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Changing Work, Changing Health: Can Real Work-Time Flexibility Promote Health Behaviors and Well-Being?

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Abstract

This article investigates a change in the structuring of work time, using a natural experiment to test whether participation in a corporate initiative (Results Only Work Environment; ROWE) predicts corresponding changes in health-related outcomes. Drawing on job strain and stress process models, we theorize greater schedule control and reduced work-family conflict as key mechanisms linking this initiative with health outcomes. Longitudinal survey data from 659 employees at a corporate headquarters shows that ROWE predicts changes in health-related behaviors, including almost an extra hour of sleep on work nights. Increasing employees' schedule control and reducing their work-family conflict are key mechanisms linking the ROWE innovation with changes in employees' health behaviors; they also predict changes in well-being measures, providing indirect links between ROWE and well-being. This study demonstrates that organizational changes in the structuring of time can promote employee wellness, particularly in terms of prevention behaviors.

Keywords

flexibility; gender; health behavior; natural experiment; organizational change; schedule control; sleep; well-being; work-family conflict

Time, especially work time, is a major shaper of human activities (Adam 1995; Gershuny 2000; Hassard 1990; Nowotny 1992; Thompson 1967; Zerubavel 1985), including health-related behaviors. Norms, rules, and regulations regarding work time constitute what Sennett (1998) calls "time cages": taken-for-granted, invisible scaffoldings confining the human experience on and off the job. Adults spend much of their waking hours following institutionalized rhythms around the start and end of workdays and workweeks. These formal and informal time clocks reflect *social time* (Sorokin and Merton 1937:622), the "qualities with which the various time units are endowed by members of a group," such that some days are defined as "work" days and some hours are defined as "work" hours. This social organization of work time is only beginning to be theorized as a structural context with profound implications for life chances and life quality (Bianchi, Robinson, and Milkie 2006; Epstein and Kalleberg 2004; Fenwick and Tausig 2007; Gershuny 2000; Hochschild 1997; Jacobs and Gerson 2004; Moen 2003; Perlow 1997; Presser 2003; Rubin 2007). Norms around work time are also norms about space—about being at the workplace during certain hours (Coser and Coser 1963; Wheaton and Clarke 2003).

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Sociologists can promote understanding of something as taken for granted as the time and timing of work by showing these socially constructed temporal structures are, in fact, verbs as well as nouns (e.g., Sewell 1992), structuring the lives—including health-related behaviors—of individuals in profound ways. The temporal structure of work refers to the expectations, norms, and unstated assumptions regarding work schedules and work hours, as well as the rules, regulations (e.g., tardiness prompts disciplinary action), reward systems (e.g., "availability" is recognized in performance reviews), and informal interactions (e.g., comments on arriving late, praise for working extra hours) that reinforce expectations and norms.

While time structures have not been fully theorized, there is renewed interest in the ways social structures more generally shape lives, and especially health (e.g., Berkman and Kawachi 2003; House 2002; Kleiner and Pavalko 2010; Link 2008; Lutfey and Freese 2005; Phelan et al. 2004). Existing evidence on structural impacts generally examines differences across individuals in different social locations, using cross-sectional snapshots, panel studies, or epidemiological patterns.

But what if the structure itself can be changed? This is a fundamental sociological question: whether and to what extent deliberate changes in social structures produce corresponding changes in individual outcomes. To begin incorporating change into an understanding of how social (and specifically temporal) structures influence health-related outcomes, we report evidence from a natural experiment of a business innovation challenging the conventional temporal structure of white-collar work. Specifically, we assess whether a corporate initiative designed to focus attention on results and not on time, called the Results Only Work Environment (ROWE), promotes healthy behaviors and/or improves employees' well-being.

ROWE, the corporate initiative we investigate, involves participatory training of work teams to help employees change everyday work processes and practices so that when or where work is accomplished is no longer an issue (Kelly et al. 2010; Moen, Kelly, and Chermack 2009; Ressler and Thompson 2008). A transformation such as ROWE—loosening work-time cages, clocks, and calendars—should, we argue, promote health-related outcomes precisely because it increases employees' schedule control and reduces the stress of work-life conflict.

Using longitudinal data from 659 white-collar employees, half of whom participated in ROWE and half of whom continued conventional work arrangements, we ask the following: (1) Does this deliberate change in the temporal structure of work predict changes in health-related outcomes? (2) Does the ROWE initiative affect health outcomes through the mechanisms of increasing employees' schedule control and/or reducing stressful work-family conflicts?

BACKGROUND

Extending the Job Strain Model

Little research focuses on control over working time, but there is a large body of evidence on the impacts of job control more generally. In his job strain model, Karasek (1979:290; see Karasek and Theorell 1990) describes job control as an employee's "potential control over his tasks and his conduct during the working day" that is conducive to health. Scholars have empirically linked it to exhaustion and depressive symptoms (Mausner-Dorsch and Eaton 2000), blood pressure and mood (Rau and Triemer 2004), heart disease (Bosma, Stansfeld, and Marmot 1998), mental and physical health (D'Souza et al. 2003; Stansfeld and Candy 2006), and work-family conflict (Thomas and Ganster 1995). Thus, there is

ample evidence in the occupational health literature linking employees' control over how they perform their work with health outcomes (de Lange et al. 2004; van der Doef and Maes 1999), but many employees are stressed because they do not have control over their working time.

Corporate policies and practices offering employees greater *schedule control*, that is, the ability to decide when and where they do their jobs, may be especially important for the health behavior and well-being of contemporary employees, given the increasing time pressures, time speed-ups, and time conflicts most are experiencing. Schedule control appears to be distinct from but related to traditional measures of job control (Kelly and Moen 2007; Kelly, Moen, and Tranby 2011; Moen, Kelly, and Huang 2008). Examining whether a corporate initiative challenging its temporal organization affects health behaviors and well-being through the mechanism of increasing employees' schedule control extends the limited longitudinal research investigating the health impacts of schedule control (Grzywacz, Casey, and Jones 2007).

A Stress Process Framing

Role strain theory, focusing on the potential stresses associated with conflicting role obligations, is often implicitly about time. Role strain, "the felt difficulty in fulfilling role obligations" (Goode 1960:483), such as negative spillover from work to home, can be a chronic stressor with deleterious consequences. A long tradition of research on family stress (Hill 1949; Hochschild 1997), life course processes (Elder, George, and Shanahan 1996; Moen and Roehling 2005), and stress more generally (Aneshensel 1992; Lazarus and Folkman 1984; Pearlin 1989; Pearlin et al. 1981; Pearlin et al. 2005; Turner, Wheaton, and Lloyd 1995) has depicted stress as occurring when a gap between resources and claims (or needs) reduces people's sense of control. The stress process approach, especially when married with life course insights about cycles of control and shifting social structures,[1] underscores the dynamic processes of "fit" between resources and claims/needs. A stress process framing suggests that the gap between time resources and demands produces stress, particularly in the absence of perceived control over the temporal organization of work (Kim, Moen, and Min 2003; Roxburgh 2004).

Work-Family Conflict and Health

Negative spillover from work to family life is a common form of stress in the lives of contemporary workers (Bianchi, Casper, and King 2005; Hammer et al. 2005; Kelly et al. 2008; Korabik, Lero, and Whitehead 2008; Kossek and Lambert 2005; Major, Klein, and Ehrhart 2002). It has been conceptualized and measured in a variety of ways—as work to nonwork "conflict" or "interference" (Greenhaus and Beutell 1985), as "spillover" (positive, negative) from work to home (Grzywacz and Marks 2000), as work-family or work-life "imbalance" (Tausig and Fenwick 2001), and as "misfit" (Grzywacz and Bass 2003; Moen, Kelly, and Hill 2011). We focus here on the negative effects of work on home life, recognizing that all workers may experience the stress of such incompatibilities.

Work-family conflict measures have been related to minor physical complaints and lower self-reported health, as well as psychological distress and depressive symptoms (Allen et al. 2000; Grzywacz and Bass 2003; Netemeyer, Boles, and McMurrian 1996; Thomas and Ganster 1995), anxiety disorders (Grzywacz and Bass 2003), lower vitality (Kristensen, Smith-Hansen, and Jansen 2005), and less well-being (Grant-Vallone and Donaldson 2001; Moen and Yu 2000).

[1] See Gotlib and Wheaton (1997) and Muhonen and Torkleson (2004).

In terms of health-related behaviors, Nomaguchi and Bianchi (2004) note that time for exercise is often squeezed out by heavy work and family responsibilities. Maume, Sebastian, and Bardo (2009:989) find women retail workers have significantly more sleep disruptions than men in similar jobs, due in part to "differences in responsibilities for work-family obligations." Other research shows a relationship between work-family conflict and unhealthy eating habits, obesity, elevated cholesterol levels, and hypertension (Allen and Armstrong 2006; Frone, Russell, and Barnes 1996; Grzywacz and Bass 2003; Grzywacz and Marks 2000; Thomas and Ganster 1995).

Focusing on Change

Taken together, the job strain and stress process/ work-family conflict approaches lead us to theorize that an organizational innovation aimed at loosening time structures should produce corresponding changes in employees' health behaviors and well-being:

> *Hypothesis 1:* Participation in ROWE produces a shift in health-promoting behaviors (amount of sleep, exercise, going to the doctor, and not working when sick) as well as well-being (self-reported health, energy, personal mastery, sleep quality, burnout, psychological distress).

Low schedule control and high work-family conflict are key risk factors for poor health outcomes. Changes in these risk factors may represent two key mediating mechanisms between ROWE, the organizational innovation, and improved employee health-related outcomes:

> *Hypothesis 2:* Increase in employees' schedule control is a key mediator between employees' participation in the ROWE initiative and subsequent changes in their health behaviors and well-being.

The ROWE initiative has also been shown to decrease employees' degree of work-family conflict (Kelly et al. 2011), suggesting the following:

> *Hypothesis 3*. The health-related effects of ROWE are mediated by a decrease in work-family conflict. The effect of enhanced schedule control on health-related outcomes is also mediated through decreases in work-family conflict.

We focus first on changes in health-promoting behaviors, since these are more likely to shift over a short period of time and are consequential for both physical and mental health. For example, increasing sleep time among this sleep-deprived population of long-hour workers would be a salutary consequence of the initiative. Another key health-promoting behavior is exercise, with ROWE hypothesized to promote greater exercise frequency. Workers who do not go to work when sick avoid the transmission of colds, flu, and other contagious diseases and may lessen the duration or severity of their own illness. Increasing the odds of employees' seeing a doctor when sick can also limit illness duration or severity.

We then gauge well-being outcomes in the form of reductions in burnout and psychological distress and increases in personal mastery, sleep quality, energy, and self-reported health. We recognize that gains in these assessments may not be evident over so short a period as the six months covered in this study but test for some movement in them, given their potential for decreasing stress-related symptoms and illnesses over a longer period of time.

DATA AND METHODS

The Organizational Initiative

We examine the health effects of the ROWE initiative rolled out at the corporate headquarters of Best Buy Co., Inc., a *Fortune* 500 retail corporation with about 3,500

headquarters employees in the metropolitan Twin Cities area of Minnesota.[2] ROWE was designed to move employees and supervisors away from time-oriented measures of work success (e.g., how many hours put in last week; how much time spent on a given task) to a completely results-based appraisal of productivity and accomplishment. After an orientation for managers, teams met with facilitators four times to critique old ways of working and discuss new possibilities (Kelly et al. 2010). Teams transitioning from conventional practices to ROWE aim to foster environments wherein employees do not need permission to modify their work location or schedules but can routinely change when and where they work based on their own and the team's needs, preferences, and job responsibilities. This collective approach to job redesign may reduce the risk that individual employees will be penalized in later evaluations for working to their own rhythms. Importantly, the ROWE sessions do not focus on work-family conflict, a deliberate strategy so that ROWE is seen as the new standard rather than another "working mother" or "family-friendly" policy that is on the books but rarely used (Kelly et al. 2010).

Participants and Procedures

ROWE was developed as an organizational initiative occurring regardless of whether we studied it, truly an "experiment of nature" (Bronfenbrenner 1979). The natural experiment design exploits the phased implementation of ROWE by using the departments that began ROWE during the study period as a treatment group and using other departments later in the queue as a comparison group, a quasi-experimental nonequivalent control group design with both pretests and posttests (Shadish, Cook, and Campbell 2002). We address potential selection bias and design limitations below and in more detail in Kelly et al. (2011). Importantly, decisions about which departments would participate in ROWE and when were made by executives, not middle managers or individuals.

The 2006 baseline wave of the web survey was completed in the month before ROWE sessions began, with the second survey wave fielded six months after a department launched ROWE (with comparison groups surveyed simultaneously). The Wave 1 response rate was 80 percent, with 92 percent of those who completed the first survey also completing Wave 2 six months later; response rates were similar for treatment and comparison groups. A total of 659 white-collar workers participated in both waves of the web survey, 334 in the comparison group and 325 in the ROWE group. Respondents are young (average age is 32), educated (84 percent have a college degree), and predominately white. They work long hours (41 percent working more than 50 hours per week) and have been with the company an average of four years. Almost half (48.4 percent) are women, 70 percent are married or partnered, one fourth have a preschooler at home, and 14 percent care for an infirm adult. Further research is needed to generalize to the experiences of older workers, workers with less education, those in blue-collar or direct service jobs, or racial/ethnic minorities.

Measures

Table 1 provides descriptive statistics for Wave 1 variables, changes between waves, and the reliability change index for all measures, with values greater than 1.96 (or less than −1.96) indicating a reliable change.

Recall we hypothesized a mediational model, in which ROWE would influence health-related outcomes by increasing schedule control and reducing negative work-home spillover. The schedule control measure gauges employees' ability to decide about the time and timing of their work and is modified from Thomas and Ganster (1995), with 1 indicating low

[2]Results Only Work Environment (ROWE) was developed by two Best Buy employees, Cali Ressler and Jody Thompson, now of CultureRx. (See Moen, Kelly, and Chermack 2009; Ressler and Thompson 2008; www.gorowe.com.)

schedule control and 5 indicating high schedule control.[3] We capture work-family conflict with a measure of negative spillover from work to home life developed and validated by Grzywacz and Marks (2000), emphasizing emotional transmission of stress (i.e., bringing worries home) and energy depletion rather than time strains or conflicts. We deliberately chose a measure of work-family conflict that does not focus on time strains to distinguish it from schedule control.[4]

We include a variety of health behaviors as outcomes. We measure hours of sleep per night, asking respondents to report how many hours of sleep they get before a workday. We ask how many days per week respondents exercised, on average, over the past four weeks, with scores ranging from *not at all* to *every day*. To gauge health care management we use two items. The first asks respondents their agreement with the statement "When I am sick, I still feel obligated to come in to work." The second is agreement with the following statement: "Sometimes I'm so busy that I don't go to the doctor even when I should." For both of these items, high scores indicate less healthy behaviors.

We assess employees' well-being with four scales: personal mastery using the classic Pearlin and Schooler (1978) scale; emotional exhaustion constructed from Maslach Burnout Inventory items (Maslach and Jackson 1986); and psychological distress (K6; Furukawa et al. 2003). Other well-being measures include a single item on quality of sleep (from *very bad* to *very good;* Burgard and Ailshire 2009), a self-reported health item (with 5 being *in excellent health*), and a scale measuring respondents' energy levels (a subset of SF-36 health survey; Ware and Sherbourne 1992 items).

Employees are coded as part of the ROWE group if they report (in the Wave 2 survey) having attended the ROWE training sessions and being assigned to a team or department that participated in the initiative during the study period.[5] We also use a variety of personal and job characteristics as control variables. We include measures of gender and active parental status (and also test them as potential moderators), age, and a summary measure of other changes in respondents' lives in the six months between surveys. Since ROWE and comparison groups differed on some measures at Wave 1 (see Table 1), we incorporate variables for salaried (or not), tenure, job level, and income. Our analysis also includes measures of job demands and job control (Karasek and Theorell 1990), along with scales of manager support and a supportive organizational culture, established predictors of work-family conflict (Kelly et al. 2008) that may also affect employees' time to manage their health. See the online supplement for detailed descriptions of the construction of variables (Part A), information about scales (see Table S-1), and a correlation matrix of all variables (see Table S-2).

Structural Equation Modeling

We use a structural equation model (SEM) to estimate the effects of ROWE, testing four possible relationships between the ROWE flexibility innovation and health-related outcomes. First is a direct effect from ROWE to changes in health behavior and well-being. Second are mediated effects, in which direct relationships from ROWE to changes in health outcomes are at least partially mediated by (operate through the mechanisms of) changes in

[3]In this white-collar setting, there is a close relationship between control over the timing of work and the location of that work, but this may not be the case in other settings. The analyses were robust to omitting the question about control over work location.

[4]We examined a number of alternative measures of work-family conflict and time strain, including Netemeyer, Boles, and McMurrian's (1996) measure of work-family conflict; a scale of time adequacy in various areas; and a measure of work-schedule fit. Using other measures did not substantively alter the results.

[5]This measure classifies the few employees who attended ROWE sessions but subsequently moved to teams still working in under the conventional rules and culture as being in the comparison group because these workers would not be able to implement the key tenets of ROWE.

schedule control and negative work-home spillover. Third are indirect (only) effects in which there may be no direct effects of ROWE on health outcomes but there are indirect effects in which ROWE changes schedule control and/or negative spillover and these changes, in turn, improve health outcomes. (See Hayes 2009:413–15 for more discussion on the distinction between mediated and indirect effects.) This relationship would indicate that there may be both positive and (possibly unmeasured) suppressor effects operating between ROWE and health measures but that the salutary effects of ROWE in promoting schedule control and reducing negative spillover indirectly enhance well-being. Fourth is the possibility that there are no direct, mediated, or indirect relationships between ROWE and changes in health outcomes. SEM allows us to capture direct effects, to test our hypothesized mediational framework, and to capture possible indirect effects of ROWE on changes in health behavior and well-being measures.[6] SEM also permits the estimation of unobserved or latent variables. We have four latent constructs—perceived schedule control and work-family conflict (specifically, negative work-to-home spillover), at both Wave 1 and Wave 2.

We estimate the hypothesized SEM (see Figure 1) using the maximum likelihood estimation procedure, which is robust, efficient, and widely used when the assumption of multivariate normality is met. To test our hypothesized mediation framework, we estimate four nested SEMs. In the first model, we estimate the direct effects of ROWE on each Wave 2 health-related outcome, controlling for the lagged Wave 1 health outcome as well as other variables described above. In the second model, we estimate our first theorized mechanism explaining the effects of ROWE on Wave 2 health-related outcomes by including change in schedule control as an intervening variable (potential mediator or indirect effect). In the third model, we estimate our second theorized mechanism by including change in negative work-home spillover as an intervening variable. In the fourth and final model, we estimate the effects of ROWE on each Wave 2 outcome by including both theorized mechanisms—change in schedule control and change in negative spillover—as intervening variables, with this final step shown in Figure 1. Table 2 summarizes standardized estimates from each of these nested SEM models, noting pathways from Figure 1.

We use three indices of goodness of fit available in AMOS 5.0 to assess overall model fit: (1) the normed χ^2 statistic, considering a χ^2/degrees of freedom ratio of less than 5 as acceptable (Bollen and Long 1993); (2) the goodness-of-fit index, with a value exceeding 0.85 taken as indicative of reasonable fit (Bentler and Bonett 1980); and (3) the root mean square error of approximation, with a value less than 0.08 representing an appropriate model fit. Generally we find the model fits better in the later mediation steps, with Model 4 yielding the best fit to the data, providing support for the proposed mechanisms.

RESULTS

Participating in the ROWE initiative directly increases employees' health-related behaviors of sleep and exercise, as well as the likelihood that employees will not go to the workplace when sick and will see a doctor when sick, net of controls included in the model and the lagged Wave 1 outcome (Model 1, Table 2, representing Pathway b in Figure 1). However, Model 1 in Table 3 reveals that ROWE does not directly produce changes in well-being

[6]We use well-known properties of structural equation modeling to describe the direct, indirect, and total effect of ROWE on health-related outcomes (Knoke, Bohrnstedt, and Mee 2002; Schumacker and Lomax 2010). The direct effects are represented by the standardized estimates of the direct effect of ROWE, schedule control, and negative work-home spillover. Effects of the indirect pathway of ROWE on the health-related outcomes through changing schedule control and negative work-home spillover are calculated by multiplying the path coefficients of that indirect path. The total indirect effect of ROWE on the health-related outcome is the sum of all of the indirect pathways from ROWE to the health-related outcome, and the total effect of ROWE on the health related outcome is the sum of both the direct and indirect paths.

measures (sleep quality, emotional exhaustion, personal mastery, psychological distress, self-reported health, energy) between survey waves (coefficients for Pathway b are not significant). Nevertheless, there is some support for Hypothesis 1 in that ROWE directly improves health-behavior outcomes over a six-month period.

We next address underlying mechanisms theorized to mediate the direct effects of ROWE on health behaviors, finding that the ROWE effects on health behaviors are mediated, in whole or in part, through increases in employees' schedule control and decreases in their negative work-home spillover. To summarize, ROWE directly affects all the health behaviors in Table 2 (Pathway b). These ROWE effects are mediated through changes in schedule control and negative work-home spillover. Specifically, for all four health behaviors, we find that ROWE increases schedule control (Pathway e) and reduces negative work-home spillover (Pathway f). In Model 4 (under Intervening Pathways), ROWE increases schedule control, with this increased schedule control then reducing negative work-home spillover; thus the direct effect of ROWE on negative work-home spillover is mediated by changes in schedule control. We describe the direct and indirect effects for each dependent variable below, illustrating the model-building process for one health behavior: hours of sleep the night before a workday.

Does ROWE Increase Sleep Hours?

As shown in Model 1 of Panel A in Table 2, those participating in the ROWE innovation report an increase in sleep hours by Wave 2, specifically about an extra 28 minutes of sleep on a weeknight (60 minutes × .46, the value of the unstandardized coefficient for Pathway b, [unstandardized coefficients in online supplement Table S-3])[7], after accounting for prior sleep hours at Wave 1 (Pathway a).

In Model 2 of Panel A, Table 2, we add change in schedule control to the model to test its mediational effects. ROWE increases schedule control at Wave 2 (Pathway e), and schedule control increases hours of sleep at Wave 2 (Pathway c). Specifically, scoring one level higher on schedule control in Wave 2 yields an average of 11 minutes more sleep per night. The direct effect of ROWE on hours of sleep continues to be significant, meaning the effect of ROWE on increases in amount of sleep is only partially mediated by increases in schedule control.

Model 3 of Panel A, Table 2, shows that ROWE decreases negative work-home spillover (Pathway f), and having lower negative work-home spillover increases hours of sleep (Pathway d). Specifically, scoring one level lower on negative work-home spillover yields an average of 34 minutes more sleep per night. The effect of ROWE on increases in sleep time is only partially mediated by reductions in negative work-home spillover.

Model 4 of Panel A, Table 2, includes both mechanisms: changes in schedule control and changes in negative work-home spillover. Being in ROWE directly increases sleep before a workday by about an extra 20 minutes (60 minutes × .33) and indirectly increases sleep by about 32 minutes per night (60 minutes × .53) by increasing schedule control and, in turn, decreasing negative work-home spillover (as shown by the intervening pathways). Thus, the direct and indirect effects of ROWE (see Model 4) sum to a total of almost an extra hour of sleep (52.3 minutes) per night.

[7]The coefficients reported in Table 2 are standardized coefficients, as is standard practice when presenting structural equation model coefficients. To calculate the effect of ROWE (or any other variable) on hours of sleep, we use the unstandardized coefficients. The unstandardized coefficients are presented in the text in some places and are available in online supplement Table S-3.

Does ROWE Alter Health Management?

As summarized in Panels B and C of Table 2, ROWE reduces employees' likelihood of feeling obligated to work when sick and negatively predicts responding that one does "not go to doctor when busy" (Pathway b). In both cases, the ROWE effect is fully mediated by increases in schedule control and partially mediated by reductions in negative work-home spillover (added in Models 2 and 3, Pathways e and f, on Figure 1). When both schedule control and negative work-home spillover are included in the model (see Model 4), the effect of ROWE on these health management outcomes is fully mediated. The likelihood of feeling obligated to work when sick and of not going to the doctor when busy is reduced by one level when both the direct effects of ROWE and the hypothesized mechanisms—schedule control and negative work-home spillover—are included.

Panel D of Table 2 shows that ROWE has a small positive effect on exercise frequency (Pathway b in Model 1). These effects are fully mediated by reductions in negative work-home spillover (Pathway d). Note that increases in schedule control promote exercise frequency indirectly by reducing negative work-to-home spillover (Pathway g). The ROWE effect is fairly small in magnitude, resulting in about a quarter of a standard deviation increase in exercise frequency, but this indicates some change in an important health behavior.

Does ROWE Improve Employees' Health and Well-Being?

As summarized in Table 3, ROWE does not directly produce changes in well-being measures (sleep quality, emotional exhaustion, personal mastery, psychological distress, self-reported health, energy levels); Pathway b is not significant.[8] However, ROWE indirectly affects these outcomes by increasing schedule control and decreasing negative work-home spillover, both of which do improve well-being outcomes (Pathways e and f). These indirect (only) effects differ from mediation effects in that there is no observable direct effect to mediate. We cannot establish why there are no observed direct effects between ROWE and well-being outcomes but suggest there are many paths of influence from ROWE, some positive and some negative, not all of which are considered in the model. However, Table 3 shows that the specific indirect pathways investigated here have positive effects on well-being.

Specifically, increases in schedule control and decreases in negative work-home spillover (Pathways c and d) both predict increases in sleep quality and energy, along with decreases in emotional exhaustion and psychological distress. Reductions in negative work-home spillover predict an increase in self-reported health and personal mastery. ROWE thus indirectly influences well-being outcomes, with the biggest indirect effects through schedule control and somewhat smaller effects through negative work-home spillover.

To summarize, ROWE facilitates employees' health-related behaviors (more sleep, more exercise, greater likelihood of going to the doctor when sick, and less likelihood of working when sick). These direct effects of ROWE are, as theorized, mediated by changes in schedule control and negative work-home spillover. On the other hand, ROWE does not directly influence employees' subjective measures of well-being, although it indirectly influences these outcomes by increasing employees' sense of schedule control and their ability to manage work and home life, changes that do improve well-being measures.

[8]To save space, we present only Models 1 and 4 here. For all outcomes, Models 2 and 3 indicate that schedule control and negative work-home spillover influence the health-related outcome and that ROWE influences schedule control and negative work-home spillover.

Additional Analysis

We considered whether the effects described above hold similarly for women and men, for parents with children at home (vs. other employees), and for mothers and fathers, examining whether our findings are consistent across these and other sub-samples (see Part B, Tables S-4 and S-5 of the online supplement). Note that small sample sizes made it difficult to detect statistically significant differences across subgroups in these exploratory analyses. However, the suggestive evidence is that women (with and without children at home) participating in ROWE experience greater changes in sleep and exercise than do fathers (see Table S-5; Maume et al. 2009). Additional investigations (see Part C of the online supplement) of two substantive issues (alternative mediation pathways and variation in implementation) and two methodological issues (selection bias and clustering of responses within teams) produced no evidence challenging the results presented here.

DISCUSSION

A major contribution of studying a corporate innovation is that it points to the potential power of organizational change as a way of promoting employee wellness, particularly in terms of prevention behaviors. Many flexibility policies are offered to help individuals on a selective basis with “their” problems (Kelly and Moen 2007). What our evidence underscores is the importance of organizational-level changes promoting real flexibility in terms of employees’ control over the time and timing of their work, not individual adaptations and accommodations that leave existing work-time arrangements intact (Heaney 2003). This is a key point. ROWE differs from more common flexible work arrangements in that flexibility becomes the standard way of working, not an exception granted by a supervisor.

Using a natural experiment design, we were able to demonstrate that this workplace initiative produced corresponding changes in employees’ health-related behaviors (getting enough sleep, exercising more, going to the doctor when sick, not going to the workplace when ill). This has important implications for health, suggesting the value of widespread adoption of organizational changes in the temporal structure of work. Sleep and exercise are linked to stress and risks of chronic diseases (Buxton and Marcelli 2010; Maume et al. 2009; Moore et al. 2002), with huge impacts for individuals and their families as well as for costs borne by employers (both health care costs and lost productivity). Less commonly considered are implications of caring for oneself properly and protecting others when one has a minor or moderate illness, but there is growing concern with “presenteeism” (being on the job but not working effectively) and with workplace transmission of illness.

Processes of Change

A second contribution is our specification of mechanisms. The theoretical framing drawn from the occupational health and stress process literatures underscores control and stress as key mediators between the social environment and health-related outcomes. We found two key mediating mechanisms, enhanced schedule control and reduced negative work-home spillover, as pathways from the ROWE innovation to changes in employee health behaviors and as indirect links to well-being measures. The evidence, particularly in the models of health behaviors, confirms Hypotheses 2 and 3 that the ROWE initiative operates by increasing employees’ schedule control, decreasing negative work-home spillover, or a combination of the two. Our model of ROWE’s changing schedule control, with schedule control changes, in turn, reducing negative work-home spillover, is consistent with previous theory and empirical research on the importance of control (whether job control, schedule control, or more global personal mastery) and stress (such as negative work-home spillover) for individual beliefs, behavior, and health.

The findings from this natural experiment (of an organizational innovation [ROWE] building real flexibility into the temporal structure of work) reinforce and extend prior evidence linking schedule control with health outcomes primarily based on cross-sectional data (Evans and Steptoe 2002; Frone et al. 1996; Grzywacz and Bass 2003; Grzywacz et al. 2007; Moen et al. 2008; Thomas and Ganster 1995). Studying such a deliberate change in working conditions permits us to move beyond issues of selection into and out of these conditions endemic to research comparing employees with or without work-place flexibility, schedule control, or work-family conflict. Moreover, the effects on health behaviors are, we believe, quite remarkable.

In contrast to the findings on health behaviors, we see no evidence of direct effects of ROWE on the well-being outcomes tested. However, there are indirect (only) effects, in that increases in schedule control and reductions in work-family conflict (which ROWE precipitates) improve employees' well-being in the form of increasing personal mastery, sleep quality, self-reported health, and energy levels, as well as reducing emotional exhaustion and psychological distress. These changes are suggestive that ROWE might have greater effects on health and well-being over longer time periods.

Limitations and Suggestions for Future Research

An ideal test of ROWE (or other workplace initiatives) would be to randomly assign work teams to treatment and control groups. Additional investigations of subgroup differences as well as other populations of employees (including blue-collar, service, and low-wage workers) are also advisable, as are studies of different types of interventions. It is not clear how an adaptive change such as ROWE would operate in retail stores or hospitals, for example, but we theorize that efforts to provide employees with tools to better control the time and timing of their work and reduce work-family stress would promote better health behaviors.

Given that all employees in the study were located in different parts of the same corporate setting, it is likely there was some social interaction between the ROWE and comparison groups, raising questions regarding potential contamination. However, any contamination between the groups would result in greater similarity and fewer differences in measured outcomes, thus creating a conservative test of differences.

There is also the possibility of treatment misidentification (Hawthorne Effect) in which simply participating in the study influences the responses of individuals. We reduced this possibility by not mentioning ROWE in the recruitment and introduction to the survey and are reassured by finding some measures (e.g., job satisfaction) did not change between waves and/or differ by group. We were also sensitive to the possibility of organizational changes affecting one group (ROWE or comparison group) more than the other, a threat to validity often called "history" (Shadish et al. 2002). While other changes occurred during ROWE implementation, there is no evidence of differential exposure to them.

Questions remain about the sustainability and the likely diffusion of this type of organizational innovation and its health-related effects, given that our study encompassed only a six-month period. The fact that a human resources staff person is charged with continuing to implement and monitor ROWE at Best Buy and that ROWE is incorporated in training new employees suggests the initiative continues to be important within this site.

In their decade review, Bianchi and Milkie (2010:718) note the "growing use of randomized experiments and quasi-experimental approaches to studying work and family issues." Our study points to the possible payoffs of investigating change in existing policies and practices creating and sustaining outdated time cages that constrain the way work is done. The

evidence suggests that loosening these time cages increases employees' schedule control and reduces negative work-family stress, two mechanisms promoting health behaviors. But as Lutfey and Freese (2005:1332) argue, there are very likely "massively multiple mechanisms" linking (in this case) time structures with health behaviors. Other potential mechanisms are fruitful avenues for future research, as are other outcomes, and other organizational innovations.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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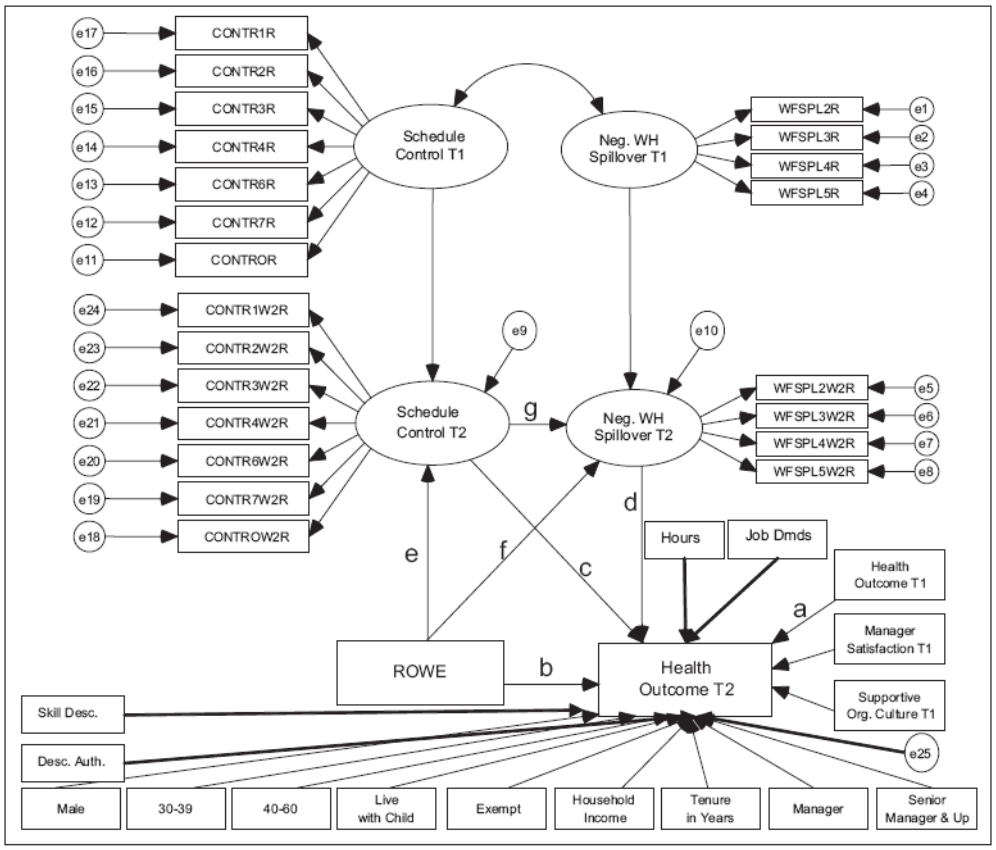

Figure 1.
Conceptual Structural Equation Model

Table 1

Descriptive Statistics of Variables

	Wave 1							Change (Wave 2–Wave 1)								
	Full Sample (*N* = 659)		ROWE (*n* = 325)		Non-ROWE (*n* = 334)			Full Sample (*N* = 659)		ROWE (*n* = 325)		Non-ROWE (*n* = 334)			Reliability Change Index	
Variable	***M* or %**	***SD***	***M* or %**	***SD***	***M* or %**	***SD***	**ROWE – Non-Rowe**	***M* or %**	***SD***	***M* or %**	***SD***	***M* or %**	***SD***	**ROWE – Non-Rowe (Difference-in-Difference)**	**Full Sample**	**ROWE**	**Non-ROWE**
Mediating Variables																	
Schedule control	3.222	(.736)	3.411	(.731)	3.035	(.693)	.376***	.205	(.707)	.333	(.743)	.082	(.649)	.250***	10.206	8.905	6.065
Negative work–home spillover	2.916	(.651)	2.994	(.667)	2.838	(.626)	.157**	−.033	(.550)	−.121	(.578)	.052	(.508)	−.174***	−3.835	−10.378	6.441
Outcome variables																	
Health behaviors																	
Hours of sleep before workday	6.723	(1.774)	6.441	(1.765)	6.994	(1.743)	−.553***	.218	(1.553)	.401	(1.618)	−.175	(1.434)	.576***	2.664	4.522	−2.828
Obligated to work when sick	2.553	(.782)	2.558	(.792)	2.549	(.774)	.009	−.124	(.828)	−.268	(.860)	.016	(.772)	−.284***	−2.400	−4.121	.455
No doctor when busy	2.453	(.853)	2.475	(.839)	2.433	(.866)	.042	−.101	(.862)	−.185	(.846)	−.019	(.871)	−.166*	−2.062	−3.916	−.395
Exercise frequency	3.185	(1.241)	3.178	(1.229)	3.191	(1.255)	−.014	−.153	(1.057)	−.072	(1.069)	−.232	(1.041)	.159*	−3.844	−1.672	−6.467
Health and well-being measures																	
Sleep quality	2.734	(.653)	2.701	(.634)	2.766	(.669)	−.065	.040	(.683)	.095	(.690)	−.013	(.673)	.108*	1.266	2.673	−.457
Emotional exhaustion	3.694	(.980)	3.773	(.964)	3.618	(.991)	.155*	.137	(.870)	.088	(.879)	.185	(.859)	−.098	4.894	2.947	7.010
Personal mastery	4.816	(.799)	4.778	(.820)	4.852	(.779)	−.074	−.011	(.660)	.007	(.666)	−.028	(.654)	.035	−.848	.608	−2.130
Pyschological distress	4.624	(3.619)	4.903	(3.824)	4.363	(.399)	.540*	−.069	(3.194)	−.208	(3.348)	.062	(3.041)	−.270	−.208	−.610	.190
Self-Reported health	3.711	(.835)	3.660	(.857)	3.760	(.812)	−.100	−.073	(.699)	−.082	(.681)	−.064	(.717)	−.018	−5.180	−7.113	−3.698
Energy	3.557	(.872)	3.476	(.898)	3.636	(.840)	−.160*	−.057	(.784)	.038	(.742)	−.150	(.813)	.188**	−2.440	2.508	−4.494
Control variables																	
Female (%)	48.4	—	48.3		48.5		−.2	—	—	—	—	—	—	—	—	—	—
Age (%)																	
Age 20–29	45.6	—	36.4	—	54.6	—	−18.2***	—	—	—	—	—	—	—	—	—	—
Age 30–39	39.3	—	44.0	—	34.6	—	9.4*	—	—	—	—	—	—	—	—	—	—
Age 40–60	15.1	—	19.5	—	10.8	—	8.8**	—	—	—	—	—	—	—	—	—	—

	Wave 1							Change (Wave 2–Wave 1)									
	Full Sample (*N* = 659)		ROWE (*n* = 325)		Non-ROWE (*n* = 334)			Full Sample (*N* = 659)		ROWE (*n* = 325)		Non-ROWE (*n* = 334)			Reliability Change Index		
Variable	***M* or %**	***SD***	***M* or %**	***SD***	***M* or %**	***SD***	**ROWE – Non-Rowe**	***M* or %**	***SD***	***M* or %**	***SD***	***M* or %**	***SD***	**ROWE – Non-Rowe (Difference-in-Difference)**	**Full Sample**	**ROWE**	**Non-ROWE**
Child (%)	34.9	—	40.3	—	29.6	—	10.7**	—	—	—	—	—	—	—	—	—	—
Salaried (%)	95.4	—	97.7	—	93.1	—	4.5**	—	—	—	—	—	—	—	—	—	—
Household Income	4.202	(1.517)	4.348	(1.484)	4.059	(1.537)	0.289*	—	—	—	—	—	—	—	—	—	—
Tenure	4.306	(3.198)	4.716	(3.303)	3.902	(3.042)	0.814**	—	—	—	—	—	—	—	—	—	—
Job level (%)																	
Non-supervising employee	67.3	—	61.9	—	72.5	—	−10.6**	—	—	—	—	—	—	—	—	—	—
Manager	19.4	—	20.5	—	18.3	—	2.2	—	—	—	—	—	—	—	—	—	—
Senior manager and up	13.3	—	17.5	—	9.2	—	8.4**	—	—	—	—	—	—	—	—	—	—
Works more than 50 hours per week (%)	41.2	—	40.5	—	41.9	—	−1.3										
Job demands	2.949	(.498)	2.989	(.487)	2.910	(.506)	.080	—	—	—	—	—	—	—	—	—	—
Decision authority	2.913	(.518)	2.922	(.525)	2.903	(.512)	.019	—	—	—	—	—	—	—	—	—	—
Skill discretion	2.921	(.456)	2.975	(.434)	2.866	(.470)	.109**	—	—	—	—	—	—	—	—	—	—
Manager support	3.543	(.914)	3.507	(.941)	3.579	(.887)	−.072	—	—	—	—	—	—	—	—	—	—
Organizational supportive culture	3.403	(.622)	3.342	(.622)	3.464	(.616)	−.122*	—	—	—	—	—	—	—	—	—	—
Life change within six months (%)	—	—	—	—	—	—	—	15.5	—	12.3	—	18.6	—	6.3*	—	—	—
Job change within six months (%)	—	—	—	—	—	—	—	13.7	—	11.1	—	16.2	—	5.1	—	—	—

Note: ROWE = Results Only Work Environment. Dashes indicate non-applicability.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 2

Summary of Direct, Mediational, and Indirect Effects of Results Only Work Environment (ROWE) on Health Behaviors

Structural Equation Model Pathway	Panel A: Hours of Sleep on a Weekday				Panel B: Obligated to Work When Sick			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
	Standard Estimate	Standard Estimate	Standard Estimate	Standard Estimate	Standard Estimate	Standard Estimate	Standard Estimate	Standard Estimate
Direct effects on health-related outcomes								
Health T1 → Health Outcome T2 (a)	.626***	.619***	.601***	.600***	.395***	.365***	.350***	.329***
ROWE → Health Outcome T2 (b)	.123***	.094**	.100**	.088*	−.172***	−.073	−.147**	−.075
Schedule Control T2 → Health Outcome T2 (c)	—	.071*	—	.028	—	−.258***	—	−.187***
Negative Work-Home Spillover T2 → Health Outcome T2 (d)	—	—	−.164***	−.156***	—	—	.289***	.232***
Intervening pathways								
ROWE → Schedule Control T2 (e)	—	.247***	—	.230***	—	.212***	—	.205***
ROWE → Negative Work-Home Spillover T2 (f)	—	—	−.088**	−.019	—	—	−.054*	−.007
Schedule Control T2 → Negative Work-Home Spillover T2 (g)	—	—	—	−.258***	—	—	—	−.224***
Indirect effects on health-related outcomes								
ROWE → Schedule Control T2 → Health T2 (h = c × e)	—	.017*	—	.006	—	−.055***	—	−.038***
ROWE → Negative Work-Home Spillover T2 → Health T2 (i = f × d)	—	—	.014*	.003	—	—	−.016**	−.002
ROWE → Schedule Control T2 → Negative Work-Home T2 → Health T2 (j = e × g × d)	—	—	—	.009*	—	—	—	−.011*
Total Indirect Effect of ROWE on Health T2 (k = h + i + j)	—	.017*	.014*	.019*	—	−.055***	−.016**	−.051***

Structural Equation Model Pathway	Panel A: Hours of Sleep on a Weekday				Panel B: Obligated to Work When Sick			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
	Standard Estimate	Standard Estimate	Standard Estimate	Standard Estimate	Standard Estimate	Standard Estimate	Standard Estimate	Standard Estimate
Total Effect of ROWE on Health T2 (b + k)	—	.112**	.114**	.106**	—	−.128**	−.163**	−.126**
Model fit statistics								
Normed χ^2	3.534	3.001	2.764	2.368	3.413	3.072	2.728	2.402
Goodness-of-Fit index	.933	.865	.908	.860	.937	.862	.909	.858
Root mean square error of approximation	.068	.061	.057	.050	.067	.062	.056	.051
Direct effects on health-related outcomes								
Health T1 → Health Outcome T2 (a)	.419***	.416***	.335***	.341***	.601***	.602***	.608***	.609***
ROWE → Health Outcome T2 (b)	−.099**	−.011	−.085*	−.029	.070*	.057	.056	.049
Schedule Control T2 → Health Outcome T2 (c)	—	−.278***	—	−.193***	—	.031	—	.009
Negative Work-Home Spillover T2 → Health Outcome T2 (d)	—	—	.301***	.245***	—	—	−.089*	−.086*
Intervening pathways								
ROWE → Schedule Control T2 (e)	—	.224***	—	.215***	—	.245***	—	.231***
ROWE → Negative Work-Home Spillover T2 (f)	—	—	−.061*	−.011	—	—	−.087**	−.010
Schedule Control T2 → Negative Work-Home Spillover T2 (g)	—	—	—	−.208***	—	—	—	−.277***
Indirect effects on health-related outcomes								
ROWE → Schedule Control T2 → Health T2 (h = c × e)	—	−.062***	—	−.041***	—	.007	—	.002
ROWE → Negative Work-Home Spillover T2 → Health T2 (I = f × d)	—	—	−.018**	−.003	—	—	.008*	.001

Structural Equation Model Pathway	Panel A: Hours of Sleep on a Weekday				Panel B: Obligated to Work When Sick			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
	Standard Estimate	Standard Estimate	Standard Estimate	Standard Estimate	Standard Estimate	Standard Estimate	Standard Estimate	Standard Estimate
ROWE → Schedule Control T2 → Negative Work-Home T2 → Health T2 (j = e × g × d)	—	—	—	−.011*	—	—	—	.006
Total Indirect Effect of ROWE on Health T2 (k = h + i + j)	—	−.062***	−.018**	−.055***	—	.007	.008*	.008*
Total Effect of ROWE on Health T2 (b + k)	—	−.073*	−.104**	−.084*	—	.064*	.064*	.058*
Model fit statistics								
Normed χ^2	3.958	3.062	2.712	2.343	9.376	6.058	5.260	4.379
Goodness-of-Fit index	.924	.863	.910	.862	.518	.683	.780	.759
Root mean square error of approximation	.074	.062	.056	.050	.113	.088	.080	.050

Note: Results are from structural equation modeling. Pathway labels (letters) correspond to Figure 1 or indicate products of coefficients for indirect effects. Controls included in the models, but not shown in the table, include gender, age group, parental status, exempt status, income, tenure, occupational level, work hours (more than 50 per week), psychological job demands, decision authority, skill discretion, satisfaction with manager, supportive occupational environment, life change between waves, and job change between waves. The full table is available on request. Dashes indicate non-applicability.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 3

Summary of Indirect Effects of Results Only Work Environment (ROWE) on Health and Well-Being

	Panel A: Sleep Quality		Panel B: Emotional Exhaustion		Panel C: Personal Mastery	
	Model 1	Model 4	Model 1	Model 4	Model 1	Model 4
Structural Equation Model Pathways	**Standard Estimate**	**Standard Estimate**	**Standard Estimate**	**Standard Estimate**	**Standard Estimate**	**Standard Estimate**
Direct effects on health-related outcomes						
Health T1 → Health Outcome T2 (a)	.450***	.384***	.574***	.452***	.642***	.603***
ROWE → Health Outcome T2 (b)	−.054	.012	−.007	.079*	−.009	−.044
Schedule Control T2 → Health Outcome T2 (c)	—	.125***	—	−.121***	—	.052
Negative Work-Home Spillover T2 → Health Outcome T2 (d)	—	-.270***	—	.381***	—	-.211***
Intervening pathways						
ROWE → Schedule Control T2 (e)		.226***		.237***		.229***
ROWE → Negative Work-Home Spillover T2 (f)		−.019		−.048		-.027
Schedule Control T2 → Negative Work-Home Spillover T2 (g)		−.230***		−.174***		-.253***
Indirect effects on health-related outcomes						
ROWE → Schedule Control T2 → Health T2 (h = c × e)	—	.028**	—	−.029***	—	.012*
ROWE → Negative Work-Home Spillover T2 → Health T2 (i = f × d)	—	.005	—	−.018*	—	.006
ROWE → Schedule Control T2 → Negative Work-Home T2 → Health T2 (j = e × g × d)	—	.014**	—	−.016*	—	.012*
Total Indirect Effect of ROWE on Health T2 (k = h + i + j)	—	.048***	—	−.063***	—	.030**
Total Effect of ROWE on Health T2 (b + k)						
Model fit statistics						
Normed χ^2	5.339	2.646	9.717	4.733	9.893	4.780
Goodness-of-Fit index	.657	.910	.524	.940	.502	.940
Root mean square error of approximation	.093	.074	.115	.075	.116	.076
Direct effects on health-related outcomes						
Health T1 → Health Outcome T2 (a)	.633***	.544***	.650***	.634***	.608***	.532***
ROWE → Health Outcome T2 (b)	-.013	.045	-.024	−.050	.058	.019

	Panel A: Sleep Quality		Panel B: Emotional Exhaustion		Panel C: Personal Mastery	
	Model 1	Model 4	Model 1	Model 4	Model 1	Model 4
Structural Equation Model Pathways	**Standard Estimate**	**Standard Estimate**	**Standard Estimate**	**Standard Estimate**	**Standard Estimate**	**Standard Estimate**
Schedule Control T2 → Health Outcome T2 (c)	—	−.083*	—	.045	—	.087*
Negative Work-Home Spillover T2 → Health Outcome T2 (d)	—	.365***	—	−.107**	—	-.227***
Intervening pathways						
ROWE → Schedule Control T2 (e)	—	.247***		.236***		.224***
ROWE → Negative Work-Home Spillover T2 (f)	—	−.033		−.023		−.010
Schedule Control T2 → Negative Work-Home Spillover T2 (g)	—	−.191***		−.269***		−.241***
Indirect effects on health-related outcomes						
ROWE → Schedule Control T2 → Health T2 (h = c × e)	—	−.021*	—	.011*	—	.020*
ROWE → Negative Work-Home Spillover T2 → Health T2 (i = f × d)	—	−.012*	—	.002	—	.002
ROWE → Schedule Control T2 → Negative Work-Home T2 → Health T2 (j = e × g × d)	—	−.017*	—	.007*	—	.012*
Total Indirect Effect of ROWE on Health T2 (k = h + i + j)	—	−.050***	—	.020**	—	.034***
Total Effect of ROWE on Health T2 (b + k)						
Model fit statistics						
Normed χ^2	3.958	2.343	5.208	2.246	5.308	2.812
Goodness-of-Fit index	.924	.862	.688	.930	.688	.942
Root mean square error of approximation	.074	.050	.098	.070	.099	.076

Note: Results are from structural equation modeling. Pathway labels (letters) correspond to Figure 1 or indicate products of coefficients for indirect effects. Controls included in the models, but not shown in the tables, include gender, age group, parental status, exempt status, income, tenure, occupational level, work hours (more than 50 per week), psychological job demands, decision authority, skill discretion, satisfaction with manager, supportive occupational environment, life change between waves, and job change between waves. The full table is available on request. Dashes indicate non-applicability.

* $p < .05$.

** $p < .01$.

*** $p < .001$.