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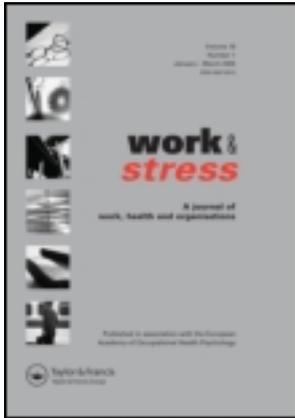
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Are communications about work outside regular working hours associated with work-to-family conflict, psychological distress and sleep problems?

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The sending and receiving of work-related communications outside of regular work hours spans the boundary between work and non-work, and with the adoption of new communication devices it is increasing. The aim of this study was to investigate whether such communication, which we call Work Contact for short, was associated with psychological distress and sleep problems. Using data from the 2011 *Canadian Work, Stress, and Health Study*, a large national sample of working adults ($N = 5729$), we found that Work Contact was associated with higher levels of work-to-family conflict, distress and sleep problems. In addition, with the Job Demands-Resources model as a guiding framework, we found support for the “resource hypothesis” – the positive association between Work Contact and either distress or sleep problems is weaker among workers with more job autonomy, schedule control and challenging work. By contrast, and consistent with the “demand hypothesis”, the positive association between Work Contact and sleep problems was stronger among those with more job pressure. Elevated levels of work-to-family conflict contributed to these interaction effects. Collectively, our findings elaborate on the complex consequences of the growing phenomenon of Work Contact, and underscore the relevance of job resources, demands and the work-family interface in these processes.

Keywords: Work Contact; communication; psychological distress; sleep; work-family conflict; working hours

Introduction

“Work Contact” is shorthand for the frequency with which workers send and receive work-related communications (e.g. emails, phone calls, text messages) outside of regular working hours (Schieman & Glavin, 2008; Voydanoff, 2007). The integration of communication technologies into many workplaces has spawned new challenges for the boundaries between work and non-work life (Chesley, Moen, & Shore, 2003). Expanded access to e-mail, cell phones, smart phones and other communication devices often enhance flexibility and enable remote work, but also contribute to a “24/7 availability” that may present new stressors and strains (Batt & Valcour, 2003; Chesley, 2005). These tools facilitate tasks outside the traditional physical and

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temporal parameters of the workplace, thus allowing work to intrude upon and gain primacy over other domains (Boswell & Olson-Buchanan, 2007; Valcour & Hunter, 2005). As border theory suggests, Work Contact represents a “boundary-spanning demand” that blurs the temporal, physical and psychological boundaries that separate work and non-work life (Clark, 2000; Voydanoff, 2007). This boundary-spanning demand is distinct from, but intricately related to, some of the more conventional indicators of job-related demands like long work hours and excessive pressures (Glavin & Schieman, 2012; Schieman & Glavin, 2008).

What is the association between Work Contact out of normal working hours and health? In this paper, we expand upon prior research by examining the consequences of Work Contact for two important outcomes: psychological distress and sleep problems. We then apply and extend the Job Demands-Resources (JD-R) model by assessing the factors that modify those associations and the potential relevance of work-to-family conflict (WFC) as a contributing influence in these processes. To address these objectives, we analyze data from a large, national survey of Canadian workers: the 2011 *Canadian Work Stress and Health* study (CAN-WSH). These data are ideal for our objectives because they include individuals from a broad range of occupations, job sectors and varying levels of job-related demands and resources.

Work contact and its consequences

To frame our argument about the potential consequences of Work Contact out of normal working hours, we draw on the ideas of border theory because of its insights about the ways that individuals construct and navigate the parameters between work and home (Clark, 2000). One of its core assumptions is that workers are motivated to manage the border between work and non-work in ways that contribute to a sense of balance, which, in turn, yields higher levels of satisfaction and better role functioning. Work Contact, however, represents a “boundary-spanning demand” that can challenge the parameters that separate work from the other domains of everyday life (Schieman & Glavin, 2008; Voydanoff, 2007). In this regard, it can be characterized as a potential stressor.

High permeability – the degree to which aspects of one domain are able to enter other domains – is associated with greater *role blurring* (Voydanoff, 2007). The spread and use of new communication technologies expand permeability such that workers may become accessible “anytime, anywhere” (Lewis & Cooper, 1999; Valcour & Hunter, 2005). This greater permeability, in turn, may increase exposure to other stressors like WFC (Chesley, 2005; Schieman & Glavin, 2008; Schieman & Young, 2010a). WFC is defined as the extent that individuals perceive that work interferes with the responsibilities and expectations of family, and competes for individuals’ finite amounts of time and energy (Greenhaus & Parasuraman, 1987). WFC occurs when role-related pressures that emanate from the work domain are incompatible with and potentially undermine family-related role quality and performance (Greenhaus & Beutell, 1985).

Work Contact may be problematic for the work-family interface when it is unexpected or unrelated to the context in which the individual finds himself or herself. For example, receiving communications about work might require one to quickly switch from a family or leisure frame of mind back to the “worker mindset”. These role-blurring processes have the potential to represent *interruptions* that can

generate strain and distress, especially when they challenge individuals' role or task performance in other domains (Ashforth, Kreiner, & Fugate, 2000; Olson-Buchanan & Boswell, 2006). Ultimately, some of the negative consequences of frequent Work Contact may be due to problems associated with these interruptions and their implications for self-control, depletion of resources and feelings of exhaustion (Freeman & Muraven, 2010; Muraven & Baumeister, 2000; Sonnentag, Binnewies, & Mojza, 2010; Sonnentag & Fritz, 2007).

Collectively, these ideas underscore the importance of the interference aspects of role-blurring activities and how these processes could represent problematic demands. Some prior research bolsters these claims by documenting a positive association between Work Contact and WFC (Schieman & Glavin, 2008; Schieman & Young, 2010a; Voydanoff, 2005), as well as the deleterious health consequences of WFC (Glavin, Schieman, & Reid, 2011; Voydanoff, 2007). To our knowledge, however, no studies have applied the JD-R model's propositions about job resources and demands as moderators in the associations between Work Contact and both distress and sleep problems or explicitly tested WFC as a potential mediator in these interrelationships. Few studies of the work-nonwork interface consider sleep problems despite evidence of a robust connection (Chatzitheochari & Arber, 2009; Maume, Sebastian, & Bardo, 2009).

An application and extension of the JD-R model

The JD-R model provides a guiding framework for articulating the ways that job attributes, often characterized as "resources" and "demands", might be associated with a range of personal, social and organizational outcomes (Bakker & Demerouti, 2007; Demerouti, Bakker, Nachreiner, & Schaufeli, 2001; Schaufeli & Bakker, 2004). The JD-R model identifies *resources* as involving the physical, psychosocial and organizational elements of work that foster the adequate completion of responsibilities (Bakker & Geurts, 2004). One of its core propositions is the claim of a multiplicative model in which job resources purportedly undermine the negative consequences of job demands (Bakker & Demerouti, 2007; Bakker, Demerouti, & Euwema, 2005; Demerouti, Bakker, de Jonge, Janssen, & Schaufeli, 2001). Most analyses of this hypothesized interaction effect have focused on "psychological strains" as outcomes – that is, attitudes (e.g. satisfaction), behavioural intentions (e.g. absenteeism, turnover), or health (Beehr, Glaser, Canali, & Wallwey, 2001). While research demonstrates that the levels and interactions of demands and resources often influence well-being (Hakanen, Schaufeli, & Ahola, 2008), conclusions about the multiplicative model remain unresolved (Beehr et al., 2001; Häusser, Mojzisch, Niesel, & Schulz-Hardt, 2010).

In the present study, we apply the JD-R model to test the *resource hypothesis*. This states that job resources should mitigate any problematic consequences of Work Contact. The specific mechanisms it proposes involve motivational elements that enhance engagement and reduce cynicism – and, by extension, contribute to either intrinsic or extrinsic motivation (see Bakker & Demerouti, 2007, p. 313). Moreover, "resource" processes associated with *buffering* may entail the modification of perceptions or cognitions that are associated with Work Contact and its consequences (Kahn & Byosserie, 1992). The JD-R model also posits that job-related resources might be especially relevant for the enhancement of work engagement or

motivation when job demands are high (Bakker & Geurts, 2007, p. 315). Applied here, we posit that Work Contact represents a potential boundary-spanning demand that could amplify the relevance and utility of job-related resources, especially as they might function as buffers in the associations between Work Contact and levels of work-to-family conflict, distress and sleep problems.

Job resources typically involve the nature of, and rewards from, the work itself (Bakker & Demerouti, 2007). This view originates from the Job Demands-Control (JD-C) model and the concept of *job control* – that is, the “working individual’s potential control over his tasks and his conduct during the working day” (Karasek, 1979, p. 289). *Job autonomy*, which involves the extent that individuals have the freedom to decide when, where and how their work gets done, has been identified as one of the most salient of these resources (Tausig & Fenwick, 2011). Similarly, schedule control entails the “temporal flexibility in work schedules”, or the degree to which workers are able to select the times that they start and/or finish work (Golden, 2001). Together, job autonomy and schedule control are often viewed as highly desirable work resources, especially given their purported benefits for navigating challenges at the work-family border and minimizing inter-role conflict (Schieman & Glavin, 2008; Voydanoff, 2007). One potential mechanism involves the ways that resources help to facilitate the achievement of specific goals or objectives (Bakker & Geurts, 2004); these processes may, in turn, erode the “demand” elements of Work Contact and its complications for stress at the work-family interface and health-related problems. An additional set of mechanisms involves the ways that Work Contact may be more predictable, expectable, understandable or controllable in the context of greater job resources (Kahn & Byosserie, 1992). As Bakker and colleagues (2005) suggest, job resources, like autonomy, may facilitate coping with job demands by allowing greater control over the nature and timing of responses to them. With these plausible mechanisms as a backdrop, the resource hypothesis predicts that any observed positive associations between Work Contact and WFC, distress and sleep problems should be weaker among individuals with more job autonomy and schedule control; this evidence would support the buffering view.

Along with these two more conventional job resources, in our analyses we consider another resource: *challenging work*. Individuals with challenging work are required to keep learning new things, engage in creative activities, use their skills and abilities and handle a variety of tasks on the job (Schieman & Young, 2010b). This concept blends interrelated themes that researchers across disciplines have referred to with a range of terms, including “complexity”, “skill variety”, “non-routine work”, “creative work”, “skill discretion”, “learning possibilities” and “opportunities for professional development” (Bakker & Geurts, 2004; Hackman & Oldham, 1975; Karasek, 1979; Mirowsky & Ross, 2003). There are conceptual and empirical reasons for characterizing challenging work as a job resource alongside autonomy and schedule control, and including it within the framework of the resource hypothesis. For example, the concept has origins in the JD-C model’s “decision latitude”, which underscores the degree of skill discretion and creativity required on the job (Karasek & Theorell, 1990; Karasek et al., 1998, p. 323; Van der Doef & Maes, 1999). According to Voydanoff (2007), work conditions that foster creativity, skill enhancement and utilization and problem solving represent highly salient job-related resources.

While the hypothesized buffering effects of these three job resources are straightforward, it is also essential to assess if job *demands* modify the impact of Work Contact. In this regard, highly demanding work provides a context that likely influences the nature of communication about work beyond the usual temporal parameters. According to Bakker and Geurts (2004): “Job demands refer to those physical, psychosocial, or organizational aspects of the job that require sustained physical and/or mental effort and are, therefore, associated with certain physiological and/or psychological costs” (p. 348). For the JD-R model, job demands are identified as potentially problematic for workers, especially in the “health impairment process” (Bakker et al., 2005; Demerouti, Bakker, Nachreiner, et al., 2001).

In the present study, we focus explicitly on the subjective experience of *job pressure* because of its centrality in the work, stress and health literature (Diestel & Schmidt, 2009; Kristensen, Bjorner, Christensen, & Borg, 2004; Tausig & Fenwick, 2011). Workers who report higher levels of job pressure tend to feel overwhelmed by the amount of work they have to do, they have to work on too many tasks at the same time, and report that the demands of their job exceed the time they have to do the work. Job pressure is a subjective perception that is linked to objective conditions in the workplace (Tausig & Fenwick, 2011). Moreover, these job pressures often increase the sense of greater time and energy commitments, which, in turn, are linked to burnout and distress (Hakanen et al., 2008), as well as exhaustion and sleep problems (see Bakker & Demerouti, 2007, p. 309).

There are several plausible reasons for the hypothesis that Work Contact is more detrimental in the context of high job pressure. One potential mechanism entails the degree that simultaneous exposure to high pressure and Work Contact heightens arousal that, in turn, poses a greater threat to one’s sense of equilibrium, energy and mental or physical resources than either one does on its own (Bakker & Geurts, 2007; Demerouti, Bakker, Nachreiner, et al., 2001). A second reason why the impact of Work Contact might be stronger among those with more job pressure involves the ways that both job pressure and Work Contact – as different, but interrelated demands – draw on the same limited volitional resources (for similar arguments, see Diestel & Schmidt, 2009; Kehr, 2004). Thirdly, Sonnentag and colleagues (2010) underscore the importance of psychological detachment as a means toward recovery from high levels of job pressure:

It implies that one is not working at home and not thinking about job-related issues, problems, or opportunities during after-work hours. In everyday life, psychological detachment from work is experienced as “switching off” and means leaving the workplace temporarily behind oneself in physical and in mental terms. (p. 965)

Frequent communications about work outside of the usual temporal parameters, however, might pose a challenge to psychological detachment and recovery from excessive job pressures; that is, it might be more difficult to “switch off” if one must frequently respond to work-related communications outside of regular work hours. In fact, this process may provide one of the primary channels for the facilitation of excessive demands. Collectively, these ideas and potential mechanisms provide a backdrop for the *demand hypothesis*: Work Contact in the context of job pressure may be more problematic for WFC, distress and sleep problems; that is, they may

have synergistic effects such that high levels of one amplifies the negative impact of the other.

Method

Sample

We analyzed data from the 2011 *Canadian Work Stress and Health* study (CAN-WSH), a national survey of the Canadian labour force. Interviews were conducted by telephone between January and August 2011. To be eligible to participate in the study, individuals had to be: (1) residing in Canada; (2) 18 years of age or older; (3) currently working at a paid job or operating an income-producing business; (4) employed in the civilian labour force; and (5) live in a non-institutional residence. In households with more than one eligible person, we used the “next birthday” method to randomly select the study participant. Participation was completely voluntary. Calls were made to a regionally stratified unclustered random probability sample generated by random-digit-dial methods. Interviews were conducted in English or French and averaged approximately 30–35 minutes. Study participants received a gift card for 20 Canadian dollars for completing the interview. The final full sample was 6004, with a response rate of approximately 40%. For the analyses in this paper, we excluded cases with missing values on the focal study variables and weighted all analyses according to the most recent Canadian Census information on the gender, age, marital status and education profile of the population. This yielded an effective sample size of 5729 with the following characteristics: 48% were women; the average age was 40 years; 48% were married or living with a partner; 40% had children younger than age 18 living in the household; 18% had a high school degree or General Education Development (GED) and another 35% were college graduates; 53% worked in a private for-profit business; 27% were professionals; the average weekly work hours were 38; and the median personal income was 41,000 Canadian dollars.

Focal measures

Work Contact. We used three items to assess the frequency of Work Contact. Each item asked study participants about the following experiences in the last three months: “How often were you called about work-related matters when you were not at work?”, “How often did you read job-related email or text messages when you were not at work?” and “How often did you contact people about work-related matters when you were not at work?” Response choices were coded as follows: “never” (1), “rarely” (2), “sometimes” (3), “often” (4) and “very often” (5). We averaged the items to create the index; higher scores indicate more frequent Work Contact ($\alpha = .78$).

Work-to-family conflict. We used four items to measure WFC. These are standard items that have been used in several recent surveys, including the National Study of the Changing Workforce and are widely published (Schieman & Glavin, 2011; Schieman & Young, 2010a, 2010b; Voydanoff, 2007). The items assess the following experiences in the last three months: “How often did you not have enough time for

the important people in your life because of your job?”, “How often did you not have the energy to do things with the important people in your life because of your job?”, “How often did your work keep you from doing as good a job at home as you could?” and “How often did your job keep you from concentrating on important things in your family or personal life?” Response choices are “*very often*” (1), “*often*” (2), “*sometimes*” (3), “*rarely*” (4) and “*never*” (5). We reverse-coded and averaged items such that higher scores indicate more WFC ($\alpha = .90$).

Psychological distress. We used seven well-known items of generalized psychological distress adapted from the Kessler index (K10; Kessler, 2002). These items assess the frequency that participants experienced the following symptoms in the past month: “anxious or tense”, “nervous”, “worry a lot about little things”, “had trouble keeping your mind on what you were doing”, “restless or fidgety”, “sad or depressed” and “hopeless”. Response choices are “*all of the time*” (1), “*most of the time*” (2), “*some of the time*” (3), “*a little of the time*” (4) and “*none of the time*” (5). We reverse-coded responses and averaged them to create the index; higher scores indicate more distress ($\alpha = .83$).

Sleep problems. We used three items to measure sleep problems (Maume et al., 2009). The items assess the following experiences in the past month: “How often did you have trouble falling or staying asleep?”, “How often did you wake up before you wanted to?” and “How often did you wake up feeling refreshed?” (reverse-coded). Response choices are coded as follows: “*none of the time*” (1), “*a little of the time*” (2), “*some of the time*” (3), “*most of the time*” (4) and “*all of the time*” (5). We averaged the items to create the index; higher scores indicate more sleep problems ($\alpha = .72$).

Job autonomy. We used three items to assess job autonomy. Participants were asked the extent to which they agree or disagree with the following statements: “I have the freedom to decide what I do on my job”, “It is basically my own responsibility to decide how my job gets done” and “I have a lot of say about what happens on my job”. Response choices were coded “*strongly disagree*” (1), “*somewhat disagree*” (2), “*somewhat agree*” (3) and “*strongly agree*” (4). We averaged responses to create the index; higher scores reflect more job autonomy ($\alpha = .78$). The items used to measure job autonomy, schedule control, challenging work and job pressures are similar or identical to those in the 2008 *National Study of the Changing Workforce* (NSCW).

Schedule control. We used one item to measure schedule control: “How much control do you have in scheduling your work hours?” We classified participants in three comparison groups, contrasting individuals who reported “*none*” or “*very little*” (low schedule control) with those who reported “*some*” or “*a lot*” (moderate) or “*complete control*” (high schedule control).

Challenging work. Five items were used to measure challenging work: “My job requires that I keep learning new things”, “My job requires that I be creative”, “My job lets me use my skills and abilities”, “The work I do on my job is meaningful to me” and “I get to do a lot of different things on my job” (Schieman & Young, 2010b). Response choices were coded “*strongly disagree*” (1), “*somewhat disagree*”

(2), “*somewhat agree*” (3) and “*strongly agree*” (4). We averaged the responses to create the index; higher scores reflect more challenging work ($\alpha = .78$).

Job pressure. We used items similar to those used in other previously published research on similar themes like “pressure”, “workload”, “overwork” or “quantitative demands” (Carayon & Zijlstra, 1999; Harmä, 2006; Karasek et al., 1998; Galinsky, Kim, & Bond, 2001; Kristensen et al., 2004). Items assess the frequency of the following experiences in the past three months: “How often did you feel overwhelmed by how much you had to do at work?”, “How often did you have to work on too many tasks at the same time?” and “How often did the demands of your job exceeded the time you have to do the work?” Response choices are coded: “*never*” (1), “*rarely*” (2), “*sometimes*” (3), “*often*” (4) and “*very often*” (5). We averaged the items to create the index; higher scores indicate more job pressure ($\alpha = .85$).

Table 1 reports summary statistics for the focal variables. Confirmatory factor analyses demonstrated that each of the work-related items loaded distinctly on their respective constructs. All analyses controlled for gender, age, marital status, children at home, province of residence, education, personal income, occupation, job sector, work hours, work shift and work location. (Full CFA results and coding details about the control measures are available on request from the authors.)

Plan of analyses

First and foremost, we expected that individuals who experienced more frequent Work Contact would also tend to experience more distress and sleep problems. As noted above, the resource hypothesis predicted that those associations should be weaker among individuals with more job-related resources. By contrast, the demand hypothesis predicted that those positive associations should be stronger among those with more job pressure. In addition, we also expected that WFC would be an explanatory mechanism in these associations. To test our predictions, we used ordinary least squares (OLS) regression techniques and separated our findings into

Table 1. Means, standard deviations and correlations between the focal variables ($N = 5729$).

	1	2	3	4	5	6	7	8	9
1 WFC	–								
2 Distress	.41	–							
3 Sleep problems	.33	.48	–						
4 Work Contact	.34	.11	.09	–					
5 Job autonomy	–.13	–.20	–.15	.22	–				
6 Some schedule control	–.03	–.04	–.06	.12	.09	–			
7 Full schedule control	–.13	–.09	–.05	.08	.33	–.41	–		
8 Challenging work	–.04	–.17	–.13	.22	.47	.04	.16	–	
9 Job pressure	.54	.30	.21	.30	–.05	–.01	–.11	.10	–
<i>M</i>	2.47	2.18	2.74	2.32	2.88	0.48	0.16	3.29	2.97
<i>SD</i>	1.00	0.71	0.98	1.07	0.81	–	–	0.68	1.09

Notes: All coefficients greater than .04 are statistically significant at the $p < .01$ level (two-tailed test). WFC = work-to-family contact.

Table 2. Regression of work-to-family conflict on work contact and job demands and resources.

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Work Contact	.310**	.214**	.215**	.265**	.213**	.209**
<i>Job Resources</i>						
Job autonomy	–	–.099**	–.109**	–.098**	–.099**	–.098**
Some schedule control	–	–.134**	–.132**	–.149**	–.134**	–.132**
Full schedule control	–	–.219**	–.212**	–.224**	–.219**	–.217**
Challenging work	–	–.137**	–.138**	–.139**	–.153**	–.137**
<i>Job Demands</i>						
Job pressures	–	.406**	.405**	.405**	.405**	.410**
<i>Moderating associations</i>						
Autonomy × Work Contact	–	–	–.060**	–	–	–
Some schedule control × Work Contact	–	–	–	–.058	–	–
Full schedule control × Work Contact	–	–	–	–.124*	–	–
Challenging work × Work Contact	–	–	–	–	–.065*	–
Job pressures × Work Contact	–	–	–	–	–	.031*
Constant	2.345	2.299	2.292	2.314	2.299	2.251
R ²	.193	.391	.393	.393	.393	.392

Notes: * $p < .01$; ** $p < .001$ (two-tailed test). Unstandardized regression coefficients are presented in the table. All models control for gender, age, marital status, children at home, province of residence, education, personal income, occupation, job sector, work hours, work shift and work location.

two inter-related parts. In the first section, we assessed the association between Work Contact and levels of WFC. As shown in Table 2, in model 1 WFC is regressed on Work Contact (adjusting for all control variables). Model 2 includes job resources and pressure to assess the net association between Work Contact and WFC. Models 3–6 test a series of interactions in which we multiplied Work Contact by job resources and pressure. (Prior to creating these interaction terms, we centred the variables.) Then we turned to the association of Work Contact with distress (Table 3) and sleep problems (Table 4), and tested whether or not resources and job pressure functioned as moderators. The steps in the first section of these analyses provided a backdrop for the steps in the second section of the analyses, which also assessed if WFC mediated any observed interactions between Work Contact and job resources or pressure.

Results

Work-to-family conflict. As shown in model 1 of Table 2, Work Contact was associated positively with WFC. In model 2, each job resource was associated negatively with WFC. Conversely, job pressure was associated positively with WFC. The positive association between Work Contact and WFC remained relatively stable net of each of these job attributes. In our tests of interaction effects, the positive association between Work Contact and WFC is weaker among those with more job

Table 3. Regression of psychological distress on work contact and job demands and resources.

Variable	Model 1	Model 2	Model 3	Model 4a	Model 4b	Model 5	Model 6
Work Contact	.117**	.080**	.081**	.107**	.045	.080**	.077**
<i>Job Resources</i>							
Job autonomy	–	–.083**	–.088**	–.082**	–.059*	–.082**	–.082**
Some schedule control	–	–.085**	–.087**	–.097**	–.061	–.088**	–.087**
Full schedule control	–	–.109*	–.106*	–.109*	–.056	–.109*	–.109*
Challenging work	–	–.145**	–.146**	–.147**	–.114**	–.147**	–.144**
<i>Job Demands</i>							
Job pressures	–	.197**	.197**	.197**	.101**	.197**	.200**
<i>Interactions</i>							
Autonomy × Work Contact	–	–	–.034	–	–	–	–
Some schedule control × Wk Contact	–	–	–	–.023	–.010	–	–
Full schedule control × Wk Contact	–	–	–	–.082*	–.054	–	–
Challenging work × Work Contact	–	–	–	–	–	–.010	–
Pressures × Wk Contact	–	–	–	–	–	–	.023
<i>Work-to-Family Conflict</i>							
Work-to-family conflict	–	–	–	–	.236**	–	–
Constant	2.219	2.188	2.184	2.196	2.245	2.184	2.184
R ²	.084	.207	.208	.208	.277	.208	.208

Notes: * $p < .01$; ** $p < .001$ (two-tailed test). Unstandardized regression coefficients are presented in the table. All models control for gender, age, marital status, children at home, province of residence, education, personal income, occupation, job sector, work hours, work shift and work location.

autonomy (model 3), schedule control (model 4) and challenging work (model 5). By contrast, the positive association between Work Contact and WFC is stronger among workers with more job pressure (model 6). We conducted F -tests to assess change in the R^2 for interaction models relative to the base model. These tests confirmed that each of the interaction terms significantly improve the fit of the model ($F_{\text{model 3}} = 15.04$, $p < .001$; $F_{\text{model 4}} = 9.17$, $p < .01$; $F_{\text{model 5}} = 8.95$, $p < .01$; $F_{\text{model 6}} = 7.54$, $p < .01$). To illustrate two of these interactions, Figure 1 illustrates that the positive association between Work Contact and WFC was weaker among those with more job autonomy. (Patterns for schedule control and challenging work were similar and therefore not illustrated.) By contrast, Figure 2 shows that the positive association between Work Contact and WFC is stronger among workers with greater job pressure.

Table 4. Regression of sleep problems on work contact and job demands and resources.

Variable	Model 1	Model 2	Model 3a	Model 3b	Model 4	Model 5a	Model 5b	Model 6a	Model 6b
Work Contact	.123**	.095**	.096**	.042	.113**	.095**	.040	.090**	.036
<i>Job Resources</i>									
Job autonomy	–	–.096**	–.107**	–.079*	–.096**	–.096**	–.071*	–.095**	–.070*
Some schedule control	–	–.104*	–.102*	–.069	–.110*	–.104*	–.070	–.102*	–.068
Full schedule control	–	–.060	–.053	.001	–.056	–.060	–.004	–.058	–.002
Challenging work	–	–.169**	–.171**	–.135**	–.171**	–.189**	–.146**	–.179**	–.133**
<i>Job Demands</i>									
Job pressures	–	.180**	.179**	.076**	.180**	.179**	.076**	.184**	.079**
<i>Interactions</i>									
Autonomy × Work Contact	–	–	–.062*	–.047*	–	–	–	–	–
Some control × Work Contact	–	–	–	–	–.008	–	–	–	–
Full control × Work Contact	–	–	–	–	–.072	–	–	–	–
Challenging work × Work Contact	–	–	–	–	–	–.067*	–.050	–	–
Pressures × Work Contact	–	–	–	–	–	–	–	.035*	.027
<i>Work-to-Family Conflict</i>									
Work-to-family conflict	–	–	–	.255**	–	–	.256**	–	.256**
Constant	2.596	2.564	2.558	2.613	2.570	2.556	2.617	2.558	2.614
R ²	.052	.115	.118	.160	.116	.117	.159	.117	.159

Notes: * $p < .01$; ** $p < .001$ (two-tailed test). Unstandardized regression coefficients are presented in the table. All models control for gender, age, marital status, children at home, province of residence, education, personal income, occupation, job sector, work hours, work shift and work location.

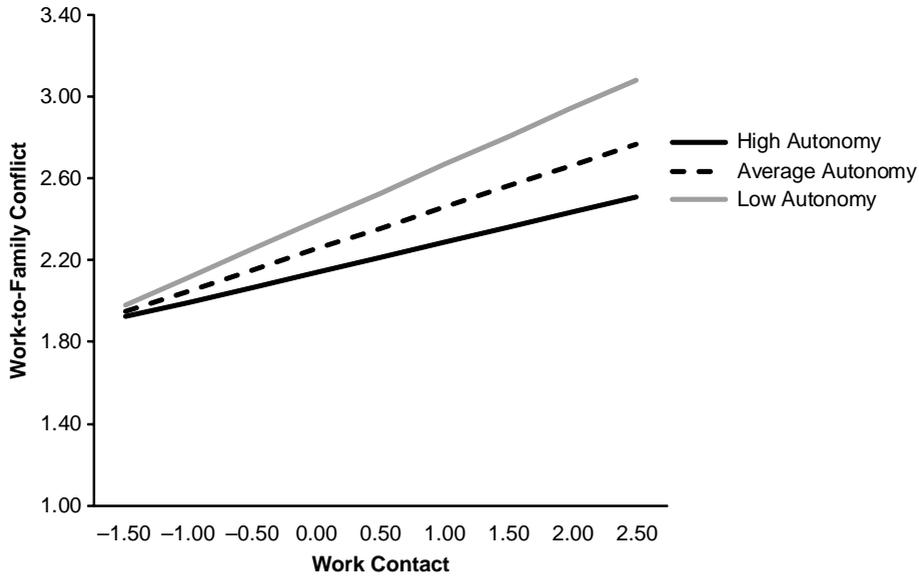


Figure 1. The relationship between work contact and work-to-family conflict across levels of job autonomy ($N = 5729$). Note: Predicted values of work-to-family conflict are based on results shown in model 3 of Table 2. All values for the continuous variables are held constant at their means. We solved that equation for white, married men working 40–49 hours per week in the private sector in professional occupations with no schedule control, earning \$25,000 to \$49,999 per year.

Psychological distress. Model 1 of Table 3 shows that Work Contact was associated positively with distress. In model 2, each job resource was associated negatively with distress, while job pressure was related to more distress. Moreover, the relationship between Work Contact and distress held net of these job attributes. For interaction effects, we observed only one statistically significant interaction: the positive association between Work Contact and distress is weaker among those with more schedule control (model 4a). Supplementary analyses confirmed that this interaction improved model fit ($F_{\text{model 4a}} = 5.37, p < .05$). In addition the inclusion of WFC, which itself is associated with greater distress, reduced the interaction effect to statistical non-significance (model 4b). A Sobel test indicated that WFC had a significant mediating influence (Sobel $t_{\text{model 4a; 4b}} = -2.97, p < .01$).

Sleep problems. Model 1 of Table 4 shows that Work Contact was associated with more sleep problems. In model 2, each job resource was associated with fewer sleep problems, while job pressure was associated with more sleep problems. Moreover, the relationship between Work Contact and sleep problems held net of these job attributes. In addition, the positive association between Work Contact and sleep problems was weaker among those with more job autonomy (model 3a) and challenging work (model 5a); however, that positive association was not moderated by schedule control (model 4a). Conversely, the positive association between Work Contact and sleep problems was stronger among those with more job pressure (model 6a). We found improved model fit with the inclusion of interaction terms for

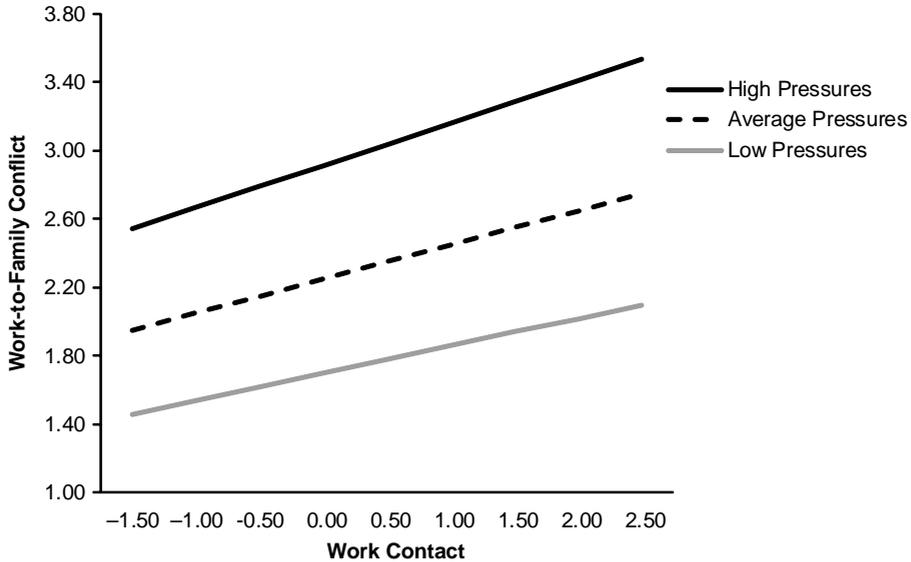


Figure 2. The relationship between work contact and work-to-family conflict across levels of job Pressure ($N = 5729$). Note: Predicted values of work-to-family conflict are based on results shown in model 6 of Table 2. All values for the continuous variables are held constant at their means. We solved that equation for white, married men working 40–49 hours per week in the private sector in professional occupations with no schedule control, earning \$25,000 to \$49,999 per year.

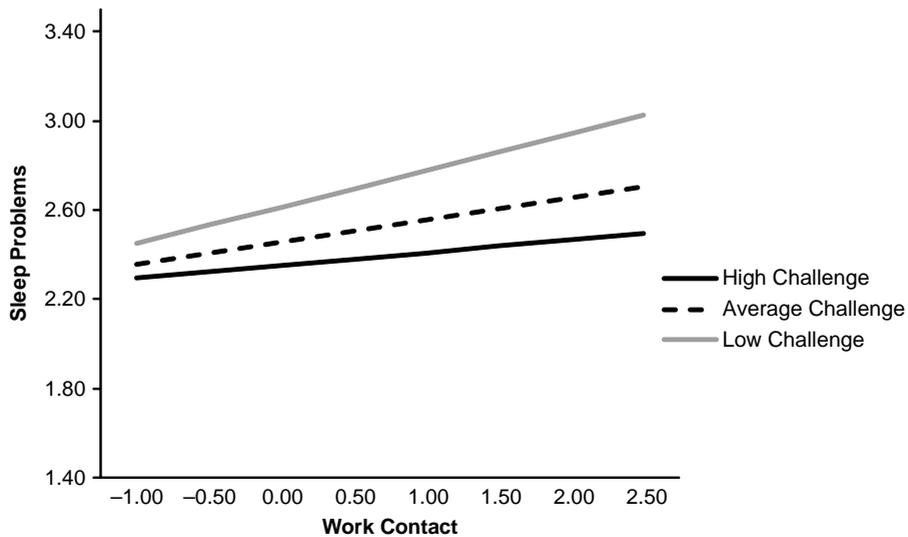


Figure 3. The relationship between work contact and sleep problems across levels of challenging work ($N = 5729$). Note: Predicted values of sleep problems are based on results shown in Table 4, model 5a. All continuous values are held constant at their respective means. We solved that equation for white, married men working 40–49 hours per week in the private sector in professional occupations with no schedule control, earning \$25,000 to \$49,999 per year.

autonomy ($F_{\text{model } 3a} = 11.10, p < .01$), challenging work ($F_{\text{model } 5a} = 7.68, p < .01$) and pressure ($F_{\text{model } 6a} = 6.78, p < .01$). To illustrate one of these interactions, Figure 3 shows the ways that challenging work buffered against the positive association between Work Contact and sleep problems. Lastly, the inclusion of WFC (which is associated with more sleep problems) reduced the interaction effects, and only the Work Contact-by-job autonomy term remained statistically significant (see models 3b, 5b, and 6b). A series of Sobel tests confirmed statistically significant mediating effects ($t_{\text{model } 3a; 3b} = -3.80, p < .01$; $t_{\text{model } 5a; 5b} = -2.87, p < .01$; $t_{\text{model } 6a; 6b} = 2.75, p < .01$).

Discussion

Is it problematic to be involved in communications about work outside working hours? In our analyses of a national sample of Canadian workers, we identified three main contributions from our study: (1) individuals who experienced more frequent Work Contact also tended to experience higher levels of WFC, psychological distress and sleep problems; (2) the positive relationship between Work Contact and WFC was weaker among those with more job resources, but stronger among those with more job pressure; and (3) to varying degrees, the positive association between Work Contact and both distress and sleep problems is weaker among those with more job resources. However, the patterns were not uniform, they differed somewhat across these two outcomes, and were largely attributable to differences in exposure to WFC. Collectively, our efforts provided an application and extension of the JD-R model.

Several observations were consistent with the *resource hypothesis*. First and foremost, all three of the job resources functioned as moderators for WFC. Specifically, the positive association between Work Contact and WFC was significantly weaker among workers who had more job autonomy, schedule control and challenging work. It is worth underscoring here that *challenging work* functioned as a moderator like the other more conventional job resources; this pattern therefore reinforced the characterization of challenging work as a “job resource”. It also indicates that Work Contact that occurred in the context of a job that requires learning new things, engaging in creative tasks and using skills and abilities was less problematic for the work-family interface.

It is noteworthy that the different job-related resources had somewhat different moderating effects – that is, Work Contact that occurred in these different contexts seemed to have differing patterns of association with WFC, distress and sleep problems. For example, both job autonomy and challenging work had similar moderating functions for two of the three focal associations: WFC and sleep problems. By contrast, the positive association between Work Contact and WFC and distress was weaker among those with more schedule control; schedule control, however, did not moderate the association between Work Contact and sleep problems. These divergent patterns are somewhat surprising and underscore the importance of considering different resources and outcomes in research on stress in the work-family interface. At this early stage of our research, we are uncertain about the specific reasons for these different patterns. One point of speculation about schedule control, for example, is as follows: because of the flexibility and type of control it affords, schedule control might be a more practical and effective resource

for neutralizing interruptions and therefore help minimize the extent to which Work Contact is disruptive. These processes associated with schedule control may be more closely related to feelings of anxiety and worry. On the other hand, having greater autonomy and challenging work may minimize the extent to which Work Contact “keeps one up at night” ruminating on work problems. Establishing a basis for these kinds of nuances, however, requires more in-depth analyses of underlying processes and meanings. Towards this end, a qualitative component of the present study that is currently in progress will directly build upon these preliminary findings and seek to elaborate on them in detail.

In addition to our observations of buffering effects for the job resources, another contribution of our study involves the ways that job pressure was consistently associated with an increased positive association between Work Contact and the different outcomes. As others have documented, job pressure has been associated with more frequent Work Contact (Schieman & Glavin, 2008). We expand upon that previous research by demonstrating that Work Contact was even *more problematic* when it occurs in a context where workers feel overwhelmed by the amount of work that they have to do, when they are required to work on too many tasks at the same time, and when the demands of their job exceeded the time that they have to do the work. In other words: high-pressured work contexts in which workers feel overworked can intensify the association between Work Contact and WFC or sleep problems. In some ways, these findings provide an extension of the JD-R model by revealing the ways in which one type of job demand, pressure or overwork, amplifies the problematic aspects of what Voydanoff (2007) has identified as a central “boundary-spanning demand”: Work Contact.

Moreover, our analyses also illustrate the ways in which WFC contributes to the interaction effects for Work Contact and these job characteristics. We detected three inter-related patterns that contribute to these effects. First, people with more WFC tended to have more distress and sleep problems. Second, each of the job resources was associated with a reduction in the positive association between Work Contact and WFC. Taking these patterns into account helps explain why job resources and job pressure moderated the positive associations between Work Contact and both distress and sleep problems. These interrelationships suggest that WFC is a potentially critical mediating mechanism.

Limitations

Despite these contributions of the study, we wish to acknowledge several study limitations. First and foremost, these findings are based on analyses of cross-sectional data. This limits our claims about causal ordering. However, it does not necessarily suggest that the patterns do not reflect some of the processes or mechanisms in workers’ experiences. One way we might reflect on this limitation involves how closely our modelling approach seeks to map on to the conceptual and theoretical ideas about the interrelationships among these job conditions. It is directly linked to the theoretical case and personal narratives that people use when they describe the nature of their work and the consequent stressors or demands embedded in those arrangements. Nonetheless, we recognize that some part of the causal associations among resources, demands and distress or sleep may occur in a different direction (de Lange, Taris, Kompier, Houtman, & Bongers, 2004). Another

concern about cross-sectional data involves the influence of selection effects. The data analyzed here are from the first wave of a proposed multi-wave effort. We anticipate the capacity in future additional waves of data to better establish causal ordering and the influence of selection effects. The present study should therefore be viewed as a preliminary baseline set of ideas and estimates that require further validation with the anticipated longitudinal data. Moreover, as we mentioned above, an ongoing supplementary qualitative component of our investigations that involves in-depth interviews with a broad cross-section of these same study participants will help us to elaborate more fully on the meanings and appraisals of the processes we have sought to articulate here.

Conclusion

We have shown that workers who frequently sent and received work communications outside of regular work hours tended to report more WFC, psychological distress and sleep problems. Three job-related resources – autonomy, schedule control and challenging work – weakened the link between Work Contact and WFC, and, to varying degrees, also buffered against the link with distress or sleep problems. Importantly, however, we have also demonstrated that job pressure had an amplifying influence, providing a context in which Work Contact was associated with even greater detrimental outcomes. Finally, WFC either partially or fully mediated these interaction effects. Collectively, these observations provide preliminary steps that shed new light on a growing phenomenon – that of sending and receiving work-related communications outside working hours – and the relevance of job-related demands and resources for its consequences, both personal and in role functioning.

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