

Disentangling the Indirect Links Between Socioeconomic Status and Health: The Dynamic Roles of Work Stressors and Personal Control

Amy M. Christie
Wilfrid Laurier University

Julian Barling
Queen's University

Prior research has documented an indirect link between socioeconomic status (SES) and health, and the goal in this study was to help unravel this phenomenon from a dynamic perspective. The authors hypothesized that SES would be positively related to feelings of personal control and negatively related to perceived work stressors. Drawing on dynamic conceptualizations of these psychosocial factors, they suggest that these psychosocial factors relate to one another over time. Individuals who have higher levels of personal control experience increasingly fewer work stressors over time than do those with lower levels of personal control, and those who experience greater work stressors increasingly perceive less personal control over time than do those with fewer work stressors. Finally, the authors argue that trajectories of personal control and work stressors are associated with the accumulation of health problems over the same period. Their model was tested with 3-wave data (over 4 years) from a nationally representative sample of Canadian employees ($N = 3,419$). Latent curve modeling provides support for the proposed dynamic model. Conceptual and practical implications are drawn, and suggestions for future research are outlined.

Keywords: work stress, SES, health, personal control

Status has inspired scholarship across time and discipline, as evidenced by the ubiquity of this topic within the social sciences. Anthropologists and sociologists explore how status organizes and stratifies (e.g., Gould, 2002), psychologists study how it relates to social identity (e.g., Tajfel & Turner, 1979), and epidemiologists document how socioeconomic status (SES) is linked to mortality, health, and well-being (Marmot, 2004). Common across approaches, and inherent in this research, is the relationship between status and the social environment. We focus in this research on SES, the psychosocial work environment, and health.

Our interest in SES and health is not novel; socioeconomic health inequalities have long attracted attention (Gallo & Matthews, 2003). With few exceptions, research has shown that health

is stratified by SES, with people lower in status more prone to poor health and diminished longevity (e.g., Marmot, Shipley, & Rose, 1984; see Marmot, 2004, for a review). This disparity is not a simple divide between rich and poor; the relationship is monotonic (i.e., “the social gradient”; Marmot, 2004, p. 2): Regardless of position in the SES hierarchy, individuals occupying higher positions typically enjoy better health and longevity than do those occupying lower positions and vice versa. Thus, even the health of people who have relatively high SES lags behind that of their counterparts who have more SES.

An extensive body of cross-disciplinary research has explored this disparity and made clear that the social gradient in health is multiply caused (see Gallo & Matthews, 2003). Risk factors such as health behaviors and unequal access to health care help account for the health inequity (e.g., Kristenson, Eriksen, Sluiter, Starke, & Ursin, 2004; Marmot & Shipley, 1996), yet these factors alone cannot explain this phenomenon. Elements of the psychosocial environment, in particular workplace factors (Marmot & Shipley, 1996; Stansfeld, Head, & Marmot, 1998), play a key role (e.g., Adler et al., 1994; Krieger, Williams, & Moss, 1997). Further, recent models propose that the SES–health relationship operates through these multiple pathways indirectly (see Gallo & Matthews, 2003). Our goal in this study was to help unravel the indirect link between SES and health by understanding the role of dynamic elements of the psychosocial work environment.

Work stressors (conceptualized in this paper as *perceived* or *subjective* stressors) in part account for health disparities, as work stress is more common in lower SES positions and is negatively related to health (e.g., Warren, Hoonakker, Carayon, & Brand, 2004). Psychological resources (such as personal control) also explain the poorer health of lower SES individuals, who draw on fewer of these resources (e.g., Pearlin & Schooler, 1978). However, static conceptualizations of work stressors and personal con-

Amy M. Christie, School of Business and Economics, Wilfrid Laurier University, Waterloo, Ontario, Canada; Julian Barling, Queen's School of Business, Queen's University, Kingston, Ontario, Canada.

An earlier version of this study was presented in March 2008 at Work, Stress, and Health in Washington, DC, and in June 2009 at the Administrative Sciences Association of Canada conference in Niagara Falls, Ontario. Financial support from the Social Sciences and Humanities Research Council of Canada to Amy M. Christie and Julian Barling is acknowledged gratefully. The analyses of the data used in this study were conducted in the Queen's Research Data Center and the South Western Ontario Research Data Center. Please note that although the research and analysis are based on data from Statistics Canada, the opinions expressed do not represent the views of Statistics Canada. Thanks to Alyson Byrne, Carl Keane, Colette Hopton, Jana Raver, Michael Frone, Natalie Allen, Nick Turner, Sean Tucker, Sharon Parker, and Stacie Byrne for constructive comments on an earlier version of this article.

Correspondence concerning this article should be addressed to Amy M. Christie, School of Business and Economics, Wilfrid Laurier University, Waterloo, Ontario N2L 3C5, Canada. E-mail: achristie@wlu.ca

trol—which characterize much of the existing research—tell us little about the enduring nature of the relationship between the SES of individuals and their health (Hallqvist, Lynch, Bartley, Lang, & Blane, 2004), because these psychosocial factors are likely to change over time.

We suggest that the way in which personal control and work stressors link SES to health should be extended conceptually and that health disparities can be appreciated more fully by exploring these factors’ often-overlooked dynamic quality. Although most empirical research has treated resources (e.g., personal control) and work stressors as static variables, theory suggests that they are dynamic and, as we argue here, responsive to each other. Integrating and expanding existing theory, we suggest that those lower in SES typically face environments that produce work stress and deplete personal control (e.g., Gallo & Matthews, 2003; Kristenson et al., 2004). In turn, these higher perceptions of work stressors are associated with experiencing less personal control over time, and lower levels of personal control initially are related to perceiving increasingly more work stressors over time. These trajectories of personal control and work stressors are then related to the accumulation of health problems. We detail this model (see Figure 1) below, outlining the constructs in the model and their hypothesized interrelationships. We then test the model using a representative sample and latent curve modeling (LCM).

A Model Relating SES, the Psychosocial Work Environment, and Health

Conceptualizing SES

SES is a relative ranking based on resources and prestige (e.g., Krieger et al., 1997). In studies of health inequalities, three indicators—income, occupational prestige, and education—are often used to capture SES; although interrelated, they are not equivalent (Gallo & Matthews, 2003). Each captures the resource and prestige domains of SES, with higher levels of the indicator being more socially desirable and signaling greater purchasing power. Each also offers a unique advantage to the study of SES-based health differentials. Income and occupational prestige may be most

closely related to earned social prestige at adulthood, but the relationship between educational attainment and health is less likely to reflect reverse causation because education is often earned before the onset of major health problems (Gallo & Matthews, 2003). Thus, income and occupational prestige may best reflect SES as people age and educational attainment becomes less relevant. However, relating education to health can help in isolating the directional effects of SES on health, given that evidence suggests that SES can both precede and respond to health conditions (the “social drift” hypothesis; Mulatu & Schooler, 2002). Tests of causal relationships between the SES indicators and health are beyond the scope of this study.

Relating SES to Work Stressors

Higher status individuals are afforded greater substantive and social luxuries, such as money, power, and opportunity, the benefits of which are far reaching (Adler et al., 1994). Work is a source of respect and self-validation for individuals in higher status jobs (Kivimäki et al., 2004), so much so that social status is considered a primary motivation (Barrick, Stewart, & Piotrowski, 2002), and individuals are willing to forgo absolute rewards to enhance their relative position in a status hierarchy (see Schnitker & McLeod, 2005). As a result, SES directs the way that people interpret and enact their environments (Snibbe & Markus, 2005), and thus individuals of varying status levels experience work differently (Aquino, Galperin, & Bennett, 2004).

The worth of higher status individuals to the organization is clearly acknowledged through material and symbolic recognition, but those with lower status more often experience “self-invalidating events” (Aquino et al., 2004). Thus, those with lower job status report more chronic stressors, such as conflict, boredom, social strain, hostility, job insecurity, and dangerous working conditions (Burke, 2002; Gallo, Bogart, Vranceanu, & Matthews, 2005). Unfavorable job characteristics are also more common in low-SES occupations (Warren et al., 2004). Although having job autonomy can lower stress and psychological and physiological strain (e.g., Karasek, 1979; Karasek & Theorell, 1990), auto-

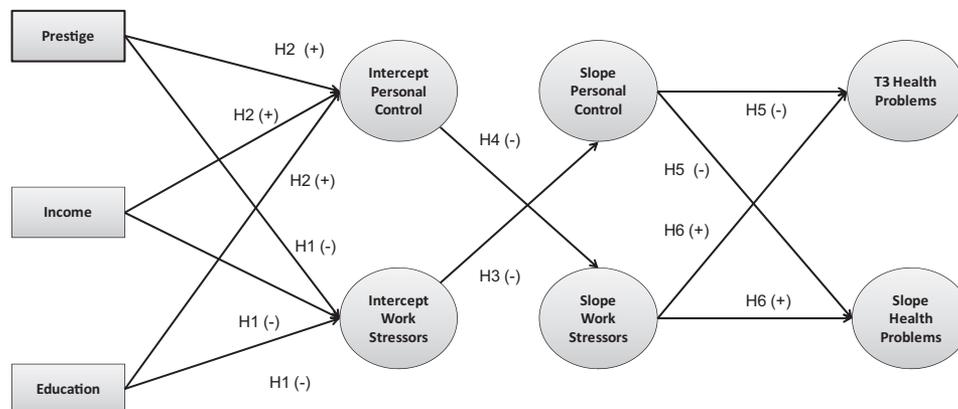


Figure 1. Hypothesized multivariate LCM paths. Pluses represent positive hypothesized relationships, and minuses represent negative hypothesized relationships. LCM = latent curve modeling; H = hypothesis; T3 = Time 3.

mous working conditions are more often present for higher SES individuals who occupy positions of formal power in the organization than for those with lower SES (e.g., Hallqvist et al., 1998).

By contrast, although physical demands are more common in lower SES jobs (e.g., Burke, 2002), higher SES individuals report more job demands and longer working hours (e.g., Hallqvist et al., 1998; Stansfeld et al., 1998). Perhaps more important, SES is related to the experience of job demands and, consequently, health disparities: Job demands may be greater for higher SES individuals, while only negatively affecting the health those with lower SES (Kunz-Ebrecht, Kirschbaum, & Steptoe, 2004). Similarly, drawing on Karasek's (1979) demand-control model (in which stressful jobs are psychologically demanding and lack job autonomy), research has shown that the health of lower SES individuals is more strongly related to these "strain" conditions (Hallqvist et al., 1998; Landsbergis, Schnall, Pickering, Warren, & Schwartz, 2003). Thus, based on past research showing that lower SES individuals typically perceive more work stressors than do higher SES individuals and respond more negatively to those stressors, we hypothesized as follows:

Hypothesis 1: Income, education, and occupational prestige will be negatively associated with subjective work stressors.

Relating SES to Personal Control

Theories of stress emphasize the health-protective role of resources, which can promote resilience and coping (e.g., Hobfoll, Johnson, Ennis, & Jackson, 2003; Karasek & Theorell, 1990). Resources go beyond tangible aspects of property, insurance, and finances to include personal resources such as personal control, optimism, and self-esteem (see Gallo & Matthews, 2003). By definition, higher SES individuals enjoy greater access to tangible resources; however, they also benefit from more psychological resources (e.g., Marmot & Theorell, 1988), in part due to feelings of relative advantage and greater opportunity for social involvement (Marmot, 2004). We focus on one psychological resource: personal control (also referred to as mastery), or the perception that one has control and influence over life outcomes.

In encountering troubling circumstances and relative deprivation, likely over many years, lower SES individuals may develop a sense of learned helplessness or hopelessness that obstructs control beliefs (Bailis, Segall, Mahon, Chipperfield, & Dunn, 2001; Kristenson et al., 2004). Lower status individuals experience less control in small groups; they are given fewer opportunities to voice their opinions and make decisions (Driskell & Mullen, 1990). Similarly, lower SES individuals may have weaker control beliefs because they lack positions of formal authority and power in organizations (e.g., Aquino et al., 2004; Lamertz & Aquino, 2004) that allow higher SES individuals to direct the behavior of others and outcomes that they wish to achieve.

Hypothesis 2: Income, occupational prestige, and education will be positively associated with perceived personal control.

Our research goal in this study was to understand the dynamic relationships between work stressors and personal control and how these relationships indirectly link SES to health. Here, we depart from much previous empirical research and draw on Hobfoll's

(1989, 2001) conservation of resources theory, Gallo and Matthews's (2003) reserve capacity model, and Karasek and Theorell's (1990) learning spirals to outline one way in which these variables are dynamically associated.

The Dynamic Relationship Between Work Stressors and Personal Control

Although some past research is based on longitudinal data (e.g., the Bosma et al., 2005, 5-year follow-up study), it has primarily captured the static role of the psychosocial environment in health disparities. Such studies typically conceptualize work stressors and personal control as stable or anchored across time (e.g., by relating work stressors at Time 1 to future health). We suggest that a more nuanced conceptualization views these constructs as variable across time and that it is the dynamic nature of the stress process that best accounts for the persistent indirect relationship between SES and health. Below, we hypothesize that work stressors are associated with future changes in personal control, that perceived control is related to future reports of work stressors, and that the resulting trajectories are associated with the accrual of health problems.

Relating Initial Work Stressors to Future Personal Control

Conservation of resources theory suggests that resources are not static over time or situation but instead are responsive to life events (e.g., Hobfoll et al., 2003). Accordingly, when stressed, individuals use existing resources, but as they do so, their bank of resources is likely to be reduced or weakened. In stressful times individuals may also reevaluate their resourcefulness. This notion is evident in the impact of natural disasters on social resources and health. In Norris and Kaniasty's (1996) study, flood victims perceived social support to be lower after a hurricane. This perception was central for predicting psychological distress. The authors argued that disasters undermine community-wide mechanisms of social support and embeddedness.

However, resource deterioration also occurs after less severe incidents of stress and for psychological resources such as personal control (Ensel & Lin, 1991). Hobfoll et al. (2003) showed that economic stress occurring from greater material loss was associated with a greater loss of personal control over a 9-month period. Holahan, Moos, Holahan, and Cronkite (1999) argued that stressful life events influence psychological resources by altering individuals' cognitive evaluation of resources; this explains why psychological resources, and personal control in particular may be responsive to experiences of workplace stressors. For example, during times of employment insecurity, individuals often feel a loss of personal control over their lives and future opportunities (Sverke, Hellgren, & Näswall, 2002).

Changes in personal control associated with work stressors likely persist across time. Conservation of resources theory posits that stress arises when loss of resources impedes individuals' ability to cope and invest in additional resources. Further, faced with an already limited supply, individuals cannot mobilize remaining resources to offset initial losses, whereas individuals with more resources can draw on them to cope and replenish those depleted. Thus, resource change is thought to spiral, such that

initial loss leads to future loss and initial gain fuels further gains (Hobfoll, 1989, 2001). Hence, individuals who have a greater sense of control should be more likely to face challenging workplace situations with optimism and confidence, thereby minimizing negative outcomes and reinforcing their sense of personal control and vice versa.

In summary, the dynamic nature of work stressors and personal control suggests that, compared with those who perceive fewer work stressors, individuals who perceive more work stressors are more likely to deplete their personal control resources. Over time, the differences between those who initially perceive more versus less work stressors grow larger as loss (gain) begets loss (gain).

Hypothesis 3: Initial ratings of work stressors will be negatively related to the trajectory of personal control across time, such that individuals who rate their work as more stressful will report increasingly less personal control across time than will individuals who rate their work as less stressful.

Relating Initial Personal Control to Future Perceptions of Work Stressors

We draw on existing theory of general psychosocial resources and stressors to argue that personal control should relate to future perceptions of work stressors. Gallo and Matthews's (2003) reserve capacity model posits that lower SES individuals have fewer resources (or less "reserve capacity") available to cope with stressful events than do higher SES individuals, because they face more situational factors that cause them to deplete their resources and their relatively constricted environments simultaneously impede the restoration and expansion of the reserve. Gallo and Matthews argued that having low resource availability heightens the risk of future recurrences of stressors through emotional pathways and inability to recover from stress. Empirical evidence supports this model. In a daily study, Gallo et al. (2005) found that lower SES women had fewer psychological resources available to them (including personal control) that were directly connected to more stressful daily experiences at work and home.

Lower SES individuals are at a double disadvantage; they more often encounter stress that requires the use of resources but have fewer to access, which makes it likely that the stressors will recur. For those with more abundant resources, the reverse should be true. Coping theories suggest that when individuals perceive stressors as controllable challenges, they are more likely to apply problem-focused coping strategies to directly alleviate the stressors (Folkman & Lazarus, 1985). This notion is supported in research on workplace stressors or "learning spirals," where past perceptions of work events relate to similar future perceptions due to processes of expectation and learning (Karasek & Theorell, 1990; Kristenson et al., 2004). Expectations of one's ability to overcome stressful work are learned through past successes and coping ability. Active, challenging work and successful coping stimulate learning and competencies that can be applied to future challenges, perpetuating the cycle (Karasek & Theorell, 1990; Parker & Sprigg, 1999). Invoking powerlessness and thus inhibition, chronic work stressors may limit the extent to which future challenges will be actively approached (Keltner, Gruenfeld, & Anderson, 2003).

In summary, individuals with less personal control tend to be at greater risk of perceiving future work stressors, and these stressors will likely perpetuate.

Hypothesis 4: Initial ratings of personal control will be negatively associated with the trajectory of work stressors across time, such that individuals who rate their personal control as lower will perceive increasingly more work stressors across time than will individuals who rate their personal control as higher.

Relating Psychological Resources, Work Stressors, and Health Over Time

Our final two hypotheses suggest that individuals' trajectories of personal control and work stressors relate to health outcomes and, in particular, physical health problems; thus, these hypotheses provide further insight into the indirect and dynamic nature of the SES–health relationship. Multiple studies have supported a link between personal control and physical health (e.g., Bailis et al., 2001). Penninx et al. (1997) suggested that personal control may be related to physical health directly through psychobiological pathways and through its relationship with coping mechanisms and health behaviors (e.g., smoking). They found empirical evidence supporting a direct link between personal control and mortality but little to suggest that health behavior accounts for the relationship. We applied these findings to our dynamic account of personal control and hypothesized that more rapid declines in personal control should be associated with a more rapid accumulation of health problems:

Hypothesis 5: The trajectory of personal control will be negatively related to the trajectory of physical health problems over the same time and will be negatively associated with physical health problems at the final time point.

Finally, stressful experiences may influence physiological health by overtaxing the mechanisms through which the body naturally responds and reacts to stress (Kristenson et al., 2004). When stressors persist over time, they have relatively greater implications for healthy bodily functioning. Thus, given evidence of the relationship between chronic work stressors and physical health (e.g., Kivimäki et al., 2004), we argue that the greater the increase in perceptions of work stressors over time, the poorer will be health over the same period and vice versa.

Hypothesis 6: The trajectory of work stressors will be positively related to the trajectory of physical health problems over the same time and will be positively associated with physical health problems at the final time point.

Method

Study Design

Data used in the study were drawn from a representative sample (based on age, sex, and geography) of Canadian workers from the National Population Health Survey (NPHS). We used a subset of the NPHS, a national probability survey that began in 1994 and has had measurement periods every 2 years since that time (Cycles 1

through 6, currently). The NPHS includes questions relating to health predictors, health behaviors, and health outcomes. The target population of the NPHS was Canadians across 10 provinces, excluding those who were institutionalized or living on Aboriginal peoples reserves and military bases. Only one individual per household was randomly selected to participate. Statistics Canada's rejective method excluded a portion of households with no members under the age of 25 to ensure that parents and children were not underrepresented in the sample. The sample of households was selected from within clusters (based on province, geography, and socioeconomic factors) according to a multistage stratified design. Trained interviewers from Statistics Canada's calling centers used a computer-assisted telephone interview technique to administer the questionnaire to participants. This technique facilitated the flow of the interview by, for example, automatically identifying invalid answers and eliminating the need for interviewers to refer to earlier survey questions.

Sampling Weights

In all descriptive statistics and analyses, the data were weighted with sampling weights to reflect the general Canadian population at the commencement of the NPHS and account for attrition over time. The NPHS sampling weights were formed in a number of steps. First, in 1994 basic weights were calculated as a function of the inverse probability that a given cluster had been selected and the inverse probability that a given household had been selected from within a cluster. Second, the longitudinal weights were computed through a number of adjustments to the basic weights for individuals who had responded to the survey in all time periods or had died. The basic weights were adjusted to reflect nonresponse in each of the cycles following Cycle 1 with a weighting class approach that classifies individuals by their propensity to respond to the survey according to various characteristics. The sampling weights were then poststratified to reflect the Canadian population in 1994 according to the census and on the basis of age and sex within each province.

Sample Characteristics

To apply the sampling weights described above, we included those participants who responded to the NPHS in all cycles available at the time of analyses. Of the original 17,276 participants, 67.1% responded to the NPHS in the six cycles. We were unable to include all NPHS cycles in our analyses due to changes in the survey questions. The response rates for the three measurement periods included (i.e., 2000, 2002, and 2004) were 84.8%, 80.6%, and 77.4%, respectively. Given our interest in employed, adult individuals, we limited our sample to the subset of participants who were employed adults during each of the three measurement periods sampled. Listwise deletion of cases (to account for participant nonresponse to the focal measures used in this study) resulted in the sample of 3,419 working individuals (average age = 39.5 years in 2000; 57% male) who were used in the analyses.

Measures

SES. We used three indicators of SES measured at Time 1: income, occupational prestige, and education. Although these are

three of the most common measures, past research has clarified that they are distinct, and researchers should avoid combining them to form a composite index (e.g., Kristenson et al., 2004). Thus, we modeled each as a separate yet concurrent variable.

Income was measured on a 6-point scale (1 = 0–\$29,999, 2 = \$30,000–\$39,999, 3 = \$40,000–\$49,999, 4 = \$50,000–\$59,999, 5 = \$60,000–\$79,999, 6 = \$80,000 and above). Participants' occupations were classified on the basis of standard occupation codes. Occupational prestige was derived from Human Resources and Social Development Canada's "National Occupational Classification Matrix" (Statistics Canada, 2006), which arranges occupations by decreasing skill level and educational requirements. Skill Level A includes occupations such as engineer, judge, physician, and accountant; Skill Level B includes occupations such as medical technician, plumber, and paralegal; Skill Level C includes occupations such as clerk, sales representative, machine operator, and transit driver; and Skill Level D includes occupations such as kitchen helper, cleaner, and primary production laborer. Occupational prestige was coded in this study as 1 = Skill Level D, 2 = Skill Level C, 3 = Skill Level B, and 4 = Skill Level A. Last, education ranged on a 5-point scale based on level of formal educational attainment (1 = some secondary education, 2 = secondary school graduate, 3 = some postsecondary school education, 4 = college or trade diploma/certificate, 5 = university graduate).

Personal control. We used Pearlin and Schooler's (1978) 7-item mastery scale to measure personal control (α s = .76, .75, and .76 at Time 1, 2, and 3, respectively). The mastery scale represents perceived control of individuals over their lives. The scale included items (e.g., "what happens to you in the future depends mostly on you"; "you can do just about anything you really set your mind to") anchored on a 5-point scale (1 = strongly disagree to 5 = strongly agree). Thus, higher values represent more personal control. To avoid small parameter estimates for the slope coefficients in the LCM analyses, we multiplied the mean of the personal control items by the total number of scale items.

Work stressors. Work stressors were measured with a formative indicator that captures an individual's perception of stressful experiences at work. Like others (e.g., Garst, Frese, & Molenaar, 2000), we used an index of multiple workplace stressors based on seven items from Karasek and Theorell's (1990) work stress scale. The measure reflects perceptions of psychological demands, physical exertion, skill utilization, and job insecurity; thus, it should not be expected that individuals who report more of one type of stressor (e.g., insecurity) necessarily report more of another (e.g., physical exertion). Sample items were rated on a 5-point scale (1 = strongly disagree to 5 = strongly agree). Items were reverse coded; therefore, higher values indicate greater work stressors overall. As for personal control, the work stressors variable was multiplied by the total number of scale items.

Health. Health was measured as the number of health problems experienced by the participants. Participants were asked to report, based on a list provided, whether or not they had experienced health problems that lasted or were expected to last 6 months and had been diagnosed by a physician (e.g., high blood pressure, migraine headaches, heart disease). The total number of health problems reported reflected the variable.

Alpha coefficients and weighted means, standard deviations, and correlations for the study variables are shown in Table 1.

Table 1
Descriptive Statistics and Correlations for Study Variables (N = 3,419)

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	10	11
1. Income	2.71	1.70											
2. Occupational prestige	2.07	1.00	.39										
3. Education	3.35	1.25	.30	.38									
4. Personal control (Time 1)	20.52	3.50	.13	.13	.17	.76							
5. Personal control (Time 2)	20.14	3.74	.15	.12	.15	.44	.75						
6. Personal control (Time 3)	20.33	3.86	.11	.11	.14	.43	.55	.76					
7. Work stressors (Time 1)	19.29	2.31	-.22	-.23	-.15	-.21	-.13	-.12					
8. Work stressors (Time 2)	19.28	2.41	-.17	-.17	-.12	-.14	-.19	-.18	.42				
9. Work stressors (Time 3)	19.20	2.41	-.16	-.16	-.14	-.14	-.14	-.22	.36	.49			
10. Health problems index (Time 1)	0.99	1.19	.00	.02	.05	-.06	-.03	-.03	.07	.06	.09		
11. Health problems index (Time 2)	1.19	1.28	-.04	.00	.02	-.08	-.10	-.09	.10	.07	.10	.73	
12. Health problems index (Time 3)	1.25	1.36	.00	-.01	.02	-.09	-.07	-.10	.09	.11	.12	.66	.75

Note. Coefficient alphas appear on the diagonal. Correlations of .03 are significant at the .05 level.

Analytic Strategy

We conducted our analyses using an LCM approach in LISREL 8, which models individual latent trajectories for variables with repeated measures. LCM uses a latent intercept factor (the initial starting point of a variable) and latent slope factor (the change in the variable across time) to capture person-specific trajectories. Although our final model hypothesizes simultaneous growth among work stressors, personal control, and health (i.e., a multivariate LCM), following recommended strategy, we began by examining (a) the scales for invariance, and (b) the structure and fit for the trajectories of each of the three growth variables separately (i.e., univariate LCMs) before combining them in a single model (Bollen & Curran, 2006).

For each of the univariate LCMs, the intercept paths were fixed to 1. For work stressors and personal control, the slope paths were represented by 0, 1, and 2 respectively to capture linear change. With three time periods, a nonlinear, heteroscedastic univariate LCM would have zero degrees of freedom. By contrast, we modeled the slope parameters for health such that they were centered on Time 3, specifically as -2 , -1 , and 0 , so that we could investigate Hypotheses 5 and 6. We compared two alternative model specifications for each univariate LCM: a homoscedastic model, where the residual variances of the repeated measures are constrained to be equal, and a heteroscedastic model, where residual variances of the repeated measures are not assumed to follow this pattern. Willet and Sayer (1994) suggested that though the homoscedastic model is more parsimonious, it is often unrealistic. After confirming the best fitting univariate models, we tested the multivariate LCM with our hypothesized paths freely estimated. See Figure 2 for a complete depiction of the multivariate LCM used to test all hypotheses.

All models were evaluated with accepted fit indices within the structural equation modeling framework (guidelines for acceptable fit given in parentheses): the chi-square goodness-of-fit index (χ^2), the comparative fit index (CFI; Bentler, 1990; .95 and above), the nonnormed fit index (NNFI; Bentler & Bonett, 1980; .95 and above), the root mean square error of approximation (RMSEA; Steiger, 1990; .08 and below), and the standardized root-mean-square residual (SRMR; .08 and below). Alternative nested models were evaluated with the chi-square difference test ($\Delta\chi^2$), the logic

of which is that less parsimonious models warrant significant improvements in model fit. However, because chi-square tests have less meaning when based on large sample sizes, such as that of the present study (Kelloway, 1995), we followed others in placing great importance on improvements in practical fit indices, and in particular changes in CFI, when comparing alternative models (Sacco & Schmitt, 2005). In particular, we determined that a less parsimonious model provided better fit to the data than did a more parsimonious model only if it offered clear improvements on both the chi-square test and CFI (i.e., changes of .02 or above, which are considered improvements; Sacco & Schmitt, 2005).

Results

Measurement Invariance

A prerequisite to LCM is demonstrating measurement invariance across time periods or, in other words, showing that the focal constructs remain unaltered at different measurement periods (Chan, 1998). Following Chan's procedures, we conducted tests of factorial measurement invariance for the one reflective scale used in the study: personal control. An invariant measure will be represented by an equal number of factors across time periods that comprise identical items or item parcels with equivalent factor loadings. To test these criteria, we compared two models. Model 1 constrained each time-specific item parcel to load equivalently on each time-specific latent factor (i.e., personal control at Time 1, Time 2, and Time 3), whereas Model 2 allowed these loadings to be estimated freely across time. The measure was determined invariant if Model 2 failed to provide substantive improvement in model fit.

Item parcels formed on the basis of exploratory factor analysis (Bagozzi & Edwards, 1998) were used in the confirmatory factor analyses. Item parcels combining two or three items can provide more stable parameter estimates (Bagozzi & Edwards, 1998) and are appropriate for unidimensional scales (Little, Cunningham, Shahar, & Widaman, 2002; see Pearlin & Schooler, 1978, for the scale's factor structure). Model 1 had an acceptable fit to the data, $\chi^2(28, N = 3,419) = 673.58, p < .01, CFI = .96, NNFI = .95, RMSEA = .09, SRMR = .05$. Model 1 was compared with Model 2, where factor loadings were freely estimated: $\chi^2(24, N =$

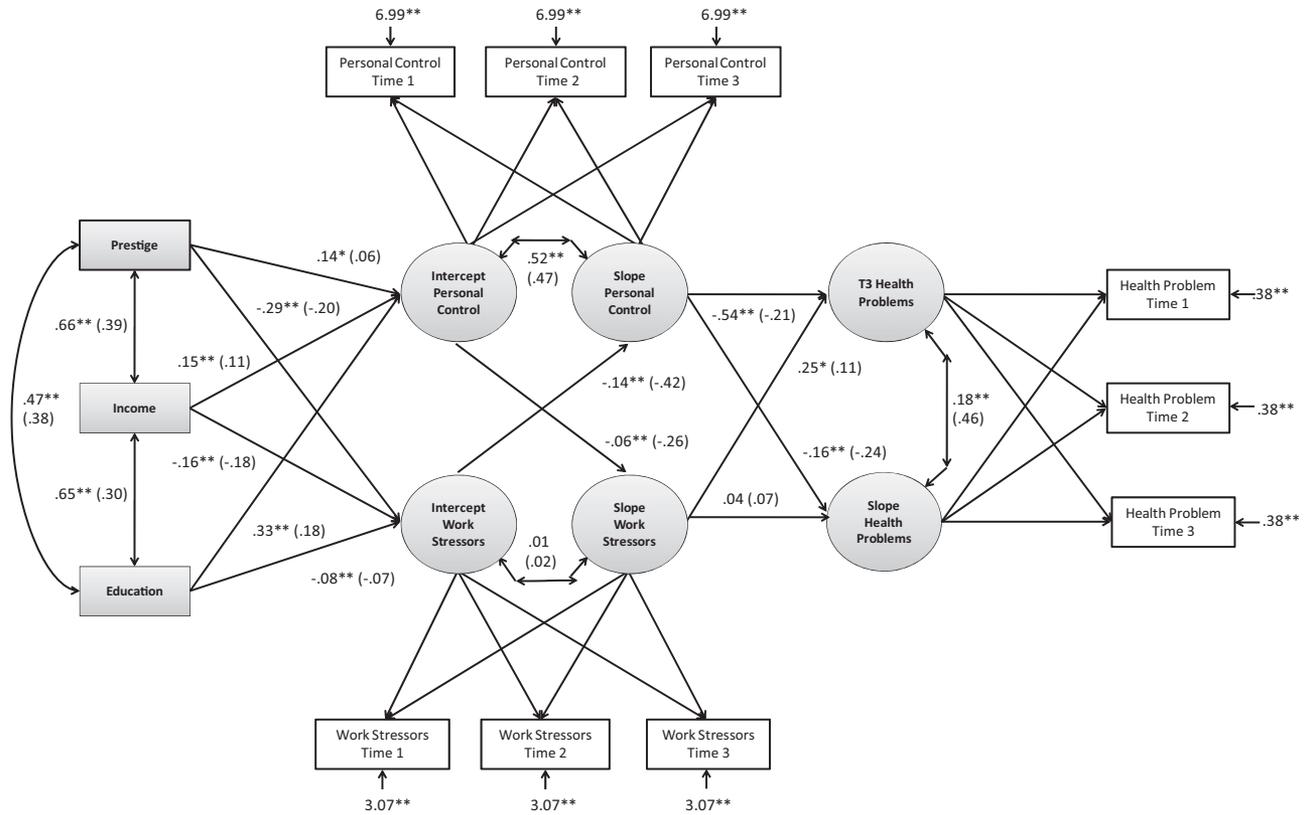


Figure 2. Multivariate LCM unstandardized (and standardized) parameter estimates for Hypotheses 1–6. Unstandardized parameter estimates are displayed for hypothesized multivariate LCM (fully standardized solution appears in parentheses). Residual variance parameters and means for exogenous and latent growth variables were measured but are not displayed due to space restrictions. For intercept variables, fixed factor loadings are 1, 1, and 1, moving from left to right, for personal control and work stressors and 1, 1, and 1, moving from top to bottom, for health problems. For slope variables, fixed factor loadings are 0, 1, and 2, moving from left to right, for personal control and work stressors and -2 , -1 , and 0 , moving from top to bottom, for health problems (health problems is centered on the final time point). T3 = Time 3. * $p < .05$. ** $p < .01$.

3,419) = 667.35, $p < .01$, CFI = .96, NNFI = .95, RMSEA = .09, SRMR = .05. Although $\Delta\chi^2 = 6.23$, $p < .01$, Model 2 offered no improvements on any of the other fit indices examined. This provided evidence of measurement invariance. These results replicate previous findings showing the scale’s invariance across time (see Pearlman, Menaghan, Lieberman, & Mullan, 1981).

Univariate LCM Analyses

In all cases, the univariate LCMs fit the repeated measures well. Fit indices and model comparisons for each of the univariate LCMs are shown in Table 2. The homoscedastic models were retained, as they fit the data best; this suggests that the three variables were rated with the equivalent precision at each measurement occurrence. The univariate LCMs showed substantial variation in both the average intercept (work stressors, $\sigma^2 = 2.40$, $p < .01$; personal control, $\sigma^2 = 5.66$, $p < .01$; health problems, $\sigma^2 = 1.08$, $p < .01$) and slope factors (work stressors, $\sigma^2 = .35$, $p < .01$; personal control, $\sigma^2 = .51$, $p < .05$; health problems, $\sigma^2 = .10$, $p < .01$) for the retained models. Therefore, individuals differed in both the starting points and slopes of their trajectories.

The multivariate LCM analyses tested how these individual trajectories varied by introducing the hypothesized paths in Figure 2.

Multivariate LCM Analyses: Hypothesis Testing

Parameter estimates for the multivariate LCM are located in Figure 2. The hypothesized model fit the data well, $\chi^2(51, N = 3,419) = 420.27$, $p < .01$, CFI = .97, NNFI = .97, RMSEA = .05, SRMR = .04, and was largely supportive of the hypotheses. Hypothesis 1 stated that each of the SES variables would be negatively related to work stressors, as is evidenced by the significant negative paths between income, occupational prestige, and education and the intercept of work stressors. The three SES indicators explained 12% of the variance in work stressors. As expected (Hypothesis 2), the opposite pattern of results emerged for personal control: Income, occupational prestige, and education were positively associated with the latent intercept variable for personal control, collectively explaining 8% of its variation.

Our next hypotheses concerned the trajectories of personal control, work stressors, and health problems. In support of Hypothesis 3, the latent intercept variable for work stressors was negatively related to

Table 2
Test of Alternative Model Specifications for Unconditional LCMs

Model	χ^2	<i>df</i>	CFI	NNFI	RMSEA	SRMR	Δdf	$\Delta\chi^2$
Personal resources								
Homoscedastic errors	50.54**	3	0.98	0.98	.07	.03		
Heteroscedastic errors	28.88**	1	0.99	0.96	.09	.00	2	21.66**
Work stressors								
Homoscedastic errors	9.93*	3	1.00	1.00	.03	.02		
Heteroscedastic errors	1.00	1	1.00	1.00	0	0	2	8.93*
Health problems								
Homoscedastic errors	51.59**	3	0.99	0.99	.07	.03		
Heteroscedastic errors	31.55**	1	0.99	0.98	.09	.00	2	20.04**

Note. LCMs = latent curve modelings; *df* = degree of freedom; CFI = comparative fit index; NNFI = nonnormed fit index; RMSEA = root mean square error of approximation; SRMR = standardized root-mean-square residual.

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

the slope factor for personal control; thus, individuals' initial status of work stressors was inversely related to individuals' rate of change in personal control. Initial work stressors explained 17% of the variation in the slope of personal control. Figure 3a illustrates this result graphically. On average, individuals with higher initial levels of work stressors perceived increasingly less personal control than did individuals who began with lower work stressors.

Hypothesis 4 related change in perceptions of stressful work to initial levels of personal control. The negative relationship between the intercept of personal control and the slope of work stressors supports this hypothesis (7% of the variance in the slope of work stressors was accounted for by the intercept of personal control). Figure 3b illustrates that, on average, individuals who began with lower levels of personal control reported progressively more work stressors over time than did individuals who began with higher levels.

Hypotheses 5 and 6 related the slopes of personal control and work stressors to health and are represented in Figures 3c and 3d. First, the slope of personal control was negatively related to the slope of health conditions across the same time period and to the total number of health conditions at the final time point. Rates of change in personal control and health problems moved in opposite directions, with declines in personal control related to more health problems accumulated concurrently by Time 3. This result supports Hypothesis 5. Warranting comment is that the relationship between these slope terms is analogous to directional paths between cross-sectional variables in typical SEMs, where all variables are measured at one time. Therefore, the relationship should be interpreted as a "cross-sectional" association between the change in personal control and the change in health problems over the same time period. That is, the faster the decline in personal control over time, the faster the concurrent increase in health problems and vice versa. Li, Duncan, and Acock (2000) suggested that though such relationships are "acknowledged to be complex . . . this approach is central to basic questions asked by many social science researchers: Does the change in predictor variables influence the rate of change in an outcome variable?" (p. 508).

Finally, steeper increases in work stressors resulted in a greater number of health problems reported at the final time point; how-

ever, the slope of work stressors did not relate to the slope of health problems experienced by participants. These results partially support Hypothesis 6. Overall, 6% of the variability in health problems at the final time point and 7% of variability in the slope of health problems was explained by changes in work stressors and personal control.

Test of Alternative Models

We also tested alternative models relating the focal variables in the study. First, although we followed an indirect conceptualization of the social gradient in health, existing research has also supported direct links between SES and health outcomes. Accordingly, we tested whether the data would better fit a model that included additional, direct paths between the SES variables and the trajectory of health problems. The model provided an acceptable fit to the data: $\chi^2(45, N = 3,419) = 406.86, p < .01, CFI = .97, NNFI = .96, RMSEA = .05, SRMR = .04$. For the less parsimonious model, $\Delta\chi^2 = 13.40, p < .05$. However, no significant improvements were found in the other fit indices less sensitive to sample size (and NNFI decreased); nor were any of the added paths between SES and health problems statistically significant. Therefore, the data in this study support an indirect association between these variables.

Second, past research has suggested that resources may buffer any negative effects of stressors on health (see Gallo & Matthews, 2003, for a review). We tested two models to determine if the interaction between personal control and work stressors was related to the trajectory of health problems. The first, outlined by Curran, Bauer, and Willoughby (2004), tested the relationship between the interaction of personal control and work stressors at Time 1 and the trajectory of health problems after controlling for main effects. The model fit the data well: $\chi^2(4, N = 3,419) = 34.15, p < .01, CFI = 1, NNFI = .99, RMSEA = .05, SRMR = .03$. However, the interaction between personal control and work stressors was not significantly related to the trajectory of health problems. Details on the second model can be found in Li et al. (2000); the model tested whether the relationship between changes in work stressors over time and changes in health problems over time was moderated by changes in personal control

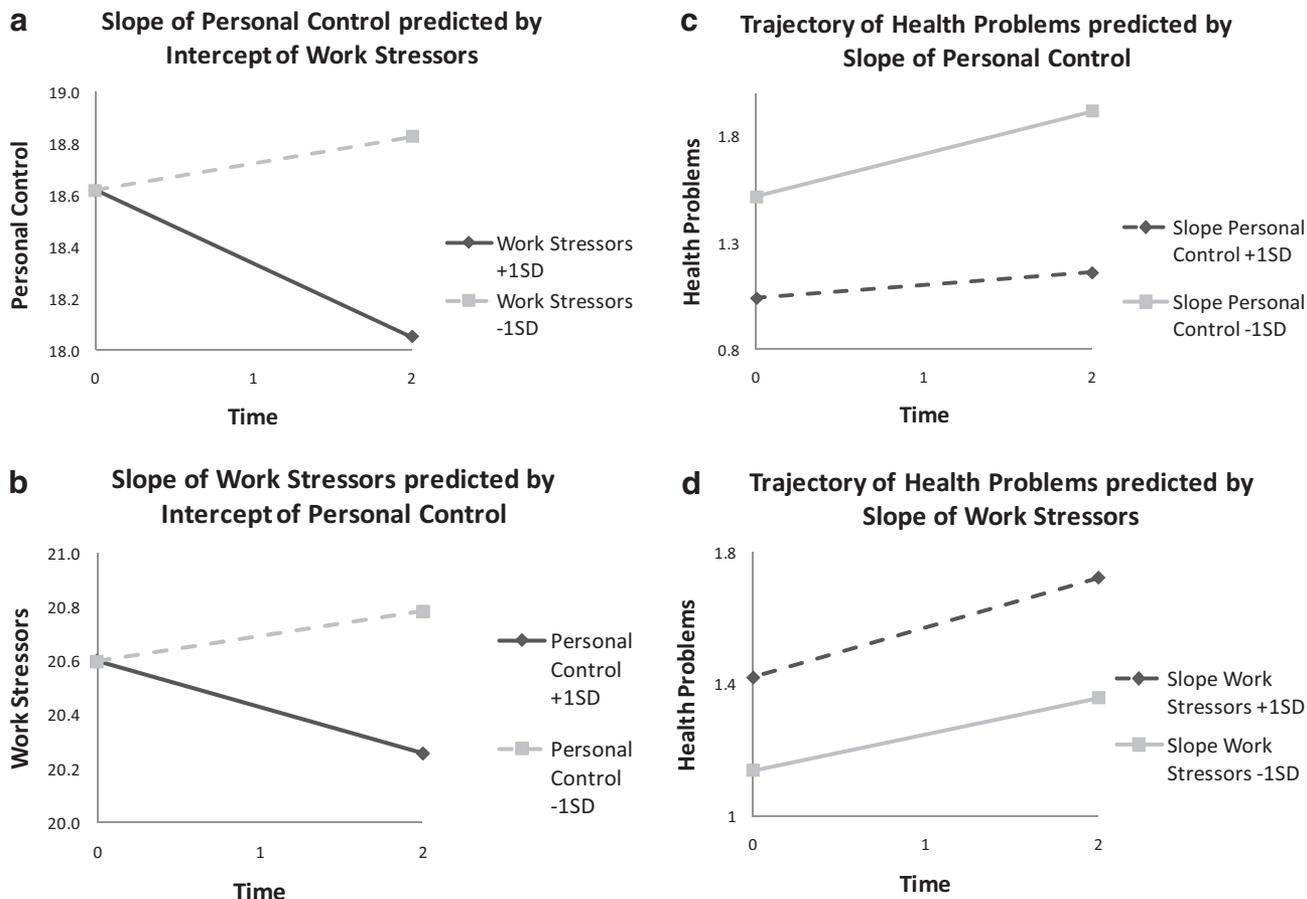


Figure 3. Plotted trajectories for Hypotheses 3 (panel a), 4 (panel b), 5 (panel c), and 6 (panel d). Predictors were centered to aid interpretation of plots. a: Work Stressors +1SD represents initial work stressor levels at one standard deviation above the centered mean, and Work Stressors -1SD represents initial work stressor levels at one standard deviation below the centered mean. The trajectory reflects only the hypothesized relationship between the intercept of work stressors and slope of personal control; given that our hypotheses were tested in an omnibus model with relationships between the intercept of personal control (work stressors) and slope of work stressors (personal control), a concurrent relationship between the intercepts was not warranted. Thus, the intercept of personal control is shown as equivalent at +1SD and -1SD of work stressors in the figure above (see Figure 1 for the model tested). b: Personal Control +1SD represents initial personal control levels at one standard deviation above the centered mean, and Personal Control -1SD represents initial personal control levels at one standard deviation below the centered mean. The trajectory reflects only the hypothesized relationship between the intercept of personal control and slope of work stressors; given that our hypotheses were tested in an omnibus model with relationships between the intercept of personal control (work stressors) and slope of work stressors (personal control), a concurrent relationship between the intercepts was not warranted. Thus, the intercept of work stressors is shown as equivalent at +1SD and -1SD of personal control in the figure above (see Figure 1 for the model tested). c: Slope Personal Control +1SD represents the plotted trajectory of an individual with a positive slope of personal control at one standard deviation above the mean, and Slope Personal Control -SD represents the plotted trajectory of an individual with a negative slope of personal control at one standard deviation below the mean. d: Slope Work Stressors +1SD represents the plotted trajectory of an individual with a positive slope of work stressors at one standard deviation above the mean, and Slope Work Stressors -1SD represents the plotted trajectory of an individual with a negative slope of work stressors at one standard deviation below the mean.

over time. Our data did not support an interaction effect between personal control and work stressors longitudinally. The model did not provide acceptable fit to the data: $\chi^2(40, N = 3,419) = 11,830.92, p < .01, CFI = .38, NNFI = .15, RMSEA = .22, SRMR = .14$. Note that relative fit between these two alternative models and our hypothesized model cannot be assessed because the models are not nested.

Discussion

A considerable body of research documents a link between SES and health. The organizational literature has been relatively silent about the explicit relationship between SES and employee health; instead, SES indicators, such as occupational position, education,

and income, have usually been treated as nuisance variables whose influence must be excluded (Adler et al., 1994; Krieger et al., 1997). Our goal in this study was to rectify this omission by developing and empirically testing a model that offers an explanation of an indirect relationship between three SES variables and health. In particular, our model is founded on the dynamic relationship between work stressors and personal control; in this, it makes theoretical contributions to the health inequalities and the work stress literatures. The results show that the dynamic psychosocial work environment plays a role in indirectly relating SES to physical health.

The present results show that lower income, occupational prestige, and education are associated with more stressful work and with less personal control. Further, individuals who initially reported more work stressors perceived increasingly less personal control over time than did those who initially reported fewer work stressors. Holahan et al. (1999) proposed that life events challenge the cognitive evaluations the individuals make about their psychological resource availability (e.g., in the light of a negative life event, individuals perceive their resources as less abundant). In the present study, stressful work may have undermined feelings of personal control, leaving individuals less equipped to face future stressors and more likely to experience a loss of control. Although the nature of the study does not permit causal inferences, these results are consistent with the concept of resource spirals, a central tenet of conservation of resources theory.

Similarly, individuals reporting lower levels of personal control at the initial time point reported increasingly more work stressors over time than did those reporting higher initial levels of personal control. The results offer a dynamic account of the work stress process. Llorens, Schaufeli, Bakker, and Salanova (2007) provided preliminary evidence of a "positive spiral" of psychological resources and the way in which work is experienced. They showed that, across two time periods, initial resources were associated with subsequent work engagement. Given our use of three time periods, the present study extends these findings to illustrate that personal control is related to subsequent change in work stressors and in negative directions as well. Thus, although higher levels of psychological resources may help individuals to approach and learn from their work environments, leading to more positive encounters in the future, lower levels of psychological resources may inhibit such behavior and limit the extent to which individuals can recover from stress. These findings are consistent with Karasek and Theorell's (1990) conceptualization of learning spirals and emphasize that the dynamic nature of stress and stress recovery deserves greater research attention going forward.

In turn, changes in both personal control and work stressors were related to trajectories of health over the same time period. Individuals who experienced steeper increases in work stressors experienced significantly more health problems by the third measurement period. Steeper increases in personal control were associated with simultaneously steeper declines in negative health outcomes and fewer health problems at the final time point and vice versa.

Limitations and Future Directions

Despite the strengths inherent in this study, a number of issues remain to be confronted by future research. First, although the

benefits of using a comprehensive archival data set such as the NPHS include access to complex survey designs with robust sampling methods, the inclusion of sample weights that account for attrition and characteristics of the population base, and a large sample size that facilitates complex analytic strategies such as multivariate LCM, archival data are not without their limitations. We were constrained in this study to include only those work stressor dimensions that were measured in the existing survey questionnaires. Doing so necessarily limited our focus to a subset of one (albeit major) conceptualization of work stress, the job strain model (Karasek & Theorell, 1990). Certain measures of work stressors, such as degree of responsibility and accountability, were excluded from the subset available. Because such stressors are likely to be more common among higher SES individuals, this omission is particularly relevant and may have biased the study results in favor of our hypotheses. Alternative theoretical development is warranted. For a comprehensive understanding of the dynamic model tested and its boundary conditions, future research should account for this discrepancy.

Research has also shown the importance of other work stressors, such as chronic work role stress (e.g., ambiguity, conflict, overload, underload; Beehr & Glazer, 2005) and role stress that may arise from an inconsistency between an individual's SES and organizational role (Bacharach, Bamberger, & Mundell, 1993). A challenge for future research will be to expand the existing model to include role stressors and to disentangle the relationship between SES and role stress.

Further, our archival data source prevented us from including additional variables that could influence the focal relationships. For example, positive or negative affectivity may be related to individuals' perceptions of work stressors and personal control, abilities to resist and recover from stress, and well-being (e.g., DeNeve & Cooper, 1998). Accounting for individual disposition in the model is left to future research. Furthermore, replications will be needed to ensure that the 2-year time lag between measurement occurrences in this study adequately captures stress and recovery processes, which should vary by individual.

Third, in this paper we focus on the psychological resource of personal control. However, other psychosocial resources (such as social support) have received substantial empirical scrutiny and also need to be accounted for in this process. In a daily study of workplace experiences, Gallo et al. (2005) found lower levels of perceived appraisal, belonging, and tangible social support in lower SES groups, which were directly related to less positive and more negative affect. Low-SES individuals also suffer most with respect to social resources following major natural disasters (Kaniasty & Norris, 1995; Norris & Kaniasty, 1996). According to this finding, which Kaniasty and Norris (1995) call "the rule of relative advantage," higher SES victims receive more help following a disaster than do lower SES victims. Weaker social resources are linked to emotional, mental, and physical distress over time (e.g., Bailis et al., 2001; Ensel & Lin 1991). Thus, future research would benefit from expanding the model to include a larger resource bank that combines the psychological and social dimensions of resources. Similarly, understanding the relationship between personal control and similar constructs, such as locus of control and self-efficacy, may be necessary for constructing a valid resource bank.

Our limited bank of resources may explain why our findings did not support an interaction effect between personal control and work stressors on health problems. de Jonge and Dormann (2006) showed that resources buffer the effects of stressors on strain when the resources, stressors, and strain “match” in terms of their cognitive, emotional, and physical components. Future research could extend our results by considering models that conceptualize interactions between resources, work stressors, and strains that “address similar domains of human psychological functioning (i.e., cognitive, emotional, or physical)” (de Jonge and Dormann, 2006, p. 1369).

Fourth, a recent and growing interest has emerged surrounding the topic of resilience in organizations (e.g., Sutcliffe & Vogus, 2003). Exploration of the results for individuals in our study whose trajectories were inconsistent with the average pattern of results (e.g., those still able to thrive despite their lower SES positions) would be interesting. Future research would benefit from understanding the moderating conditions that promote resilience in the midst of hardship, whether they are personal traits, such as proactive personality, or situational conditions, such as supportive climates. Explicating pathways for reversing the negative cycles and capitalizing on positive cycles will be of particular practical relevance.

Fifth, in the present study we used three widely accepted indicators of SES. Future research could enhance the SES construct by considering additional indicators, such as race and gender, and including multiple levels of analysis, such as household and neighborhood SES (Krieger et al., 1997). From an organizational perspective, a benefit would be considering intra-organization markers of status, such as office perks and job titles. A related question that requires empirical attention is whether intra-organization health differentials derive from intra-organization status distinctions, which would differentiate between individuals with higher and lower organizational status within a group of individuals who may have similar SES. Given that organizational status may be more malleable than SES, addressing this question could also provide an opportunity for researchers to explore changes in organizational status and subsequent relationships with personal control, work stressors, and health.

Next, understanding the nature and form of the work stressors, personal control, and health trajectories would be of conceptual and empirical significance. The model in this study was tested over a relatively short amount of time with only three measurement occurrences, and thus, the findings should be interpreted cautiously. Further data are needed to determine how the dynamic relationships manifest over a prolonged period of time: Intensifying trajectories cannot continue indefinitely and should become more gradual over time or as levels become more extreme, at which time individuals may seek active change (e.g., exit, voice). Such patterns could be captured using LCM data analyses over a longer time frame with a greater number of measurement occasions. This research will be necessary if we are to understand how and when these trajectories terminate. This issue is unexplored in our study but requires theoretical and empirical attention.

A longer time frame would not only provide an opportunity to study the functional form of change but could also allow for tests of reverse causality and the inclusion of feedback loops in the model. If individuals report increasingly more health problems, they may also miss or withdraw from work, jeopardizing their

SES. Thus, health problems may be associated with a decline in SES, consistent with the “social drift” hypothesis (e.g., Mulatu & Schooler, 2002).

Last, the data used in this study were based solely on self-reports. Although threats to mono-method bias are minimized because of the three-wave longitudinal study, the results remain to be replicated with multisource data. For example, a better measure of physical health may be derived from medical records, which could include a number of health problems associated with chronic work stressors, such as new instances of heart disease. Related research has used these objective measures of physical health (e.g., Kivimäki et al., 2004). Likewise, this study focused on one limited subset of health problems, those requiring medical attention. A more comprehensive test of the model would include less severe health problems as well.

Practical Implications

The results of this research have a number of practical implications for employee health and well-being in organizations. First, the dynamic relationship between work stressors and personal control suggests that interventions designed to reduce subjective work stressors may be related to individuals’ psychological well-being more generally. Given the close connection between perceptions of personal control and general mental health (Bailis et al., 2001), this benefit is accentuated. Conversely, the results of this study may inform organizations of alternative forms of work stress interventions, particularly for jobs in which work stressors are difficult to remove. For such jobs, interventions that target improving employees’ sense of personal control may be one way to mitigate subjective work stressors in the long term.

Second, although the objective indicators of SES may be largely beyond the control of organizations, they may be able to influence employee income (to some extent) and to offer opportunities that help employees to become more educated. Furthermore, recent research suggests that perceived SES may be as relevant to and may correlate similarly with health outcomes (e.g., Cohen et al., 2008). Perceived SES is most often operationalized with a ladder scale: Participants are asked how their income, education, and occupational prestige compare to those of others by indicating their relative rank on an illustration of a ladder. Organizations may have the opportunity to influence employees’ SES perceptions even if they cannot change employees’ objective SES positions. For example, organizations that pay higher salaries than the industry norm may enhance employee perceptions of their income relative to that of others and, thus, SES. These benefits may be enhanced should the pay schedules in such industries be disclosed versus secret. Likewise, organizations and their leaders can improve employee perceptions of their work’s prestige through socially responsible behavior, market leadership, and similar acts that exemplify the significance of working for the organization or the perceived meaningfulness of one’s work (e.g., Arnold, Turner, Barling, Kelloway, & McKee, 2007).

References

- Adler, N. E., Boyce, T., Chesney, M. A., Cohen, S., Folkman, S., Kahn, R. L., & Syme, L. (1994). Socioeconomic status and health: The challenge of the gradient. *American Psychologist*, *49*, 15–24.

- Aquino, K., Galperin, B., & Bennett, R. J. (2004). Social status and aggressiveness as moderators of the relationship between interactional justice and workplace deviance. *Journal of Applied Social Psychology, 34*, 1001–1029.
- Arnold, K. A., Turner, N., Barling, J., Kelloway, E. K., & McKee, M. (2007). Transformational leadership and psychological well-being: The mediating role of meaningful work. *Journal of Occupational Health Psychology, 12*, 193–203.
- Bacharach, S., Bamberger, P., & Mundell, B. (1993). Status inconsistency in organizations: From social hierarchy to stress. *Journal of Organizational Behavior, 14*, 21–36.
- Bagozzi, R. P., & Edwards, J. R. (1998). A general approach for representing constructs in organizational research. *Organizational Research Methods, 1*, 45–87.
- Bailis, D. S., Segall, A., Mahon, M. J., Chipperfield, J. G., & Dunn, E. M. (2001). Perceived control in relation to socioeconomic and behavioral resources for health. *Social Science & Medicine, 52*, 1661–1676.
- Barrick, M. R., Stewart, G. L., & Piotrowski, M. (2002). Personality and job performance: Test of the mediating effects of motivation among sales representatives. *Journal of Applied Psychology, 87*, 43–51.
- Beehr, T. A., & Glazer, S. (2005). Occupational role stress. In J. Barling, E. K. Kelloway, & M. R. Frone (Eds.), *Handbook of work stress* (pp. 7–33). Thousand Oaks, CA: Sage.
- Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin, 107*, 238–246.
- Bentler, P. M., & Bonett, D. G. (1980). Significance tests and goodness of fit in the analysis of covariance structures. *Psychological Bulletin, 88*, 588–606.
- Bollen, K. A., & Curran, P. J. (2006). *Latent curve models: A structural equation perspective*. Hoboken, NJ: Wiley.
- Bosma, H., Van Jaarsveld, C. H. M., Tuinstra, J., Sanderman, R., Ranchor, A. V., Van Eijk, J. T. M., & Kempen, G. I. J. M. (2005). Low control beliefs, classical coronary risk factors, and socioeconomic differences in heart disease in older persons. *Social Science & Medicine, 60*, 737–745.
- Burke, R. J. (2002). Work stress and women's health: Occupational status effects. *Journal of Business Ethics, 37*, 91–102.
- Chan, D. (1998). The conceptualization and analysis of change over time: An integrative approach incorporating longitudinal mean and covariance structures analyses (LMACS) and multiple indicator latent growth modeling (MLGM). *Organizational Research Methods, 1*, 421–483.
- Cohen, S., Alper, C. M., Doyle, W. J., Adler, N., Treanor, J. J., & Turner, R. B. (2008). Objective and subjective socioeconomic status and susceptibility to the common cold. *Health Psychology, 27*, 268–274.
- Curran, P. J., Bauer, D. J., & Willoughby, M. T. (2004). Testing main effects and interactions in latent curve analysis. *Psychological Methods, 9*, 220–237.
- de Jonge, J., & Dormann, C. (2006). Stressors, resources, and strain at work: A longitudinal test of the triple-match principle. *Journal of Applied Psychology, 91*, 1359–1374.
- DeNeve, K. M., & Cooper, H. (1998). The happy personality: A meta-analysis of 137 personality traits and subjective well-being. *Psychological Bulletin, 124*, 197–229.
- Driskell, J. E., & Mullen, B. (1990). Status, expectations, and behavior: A meta-analytic review and test of the theory. *Personality and Social Psychology Bulletin, 16*, 541–553.
- Ensel, W. M., & Lin, N. (1991). The life stress paradigm and psychological distress. *Journal of Health and Social Behavior, 32*, 321–341.
- Folkman, S., & Lazarus, R. S. (1985). If it changes it must be a process: Study of emotion and coping during three stages of a college examination. *Journal of Personality and Social Psychology, 48*, 150–170.
- Gallo, L. C., Bogart, L. M., Vranceanu, A., & Matthews, K. A. (2005). Socioeconomic status, resources, psychological experiences, and emotional responses: A test of the reserve capacity model. *Journal of Personality and Social Psychology, 88*, 386–399.
- Gallo, L. C., & Matthews, K. A. (2003). Understanding the association between socioeconomic status and physical health: Do negative emotions play a role? *Psychological Bulletin, 129*, 10–51.
- Garst, H., Frese, M., & Molenaar, P. C. M. (2000). The temporal factor of change in stressor-strain relationships: A growth curve model on a longitudinal study in East Germany. *Journal of Applied Psychology, 85*, 417–438.
- Gould, R. V. (2002). The origins of status hierarchies: A formal theory and empirical test. *American Journal of Sociology, 107*, 1143–1178.
- Hallqvist, J., Diderichsen, F., Theorell, T., Reuterwall, C., Ahlbom, A., and the SHEEP study. (1998). Is the effect of job strain on myocardial infarction risk due to interaction between high psychological demands and low decision latitude? Results from the Stockholm Heart Epidemiology Program (SHEEP). *Social Science & Medicine, 46*, 1405–1415.
- Hallqvist, J., Lynch, J., Bartley, M., Lang, T., & Blane, D. (2004). Can we disentangle life course processes of accumulation, critical period and social mobility? An analysis of disadvantaged socio-economic positions on myocardial infarction in the Stockholm Heart Epidemiology Program. *Social Science & Medicine, 58*, 1555–1562.
- Hobfoll, S. E. (1989). Conservation of resources: A new attempt at conceptualizing stress. *American Psychologist, 44*, 513–524.
- Hobfoll, S. E. (2001). The influence of culture, community, and the nested-self in the stress process: Advancing conservation of resources theory. *Applied Psychology: An International Review, 50*, 337–421.
- Hobfoll, S. E., Johnson, R. J., Ennis, N., & Jackson, A. P. (2003). Resource loss, resources gain, and emotional outcomes among inner city women. *Journal of Personality and Social Psychology, 84*, 632–643.
- Holahan, C. J., Moos, R. H., Holahan, C. K., & Cronkite, R. C. (1999). Resource loss, resource gain, and depressive symptoms: A 10-year model. *Journal of Personality and Social Psychology, 77*, 620–629.
- Kaniasty, K., & Norris, F. H. (1995). Mobilization and deterioration of social support following natural disasters. *Current Directions in Psychological Science, 4*, 94–98.
- Karasek, R. A. (1979). *Job demands, decision latitude, and mental strain: Implications for job design*. Ithaca, NY: Cornell University Press.
- Karasek, R. A., & Theorell, T. (1990). *Healthy work: Stress, health, and the reconstruction of working life*. New York, NY: Basic Books.
- Kelloway, E. K. (1995). Structural equation modeling in perspective. *Journal of Organizational Behavior, 16*, 215–225.
- Keltner, D., Gruenfeld, D. H., & Anderson, C. (2003). Power, approach, inhibition. *Psychological Review, 110*, 265–284.
- Kivimäki, M., Ferrie, J. E., Head, J., Shipley, M. J., Vahtera, J., & Marmot, M. G. (2004). Organisational justice and change in justice as predictors of employee health: The Whitehall II study. *Journal of Epidemiology & Community Health, 58*, 931–937.
- Krieger, N., Williams, D. R., & Moss, N. E. (1997). Measuring social class in U.S. public health research: Concepts, methodologies, and guidelines. *Annual Review of Public Health, 18*, 341–378.
- Kristenson, M., Eriksen, H. R., Sluiter, J. K., Starke, D., & Ursin, H. (2004). Psychobiological mechanisms of socioeconomic differences in health. *Social Science & Medicine, 58*, 1511–1522.
- Kunz-Ebrecht, S. R., Kirschbaum, C., & Steptoe, A. (2004). Work stress, socioeconomic status and neuroendocrine activation over the working day. *Social Science & Medicine, 58*, 1523–1530.
- Lamertz, K., & Aquino, K. (2004). Social power, social status, and perceptual similarity of workplace victimization: A social network analysis of stratification. *Human Relations, 57*, 795–822.
- Landsbergis, P. A., Schnall, P. L., Pickering, T. G., Warren, K., & Schwartz, J. E. (2003). Lower socioeconomic status among men in relation to the association between job strain and blood pressure. *Scandinavian Journal of Work and Environmental Health, 29*, 206–215.
- Li, F., Duncan, T. E., & Acock, A. (2000). Modeling interaction effects in latent growth curve models. *Structural Equation Modeling: An Interdisciplinary Journal, 7*, 497–533.

- Little, T. D., Cunningham, W. A., Shahar, G., & Widaman, K. F. (2002). To parcel or not to parcel: Exploring the question, weighing the merits. *Structural Equation Modeling*, *9*, 151–173.
- Llorens, S., Schaufeli, W., Bakker, A., & Salanova, M. (2007). Does a positive gain spiral of resources, efficacy beliefs and engagement exist? *Computers in Human Behavior*, *23*, 825–841.
- Marmot, M. G. (2004). *The status syndrome: How social standing affects our health and longevity*. New York, NY: Times Books.
- Marmot, M. G., & Shipley, M. J. (1996). Do socioeconomic differences in mortality persist after retirement? 25 year follow up of civil servants from the first Whitehall study. *British Medical Journal*, *313*, 1177–1180.
- Marmot, M. G., Shipley, M. J., & Rose, G. (1984). Inequalities in death—specific explanations of a general pattern? *The Lancet*, *323*, 1003–1006.
- Marmot, M. G., & Theorell, T. (1988). Social class and cardiovascular disease: The contribution of work. *International Journal of Health Services*, *18*, 659–674.
- Mulatu, M. S., & Schooler, C. (2002). Causal connections between socioeconomic status and health: Reciprocal effects and mediating mechanisms. *Journal of Health and Social Behavior*, *43*, 22–41.
- Norris, F. H., & Kaniasty, K. (1996). Received and perceived social support in times of stress: A test of the social support deterioration deterrence model. *Journal of Personality and Social Psychology*, *71*, 498–511.
- Parker, S., & Sprigg, C. (1999). Minimizing strain and maximizing learning: The role of job demands, job control, and proactive personality. *Journal of Applied Psychology*, *84*, 925–939.
- Pearlin, L., Menaghan, E. G., Lieberman, M. A., & Mullan, J. T. (1981). The stress process. *Journal of Health and Social Behavior*, *22*, 337–356.
- Pearlin, L., & Schooler, C. (1978). The structure of coping. *Journal of Health and Social Behavior*, *19*, 2–21.
- Penninx, B. W. J. H., van Tilburg, T., Kriegsman, D. M. W., Deeg, D. J. H., Boeke, A. J. P., & van Eijk, J. T. M. (1997). Effects of social support and personal coping resources on mortality in older age: The Longitudinal Aging Study Amsterdam. *American Journal of Epidemiology*, *146*, 510–519.
- Sacco, J. M., & Schmitt, N. (2005). A dynamic multilevel model of demographic diversity and misfit effects. *Journal of Applied Psychology*, *90*, 203–231.
- Schnittker, J., & McLeod, J. D. (2005). The social psychology of health disparities. *Annual Review of Sociology*, *31*, 75–103.
- Snibbe, A. C., & Markus, H. R. (2005). You can't always get what you want: Educational attainment, agency, and choice. *Journal of Personality and Social Psychology*, *88*, 703–720.
- Stansfeld, S. A., Head, J., & Marmot, M. (1998). Explaining social class differences in depression and well-being. *Social Psychiatry and Psychiatric Epidemiology*, *33*, 1–9.
- Statistics Canada. (2006). *National occupational classification for statistics* (Catalogue No. 12–583-XIE). Ottawa, Ontario, Canada: Minister of Industry.
- Steiger, J. H. (1990). Structural model evaluation and modification: An interval estimation approach. *Multivariate Behavioral Research*, *25*, 173–180.
- Sutcliffe, K., & Vogus, T. J. (2003). Organizing for resilience. In K. Cameron, J. E. Dutton, & R. E. Quinn (Eds.), *Positive organizational scholarship: Foundations of a new discipline* (pp. 94–110). San Francisco, CA: Berrett-Koehler.
- Sverke, M., Hellgren, J., & Näswall, K. (2002). No security: A meta-analysis and review of job insecurity and its consequences. *Journal of Occupational Health Psychology*, *7*, 242–264.
- Tajfel, H., & Turner, J. C. (1979). An integrative theory of intergroup conflict. In W. Austin & S. Worchel (Eds.), *The social psychology of intergroup relations* (pp. 33–47). Monterey, CA: Brooks/Cole.
- Warren, J. R., Hoonakker, P., Carayon, P., & Brand, J. (2004). Job characteristics as mediators in SES–health relationships. *Social Science & Medicine*, *59*, 1367–1378.
- Willet, J. B., & Sayer, A. G. (1994). Using covariance structure analysis to detect correlates and predictors of individual change across time. *Psychological Bulletin*, *116*, 363–381.

Received April 29, 2008

Revision received June 4, 2009

Accepted June 8, 2009 ■