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## Healthy Work Revisited: Do Changes in Time Strain Predict Well-Being?

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### Abstract

Building on Karasek and Theorell (R. Karasek & T. Theorell, 1990, *Healthy work: Stress, productivity, and the reconstruction of working life*, New York, NY: Basic Books), we theorized and tested the relationship between *time strain* (work-time demands and control) and seven self-reported health outcomes. We drew on survey data from 550 employees fielded before and 6 months after the implementation of an organizational intervention, the Results Only Work Environment (ROWE) in a white-collar organization. Cross-sectional (Wave 1) models showed psychological time demands and time control measures were related to health outcomes in expected directions. The ROWE intervention did not predict changes in psychological time demands by Wave 2, but did predict increased time control (a sense of time adequacy and schedule control). Statistical models revealed increases in psychological time demands and time adequacy predicted changes in positive (energy, mastery, psychological well-being, self-assessed health) and negative (emotional exhaustion, somatic symptoms, psychological distress) outcomes in expected directions, net of job and home demands and covariates. This study demonstrates the value of including time strain in investigations of the health effects of job conditions. Results encourage longitudinal models of change in psychological time demands as well as time control, along with the development and testing of interventions aimed at reducing time strain in different populations of workers.

### Keywords

time strain; health; psychological time demands; time adequacy; organizational intervention

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*Healthy Work*, published by Karasek and Theorell in 1990, became a watershed book, underscoring the importance of job strain (high job demands, low job control) as an occupational stressor and risk factor for cardiovascular disease and other health outcomes (see also Karasek, 1979). But in the 20-plus years since this classic was published, the context of work has changed dramatically, with both working conditions and the labor force in flux. Specifically, both technological advances (blurring the temporal and spatial boundaries between work and nonwork) and a global risk economy have heightened job demands and pressures for workers to engage in work tasks outside of traditional work times and places, in order to accomplish the work as well as to appear as invaluable, committed employees (Blair-Loy, 2003). Moreover, work overloads and time pressures are mounting even as ever fewer employees—men or women—have homemakers or others who can take care of their nonwork obligations. A 2004 study of a nationally representative sample of U.S. adults found 69% reported feeling highly overworked on the job, while 78% reported

often or very often having to work on too many tasks at the same time (Galinsky et al., 2005). Taken together, these developments suggest that employees are experiencing an increasing sense of *time strain* in the form of higher psychological work-time demands and lower control over their time allocations (Epstein & Kalleberg, 2004; Hochschild, 1997; Jacobs & Gerson, 2004; Kompier, 2006; Moen, 2003).

This study extends the current literature on job strain to investigate the health effects of *time strain* (high time demands, low time control) in both the cross-section and over a 6-month period. In doing so, we exploited prospective data on a flexibility intervention to investigate its impacts on changes in time demands and time control. We then examined whether changes in time demands and/or time control predicted changes in self-reported health outcomes using a two-wave panel design.

While Karasek and Theorell's (1990) classic job strain model revolutionized the occupational health literature, scholars have called for new framings that move beyond existing models (de Lange, Taris, Kompier, Houtman, & Bongers, 2003; Hammer, Saksvik, Nytro, Torvatn, & Bayazit, 2004; Ippolito, Adler, Thomas, Litz, & Holzl, 2005; Strazdins, D'Souza, Lim, Broom, & Rodgers, 2004; Theorell, 2006; Vanroelen, Levecque, Moors, Gadeyne, & Louckx, 2009). This study offers just such a new framing, thereby making three contributions to the literature on the relationships between occupational conditions and health. First, we extend the job strain model (Karasek, 1979; Karasek & Theorell, 1990) to theorize and test an additional *time strain* component as another aspect of contemporary work stress that is a significant risk factor for health, over and above conditions of high job demands and low job control. To do so, we investigate the value of including time strain in both cross-sectional and prospective models.

Second, we drew on the implementation of a flexibility intervention to assess a dynamic model of within-person change in time strain, surveying respondents before and 6 months after rollout of the organizational intervention focusing on results, not time spent on the job (Results Only Work Environment-ROWE, see Ressler & Thompson, 2008). This permitted us to capture the degree to which a flexibility intervention could, in fact, reduce time strain. This complements and extends previous research on changes in job strain (de Lange, Taris, Kompier, Houtman, & Bongers, 2004, 2005; Rosenström et al., 2011) and on interventions designed to reduce job strain (Bond, Flaxman, & Bunce, 2008; Bourbonnais, Brisson, Vient, Vezina, & Lower, 2006).

Third, we tested the effects of changes in time strain on changes in health outcomes, net of changes in both home demands and home control and job demands and job control. Our research design permitted an assessment of 1) whether the intervention increased time control and/or decreased time demands, and 2) whether changes in time control or time demands were associated with improvements in health outcomes.

## Background

Of particular added value is the fact that this study builds on and integrates the growing literature documenting the rise in the intensity of work, leading to time pressures and overloads (Galinsky et al., 2005; Milkie, Mattingly, Nomaguchi, Bianchi, & Robinson, 2004; Milkie, Raley, & Bianchi, 2009) with the more established literature on the health effects of job conditions (de Lange et al., 2003; Häusser, Mojzisch, Niesel, & Schulz-Hardt, 2010; Stansfeld & Candy, 2006). Karasek and Theorell (1990) recognized the importance of job control (job latitude over how one does one's job and over the skills used to do it), but there is also the matter of control over when and where one works. Work-time control (also called *schedule control*) has been defined as employees' autonomy in making decisions regarding the duration and timing of their work, including where their work is done (Ala-

Mursula, Vahtera, Kivimaki, Kevin, & Pentti, 2002; Ala-Mursula, Vahtera, Linna, Pentti, & Kivimaki, 2005; Fenwick & Tausig, 2001; Härmä, 2006). We argue that control over work time may be especially important for the health and well-being of contemporary employees, given the increasing time pressures, time speed-ups, and work-family time conflicts many are experiencing (Hill, Hawkins, Martinson, & Ferris, 2003; Kelly & Moen, 2007; Moen, Kelly, & Huang, 2008; Thomas & Ganster, 1995). Measures of time control have been found to be correlated with but distinct from job control measures (Moen et al., 2008). In support of this argument is a 1997 Finnish study of municipal employees by Ala-Mursula and colleagues (2002) defining work-time control as control over work scheduling, work hours, timing of breaks, and vacations and days off. They found that poor health and psychological distress were more prevalent among women in the lowest quartile of work-time control, compared to those in the highest quartile of work-time control, net of job control measures. And Fenwick and Tausig (2001) used 1992 data to show that schedule control was associated with less burnout, distress, life dissatisfaction, poor general health, minor physical problem, and lack of work-home balance.

A sense of time control may also reflect time constraints more generally (such as in meeting occupational and family time demands and expectations—e.g., Hochschild, 1997; Thomas & Ganster, 1995; Vanroelen et al., 2009). Accordingly we also include *time adequacy* as another dimension of time control, capturing employees' assessments of having "enough" time for themselves, for being with their families, and for participating in their communities (Van Horn, Bellis, & Snyder, 2001). In support of this, a 1997 national study by Nomaguchi, Milkie, and Bianchi (2005) found that dual-earner parents who felt they did not have enough time with their children, spouses, or for themselves reported poor psychological well-being. A study of construction workers also found time adequacy to be correlated with work-to-family enrichment (Lingard, Francis, & Turner, 2010).

One form of work-time demands is excessive *work hours* or overtime (Beckers et al., 2008; Härmä, 2006). A meta-analysis revealed small but significant correlations between hours of work and both psychological and physical health outcomes, as well as health symptoms (Sparks, Cooper, Fried, & Shirom, 1997). Other studies have also linked work hours to poorer health outcomes, including poor mental health status, self-reported hypertension, and smoking (Artazcoz, Cortes, Escriba-Aguir, Cascant, & Villegas, 2009; Virtanen et al., 2011). In a study of civil servants in Britain, Finland, and Japan, long work hours (>9 hours per day) were linked to poor physical functioning for Japanese and Finnish men (but not women) and to poor mental functioning for both Japanese men and women net of job demands and job control (Sekine, Chandola, Martikainen, Marmot, & Kagamimori, 2009).

Another form of work-time demands is psychosocial time pressures, such as tight deadlines (Shultz, Wang, & Olson, 2010), perceived time pressure (Dugan, Matthews, & Barnes-Farrell, 2012; Milkie et al., 2004), or a time famine of too much work to do in the time available (Perlow, 1999). Such subjective assessments of time demands may be more important for health than hours spent on the job, and have been investigated as perceived work overload (Carlson & Perrewe, 1999), high amounts and pace of work (Mauno, Kinnunen, & Ruokolainen, 2007), and perceived work-time pressure (Dugan et al., 2012). In their study of employees in different professions (ranging from management to manual labor), Dugan and colleagues (2012) found perceived work-time pressure to have an indirect effect on self-reported health, while number of work hours had only small indirect effects.

The evidence to date on the health effects of work-time demands or control is primarily cross-sectional, even though longitudinal research designs are key to advancing the field of occupational health (de Lange et al., 2003). We know of only three longitudinal studies of work-time demands or control in relation to health outcomes. Ala-Mursula and colleagues

(2005) conducted an important prospective 2-year study of public sector Finnish employees, finding that work-time control moderated the effects of high work stress (defined as workload and work pace) on women's sickness absence over a 2-year follow-up. Note that these researchers did not, however, examine the effects of changes in work-time control. Two other prospective studies drawing on the data set we use in this paper (608 workers at a white-collar organization in the U.S.) showed that the ROWE flexibility intervention decreased work-family conflict and improved work-family fit over a 6-month period, as well as increasing reported hours of sleep. (Kelly, Moen, & Tranby, 2011; Moen, Kelly, Tranby, & Huang, 2011).

Scholars have also pointed to the paucity of intervention research aimed at changing the psychosocial work environment or assisting employees to manage their work and family demands (Bourbonnais et al., 2006; Brough & O'Driscoll, 2010). And yet intervention research is key to understanding solutions for making positive organizational changes, for changing employees' psychosocial work environments, or for helping employees manage their multiple obligations on and off the job. In one promising intervention study, Bond and colleagues (2008) adopted a participative action research (PAR) approach in two call centers in the United Kingdom, involving team members in the intervention group to identify and propose solutions for problematic aspects of their work organization, finding improvements in employee mental health and a decrease in absences 12 months after the intervention. A 2009 literature review of 13 articles on organizational interventions aimed at balancing work and family demands by Brough and O'Driscoll (2010) found that most involved changes in working time and/or working hours, such as studies of compressed work weeks (Dunham, Pierce, & Castaneda, 1987; Lingard, Brown, Bradley, Bailey, & Townsend, 2007; Moore & Morrow, 1987; Vega & Gilbert, 1997) and employees' self-scheduling of shift-work (Wilson, Polzer-Debruyne, Chen, & Fernandes, 2007). However, workers in these studies did not control when they started or ended work, or the number of hours they worked.

## The ROWE Intervention

This study builds on and extends the sizable literature on flexible work arrangements (Allen, 2001; Brough, O'Driscoll, & Kalliath, 2005; Carlson, Grzywacz, & Kacmar, 2010; Grice, McGovern, & Alexander, 2008; Grzywacz, Carlson, & Shulkin, 2008; Halpern, 2005; Hill et al., 2008; Hill, Hawkins, Ferris, & Weitzman, 2001) by actually testing an intervention designed to make flexibility an accepted (normal) part of the way work is accomplished. Existing studies of flexibility have characteristically investigated the availability, utilization, or perceived usability of specific work-family policies, typically by comparing employees who do or do not have or use flexibility arrangements. However, such flexibility arrangements are often offered at the discretion of employees' supervisors. By contrast, the present study investigates within-person changes as a result of an intervention designed to make flexibility the norm, not the exception, theorizing that such an intervention might reduce employees' work-time demands and/or promote their control over their time.

We drew on data collected before and 6 months after the rollout of ROWE (Results Only Work Environment), deliberately designed to deemphasize time by focusing on results, not when or where work was accomplished (Ressler & Thompson, 2008). ROWE was developed internally and then implemented at the corporate headquarters of a large retail organization (see Kelly, Ammons, Chermack, & Moen, 2010; Kelly et al., 2011; Moen, Kelly, & Chermack, 2009; Moen, Kelly, & Hill, 2011). The goal of the ROWE intervention was to move from conditions where individual employees have some "flexibility" (with their supervisors' permission) to conditions where flexibility is an integral part of organizational practices and culture. Unlike most flexibility initiatives (Kelly & Moen, 2007), the ROWE employees were told they no longer needed their supervisors' permission

to modify their work schedules or work location. Instead, employees could routinely change when and where they work based on their individual needs, so long as agreed upon results were achieved (Ressler & Thompson, 2008). Employees receiving the ROWE treatment were repeatedly encouraged to focus only on results, not time at work (such as when people arrive or leave the workplace). Employees and their supervisors were also trained to no longer equate time at work with productivity or with getting work accomplished, but to focus instead on performance accountability. Teams were encouraged to establish clear goals (results), as well as metrics by which to assess whether they have been met. A key question we address was whether ROWE actually reduced employees' time strain, in terms of reducing their work-time demands and/or increasing their time control.

## Hypotheses

### Cross-Sectional Associations

We first examined a cross-sectional model, estimating the relationship between work-time demands and control and self-reported health outcomes. We included as covariates traditional job strain measures, gender, and measures of home demands and home control.

**Hypothesis 1** Higher levels of work-time demands and lower levels of time control are related to poorer health outcomes.

### Intervention Effects

Given its focus on making flexibility routine, we hypothesized that being part of the ROWE treatment would increase employees' perceptions of time control and reduce their time demands.

**Hypothesis 2** Employees enrolled in the ROWE intervention will report a reduction in time strain (lower time demands, greater time control), in contrast to the comparison group of employees continuing usual practices.

### Health Outcome Changes

Our third hypothesis links changes in work-time demands and control to changes in health outcomes over the 6 months between surveys. Specifically, increases in employees' work-time demands should predict negative health outcomes, while increases in time control should predict positive health outcomes, over and above the effects of any changes in job demands/control or home demands/control.

**Hypothesis 3** Changes in time strain predict changes in health outcomes, net of any health effects associated with changes in job strain or home conditions.

## Method

### Participants and Procedure

The participants were white-collar employees in the corporate headquarters of a large retail firm in the Midwest. This study employed a quasi-experimental, pre-post-test comparison design to investigate whether ROWE predicts changes in time strain by conducting two web-based surveys 6 months apart in 2006, before and after the implementation of ROWE. The staggered rollout of ROWE provided a comparison group of those not yet experiencing it by Wave 2, with both groups interviewed at Wave 1, prior to the ROWE rollout (Shadish, Cook, & Campbell, 2002; Strauss & Thomas, 2008). Those who went through the ROWE treatment during the study period were contrasted with those who had not done so as a comparison sample to test whether participation in the ROWE innovation altered

employees' time strain (time demands, time control). Half of the participants received the treatment; half served as a comparison sample. We then used a cohort design to examine whether changes in time strain (time demands and time control) were related to corresponding changes in employees' health outcomes.

ROWE was not presented as a pilot study, but as a new initiative that would eventually make its way to most, if not all, departments within the corporate headquarters. It was a corporate initiative developed by human resources staff within the company, a presumably permanent shift in the organization. Employees and managers adopted ROWE ways of working after engaging in four participatory workshop sessions led by HR personnel that first discussed the limits of traditional time expectations and policies, and then identified new work practices that focus on achieving results, not on time spent at the workplace. In these sessions, employees and managers were encouraged to reinterpret current practices and policies as too focused on face time and therefore inefficient; qualitative data on employees' and managers' responses to ROWE was described and analyzed in Kelly et al. (2010).

Departments were not randomized to participate in ROWE, but neither did individual employees or their direct (department-level) supervisors decide whether they would participate. Since not every group could go through the intensive training at the same time (given capacity constraints of ROWE facilitators), some were necessarily at the end of the queue and served as our comparison group. Senior leadership (at the VP level, not the participants' direct supervisors) decided whether to bring all of the departments reporting to them into ROWE at Wave 1 or to wait until later. Thus, individual departments were not selected into or out of the ROWE rollout; rather, all departments within a division were scheduled to be either earlier or later in the queue. While we are comfortable assuming that there were no selection effects at either the individual or department level, nonetheless, we cannot rule out that some unknown selection processes affected whether VPs moved their divisions (and hence, the departments in them) quickly into ROWE and which VPs had their divisions wait for later implementation (our comparison group). For example, based on previous research on managers' support of flexible work options (Blair-Loy & Wharton, 2002), senior executives may have been drawn to ROWE based on their personal characteristics or their sense of employees' needs. Kelly et al. (2011) showed departments were more likely to move into ROWE during the study period if they had more women, higher average job demands, or higher average schedule control at Wave 1. Accordingly, in estimating the effects of ROWE on time strain we controlled for all these Wave 1 measures.

Because moving into ROWE was an executive decision to participate in a company program, employees did not formally consent to the intervention. The survey was presented as a broad study of work, family, and health conducted by academic researchers; it was not explicitly tied to ROWE. All participants gave written informed consent to the study, and it was approved by a university Institutional Review Board. A total of 659 employees completed both waves of the survey, with 109 excluded because of a missing value on variables being investigated, producing an analytic sample of 550. Test of differences between those in our analytical sample and those excluded due to missing data did not reveal any significant differences between the two groups, except for marital status. Those included in our analytical sample were more likely ( $p < .05$ ) to be married or partnered (69%), than were those excluded (57%).

## Measures

**Time strain**—Based on the literature (reported above) on the importance of both objective and subjective time pressures, two measures capture work-time demands: *work hours* (average hours worked per week) and a newly constructed *psychological time demands*

*scale*. This sample regularly puts in long hours (on average 48.2 hours/week) in a corporate environment where long hours are expected (Kelly et al., 2011). *Psychological time demands* is a 6-item scale we constructed with three items gauging perceived work-time pressures, including “I do not have time to step back and process or reflect on the work I’m doing” and “In my free time, I never know when work will call or page me about a problem.” An additional three items were drawn from Siegrist et al. (2004), including “When I get home, I can never easily relax and ‘switch off’ work” and “Work rarely lets me go; it is still on my mind when I go to bed.” Responses were on a 5-point scale that ranged from *strongly disagree* (1) to *strongly agree* (5). Factor analysis supported that these items constitute a single scale, with reliability estimated at 0.74.

We also included two time-control scales, based on the literature (described above) on the importance of schedule control and time adequacy for health. *Schedule control* ( $\alpha = 0.78$ ) is derived from Thomas and Ganster’s (1995) seven items, measured using a 5-point scale, from (1) *Very little* to (5) *Very much*, indicating how much control employees have over when they work. Responses were prompted by “How much choice do you have over... (e.g., when you can take a few hours off; when you begin and end each workday).” *Time adequacy* ( $\alpha = 0.90$ ) is a scale consisting of nine items derived from Van Horn et al. (2001) and Becker, Stuifbergen, Soo Oh, and Hall (1993). These items ask employees to assess, on a 10-point scale, from (0) *Not at all adequate* to (10) *Almost always adequate*, whether they have enough time to spend with family, community groups and for themselves. We include both Wave 1 and Wave 2 scores, with Wave 2 capturing the change in time demands or time control in the 6 months between surveys.

**Covariates**—Given the emerging focus on home demands and home control (Chandola, Kuper, Singh-Manoux, Bartley, & Marmot, 2004; Ertel, Koenen, & Berkman, 2008; Griffin, Fuhrer, Stansfeld, & Marmot, 2002; Moen et al., 2008), we also included measures of *home demands* (gauged by marital status, having a preschool child at home, caring for aging relatives and having a child with a disability) and *home control*, ( $\rho = 0.73$ ), on a 5-point scale, constructed from two items mirroring Karasek’s (1979) job control measure, “To what extent do you have the freedom to decide how to organize your household work?” and “To what extent do you have control over what happens at home?” Responses range from (1) *Never* to (5) *Extremely Often*. Griffin and colleagues (2002) found low control at home to be a strong predictor of depression and anxiety for both men and women; with home control a stronger predictor of women’s anxiety than job control. Changes in home control were measured by including both Wave 1 and Wave 2 home control. Changes in home demands were measured by changes in each of the above statuses (such as ceasing or beginning to care for an aging relative).

Conventional measures of job strain are also included as covariates. Job control (*decision latitude*) is a combination of Karasek and Theorell’s (1990) 3-item decision authority scale and a 6-item skill discretion scale in terms of the skills they use on their job ( $\alpha = 0.81$ ). Respondents were asked to rate from (1) *Strongly disagree* to (4) *Strongly agree* on questions such as “I have a lot of say about what happens on my job” and “My job allows me to make a lot of decisions on my own.” *Psychological job demands* ( $\alpha = 0.77$ ) uses Belkic’s measures (Belkic, Landsbergis, Schnall, & Baker, 2004) plus one item on interruptions and disturbances on the job (Siegrist et al., 2004). Respondents were asked to rate from (1) *Strongly disagree* to (4) *Strongly agree* on items such as “My job requires very hard work” and “My job requires excessive work.” Changes in job strain measures are computed by subtracting Wave 1 scores from Wave 2 scores.

*ROWE* is a zero/one dummy variable. Recall that half the sample had participated in *ROWE* prior to the Wave 2 survey (treatment group), and the other half continued existing work practices through the Wave 2 survey (comparison group).

**Health outcomes—***Self-assessed health* is from a question asking, “In general, how would you say your health is?” with responses ranging from 1 = *poor* to 5 = *excellent*. *Somatic symptoms* are a count of how respondents answer (yes/no) whether they were afflicted over the last 4 weeks with any of 15 symptoms: headache, constipation/diarrhea, muscle soreness, shortness of breath, tightness of chest, trembling/shaking, backache, cold/flu symptoms, heart pounding, nausea/upset stomach, hot or cold flashes, congestion, poor appetite, sore throat, and dizziness, with a possible score from 0 to 15. *Energy* ( $\alpha = 0.86$ ) is a 4-item subset of a scale on employee energy level during the past 4 weeks (Ware & Sherbourne, 1992), from 1 = *all of the time* to 6 = *none of the time* including questions like, “Did you feel worn out?” *Emotional exhaustion* scale ( $\alpha = 0.73$ ) is a 5-item subset of items from the Maslach Burnout Inventory, on a 7-point scale, from (1) *Never* to (7) *Everyday* (e.g., “I feel emotionally drained from my work” –Maslach & Jackson, 1986). *Psychological Well-Being* ( $\alpha = 0.74$ ) is a 6-item scale from Ryff and Keyes (1995) on employees’ general sense of well-being and outlook in life. Respondents are asked to rate from (1) *Strongly disagree* to (6) *Strongly agree* on items such as “When I look at the story of my life, I am pleased with how things have turned out.” *Personal mastery* ( $\alpha = 0.82$ ) is a 7-item scale from Pearlin and Schooler (1978). Responses were captured on a 6-point scale, from (1) *Strongly agree* to (6) *Strongly disagree* on questions including “There is no way I can solve some of the problems I have.” *Psychological distress*, ( $\alpha = 0.83$ ) developed for the National Center for Health Statistics, measures overall personal distress over the last 4 weeks (Furukawa, Kessler, Slade, & Andrews, 2003). Respondents indicated from (0) *None of the time* to (4) *All of the time* with regard to questions such as “During the past 4 weeks, about how often did you feel... (e.g., nervous; hopeless).” All of the items for the health outcomes are available in the Appendix.

### Statistical Approach

To test Hypothesis 1, we estimated cross-sectional models of relationships between measures of time strain (time demands, time control) and subjective health outcomes at Wave 1. Next, we drew on prospective data over the 6-month study period to test Hypothesis 2, that *ROWE* would reduce work-time demands and increase time control. This was accomplished in a step-wise fashion, including only covariates along with the Wave 1 demand or control measure in Step 1. Step 2 assessed whether including *ROWE* in the model had statistically significant effects above and beyond that of the covariates in predicting the demand or control measure at Wave 2. *ROWE* employees reported higher schedule control and psychological time demands at baseline; given ceiling effects and the direction of hypotheses, this may reduce the ability to detect *ROWE* effects on changes in these measures. The differences between *ROWE* and the comparison group at baseline thus reinforced the importance of including Wave 1 measures in the models to reduce possible bias.

We then used both Wave 1 and Wave 2 time strain measures in models to test Hypothesis 3, theorizing increases in work-time demands lower health outcomes, while increases in time control promote better health outcomes. Looking at differences in each measure across two points in time means that fixed characteristics are differenced out, reducing any potential source of bias from time-invariant unmeasured characteristics (Avendano, 2012; Wooldridge, 2002). We employed regression models to estimate whether changes in time strain (captured in the Wave 2 measures) were associated with changes in health outcomes (Wave 2 health outcomes, controlling for Wave 1 health outcomes), net of changes in



covariates (home demands, home control, job demands, job control) and time strain at Wave 1. Thus this phase of the study was a cohort analysis of the health effects of changes across two time periods in time demands and time control. This was accomplished in a stepwise fashion, first testing the effects of changes in covariates in Step 1, then including in Step 2 changes in time strain (as evidenced in Wave 2 time control, time demands) to examine whether inclusion of changes in time strain predicted changes in the seven self-reported health outcomes (Hypothesis 3). Since ROWE did not predict changes in health outcomes in a prior study (Moen, Kelly, Tranby, & Huang, 2011), we included ROWE as a covariate to capture any unmeasured differences between ROWE and the comparison group.

## Results

Table 1 provides a correlation matrix as well as descriptive Wave 1 data on time strain measures, health outcomes and covariates. Correlations between variables are low to moderate, with the highest being correlations between psychological time demands and the traditional job demands measure (.52) and between time adequacy and psychological time demands (−.50) at baseline. We do not see these correlations as suggesting concept overlap, since a correlation of .5 means that only .25 of the variance in one variable is explained by the other variable. Moreover, the baseline correlation between time demands and job demands is not surprising; one would expect both job and time demands to overlap in work environments. The correlation between time control and psychological time demands is also not surprising, given that we hypothesized that time demands predict lower time control. These two moderate, bordering on high, correlations point to the value of our analysis of changes in these measures over time, as well as our modeling of the health effects of time-related job conditions net of traditional measures of job strain conditions. Note that there are high correlations (.67; −.57) between psychological well-being, mastery, and psychological distress, all of which are complementary but distinct measures of emotional health.

### Hypothesis 1: Cross-Sectional Associations

Table 2 provides estimates from cross-sectional OLS regression models of the links between time strain measures and health outcomes at Wave 1. Net of job demands and other covariates, psychological work-time demands were negatively associated with positive (energy, mastery, psychological well-being, self-assessed health) outcomes and positively associated with negative (emotional exhaustion, psychological distress) outcomes, which are the expected directions. But, contrary to expectations, longer work hours were positively related to five of the health outcomes, which was not the direction hypothesized or suggested by the literature. Specifically, at Wave 1, work hours were positively associated with energy, mastery, and psychological well-being and negatively associated with emotional exhaustion and psychological distress. However, as we show below (see Table 4), increases (or decreases) in work hours were not predictive of health changes from Wave 1 to Wave 2. This suggests that the cross-sectional results may have been capturing the fact that employees who worked longer hours at Wave 1 in this white-collar setting (where average hours were already long) may be different in other ways, such as being highly engaged in their careers. Note as well that this cross-sectional association between work hours and health outcomes was net of both psychological time demands and psychological job demands.

As hypothesized, time control measures were positively associated with health outcomes. We found that Wave 1 time adequacy was associated with all seven Wave 1 health outcomes. Net of decision latitude and other control variables, higher time adequacy was related to higher levels of energy, mastery, and self-assessed health, as well as to lower levels of emotional exhaustion and psychological distress. Higher time adequacy and schedule control were both associated with fewer somatic symptoms, but had different

effects on psychological well-being (time adequacy positive effects, schedule control negative effects). Including both measures of time control in the same models thus produced different effects of schedule control on psychological well-being, suggesting that those with schedule control who nevertheless lacked a sense of time adequacy may have different health outcomes. The fact that schedule control was associated with lower psychological well-being raises the issue of whether schedule control contributes to greater permeability of the work-home boundary and job overloads, given the stress of higher status jobs that often come with greater control over working time (Schieman, Milkie, & Glavin, 2009). However, no such negative effects of schedule control were found in estimating models of the effects of changes in schedule control on changes in health outcomes (see Table 4).

This cross-sectional analysis provides general support for Hypothesis 1 and the findings of previous research on health outcomes and psychological time demands, time adequacy, and schedule control. What this cross-sectional analysis contributes is analysis of 1) the relationship of both time demands and time control measures to self-reported health outcomes in the same models (most studies examine one or the other, but not both), and 2) the relationship between these time strain measures and health outcomes while simultaneously controlling for the effects of traditional job strain measures as well as measures of home demands and home control.

### **Hypothesis 2: Does ROWE Reduce Time Strain?**

Table 3 reports the results of OLS regression models investigating whether the ROWE intervention produced changes in work-time demands and time control. Results provide partial support for Hypothesis 2 in that ROWE promoted increased time control over the 6 months between surveys, in terms of gains in both schedule control and time adequacy (see Table 3, Step 2 models for W2 Time Adequacy and W2 Schedule Control). Contrary to Hypothesis 2, the ROWE treatment did not predict statistically significant changes in psychological time demands or work hours. Inclusion of the ROWE intervention proved to be a slightly better model fit for Wave 2 measures of time control, above and beyond covariates (changes in  $R^2$  of .01 and .06 from Step 1 to Step 2).

### **Hypothesis 3. Do Changes in Time Strain Promote Positive Health Changes?**

Models of within-person change over the 6 months between survey waves (see Step 2, Table 4) showed, in support of Hypothesis 3, that changes in work-time demands and time control (Wave 2 measures) predicted changes in health outcomes in the expected directions, net of any changes in covariates (job or home demands or job or home control). First, increases in time adequacy predicted positive changes in energy, mastery, and self-assessed health, along with reductions in somatic symptoms, emotional exhaustion, and psychological distress.

Second, the models also point to statistically significant health effects of changing time demands (Wave 2 measures; Step 2, Table 4). The evidence shows that, as hypothesized, increases in psychological time demands predicted decreases in every single positive health outcome (energy, personal mastery, psychological well-being, and self-assessed health), along with increases in all negative health outcomes (emotional exhaustion, somatic symptoms, and psychological distress). Changes in work hours, however, did not predict changes in any health outcomes. This suggests that the positive cross-sectional (see Table 2) relationships found between work hours and well-being outcomes might have been capturing unmeasured differences across individuals at Wave 1. Any such unmeasured variables are differenced out in the models here. Inclusion of within-person changes in time demands and time control in the models also contributed to increased explanatory power (see changes in  $R^2$  at Step 2 on Table 4, ranging from .03 to .07).

## Discussion

This study provides strong support for our hypotheses that time demands and time control are important job conditions that matter for health, net of classic job strain measures (job demands and job control), as well as measures of home strain (home demands and home control). It thus builds on and extends the limited evidence to date on the health effects of the rising time strain experienced by growing numbers of workers. Time strain is increasing in part because most contemporary workers have no backup on the home front (Hochschild, 1997). This is compounded by advances in communication technologies, heightened job insecurity, and a competitive global economy—all ratcheting up both work hours and psychological time demands (Chesley, 2010; Duxbury, Lyons, & Higgins, 2008; Perlow & Porter, 2009; Voydanoff, 2005).

While cross-sectional evidence showed the added value of including work-time demands and time control in estimating health outcomes (Hypothesis 1), the major contribution lies in the investigation of changes, captured through the use of prospective data, in both time strain and health outcomes. To begin to understand antecedents of changes in the quality of work experience, we utilized quasi-experimental data to test the effects of an organizational intervention (ROWE) on reducing time strain (Hypothesis 2), finding that exposure to ROWE increased time control (time adequacy, schedule control) but did not change time demands (work hours, psychological time demands). We then found support in the expected directions for the effects of within-person changes in psychological time demands and sense of time adequacy on shifts in a range of positive and negative self-reported health outcomes (Hypothesis 3).

The study also tested the effects on employees' time demands and time control of an intervention (ROWE) designed to make flexibility the "normal" way of working (Hypothesis 2). While prior research showed that ROWE did not measurably improve health outcomes over the short 6-month study period (Moen, Kelly, Tranby, & Huang, 2011), evidence from the present study suggests the possibility that this could well be because participating in ROWE did not reduce psychological time demands, as was hypothesized. In partial support of Hypothesis 2, however, the ROWE treatment did improve employees' time control: schedule control and time adequacy. This points to the importance of moving beyond assumptions of stability in job conditions to capture change in the temporal environment of work, illustrating the potential payoffs of future prospective cohort studies examining changes in job conditions over time as well as interventions aimed at modifying work conditions, especially given concerns about selection and causal direction in cross-sectional studies. Our longitudinal design with a quasi-experimental component permitted examination of intra-individual changes in time demands and time control as a result of a flexibility intervention, not simply cross-sectional snapshots of differences across employees. However, there are important limitations.

## Limitations

A key limitation to this study is that the sample is a very specific segment of the workforce, predominantly a white-collar, European American, well-educated, young sample of women and men employed at a large corporate headquarters in the Midwest of the United States. Additional research is needed to investigate the effects of changes in time strain beyond a white-collar workforce. Time control may be manifested differently (e.g., more predictable schedules combined with easier schedule swaps or the ability to refuse overtime) among low-wage workers and service and production workers, but we expect that time strain would be similarly related to health and well-being in a wide variety of work settings.

A second limitation, this study occurs over a short, 6-month period, suggesting the need for future research assessing stability and change in time demands and time control—as well as their effects on health outcomes—over longer periods. A third limitation is that the health outcomes were all self-reported; future research is necessary to test the effects of changes in time strain measures on more objective health outcomes.

Finally, our research design is only quasi-experimental; we were unable to randomly assign participants to treatment and control groups, and thus cannot be sure about unmeasured differences in the ROWE and comparison sample. More rigorous experimental designs with randomized assignment would be ideal, in addition to studies of ROWE-type interventions on employees in other occupations, organizations, and sectors. Some measure of internal validity can be expected, since ROWE was a corporate initiative and has continued to be the policy at its organizational headquarters. However, we do not know whether it would be generalizable to workers in other settings or in different types of occupations.

### Practical Implications

The evidence from this study underscores the importance of workplace policies and practices that shape job conditions, including the amount and degree of work-time demands and time control. What is key for practitioners and policymakers is the fact we showed that employees' psychosocial working conditions both changed over time (even over a 6-month period) and can be changed by interventions that modify the existing clockworks (schedules, norms, routines) of work. Workplace innovations such as ROWE (focusing on results, not time) offer employees more flexibility. While other studies (Kelly et al., 2011; Moen, Kelly, Tranby, & Huang, 2011) have documented ROWE effects on time control, this study is unique in showing the effects of increasing time adequacy on health outcomes. Employers would do well to attend to the conditions of work that provide their employees with a greater sense of having adequate time for their families and for themselves. Since psychological time demands were also an important predictor of health outcomes, there is clearly a need for the development and testing of interventions aimed at reducing employees' psychological time demands, something that ROWE did not do, and for testing a range of interventions in different populations of employees. Time strain, in the form of psychological time demands and a low sense of time adequacy, appears to take its toll on American workers' health.

Neither scholars nor human resource professionals understand the antecedents of changes in work-time demands or time control. This suggests the importance of partnerships between researchers and organizations to foster investigations of the effects, within and across work organizations, of existing and innovative policies and practices, in terms of contributing to greater time control or ameliorating the stress of psychological time demands at work.

### Promising Future Directions

Karasek and Theorell's (1990) major impact has been to show that the quality of experience with employment—specifically psychological job demands and job control—matters for the health and well-being of employees. In doing so, they established in the occupational health literature a framework underscoring job conditions as key ingredients to health. Building on this job strain model, the present study suggests three possible future directions for promoting understanding of healthy work. First, we showed the value of incorporating time strain—time demands and time control—as important job conditions contributing to health, even net of traditional job strain measures. There is need for future research considering the relative importance of job conditions producing time strain in different workforces and occupational sectors.

Second, we demonstrated the value of prospective data examining the effects of *changes in the temporal conditions of work*. Additional scholarship is necessary to further develop and test concepts capturing shifting time demands and time control at work and in private life. Our inclusion of home demands and home control as covariates points to the value of considering the family context in estimating health outcomes, given the family relatedness of many work decisions (Greenhaus & Powell, 2012). Different degrees of time demands and time control at work and at home may moderate one another in shaping the health and well-being of employees (see also Moen et al., 2008).

Third, we documented the potential importance of the future development and testing of interventions designed to reduce time strains. The salutary changes we found in time control as a result of ROWE could be interpreted as indicative of the value of future studies of other interventions aimed at providing employees greater flexibility and latitude around the time and timing of their work, especially since ROWE-related changes in time adequacy predicted positive health outcomes. The significance of time adequacy in promoting positive health outcomes net of schedule control suggests the need for future research analyzing the relationships between interventions, schedule control and time adequacy. We found that the ROWE flexibility initiative did not reduce psychological time demands, probably because ROWE-type interventions do not diminish the amount, intensity, or expectations of time investments in work. And yet the evidence we found on the negative health effects of increases in psychological time demands, which were not impacted by ROWE, suggest the need for future studies of job redesigns aimed at reducing work overloads and time pressures in addition to interventions promoting greater flexibility and control. Since increases in psychological time demands had deleterious health effects, future investigations are needed as to both the factors associated with high psychological work-time demands and interventions specifically designed to reduce them. An example of one such innovation, Leslie Perlow and her colleague described an intervention for business consultants where workers are required to disconnect from work, having “predictable time off” of either one full day in the middle of the work week, or one scheduled night off a week, where workers are not allowed to work after 6 p.m. (Perlow, 2012; Perlow & Porter, 2009). Doing so was found to have salutary effects for both workers and their employer, in terms of job satisfaction, work – life balance, value delivery, and other job attitudes outcomes (Perlow & Porter, 2009).

To conclude, this study points to the need for theorizing time strain as well as job strain as conditions affecting health, for dynamic models of change (and intervention effects) over time, and for developing interventions that not only promote greater time control, but also help to reduce mounting psychological work-time demands. We draw from it two especially fruitful questions for future research. First, what are the effects of interventions designed to reduce psychological time demands as well as increase time control? This is key to informing policy initiatives in both public and corporate sectors (Quick & Tetrick, 2003). Second, what factors precipitate changes in psychological time demands and control, absent any intervention effects? Further evidence is needed on whether there are precipitating events (such as a job or manager change) altering psychological time demands and control, or whether changes in these measures are primarily capturing alterations in workers’ subjective assessments of the nature of work conditions, not actual changes in them. These are clearly promising areas of inquiry that can do much to advance the science of occupational health psychology and to promote contemporary employees’ health and well-being.

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## Appendix. Description of Job Demands, Job Control, Time Demands, and Time Control and Health Outcome Scales Used in Analysis

Scale	Source	Variable description	Range
Psychological Job Demands	Belkic, Landsbergis, Schnall, & Baker, 2004	I do not have enough time to get my job done.  My job requires very fast work.  My job requires very hard work.	

Scale	Source	Variable description	Range
Decision Latitude = Decision Authority + Skill Discretion	Karasek and Theorell, 1990; Appelbaum, Bailey, Berg, & Kalleberg, 2000; Quinn & Staines, 1978	My job requires excessive work.	1-4
		My job involves conflicting demands.	
		I have many interruptions and disturbances in my job.	
		On my job, I have very little freedom to decide how I do my work.	
		I have a lot of say about what happens on my job.	
		My job allows me to make a lot of decisions on my own.	
		My job requires that I learn new things.	
Psychological Time Demands	Siegrist et al., 2004	My job involves a lot of repetitive work.	1-4
		My job requires me to be creative.	
		My job requires a high level of skill.	
		I get to do a variety of different things on my job.	
		I have an opportunity to develop my own special abilities.	
		In my free time, I never know when work will call or page me about a problem.	
		I am often pressured to work overtime.	
Time Adequacy	Van Horn, Bellis, & Snyder, 2001; Becker, Stuijbergen, Soo Oh, & Hall, 1993	I do not have time to step back and process or reflect on the work I'm doing.	1-5
		When I get home, I can easily relax and "switch off" work.	
		People close to me say I sacrifice too much for my job.	
		Work rarely lets me go; it is still on my mind when I go to bed.	
		To what extent is there time to get enough sleep/rest?	
		...Be by yourself?	
		...Socialize?	
Schedule Control	Thomas & Ganster, 1995	...Keep in shape?	1-10
		...Prepare or eat healthy meals?	
		...Participate in civic groups or be active in your community?	
		...Nurture your spiritual and/or creative side?	
		...Complete housework and chores?	
		...For your family to be together?	
		How much choice do you have over when you take vacations or days off?	
...when you can take a few hours off?			
...when you begin and end each workday?			

Scale	Source	Variable description	Range
Energy	Ware & Sherbourne, 1992	...over doing some of your work at home or at another location?	1-5
		...the amount or times you take work home with you?	
		...shifting to a part-time schedule if you wanted to do so?	
		...the total number of hours you work each week?	
Personal Mastery	Pearlin & Schooler, 1978	How much time during the past 4 weeks did you feel full of pep?	1-6
		...did you have a lot of energy?	
		...did you feel worn out?	
		...did you feel tired?	
Psychological Well-Being	Ryff & Keyes, 1995	There is no way I can solve some of the problems I have.	1-6
		Sometimes I feel that I'm being pushed around in life.	
		I have little control over the things that happen to me.	
		I can do just about anything I really set my mind to.	
		I often feel helpless in dealing with the problems of life.	
		What happens to me in the future mostly depends on me.	
Emotional Exhaustion	Maslach & Jackson, 1986	There is little I can do to change many of the important things in life.	1-6
		I like most aspects of my personality.	
		In many ways, I feel disappointed about my achievements in life.	
		When I look at the story of my life, I am pleased with how things have turned out.	
		I think it is important to have new experiences that challenge how you think about yourself and the world.	
		For me, life has been a continuous process of learning, changing, and growth.	
Count of Physical Symptoms	Grzywacz & Marks, 2000	I gave up trying to make big improvements or changes in my life a long time ago.	0-15
		I feel energized by my work.	
		I feel emotionally drained by my work.	
		I feel burned out by my work.	
Psychological Distress	Furukawa, Kessler, Slad, & Andrews, 2003	I feel stimulated by my work.	1-7
		I feel used up at the end of the workday.	
		In the last 4 weeks, did you experience any of the following physical symptoms, headache, constipation/diarrhea, muscle soreness, shortness of breath, tightness in chest, nausea/upset stomach, hot or cold flashes, congestion, poor appetite, sore throat, dizziness	
Psychological Distress	Furukawa, Kessler, Slad, & Andrews, 2003	During the past 4 weeks about how often did you feel nervous?	1-7
		...did you feel hopeless?	
		...did you feel restless or fidgety?	

Scale	Source	Variable description	Range
		...did you feel so depressed that nothing could cheer you up?	
		...did you feel that everything was an effort?	
		...did you feel worthless?	0-4

**Table 1**  
Descriptive Statistics and Correlations of Covariates, Time Demands, Time Control and Health Outcomes at Wave 1

Variable	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1. Women (0, 1)	.50	.50	—																		
2. Married/partnered (0, 1)	.69	.46	-.06	—																	
3. Parent of preschooler (0, 1)	.23	.42	-.02	.31*	—																
4. Parent of a child with disability (0, 1)	.09	.29	.03	.15*	.25*	—															
5. Caregiver to an adult (0, 1)	.12	.32	-.07	.10*	.02	.18*	—														
6. Home control W1	4.2	.77	.17*	-.30*	-.24*	-.19*	-.05	.84	—												
7. Work hours W1	48.18	6.68	-.05	.03	-.04	.06	.03	-.11*	—												
8. Psychological time demands W1	2.54	.68	.06	.04	.03	.13*	.03	-.21*	.43*	.74	—										
9. Schedule control W1	3.23	.73	.02	.11*	.17*	.08	-.05	.06	-.10*	-.11*	.78	—									
10. Time adequacy W1	5.09	1.88	-.03	-.19*	-.31*	-.16*	-.04	.42*	-.25*	-.50*	.13*	.90	—								
11. Psychological job demands W1	2.96	.49	.01	.09*	.05	.04	.03	-.14*	.38*	.52*	-.03	-.32*	.77	—							
12. Decision latitude (job control) W1	2.92	.43	-.08	.12*	.07	.04	-.01	.02	.16*	.05	.33*	.03	.27*	.81	—						
13. Self-assessed health W1	3.72	.83	.08	-.01	-.09*	-.13*	-.07	.22*	-.11*	-.28*	.10*	.36*	-.13*	.03	—						
14. Somatic symptoms W1	3.45	2.42	.13*	-.02	.08	.03	.00	-.13*	.05	.19*	-.17*	-.35*	.08*	-.12*	-.34*	—					
15. Energy W1	3.57	.87	-.01	-.03	-.07	-.05	-.05	.20*	-.05	-.33*	.08	.45*	-.16*	.14*	.37*	-.40*	.86	—			
16. Emotional exhaustion W1	3.67	.97	.04	.01	-.01	.00	.01	-.10*	.09*	.44*	-.21*	-.33*	.28*	-.31*	-.21*	.28*	-.53*	.73	—		

Variable	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
17. Psychological well-being W1	5.05	.68	.10*	.11*	.00	-.12*	-.05	.14*	.09*	-.10*	.06	.20*	.11*	.31*	.28*	-.16*	.32*	-.23*	.74		
18. Mastery W1	4.82	.80	.00	.09*	.01	-.11*	-.03	.28*	.01	-.22*	.15*	.31*	-.03	.27*	.30*	-.27*	.37*	-.32*	.67*	.82	
19. Psychological distress W1	4.62	3.65	.04	-.16*	-.08	-.01	.00	-.17*	.04	.36*	-.18*	-.33*	.10*	-.22*	-.31*	.34*	-.48*	.45*	-.41*	-.57*	.83

Note.  $N=550$ . Reliabilities (alphas) are on the diagonal. *SD* stands for standard deviation.

\*  $p < .05$ .

**Table 2**

Regression Analyses Examining the Relationship Between Time Demands, Time Control, and Health Outcomes at Wave 1

	W1 Energy	W1 Mastery	W1 Psychological well-being	W1 Self-assessed health	W1 Emotional exhaustion	W1 Somatic symptoms	W1 Psychological distress
Predictor variables							
Time demands							
Work hours	.12**	.11**	.11*	.03	-.12**	-.04	-.12**
Psychological time demands	-.18***	-.13**	-.09 <sup>†</sup>	-.15**	.40***	.03	.32***
Time control							
Time adequacy	.40***	.22***	.22***	.27***	-.11*	-.34***	-.24***
Schedule control	-.04	-.00	-.09*	.04	-.04	-.11*	-.02
Covariates							
Women	.02	.02	.13***	.09*	-.04	.10*	.01
Home demands							
Married/partnered	.04	.15***	.14***	.08 <sup>†</sup>	.03	-.07	-.19***
Parent of preschooler	.06	.09*	.07	.00	-.02	.02	-.11*
Parent of a child with disability	.02	-.07 <sup>†</sup>	-.11**	-.07 <sup>†</sup>	-.04	-.02	-.04
Caregiver to an adult	-.04	-.01	-.03	-.04	-.01	-.00	.01
Home control	.03	.22***	.07	.07	.05	-.01	-.11**
Psychological job demands	-.02	.02	.11*	.03	.19***	-.01	-.04
Decision latitude (job control)	.13**	.23***	.29***	.01	-.35***	-.05	-.16***
R <sup>2</sup>	.26	.24	.21	.17	.38	.16	.28

Note. N = 550.

\* p < .05.

\*\* p < .01.

\*\*\* p < .001.

<sup>†</sup> p < .1. Standardized values are shown.



**Table 3**

Hierarchical Regression Analyses Examining the Relationship Between ROWE Intervention and Time Demands, Time Control at Wave 2

Predictor variable	W2 Work hours		W2 Psychological time demands		W2 Time adequacy		W2 Schedule control	
	Step 1	Step 2	Step 1	Step 2	Step 1	Step 2	Step 1	Step 2
ROWE Intervention		-.06 <sup>+</sup>		.03		.11***		.26***
Wave 1 time strain								
Work hours	.51***	.50***	.03	.04	-.06 <sup>+</sup>	-.05	-.05	-.03
Psychological time demands	.07	.09 <sup>+</sup>	.64***	.63***	-.09*	-.11**	-.04	-.09*
Time adequacy	-.06	-.06	-.10*	-.10*	.59***	.59***	.03	.02
Schedule control	.02	.04	-.02	-.03	.10**	.07*	.56***	.49***
Covariates								
Women	-.06	-.06	-.06*	-.06*	.03	.03	.05	.05
Home demands								
Married/partnered	-.03	-.04	-.04	-.04	-.01	-.01	.02	.03
Parent of preschooler	-.06	-.05	.04	.04	-.13***	-.14***	.06	.03
Parent of a child with disability	-.00	-.01	-.07*	-.07*	.02	.02	.05	.06 <sup>+</sup>
Caregiver to an adult	.03	.04	.00	.00	.00	-.01	.07 <sup>+</sup>	.04
Home control	.01	.00	.04	.04	.02	.02	.01	.02
R <sup>2</sup>	.33	.33	.49	.49	.53	.54	.36	.42
ΔR <sup>2</sup>	.00	.00	.00	.00	.01	.01	.06	.06

Note. N = 550.

\* p < .05.

\*\* p < .01.

\*\*\* p < .001.

<sup>+</sup> p < .1. Standardized values are shown.

**Table 4**  
 Hierarchical Regression Analyses Examining the Relationship Between Changes in Time Demands and Time Control, and Changes in Health Outcomes Over 6 Months

	W2 Energy		W2 Mastery		W2 Psychological well-being		W2 Self-assessed health		W2 Emotional exhaustion		W2 Somatic symptoms		W2 Psychological distress	
	Step 1	Step 2	Step 1	Step 2	Step 1	Step 2	Step 1	Step 2	Step 1	Step 2	Step 1	Step 2	Step 1	Step 2
Predictor variables														
Time demands														
Work hours, W1	0.00	0.00	0.00	0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.02	-0.02
Work hours, W2	0.00	0.01 <sup>+</sup>	0.00	0.00	0.00	0.00	0.00	0.00	-0.00	-0.00	0.01	0.01	-0.02	-0.02
Psychological time demands, W1	-0.01	0.04	0.03	0.03	0.08	0.08	-0.22 <sup>**</sup>	-0.22 <sup>**</sup>	-0.43 <sup>*</sup>	-0.43 <sup>*</sup>	-0.27	-0.27	-0.27	-0.27
Psychological time demands, W2	-0.18 <sup>**</sup>	-0.26 <sup>***</sup>	-0.20 <sup>***</sup>	-0.20 <sup>***</sup>	-0.19 <sup>**</sup>	-0.19 <sup>**</sup>	0.42 <sup>***</sup>	0.42 <sup>***</sup>	0.58 <sup>**</sup>	0.58 <sup>**</sup>	1.56 <sup>***</sup>	1.56 <sup>***</sup>	1.56 <sup>***</sup>	1.56 <sup>***</sup>
Time control														
Time adequacy, W1	-0.04 <sup>+</sup>	-0.03	-0.02	-0.02	-0.01	-0.01	-0.00	-0.00	0.06	0.06	0.17 <sup>+</sup>	0.17 <sup>+</sup>	0.17 <sup>+</sup>	0.17 <sup>+</sup>
Time adequacy, W2	0.15 <sup>***</sup>	0.05 <sup>*</sup>	0.04 <sup>+</sup>	0.04 <sup>+</sup>	0.07 <sup>**</sup>	0.07 <sup>**</sup>	-0.06 <sup>*</sup>	-0.06 <sup>*</sup>	-0.17 <sup>*</sup>	-0.17 <sup>*</sup>	-0.33 <sup>**</sup>	-0.33 <sup>**</sup>	-0.33 <sup>**</sup>	-0.33 <sup>**</sup>
Schedule control, W1	-0.03	0.02	0.02	0.02	0.01	0.01	0.00	0.00	0.04	0.04	0.21	0.21	0.21	0.21
Schedule control, W2	0.05	-0.03	-0.03	-0.03	-0.02	-0.02	-0.07	-0.07	-0.24	-0.24	-0.23	-0.23	-0.23	-0.23
Covariates														
Outcome, W1	0.60 <sup>***</sup>	0.54 <sup>***</sup>	0.62 <sup>***</sup>	0.60 <sup>***</sup>	0.67 <sup>***</sup>	0.64 <sup>***</sup>	0.56 <sup>***</sup>	0.52 <sup>***</sup>	0.57 <sup>***</sup>	0.57 <sup>***</sup>	0.65 <sup>***</sup>	0.62 <sup>***</sup>	0.62 <sup>***</sup>	0.62 <sup>***</sup>
Women	0.01	0.01	0.07	0.07	0.01	0.01	0.03	0.05	0.31 <sup>+</sup>	0.37 <sup>*</sup>	-0.55 <sup>*</sup>	-0.51 <sup>*</sup>	-0.51 <sup>*</sup>	-0.51 <sup>*</sup>
Changes in home demands														
Married/partnered change <sup>1</sup>	-0.02	0.06	0.14	0.19	0.03	0.09	0.18	0.07	-0.93	-1.09 <sup>+</sup>	-0.16	-0.16	-0.16	-0.16
Becoming single	-0.13	-0.12	-0.01	0.15	0.07	0.07	-0.11	-0.12	0.14	0.13	0.15	0.15	0.15	0.15
Becoming married/partnered	-0.42 <sup>*</sup>	-0.34 <sup>+</sup>	0.10	0.13	-0.01	0.04	0.53 <sup>**</sup>	0.48 <sup>**</sup>	0.07	-0.07	-0.90	-0.90	-0.90	-0.90
Parent of preschooler change <sup>1</sup>	-0.34	-0.36	0.10	0.05	-0.16	-0.20	-0.22	-0.16	-1.41	-1.38	-0.54	-0.54	-0.54	-0.54
Parent of a child with disability change <sup>1</sup>	0.00	0.18	0.06	0.13	0.00	0.05	-0.18	-0.04	0.15	-0.03	0.49	0.49	0.49	0.49
Caregiver to an adult change <sup>1</sup>	0.02	0.04	0.00	0.00	0.13	0.13	0.05	0.04	-0.06	-0.04	-0.23	-0.14	0.51	0.45

	W2 Energy		W2 Mastery		W2 Psychological well-being		W2 Self-assessed health		W2 Emotional exhaustion		W2 Somatic symptoms		W2 Psychological distress	
	Step 1	Step 2	Step 1	Step 2	Step 1	Step 2	Step 1	Step 2	Step 1	Step 2	Step 1	Step 2	Step 1	Step 2
From no to yes	-0.06	-0.01	-0.34**	-0.28*	-0.01	0.04	-0.10	-0.05	-0.12	-0.17	-0.19	-0.26	-0.24	-0.42
From yes to no	0.17	0.10	0.19	0.17	0.13	0.11	-0.04	-0.06	-0.24	-0.18	-0.02	0.13	-0.87	-0.56
Home control, W1	-0.05	-0.06	0.05	-0.03	0.05	0.06	-0.02	-0.03	0.08	0.08	-0.03	-0.06	0.13	0.04
Home control, W2	0.16***	0.08	0.11**	0.07	0.06	0.03	0.13**	0.08	-0.19***	-0.09	-0.35*	-0.16	-0.64**	-0.29
Psychological job demands, W1	0.03	0.04	0.03	0.04	-0.01	0.00	0.03	0.04	-0.14	-0.08	0.18	0.34	-0.56	-0.49
Psychological job demands, W2	-0.27***	-0.04	-0.13*	0.02	0.04	0.17**	0.00	0.18*	0.49***	0.19*	0.75**	0.17	1.02**	-0.11
Decision latitude (job control), W1	-0.04	-0.05	-0.06	-0.07	-0.01	-0.02	0.06	0.05	0.30**	0.27**	0.20	0.15	0.63	0.56
Decision latitude (job control), W2	0.29**	0.19*	0.33***	0.29***	0.22**	0.19**	-0.04	-0.11	-0.92***	-0.78***	-0.57	-0.24	-1.55***	-1.11**
ROWE Intervention	0.09	0.05	-0.04	-0.01	-0.03	-0.01	-0.08	-0.09	0.03	0.07	-0.07	0.10	0.11	0.12
R <sup>2</sup>	0.435	0.496	0.499	0.536	0.498	0.526	0.464	0.495	0.521	0.580	0.381	0.412	0.472	0.537
ΔR <sup>2</sup>		0.061		0.037		0.028		0.031		0.059		0.031		0.065

Note. N = 550.

\* p < .05.

\*\* p < .01.

\*\*\* p < .001.

+ p < .1.

Standardized values are shown. Reference Group: 1 no change in home demands.