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Work-Family Spillover Stress Predicts Health Outcomes Across Two Decades

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Introduction

Americans report high levels of stress in their daily lives, with much of this stress stemming from work-related issues (American Psychological Association, 2015). Work-related stress includes both the stress experienced at the workplace, such as work-related pressures and demands, as well as the concerns that often spill over into the evening and weekends as people worry about issues such as job security, financial stressors, and upcoming deadlines (Lambert, 1990). A growing number of studies have found that stress experiences during the workday accumulate over time and lead to worse health outcomes (Chandola, Brunner, & Marmot, 2006; Ferrie, Kivimaki, Shipley, Smith, & Virtanen, 2013). Also, the spillover of work and of work-related stress to the home (negative work-family spillover; NWFS) is also related to poorer health behaviors (e.g., Gryzwacz & Marks, 2003) and an increased likelihood of having a chronic condition (Segel-karpas & Agrigoroaei, 2017). The current prospective study examined how both perceived stress reported on the job (job demands) and NWFS – are each related to reports of chronic health conditions, disability, and overall health 10 and 20 years later among working men and women in the United States using data from the Midlife in the United States (MIDUS) Survey.

Workplace stress.

Workplace stress is common in the United States (American Psychological Association, 2015). High levels of stress at work are reported across a broad range of occupations and linked to negative outcomes, including greater alcohol use and greater risk for cardiovascular disease (Nyberg et al., 2013). Workplace stress may arise for many reasons, such as high work demands; poor inter-employee/management relations; lack of control and decision making at work; feelings of job insecurity; and the emotionally taxing nature of many service jobs (Cooper & Marshall, 1976; Ferrie, et al., 2013; Johnson et al., 2005; Karasek,

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Baker, Marxer, Ahlbom, & Theorell, 1981). The frequent experience and buildup of stressful work demands may accumulate over time and lead to worse health outcomes (Chandola, Brunner, & Marmot, 2006; Ferrie, Kivimaki, Shipley, Smith & Virtanen, 2013). For example, meta-analyses pooling information from thousands of participants found that higher job demands and lower job control increased the risk for cardiovascular disease (Nyberg et al., 2013) and type 2 diabetes (Nyberg et al., 2014).

Negative work-family spillover.

The association between stress at work and alcohol use (Nyberg, 2013) suggests that stress from job demands continue to wear on individuals after actual work hours. Negative work-family spillover (NWFS; Grzywacz, 2000) is a form of chronic work stress separate from on-the-job demands that captures the extent to which job demands interfere with family life after the workday is over. Technological advances such as smartphones provide benefits such as allowing people to work from home (e.g., Wheatley, 2012) but they may also make disengaging from work and engaging in restorative activities to relax and unwind more difficult (e.g., Derks & Bakker, 2014). Even people who are not doing the actual work after hours may carry their worries and negative feelings about both previous and anticipated adverse work events.

Researchers have established links between NWFS and poorer physical and emotional health conditions including anxiety, depression, psychosomatic health complaints, sleep disruption, fatigue, poor sleep, obesity, and increased risk for chronic illness (Allen, Herst, Bruck, & Sutton, 2000; Buxton et al., 2016; Demerouti & Geurts, 2004; Frone, Russell, & Cooper, 1997; Geurts, Rutte, & Peeters, 1999; Grzywacz, 2000; Grzywacz, Almeida, & Mcdonald, 2002; Williams, Franche, Ibrahim, Mustard, & Layton, 2006). Moreover, researchers have found that NWFS accounts for the relationship between reported job stress and adverse health outcomes in a cross-sectional study (Geurts et al., 1999; Geurts, Kompier, Roxburgh, & Houtman, 2003). These findings imply that the resulting lingering effects of work stress compound over time, yet are limited by the lack of longitudinal information (Geurts et al., 2003). A recent longitudinal study examined the role of NWFS using MIDUS data, finding that higher levels linked to greater number of chronic illnesses and worse self-perceived health ten years later (Lee, Lawon, Chang, Neuendorf, Dmitrieva, & Almeida, 2015). Yet, this study did not adjust for any measure of workplace stress, so it is unclear whether NWFS is uniquely predictive of health beyond the effects of work-related stress.

The perseverative cognition hypothesis suggests that engaging in repetitive thoughts about either a past or future stressor has negative impacts on physiological processes and future health outcomes (Brosschot, Gerin, & Thayer, 2006). Ongoing worries about work stressors, rather than the work stressor itself, may cause prolonged activation of a wide range of biological systems, leading to long-term wear on the body and downstream physical health consequences (Lundberg, 2005). Additionally, NWFS is associated with poor health behaviors, including smoking, short sleep duration, and unhealthy eating, independent of job demands and work conditions (e.g. Buxton et al., 2016; Lallukka et al., 2010). Thus, NWFS

may predict future physical health above and beyond job demands, but this question is currently untested.

The current study.

The current study represents the first known examination of the unique longitudinal relationships of NWFS and job demands with self-reported health across approximately 20 years, offering a test of these relationships across a longer time frame than previous studies. We used data from the Midlife in the United States (MIDUS) to examine the long-term effects of NWFS and job demands among people who worked at least 20 hours a week on three self-reported physical health outcomes: chronic illness, functional limitations, and self-rated health status. In addition to the number of chronic illnesses, functional limitations was included given its ability to predict important health-related outcomes, particularly later in life, including hospitalization, medical care, dependency of living, and mortality (Avelino-Silva et al., 2014; Hirani et al., 2014; Wiener, Hanley, Clark, & Van Nostrand, 1990). Self-rated health was also included in the study of health outcomes due to its strong relationships with both morbidity (Mavaddat, Valderas, Linde, Khaw, & Kinmonth, 2014) and mortality (DeSalvo, Bloser, Reynolds, He, & Muntner, 2006). We hypothesized that higher levels of NWFS would predict a greater number of chronic illnesses, greater functional limitations, and poorer self-rated health nearly ten and twenty years later after adjusting for baseline health status and baseline job demands.

Methods

Participants and Procedure

This study examined a subset of participants from the Midlife in the United States (MIDUS) Survey. The MIDUS was approved by the Institutional Review Board of the University of Wisconsin, and participants provided informed consent. The MIDUS study included a national probability sample of U.S. adults, aged 20 to 74 at baseline, and took place across three separate waves approximately ten years apart: MIDUS I (1995–1996), MIDUS II (2004–2006), and MIDUS III (2013). A total of 7,108 participants completed both phone interviews and self-administered questionnaires at Wave 1.

To be eligible for the current study, participants had to have reported working at least 20 hours per week. From the 7,108 participants, 4,200 participants (59%) reported working at least 20 hours per week. These 4,200 participants comprised the final analytic sample for this study. Of these 4,200 eligible participants from Wave 1, 3,221 participated in Wave 2 (77%). Of these 3,221 participants, 2,318 (72% from those at Wave 2) also participated at Wave 3. Comparing the eligible participants at Wave 1 who did not participate through all three waves ($n = 1882$) to those who participated at all three waves ($n = 2318$), those who participated at all three waves were more likely to be Caucasian, $\chi 2$ (1, $N = 4200$) = 58.30, $p < .001$, female, $\chi 2$ (1, $N = 4200$) = 12.54, $p < .001$, and were slightly older at Wave 1 (44.09 ± 10.18 vs. 43.34 ± 11.66, $t(4198) = 2.25$, $p < .05$). Those participating in all three waves also reported greater NWFS (10.70 vs. 10.41, $t(4198) = 3.35$), but less functional disability (2.43 vs. 2.59, $t(4190) = -5.90$) and better self-rated health (3.74 vs. 3.57, $t(4196) = 6.14$) at

Wave 1 than those who did not participate at all three waves (all *ps* < .01). These two groups did not differ in job demands or levels of chronic illness at Wave 1.

We used multiple imputation to handle missing data. We first checked to see if the data were missing completely at random (MCAR) using Little's test (Little, 1988). The assumption of MCAR was violated (e.g. data were not missing completely at random). As a result, we imputed missing data using the Markov chain Monte Carlo (MCMC) approach. We imputed five data sets and pooled parameter estimates across imputations. There was a successful convergence for the mean and variance of all imputed variables.

Participants (N = 4,200) ranged in age from 20–74 years (M = 43.75, SD = 10.88) and 68% were married at Wave 1. The subsample for the current study had a slightly lower percentage of women (47%) compared to the 7,108 MIDUS 1 sample, which were 52%, 53% and 55% across Waves 1, 2, and 3, respectively. MIDUS 1 was predominantly Caucasian (91%), with a small number of African Americans (4.9%), Native American or Alaskan Natives (.6%), Asian or Pacific Islanders (.9%), and people reporting other (2%). The final subsample was similar, with 89.5% Caucasian. The subsample for the current study also had a higher percentages of college graduates (36.1%) compared to the MIDUS I sample (31%).

Measures

Negative work-family spillover.—At Wave 1, negative work-family spillover was assessed with four items (Grzywacz & Marks, 2000). Items were: (1) job reduces the effort you can give to activities at home; (2) stress at work makes you irritable at home; (3) your job makes you feel too tired to do the things that need attention at home; (4) job worries/ problems distract you when you are at home. For each of these items, participants rated their agreement with each item on a 5-point scale from 1 (all of the time) to 5 (never) and items were reverse-scored so that higher values reflect greater NWFS. A composite score for NWFS reflects the summed total of the four items (α = .81). Only the Wave 1 assessment of NWFS was used in the current study.

Job demands.—The job demands scale (Karasek et al., 1981) was originally developed to create an objective measure of psychological stress in the workplace. Five items ranging from 1 (all the time) to 5 (never) measure the extent to which a participant finds his or her job responsibilities to be demanding. Items include how often: do you have to work very intensively -- that is, you are very busy trying to get things done?; do different people or groups at work demand things from you that you think are hard to combine?; you have too many demands made on you; you have enough time to get everything done; [and] you have a lot of interruption? The composite score was constructed by calculating the sum of the reverse-coded values of the items in the scale (α = .74). Only the Wave 1 assessment of job demands was used in the current study.

Functional limitations.—Functional limitations were assessed at all three waves with the summed scores of two modified measures: activities of daily living (ADLs; Katz, Ford, Moskowitz, Jackson, & Jaffe, 1963) and instrumental activities of daily living (IADLs; Lawton & Brody, 1969). For both ADLs and IADLS, the subscales were modified by only including a subset of the total items from each original scale in MIDUS. The three items

measuring ADL reflect a person's functional abilities that are commonly limited with chronic illness or disability and include bathing or dressing; climbing one flight of stairs; and walking one block. The seven items measuring IADLs describe activities involved in everyday physical functioning and include lifting or carrying groceries; climbing several flights of stairs; bending, kneeling, or stooping; walking more than a mile; walking several blocks; vigorous activities (e.g., running, lifting heavy objects); and moderate activities (e.g., bowling, vacuuming). For both ADLs and IADLs, participants rated their abilities to engage in each activity from 1 (a lot) to 4 (not at all) and summary scores reflect the mean of all reverse-coded items so that higher scores reflect greater functional limitation. Summing ADLs and IADLs to measure functional limitation has the advantage of a greater response range and parsimony, while continuing to measuring the unidimensional construct of functional limitation (Spector & Fleishman, 1998).

Chronic illness.—Participants reported at all waves whether or not they had experienced each of 27 chronic health conditions including stomach trouble, arthritis, ulcer, and high blood pressure, among others, during the past twelve months. The total of all endorsed conditions was summed to create one composite score for number of chronic illnesses, consistent with previous studies (e.g., Leger, Charles, Ayanian, & Almeida, 2015; Piazza, Charles, & Almeida, 2007). Over 90% of participants reported 5 or fewer chronic illnesses. To correct for the positive skew, those reporting 5 or more chronic conditions were recoded to a winsorized score of 5.

Self-rated health.—At each wave of data collection, participants were asked, "In general, would you say your physical health is excellent, very good, good, fair, or poor?" using a scale from 1 (poor) to 5 (excellent) in Wave 1 and from 1 (excellent) to 5 (poor) in Waves 2 and 3. Responses were reverse coded for Waves 2 and 3 so that for all waves, higher scores reflect better self-rated health.

Covariates.—Sociodemographic variables included age, gender (1 = male, 2 = female), education level (using an ordinal scale from 1= none or some grade school to 12 = a doctorate or professional degree), ethnicity (0 = non-Caucasian; 1 = Caucasian), marital status (0 = not married; 1= married), and income. Participants reported their individual total income using a rating scale that reflected 30 different ranges of monetary values, with the lower levels represented with 1000 increments and higher levels representing wider increments (e.g. 1 = $1,000 – 1,999, 2 = 2,000 – 2,999…. 40,000 – 44999, to 30 = $300,000 or higher).

Statistical Analyses

We ran a series of multiple regressions to test the hypotheses that higher Wave 1 NWFS and job demands would each uniquely predict each of the health outcomes nearly ten and twenty years later. For each health index (chronic illness, functional limitation, self-rated health), three regression models were computed. In each model, NWFS and job demands at Wave 1 were included as the independent variables, and all models included gender, ethnicity, age, marital status, education, and income as covariates.

The first model established the cross-sectional association (for descriptive purposes and to reaffirm prior findings in the literature showing concurrent associations between stress and health-related variables) using the health index at baseline as the dependent variable. The second model tested the main hypotheses by entering the health index 10 years later, keeping the baseline (Wave 1) score for the respective health outcome as a covariate. In the third model, the health index almost 20 years later was entered as the dependent variable, again adjusting for its baseline level at Wave 1.

Results

Descriptive Analyses

Across the waves, overall means suggested that physical health declined over time: number of chronic illnesses and functional limitations increased, and self-rated health were similar across the first two waves but then was rated more poorly at Wave 3 (see Table 1 for means). Women reported significantly higher levels of chronic illness than men at all three waves (Wave 1: 1.91 vs. 1.49, $t(4198) = -8.39$; Wave 2: 1.97 vs. 1.63, $t(4198) = -6.58$; Wave 3: 2.37 vs. 1.94, $t(4198) = -6.58$, all $ps < .001$), and greater functional limitation (Wave 1: 2.60 vs. 2.42, $t(4198) = -6.87$; Wave 2: 3.02 vs. 2.75, $t(4198) = -5.39$; Wave 3: 3.47 vs. 3.20, $t(4198) = -4.38$, all $ps < .001$). Women and men did not differ in their self-rated health at any wave. Women reported greater job demands than men at Wave 1 (16.30 vs. 16.12, $t(4198) = -2.45$), but men and women did not differ from one another on baseline NWFS scores.

Ethnic minorities did not differ from Caucasians in reported levels of chronic illness at any wave. Ethnic minorities reported greater functional limitation than Caucasians at Wave 1 (2.65 vs. 2.49, $t(4198) = 3.59$, $p < .001$) and Wave 2 (3.02 vs. 2.87, $t(4198) = 2.07$, $p < .05$) only. Ethnic minorities also reported worse self-rated health than Caucasians at all three waves (3.47 vs. 3.69, $t(4198) = -4.88$; 3.43 vs. 3.63, $t(4198) = -3.10$; 3.21 vs. 3.45, $t(4198) = -3.34$, all $ps < .01$). Ethnic minorities also reported lower baseline levels of NWFS (10.07 vs. 10.63, $t(4198) = -4.01$, $p < .001$) and lower baseline job demands (15.80 vs. 16.25, $t(4198) = -3.77$, $p < .001$) than Caucasians.

Those who were not married reported higher levels of chronic illness than married individuals at all three waves (Wave 1 = 1.79 vs. 1.63, $t(4198) = 2.99$; Wave 2 = 1.90 vs. 1.74, $t(4198) = 2.57$; Wave 3 = 2.25 vs. 2.11, $t(4198) = 2.10$, all p's $< .05$). Non-married individuals reported greater functional limitation than those who were married at Wave 1 (2.58 vs. 2.47, $t(4198) = 3.60$, $p < .001$) and Wave 2 (2.98 vs. 2.85, $t(4198) = 2.87$, $p < .01$) only. Those who were not married also reported poorer self-rated health than married individuals at Wave 1 (3.59 vs. 3.70, $t(4198) = -3.76$, $p < .001$) and Wave 3 (3.37 vs. 3.44, $t(4198) = -2.06$, $p < .05$) only. Married and non-married individuals did not differ from one another on baseline scores of NWFS or job demands.

All intercorrelations among study variables can be found in Table 2. At each of the three waves, being older was associated with more reported chronic illnesses, higher functional limitation, and poorer self-rated health. Having less education and a lower income was related to more reported chronic illnesses, greater functional limitation, and poorer self-rated

health at each wave. At Wave 1, greater NWFS and job demands were both related to decreases of age but increases of education and income. Based on these findings, all analyses included gender, ethnicity, age, marital status, education, and income as covariates.

Hypothesis Testing

Chronic Illness.—Results for the multiple regression models predicting the number of chronic illnesses are displayed in Table 3. As hypothesized, higher NWFS was related to concurrent chronic illness (Model 1) and predicted greater numbers of chronic conditions 10 years later (Model 2) and 20 years later (Model 3). In contrast and contrary to the hypothesis, job demands was unrelated to chronic illness in all of the models. NWFS accounted for 1% of the variance in Model 2 and in Model 3. Examining the covariates across all three models revealed that being female was related to having a greater number of chronic illnesses at baseline only, and being older, having a lower income, and less education was related to having a greater number of chronic illnesses across all three waves. Being unmarried and being an ethnic minority was related to greater chronic illness at Wave 1.

Functional Limitation.—Results for the multiple regression models predicting functional limitation are displayed in Table 4. NWFS was related to concurrent functional limitation (Model 1), and as predicted by the hypothesis, was associated with greater functional limitations 10 years (Model 2) and 20 years later (Model 3). Contrary to the hypothesis, job demands was unrelated to functional limitations. NWFS accounted for 1% of the variance in Model 2 and in Model 3. Being older, having a lower educational level and a lower income were associated with greater functional limitation in all three models. Being an ethnic minority, female and being unmarried were related to functional limitation only at Wave 1.

Self-rated health.—Results for the multiple regression models predicting self-rated health are displayed in Table 5. Greater NWFS at Wave 1 was concurrently associated with poorer self-rated health and predicted poorer self-rated health 10 years later (Model 2) and 20 years later (Model 3). In contrast and contrary to the hypothesis, job demands was unrelated to self-rated health. NWFS accounted for 1% of the variance in Models 2 and 3. Being female, older, having a lower educational level, and having a lower income were each related to poorer self-rated health across all waves. Being unmarried and being an ethnic minority was related to poorer self-reported health at Wave 1 only.

Discussion

Work-related stress is common among U.S. adults. Although a number of studies have established concurrent associations between both job demands and NWFS with poorer physical and mental health (e.g., Allen et al., 2000; Geurts et al., 2003), fewer studies examine long-term relationships between both aspects of work-related stress to physical health outcomes. The current study confirmed the hypothesis that higher NWFS significantly predicted greater numbers of chronic illnesses, greater functional limitation, and worse self-rated health 10 and 20 years later. These findings remained even after adjusting for job demands, baseline levels of health, and relevant covariates. In contrast, job

demands – a measure that was designed to assess during the time at work – was not an independent predictor of long-term health outcomes. This finding is consistent with the theoretical conceptualization that although stress when physically at work is most likely a causal contributor to NWFS (and in this study was moderately related to NWFS). Thus, NWFS represents a unique source of stress that has a stronger association with health outcomes.

NWFS predicted three different self-reported health measures across 10- and 20-year periods. Several mechanisms may account for the significant relationship between greater NWFS and worse physical health over time. Greater NWFS may lead to physiological dysregulation by wearing down multiple bodily systems in what scientists refer to as allostatic load (McEwen, 1998). When people encounter an acute psychological stressor, multiple systems including the autonomic nervous system, the hypothalamic-pituitary-adrenal (HPA) axis, and the cardiovascular system are differentially activated in response to the stressor. This is a protective and regulatory physiological response to an acute stressor, but chronic activation is believed to lead to long-term dysregulation and wearing down of multiple bodily systems (Lundberg, 2005; McEwen, 1998, 2004). NWFS may be a potent form of chronic stress for those with stressful and demanding jobs for whom efforts to recover from this daily stress once at home are ineffective (Geurts & Sonnentag, 2006). In contrast, demands experienced on the job may also place wear and tear on the physical system, yet their influence ends when people leave the workplace. As a result, the predictable, time delimited nature of this stress may be less pernicious for their physical health. Job demands predicted functional limitation and poorer self-reported health nearly 10 years later, but not 20 years later; job demands did not predict chronic health conditions at any point.

Another reason why NWFS stress may influence later physical health is through an indirect pathway in its relationship with a number of health behaviors. Workplace stress in general is associated with various harmful health practices including smoking, eating a high-fat diet, increased alcohol intake, and infrequency of exercise (Hellerstedt & Jeffery, 1997; Ng & Jeffery, 2003; Payne, Kinman, & Jones, 2014). The current study suggests that it is not the workplace stress itself that may be related to these behaviors, but the extent to which people continue to worry about their jobs long after their workday is over. NWFS has also been associated with unhealthy eating, smoking, and increased alcohol consumption (e.g., Lallukka et al., 2010). Sleep is another health behavior that likely plays a critical role in the relationship between NWFS and long-term health. Getting enough good quality sleep is critical for maintaining good health (Imeri & Opp, 2009; Kamel & Gammack, 2006), but NWFS has been related to shorter sleep duration and poorer sleep quality (Buxton et al., 2016; Demerouti & Geurts, 2004; Van Hooff, Geurts, Kompier, & Taris, 2006).

Although NWFS uniquely predicted chronic illness, functional limitation, and self-rated health at both follow-ups, NWFS's relationship with these health outcomes was quite modest. However, given that a number of demographic, psychosocial, and behavioral factors influence people's physical health and functioning such as genetic predispositions, diet, physical activity, health behaviors, sleep quality (Åkerstedt, 2006), socioeconomic status, social support (Reblin & Uchino, 2008), and positive (Pressman & Cohen, 2005) and

negative affect (Charles, Gatz, Kato, & Pedersen, 2008), the fact that NWFS was significant across such a long time period is noteworthy. With so many factors influencing physical health, it is not surprising that NWFS yielded only a small effect on long-term health outcomes. Furthermore, this small effect is consistent with other studies predicting longitudinal health outcomes from psychosocial variables (e.g., Rasmussen, Scheier, & Greenhouse, 2009).

Limitations

Several limitations of the present study should be addressed in future research. First, although this study used a large national sample, the sample was predominantly Caucasian and so these findings do not represent the current ethnic/racial composition of the U.S. workforce. Moreover, ethnic minorities may be even more susceptible to experiencing job stress due to feelings of discrimination or varying cultural pressures (Capasso, Zurlo, & Smith, 2016; Wadsworth et al., 2007) and the effects of spillover stress may be even more pronounced. Capturing greater ethnic diversity is a priority for future studies examining NWFS. In addition, although temporal relationships were established between NWFS and three separate health indices, these relationships were correlational and no causal inferences could be made from this data. Nonetheless, these results provide stronger evidence of the longitudinal relationships between NWFS and health than could be demonstrated through only cross-sectional work; higher NWFS predicted multiple health outcomes many years later even when adjusting for baseline levels of each self-reported health outcome. Future studies could also examine specific types of workplace stress or what occurs at home that may explain why higher NWFS is related to later poor health.

Finally, all three measures of health used in this study were self-reported. Self-reported health outcomes are subject to a self-report bias, the same bias that may also conflate reports of stress. Despite this limitation, however, each of the self-reported health measures included in this study has been shown to predict important objective health outcomes. Chronic illness continues to cost Americans billions of dollars annually in healthcare expenses and is the leading cause of disability and death in the U.S. (Centers for Disease Control and Prevention, 2016). Functional limitation predicts further critical health outcomes including hospitalization, increased need for medical care, independent living, and mortality in elderly samples (Avelino-Silva et al., 2014; Hirani et al., 2014; Wiener et al., 1990). Self-rated health predicts multiple chronic health conditions (Mavaddat et al., 2014; Møller, Kristensen, & Hollnagel, 1996) and is a strong predictor of mortality (e.g., DeSalvo et al., 2006). Still, future research should utilize objective measures of health to provide more concrete evidence of long-term relationships with NWFS.

Conclusions

Negative work-family spillover is a form of stress that is becoming increasingly common as more U.S. households have two working partners. Stress in general, and NWFS in particular, is related to a number of chronic health conditions including cardiovascular disease, Type 2 diabetes, and poor immune functioning. Past research has established cross-sectional relationships between higher levels of NWFS and poor physical health outcomes, but the

current study was the first to demonstrate these relationships across 20 years. Greater initial NWFS, but not necessarily the demands during the workplace itself, was related to a higher number of chronic illnesses, greater functional limitation, and poorer self-rated health after 20-years after adjusting for initial health. These findings underscore the importance of being able to escape – both physically as well as psychologically – from the stress of the workplace when the actual workday is over.

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Highlights

- Negative work-family spillover stress predicts long-term health outcomes.
- Negative work-family spillover stress predicts health independent of job stress.
- Negative work-family spillover predicts health ten and twenty years later.

Table 1

Means and standard deviations of key variables across all three waves.

	Baseline (Wave 1)		10 years later (Wave 2)		~20 years later (Wave 3)	
Variables	***M***	***SD***	***M***	***SD***	***M***	***SD***
Number of chronic illnesses	1.68	1.60	1.79	1.61	2.16	1.69
Functional limitation	2.50	.89	2.89	1.24	3.32	1.56
Self-rated health	3.67	.90	3.61	.98	3.42	1.02
Job Demands	16.20	2.34	--	--	--	--
Negative work-family spillover	10.57	2.80	--	--	--	--

Table 2

Correlation Matrix.

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
1. Age	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2. Education	−.05**	-	-	-	-	-	-	-	-	-	-	-	-	-
3. Income	−.01	.32***	-	-	-	-	-	-	-	-	-	-	-	-
4. NWFS	−.13***	.14***	.14***	-	-	-	-	-	-	-	-	-	-	-
5. Job Demands	−.08***	.11***	.19***	.39***	-	-	-	-	-	-	-	-	-	-
6. Chronic Ill W1	.17***	−.09***	−.11***	.15***	.04**	-	-	-	-	-	-	-	-	-
7. Chronic Ill W2	.22***	−.11***	−.14***	.11***	.02	.52***	-	-	-	-	-	-	-	-
8. Chronic Ill W3	.20***	−.14***	−.15***	.09***	.04	.47***	.59***	-	-	-	-	-	-	-
9. Func Lim W1	.18***	−.13***	−.14***	.10***	.03	.35***	.33***	.33**	-	-	-	-	-	-
10. Func Lim W2	.21***	−.21***	−.19***	.08***	−.01	.34***	.48***	.46***	.55***	-	-	-	-	-
11. Func Lim W3	.22***	−.25***	−.17***	.06**	.01	.33***	.43***	.53***	.48***	.68***	-	-	-	-
12. S-r Health W1	−.08***	.20***	.13***	−.10***	.02	−.33***	−.29***	−.30***	−.37***	−.33***	−.34***	-	-	-
13. S-r Health W2	−.12***	.24***	.17***	−.08***	.05**	−.27***	−.40***	−.38***	−.33***	−.51***	−.44***	.49***	-	-
14. S-r Health W3	−.10***	.24***	.17***	−.05*	.02	−.26***	−.34***	−.43***	−.33***	−.45***	−.58***	.43***	.56***	-

Note. NWFS = negative work-family spillover, *Chronic Ill* = number of chronic illnesses, *Func Lim* = functional limitation, *S-r Health* = self-rated health.

* $p < .05$

** $p < .01$

*** $p < .001$

Table 3.

Regressions of the cross-sectional associations between NWFS and chronic illness at baseline (Wave 1) and NWFS predicting chronic illness 10 years later (Wave 2) and about 20 years later (Wave 3).

	Concurrent Chronic Illness (Wave 1; *N* = 4,200)			Chronic Illness 10 years later (Wave 2; *N* = 4,200)			Chronic Illness about 20 years later (Wave 3; *N* = 4,200)		
Variables	***b***	***SE***	**95% CI**	***b***	***SE***	**95% CI**	***b***	***SE***	**95% CI**
Gender	.30***	.051	[.20, .40]	.05	.050	[−.05, .14]	.07	.059	[−.05, .19]
Ethnicity	−.16*	.079	[−.32, −.01]	−.08	.082	[−.25, .09]	−.16	.118	[−.43, .10]
Age	.03***	.002	[.02, .03]	.02***	.002	[.02, .03]	.02***	.004	[.01, .03]
Education	−.05***	.010	[−.07, −.03]	−.03*	.012	[−.05, −,01]	−.06**	.014	[−.09, .03]
Income	−.02***	.004	[−.03, −.01]	−.02**	.005	[−.03, −.01]	−.02***	.004	[−.03, −.01]
Marital Status	−.14*	.053	[−.24, −.03]	−.10	.057	[−.21, .02]	−.07	.063	[−.20, .06]
Number of chronic illnesses W1	—	—	—	.47***	.016	[.43, .50]	.44***	.022	[.39, .49]
Job Demands	.01	.012	[−.02, .03]	.01	.014	[−.03, .03]	.03	.016	[−.01, .06]
Negative work-family spillover W1	.11***	.009	[.09, .13]	.04**	.013	[.01, ,07]	.03**	.011	[.01, .06]
R^2		.10			.29			.26	

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 4.

Regressions of the cross-sectional associations between NWFS and functional limitation at baseline (Wave 1) and NWFS predicting functional limitation 10 years later (Wave 2) and about 20 years later (Wave 3).

	Concurrent Functional Limitation (Wave 1; *N* = 4,200)			Functional Limitation 10 years later (Wave 2; *N* = 4,200)			Functional Limitation about 20 years later (Wave 3; *N* = 4,200)		
Variables	***b***	***SE***	**95% CI**	***b***	***SE***	**95% CI**	***b***	***SE***	**95% CI**
Gender	.10***	.028	[.04, .16]	.02	.044	[−.07, .11]	−.01	.053	[−.12, .09]
Ethnicity	−.19***	.043	[−.27, −.10]	−.04	.059	[−.16, .08]	−.07	.087	[−.25, .10]
Age	.02***	.001	[.01, .02]	.02***	.002	[.01, .02]	.02***	.002	[.02, .03]
Education	−.04***	.006	[−.05, −.03]	−.06***	.009	[−.08, −.05]	−.11***	.017	[−.15, −.07]
Income	−.01***	.002	[−.02, −.01]	−.02**	.005	[−.03, −.01]	−.02***	.004	[−.02, −.01]
Marital Status	−.10**	.029	[−.15, −.04]	−.07	.040	[−.15, .01]	−.03	.047	[.13, .06]
Functional limitation W1				.67***	.027	[.62, .73]	.73***	.059	[.59, .88]
Job Demands	.01	.006	[.00, .02]	−.01	.008	[−.03, .01]	.01	.016	[−.02, .05]
Negative work-family spillover W1	.05***	.005	[.04, .06]	.04***	.007	[.02, .05]	.03*	.011	[.01, .06]
R^2		.09			.34			.28	

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 5

Regressions of the cross-sectional associations between NWFS and self-rated health at baseline (Wave 1) and NWFS predicting self-rated health 10 years later (Wave 2) and almost 20 years later (Wave 3).

	Concurrent Self-Rated Health (Wave 1; *N* = 4,200)			Self-Rated Health 10 years later (Wave 2; *N* = 4,200)			Self-Rated Health almost 20 years later (Wave 3; *N* = 4,200)		
Variables	***b***	***SE***	**95% CI**	***b***	***SE***	**95% CI**	***b***	***SE***	**95% CI**
Gender	.06*	.029	[.01, .12]	.07*	.030	[.01, .13]	.08**	.030	[.02, .14]
Ethnicity	.22***	.044	[.13, .30]	.09	.058	[−03, .21]	.14	.071	[−.01, .30]
Age	−.01***	.001	[−.01, −.01]	−.01***	.002	[−.01, −.01]	−.01***	.002	[−.01, .00]
Education	.07***	.006	[.06, .08]	.05***	.006	[.04, .07]	.06***	.009	[.04, .08]
Income	.01***	.002	[.01, .02]	.01***	.003	[.01, .02]	.02***	.003	[.01, .02]
Marital Status	.11***	.029	[.06, .17]	.03	.038	[−.05, .11]	.03	.032	[−.03, .09]
Self-rated health W1	—	—	—	.48***	.017	[.44, .51]	.42***	.022	[.38, .47]
Job Demands	.01	.006	[.00, .02]	.01	.008	[.00, .03]	−.01	.010	[−.03, .01]
Negative work-family spillover W1	−.05***	.005	[−.07, −.04]	−.03***	.006	[−.04, −.02]	−.02*	.008	[−.04, .00]
R^2		.08			.28			.21	

* $p < .05$.

** $p < .01$.

*** $p < .001$.