journal of Public Health* 2000;90:1765–1770. [PubMed: 11076247]
- Menaghan EG. Work experiences and family interaction processes: The long reach of the job? *Annual Review of Sociology* 1991;17:419–444.
- Menaghan EG, Parcel TL. Parental employment and family life: Research in the 1980s. *Journal of Marriage and the Family* 1990;52:1079–1098.

- Merluzzi, TV.; Nairn, RC. Adulthood and aging: Transitions in health and health cognitions. In: Whitman, TL.; Merluzzi, TV.; White, RD., editors. *Life-span perspectives on health and illness*. Mahwah, NJ: Lawrence Erlbaum Associates; 1999. p. 189-206.
- Mirowsky, J.; Ross, CE. *Education, social status and health*. New York: Aldine de Gruyter; 2003.
- Moen, P.; Wethington, E. Midlife development in a life course context. In: Willis, SL.; Reid, JD., editors. *Life in the middle: Psychological and social development in middle age*. San Diego, CA: Academic Press; 1999. p. 3-23.
- Nakao, K.; Treas, J. *Computing 1989 occupational prestige scores*. Chicago: University of Chicago, National Opinion Research Center; 1990.
- Pearlin LI, Lieberman MA, Menaghan EG, Mullan JT. The stress process. *Journal of Health and Social Behavior* 1981;22:337–356. [PubMed: 7320473]
- Pearlin LI, Schieman S, Fazio EM, Meersman SC. Stress, health, and the life course: Some conceptual perspectives. *Journal of Health and Social Behavior* 2005;46:205–219. [PubMed: 16028458]
- Pierce, CP. A PhD Dissertation. University of Massachusetts, Amherst; 2005. Sense of control and psychological well-being during the transition to parenthood.
- Rodin, J.; Timko, C. Sense of control, aging, and health. In: Ory, MG.; Abeles, RP.; Lipman, PD., editors. *Aging, health, and behavior*. Thousand Oaks, CA: Sage Publications; 1992. p. 174-206.
- Romelsjo A, Kaplan GA, Cohen RD, Allebeck P, Andreasson S. Protective factors and social risk factors for hospitalization and mortality among young men. *American Journal of Epidemiology* 1992;135:649–668. [PubMed: 1580241]
- Scheier MF, Carver CS. Optimism, coping, and health: Assessment and implications of generalized outcome expectancies. *Health Psychology* 1985;4:219–247. [PubMed: 4029106]
- Scheier MF, Carver CS, Bridges MW. Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): A reevaluation of the Life Orientation Test. *Journal of Personality and Social Psychology* 1994;67:1063–1078. [PubMed: 7815302]
- Scheier MF, Matthews KA, Owens JF, Magovern GJ, Lefebvre RC, Abbott RA, Carver CS. Dispositional optimism and recovery from coronary artery bypass surgery: The beneficial effects on physical and psychological well-being. *Journal of Personality and Social Psychology* 1989;57:1024–1040. [PubMed: 2614656]
- Schalbe ML, Staples CL. Gender differences in sources of self-esteem. *Social Psychology Quarterly* 1991;54:158–168.
- Seeman M, Seeman TE. Health behavior and personal autonomy: A longitudinal study of the sense of control in illness. *Journal of Health and Social Behavior* 1983;24:144–160. [PubMed: 6886369]
- Tedesco LA, Keffer MA, Fleck-Kandath C. Self-efficacy, reasoned action, and oral health behavior reports: A social cognitive approach to compliance. *Journal of Behavioral Medicine* 1991;14:341–355. [PubMed: 1942013]
- Theorell T, Tsutsumi A, Hallquist J, Reuterwall C, Hogstedt C, Fredlund P, Emlund N, Johnson JV. Decision latitude, job strain, and myocardial infarction: A study of working men in Stockholm. *American Journal of Public Health* 1998;88:382–388. [PubMed: 9518968]
- Thoits PA. Identity structures and psychological well-being: Gender and marital status comparisons. *Social Psychology Quarterly* 1992;55:236–256.
- Turner RH. The role and the person. *American Journal of Sociology* 1978;84:1–23.
- Whitbeck LB, Simons RL, Conger RD, Wickrama KAS, Ackley KA, Elder GH Jr. The effects of parents' working conditions and family economic hardship on parenting behaviors and children's self-efficacy. *Social Psychology Quarterly* 1997;60:291–303.
- Wickrama KAS, Beiser M, Kaspar V. Assessing the longitudinal course of depression and economic integration of south-east Asian refugees: An application of latent growth curve analysis. *International Journal of Methods in Psychiatric Research* 2002;11:154–168. [PubMed: 12459819]
- Wickrama KAS, Lorenz FO, Conger RD, Matthews L, Elder GH Jr. Linking occupational conditions to physical health through marital, social, and intrapersonal processes. *Journal of Health and Social Behavior* 1997;38:363–375. [PubMed: 9425780]
- Wickrama KAS, Lorenz FO, Fang SA, Abraham WT, Elder GH Jr. Gendered trajectories of work control and health outcomes in the middle years: A perspective from the rural Midwest. *Journal of Aging and Health* 2005;17:779–806. [PubMed: 16377772]

Wickrama KAS, Conger RD, Lorenz FO, Matthews L. Role identity, role satisfaction, and perceived physical health. *Social Psychology Quarterly* 1995;58:270–283.

Appendix

Appendix A. Measures

Work Control Items (Karasek & Theorell, 1990)

1 = strongly disagree to 5 = strongly agree; R = reverse coded.

1. This job matches my education and experience.
2. My job allows me to use my skills and abilities.
3. My job matches what I like to do.
4. R: I have skills from training or experience that I would like to use, but can't in this job.
5. R: I am over qualified for the work that I do in this job.
6. I have a flexible work schedule in this job.
7. In this work, I am mostly my own boss.
8. This job gives me the amount of independence I like.

Personal Control Items (Pearlin et al., 1981)

1. 1 = strongly agree to 5 = strongly disagree; R = reverse coded.
2. There is really no way I can solve some of the problems I have.
3. Sometimes I feel that I'm being pushed around in life.
4. I have little control over the things that happen to me.
5. R: I can do just about anything I really set my mind to.
6. I often feel helpless in dealing with the problems of life.
7. R: What happens to me in the future mostly depends on me.
8. There is little I can do to change many of the important things in my life.

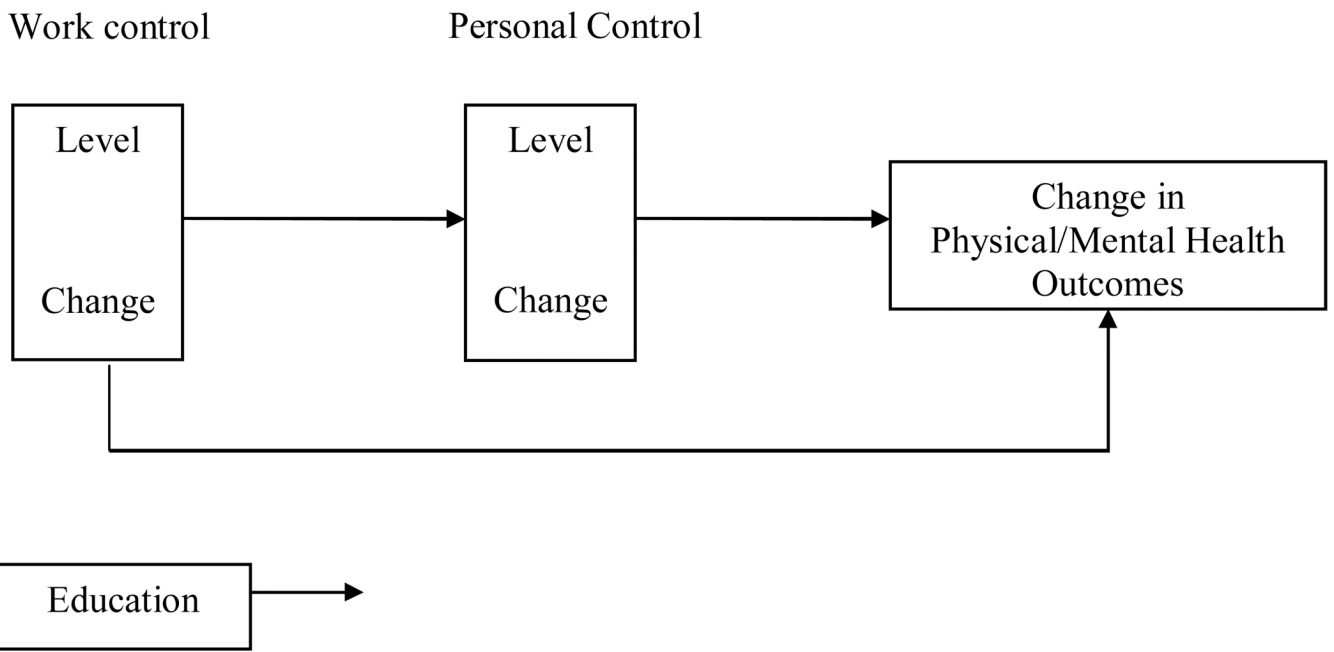
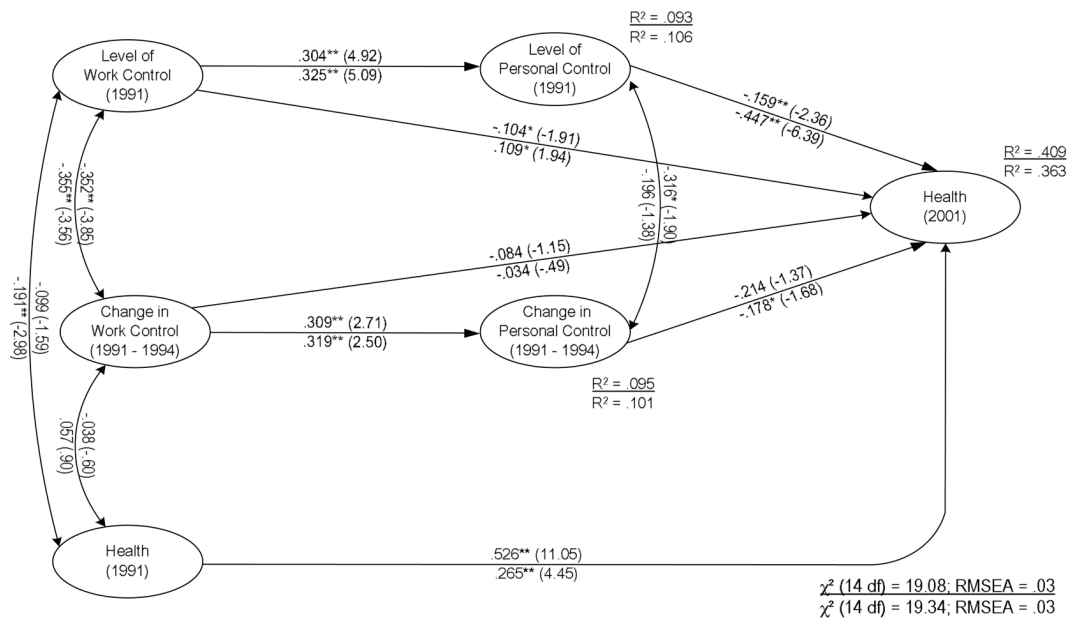
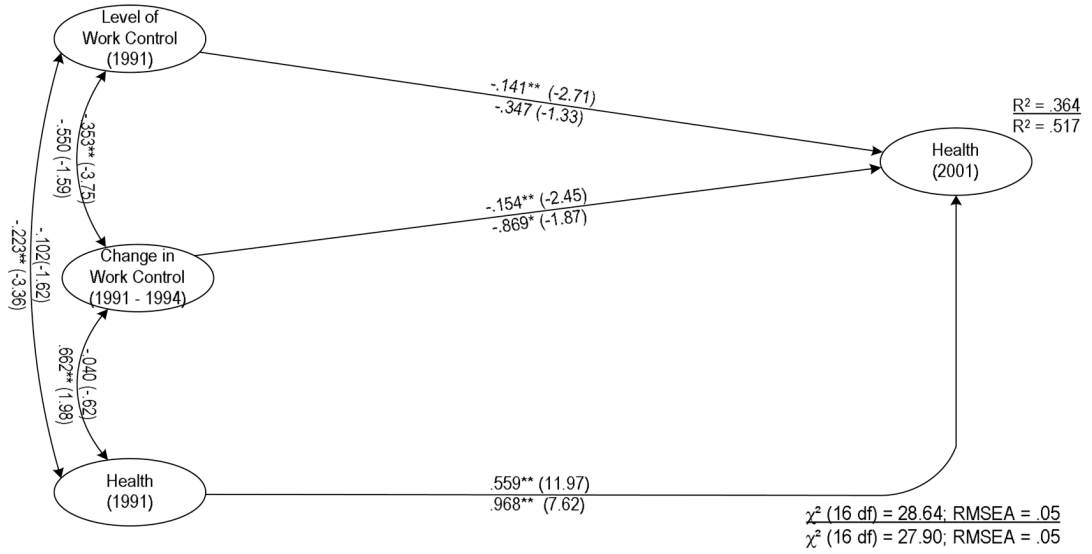


Figure 1.
The Theoretical Model



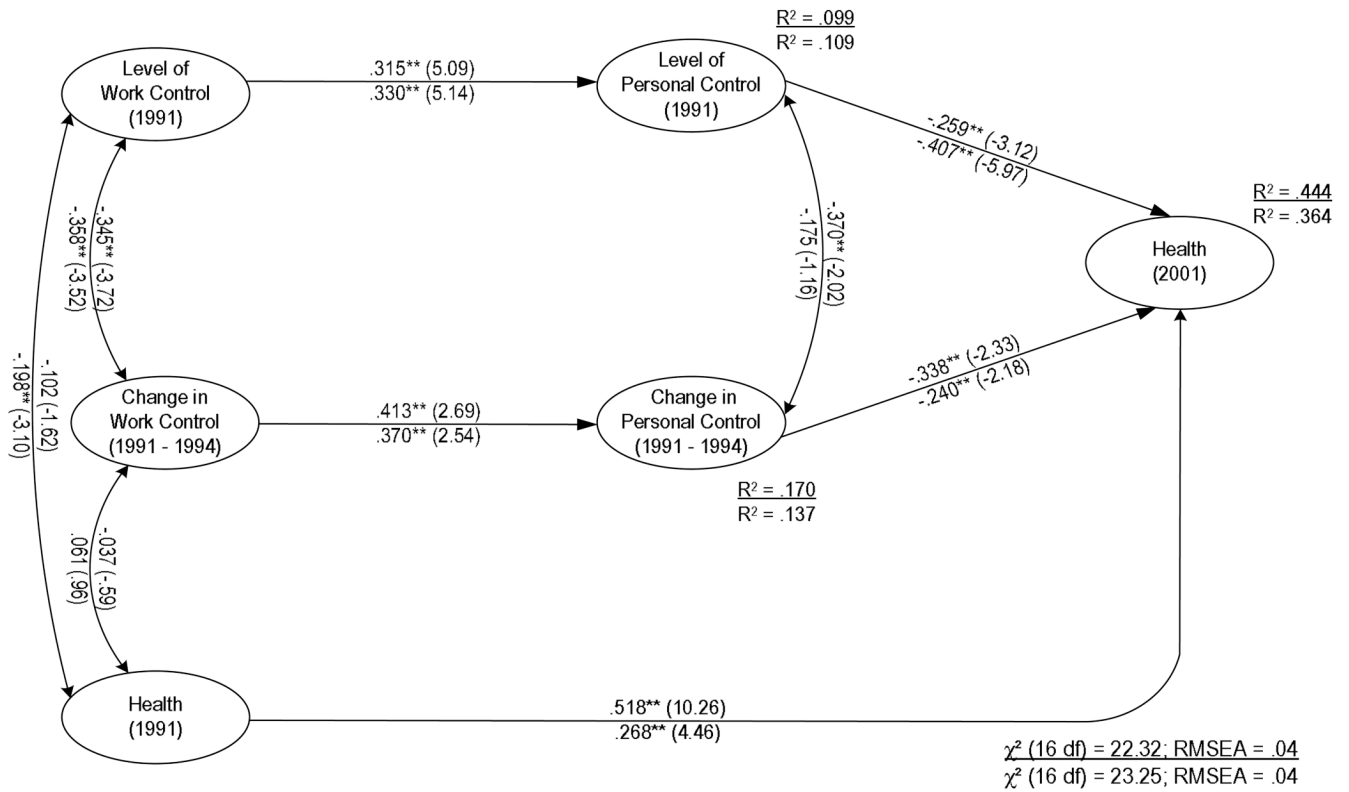


Figure 2.

Figure 2A. The Direct Influence of the Trajectories of Work Control on Health Outcomes (Standardized values with *t*-ratios in parentheses).

Note. Values above each line represent results predicting poor physical health, and values below the line represent results predicting depressive symptoms. **p* < .10; ***p* < .05

Figure 2B. The Direct and Indirect Influence of the Trajectories of Work Control on Health Outcomes (Standardized values with *t*-ratios in parentheses).

Note. Values above each line represent results predicting poor physical health, and values below the line represent results predicting depressive symptoms. **p* < .10; ***p* < .05

Figure 2C. The Indirect Influence of Work Control on Health Outcomes (Standardized Values with *t*-ratios in parentheses).

Note. Values above each line represent results predicting poor physical health, and values below the line represent results predicting depressive symptoms. **p* < .10; ***p* < .05

Table 1

Zero-Order Correlation among Study Variables

	1	2	3	4	5	6	7	8	9	10	11
1. Work control 1991	—										
2. Work control 1992	.75**	—									
3. Work control 1994	.64**	.72**	—								
4. Personal control 1991	.24**	.19**	.24**	—							
5. Personal control 1992	.17**	.14*	.21**	.66**	—						
6. Personal control 1994	.11	.12	.23**	.55**	.58**	—					
7. Poor health 1991	-.15*	-.13*	-.16*	-.25**	-.21**	-.20**	—				
8. Poor health 2001	-.18**	-.11	-.26**	-.23**	-.29**	-.28**	.58**	—			
9. Depressive symptoms 1991	-.15*	-.14*	-.15*	-.51**	-.40**	-.31**	.24**	.18**	—		
10. Depressive symptoms 2001	-.01	-.03	-.11	-.42**	-.43**	-.39**	.19**	.29**	.43**	—	
11. Education	.11	-.01	-.01	.05	.06	-.03	-.02	-.07	.12	.04	—
Mean	3.60	3.62	3.65	3.84	3.78	3.78	2.30	2.61	1.29	1.38	14.12
SD	.58	.61	.60	.50	.53	.51	.74	.74	.45	.41	4.53

**
 $p < .01$ *
 $p < .05$

Table 2
 Estimates for Growth Parameters of Univariate Growth Curves (*t*-values in parentheses)

Model	Intercept		Linear slope		χ^2 (df)
	Mean	Variance	Mean	Variance	
Work control (1991–1994)	3.573 (100.83)	0.327 (9.66)	0.020 (1.95)	0.025 (3.75)	.09 (1)
Personal control (1991–1994)	3.817 (130.77)	0.195 (8.28)	-0.020 (-2.05)	0.009 (1.53)	1.26 (1)