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Keywords

employed, health, control, demands, job, between, association, work, mediating, family, parents, role, enhancement, interference

Disciplines

Arts and Humanities | Life Sciences | Medicine and Health Sciences | Social and Behavioral Sciences

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The association between job demands/control and health in employed parents: The mediating role of work-to-family interference and enhancement

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Abstract

This paper examined whether work-to-family interference (WFI) and work-to-family enhancement (WFE) mediated the association between job demands/control and self-reported mental and physical health. Data were from the Household, Income and Labor Dynamics in Australia survey and included 1,404 Australian adults aged 18–64 years at baseline; 820 participants provided data at three time points (baseline, 12-month follow-up, and 24-month follow-up). Self-report questionnaires assessed mental and physical health, WFI and WFE, and job demands/control. Mediation analyzes performed on the longitudinal data indicated that WFI mediated the relationships between job demands/control and self-reported mental and physical health. The findings have implications for improving the well-being of employees and workplace productivity.

Key words: work-to-family interference, work-to-family enhancement, vitality, multiple mediation, job strain.

Job Demands/Control and Work-Family Balance

Karasek's (1979) job demand-control model is one of the most influential models in the occupational health psychology field. The model proposes that job demands (i.e., workload demands) and job control (i.e., decision latitude) are two critical aspects of the psychosocial work environment, and influence a range of outcomes including mental and physical health. According to the strain hypothesis, psychological job strain is the result of a combination of high demands and low control (Häusser, Mojzisch, Niesel, & Schuz-Hardt, 2010), and predicts adverse health outcomes such as cardiovascular disease, obesity, depression, and mortality (Sanne, Mykletun, Dahl, Moen, & Tell, 2005; Virtanen et al., 2007). The buffer hypothesis proposes that the relationships between job demands and health outcomes are moderated by levels of job control (Häusser et al., 2010). However, the strain hypothesis has generally received more empirical support than the buffer hypothesis (de Lange, Taris, Kompier, Houtman, & Bongers, 2003; Häusser et al., 2010).

The purpose of the present research was to further investigate the longitudinal associations between job demands/control and employee mental and physical health, specifically by examining the role of two work-family balance variables (work-to-family interference [WFI] and work-to-family enhancement [WFE]). Work-family balance (i.e., the level of compatibility between an individual's work and family roles) is increasingly relevant in countries such as Australia and the U.S.A. as more parents, especially mothers, are seeking or continuing employment after having children (Australian Bureau of Statistics, 2006; U.S. Bureau of Labor Statistics, 2009). In Australia, the proportion of employed mothers increased from 40% to 53% between 1979 and 2004 (Australian Bureau of

Statistics, 2006), with similar trends observed in the U.S.A. (U.S. Bureau of Labor Statistics, 2009). Consequently, dual-income families (i.e., families where two parents are employed) are now the most common type of family in Australia (Australian Bureau of Statistics, 2003). More parents, therefore, face the considerable challenge of combining work and family roles, which has implications for employee health and workplace productivity.

The nature of the relationship between work and family life is multidirectional and complex (Demerouti, Bakker, & Bulters, 2004). As noted above, this paper focuses on two work–family balance variables, WFI and WFE, which reflect the positive and negative spillover effects of work on family life. In particular, we examine whether WFI and WFE mediate the association between job demands/control and self-reported mental and physical health. However, experiences in the family domain (e.g., marital conflict) can also have positive (family-to-work enhancement [FWE]) and negative (family-to-work interference [FWI]) effects on experiences in the work domain (Byron, 2005; Geurts, Kompier, Roxburgh, & Houtman, 2003; Grzywacz & Marks, 2000; Montgomery, Panagopolou, & Benos, 2006).

Although FWI and FWE are important components of work–family balance, they are not examined in the present paper because they may play a very different role on the relationship between job demands/control and health compared with WFI and WFE. This proposition is based on evidence indicating that WFI/WFE is distinct from FWI/FWE, particularly in relation to their associations with work-related factors (Byron, 2005; Mesmer-Magnus & Viswesvaran, 2005). For instance, WFI and WFE reflect the perceived consequences of work-related factors on family life

(other factors such as personality are also important) and may mediate the effects of job demands/control on self-reported mental and physical health (Byron, 2005; Mesmer-Magnus & Viswesvaran, 2005). In contrast, FWI and FWE are more likely the result of nonwork, rather than work-related, factors such as family conflict, family social support, sex, and personality (Byron, 2005), and have the potential to influence perceived job demands/control (Graves, Ohlott, & Ruderman, 2007). Therefore, WFI and WFE are likely to be a consequence of the psychosocial work environment (in addition to factors such as sex and personality), and may link work-related factors such as job demands/control with health and well-being. In contrast, FWI and FWE primarily reflect nonwork variables and are likely to have a different influence on the job demands/control–health relationship compared to WFI and WFE. Thus, the present paper focuses on WFI and WFE, but acknowledges that other aspects of work–family balance are also important and warrant separate investigation.

Job Demands/Control, Work-to-Family Interference and Health

WFI can occur when negative aspects of an individual's employment such as stress are transmitted to the family domain (Demerouti et al., 2004; Greenhaus & Beutell, 1985; Ilies et al., 2007; Losoncz & Bortoiotto, 2009). This can have a range of consequences including mental and physical health problems such as depression, burnout, and hypertension (Ilies et al., 2007; Losoncz & Bortoiotto, 2009). Although work characteristics such as job demands/control are strong predictors of WFI, other factors relating to sex, personality (e.g., high neuroticism), time management skills, and existing levels of family conflict also have the potential to influence levels of WFI (Byron, 2005; Wayne et al., 2004).

Existing theories of occupational health suggest that WFI mediates the relationship between job demands/control and employee mental and physical health. The role-strain hypothesis proposes that an individual has limited amounts of time, physical energy, and psychological resources (Greenhaus & Powell, 2006; Grzywacz & Marks, 2000). When work and family life compete for these resources, it can cause interrole conflict, whereby family life is made more difficult because of work pressures (Greenhaus & Beutell, 1985). These work pressures may be time-based (e.g., long working hours), strain-based (e.g., job demands) and/or behavior-based (e.g., work roles that are incompatible with family life) (Greenhaus & Beutell, 1985), and over time impair mental and physical health. The role-strain hypothesis thus suggests that WFI is not an independent variable, but rather a mediator through which the negative aspects of an individual's job (e.g., high job demands/low control) affect mental and physical health.

The effort-recovery model (Meijman & Mulder, 1998) proposes that work demands requiring effort lead to tangible results such as task completion, and are accompanied by short-term physiological and psychological responses reflecting stress. With sufficient rest and recovery, the stress response normally attenuates rapidly. However, it can remain elevated if the individual's opportunities for rest and relaxation are disrupted, and contribute to a range of physical and mental health problems. An individual's recovery from effort at work during nonwork hours can be disrupted by a myriad of factors, including WFI (Geurts et al., 2003). This is because elevated WFI can contribute to increased family conflict, limiting opportunity for leisure time and relaxation. Geurts et al. (2003) found empirical support for this proposition, with increased WFI partially mediating the relationship between increased workload and outcomes such as depressive mood and physical health complaints.

It is important to note that WFI may be one of several mechanisms linking job demands/control to poorer physical and mental health. For example, low WFE (discussed below) and engagement in health compromising behaviors (e.g., smoking) are potential consequences of job demands/control and may impair mental and physical health over time (Landsbergis et al., 1998). In addition, job demands/control could directly impair mental and physical health via physiological pathways (e.g., overactivation of the sympathetic nervous system).

This suggests that WFI is likely to partially mediate the relationship between job demands/control and measures of mental and physical health; this proposition has been supported by a number of cross-sectional studies (Franche et al., 2006; Geurts et al., 2003; Höge, 2009; Janssen, Peeters, de Jonge, Houkes, & Tummers, 2004; Montgomery et al., 2006; Parasuraman, Purohit, Godshalk, & Beutell, 1996). Peeters, de Jonge, Janssen, and van der Linden (2004) conducted a longitudinal study of 383 healthcare employees and found that WFI partially mediated the association between work and health. However, few other longitudinal studies have tested this mediation hypothesis in this context. Therefore, more longitudinal studies are required to examine whether WFI partially mediates the association between occupational factors such as job demands/control and mental and physical health.

Hypothesis 1. WFI will partially mediate the association between high job demands/control and poorer self-reported mental and physical health. Partial mediation is hypothesized given that there may be a direct link between high job demands/control and self-reported mental and physical health, in addition to a range of other indirect pathways (e.g., health behaviors).

Job Demands/Control, Work-to-Family Enhancement and Health

WFE can occur when positive aspects of work associated with income, social support, and increased self-efficacy spill over and benefit family life (Carlson, Kacmar, Wayne, & Grzywacz, 2006; Greenhaus & Powell, 2006; Grzywacz & Marks, 2000). WFE and WFI do not represent two ends of a continuum and can co-occur since work can lead to high WFI (e.g., spillover of stress) and high WFE (e.g., financial security, personal growth) (Grzywacz & Marks, 2000). WFI and WFE should, therefore, be considered as separate but related constructs. WFE is primarily influenced by characteristics of the work environment; for example, job characteristics such as higher autonomy have been associated with higher WFE (Grzywacz & Butler, 2005; Voydanoff, 2004), while factors such as increased time pressure are linked with lower WFE (Voydanoff, 2004). A range of nonwork factors such as sex and personality (e.g., high extraversion) also have the potential to influence WFE (Wayne et al., 2004).

Consistent with existing theories, WFE has been linked with a range of positive health outcomes (Kinnunen, Feldt, Geurts, & Pulkkinen, 2006). According to the role-enhancement hypothesis, for example, combining multiple roles can promote personal growth and improve tolerance to stressors (Grzywacz & Marks, 2000). This may benefit family life, parenting, and the ability to deal with stress arising from work and family environments (Greenhaus & Powell, 2006). Greenhaus and Powell (2006) proposed that five types of resources can be generated by work or family roles: (1) skills and perspectives (e.g., coping, valuing individual differences); (2) psychological and physiological resources (e.g., self-efficacy); (3) social capital resources (e.g., information); (4) flexibility in the timing, pace, and location of meeting role requirements; and (5) material resources such as income.

Two mechanisms explain how resources generated in one role can impact on performance

and well-being in another role (Greenhaus & Powell, 2006); we discuss this in relation to the potential impacts of work on family functioning. First, there is an instrumental pathway whereby the resources gained from work (e.g., income, coping skills) are directly transferred to family roles and enhance performance. Second, the affective pathway reflects positive affect such as higher self-esteem and satisfaction generated by work, which can spill over and have a positive effect on the family domain (Greenhaus & Powell, 2006).

WFE reflects the spillover of positive aspects of work into the family domain, and is a predictor of several health outcomes. Therefore, low WFE may partially mediate the association between high job demands/control and poor mental and physical health. The combination of high demands and low control may contribute to lower WFE because these work characteristics could limit the transfer of resources from the work domain to the family domain. In turn, lowered WFE may be inversely associated with employee mental and physical health since the work environment does not benefit the individual or their family life through instrumental and affective pathways. Partial mediation would be expected given that a range of other factors in addition to job characteristics (e.g., personality, WFI) may also influence WFE (Wayne et al., 2004).

Few studies have examined whether WFE partially mediates the association between work characteristics and measures of mental and physical health. Franche et al. (2006) investigated whether WFI and WFE (along with measures of FWI and FWE) mediated the relationship between work and depressive symptoms. Their results indicated that WFI, but not WFE, partially mediated this relationship in 218 female healthcare workers. The lack of a significant finding for WFE may reflect a number of methodological issues relating to the relatively small sample size, the specific characteristics of the sample, and the use of cross-sectional data. There is, therefore, a need for longitudinal research to also examine the

potential role of WFE on the relationship between job demands/control and employee mental and physical health.

Hypothesis 2. Lowered WFE will partially mediate the association between high job demands/control and poorer self-reported mental and physical health. Consistent with Hypothesis 1, we expect partial mediation since there are other factors that may also underlie the association between job demands/control and self-reported health.

Method

Participants and Procedure

The Household, Income and Labor Dynamics in Australia (HILDA) survey commenced in 2001 and collects data on health and well-being, family dynamics, and occupational factors every 12 months. Data are collected through face-to-face interviews and self-completion questionnaires. In this paper, we utilized data collected in Waves 7 (2007), 8 (2008), and 9 (2009) of the HILDA study, which in the remainder of this paper are referred to as Time 1, Time 2, and Time 3, respectively. Each time point was 12 months apart; these time lags are consistent with Peeters et al. (2004) and other studies that have examined the associations between work characteristics and indicators of physical and mental health (de Lange et al., 2003). We restricted the sample to adults who were employed full-time (i.e., ≥ 35 hours/week), had at least one child living at home, and were married or in a de facto relationship. This led to a sample size of 1,404 at baseline, with 820 participants providing data at all three time points. Ethics approval to use the HILDA data for the purposes of the present paper was obtained from the University Human Research Ethics Committee.

Measures

Self-Reported Mental and Physical Health.

The eight subscales of the Short-Form Health Survey (SF-36) were used to assess mental and physical health in this paper (Ware, Kosinski, & Gandek, 2000). The advantage of the SF-36 is that it provides important information on multiple dimensions of an individual's health and well-being (e.g., psychological, social, and biological), and is sensitive to changes in health and well-being over relatively short periods of time (Hemingway, Stafford, Stansfeld, Shipley, & Marmot, 1997). Hence it is considered suitable for the purposes of the present study.

The Vitality subscale (Cronbach's alpha = .85) consists of four items assessing how often an individual reported feeling worn out and fatigued over the past 4 weeks (e.g., “Did you feel tired?,” “Did you feel worn out?”). The Role-Emotional subscale (Cronbach's alpha = .84) includes three items that provide insight into whether emotional problems interfere with work or daily activities (e.g., “[have you] cut down the amount of time you spent on work or other activities?”). The Mental Health subscale (Cronbach's alpha = .80) consists of five items assessing depression (e.g., “Have you felt down?”) and anxiety (e.g., “Have you been a nervous person?”). The Social Functioning scale (Cronbach's alpha = .77) consists of two items reflecting whether emotional or physical problems impact on normal social activities (e.g., “How much of the time have your physical health or emotional problems interfered with your social activities?”). These four subscales are generally considered to reflect self-reported mental health (Ware et al., 2000).

The remaining four subscales of the SF-36 reflect self-reported physical health. The Physical Functioning subscale (Cronbach's alpha = .89) examines the extent to which the individual's health limits their engagement in 10 different activities (e.g., “vigorous activities,” “climbing several flights of stairs”). The Role

Physical subscale (Cronbach's alpha = .82) includes four items assessing whether the individual's regular daily activities are affected by their physical health (e.g., “[have you] accomplished less than you would like”). The Bodily Pain subscale (Cronbach's alpha = .78) consists of two items examining whether the individual experiences bodily pain and whether this interferes with daily activities (e.g., “How much did pain interfere with your normal work?”). Finally, the General Health subscale (Cronbach's alpha = .79) is a 5-item scale that evaluates overall physical health (e.g., “I am as healthy as anybody I know,” “I expect my health to get worse”).

WFI and WFE.

The HILDA survey included 16 items from the Work-Family Strains and Gains Scale (Marshall & Barnett, 1993). Eight items (see Table 1) assess the effect of work on family life and parenting (e.g., “Work makes family time less enjoyable,” “Work has a positive effect on my children”) and were included in this paper. We performed exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) to determine the factor structure of these items; these analyses were performed by splitting the Time 1 sample into random halves.

Table 1. Factor loading for the eight items assessing work-to-family interference and work-to-family enhancement (N = 702).^a

	Work-to-Family Interference	Work-to-Family Enhancement
Working minimises rewarding aspects of parenting	.86	
Working limits home or family activities	.82	
Working leaves too little energy to be a good parent	.79	
Work makes family time less enjoyable	.63	

Work makes me feel good, which benefits my children	.81
Work has a positive effect on my children	.80
Work makes me a better parent	.79
Work helps me appreciate my time with my children	.75

^aFor clarity, loadings < 0.30 are not presented.

For the EFA, the number of factors was determined using Velicer's minimum average partial (MAP) test (O'Connor, 2000). Two factors were identified and then extracted using Principal Components Analysis with Direct Oblimin Rotation. Factor 1 (see Table 1) included four items assessing the negative impacts of work on family life and was labeled WFI. Factor 2 included the remaining four items assessing positive effects of work on family life and was subsequently labeled WFE. CFA was performed using AMOS (version 17), with model fit assessed on the basis of chi-square, Goodness of Fit (GFI), Adjusted Goodness of Fit (AGFI), Comparative Fit Index (CFI), and Root Mean Square Error of Approximation (RMSEA). Although the chi-square value was significant, $[\chi]^2(19, N = 702) = 147.9, p < .01$, most fit indices indicated an appropriate fit between the model and the data (GFI = .95; AGFI = .91; CFI = .94; RMSEA = .10). The subsequent factor structure supported the four-item measure of WFI (Cronbach's alpha = .83) and a four-item measure of WFE (Cronbach's alpha = .80), both of which had acceptable levels of internal consistency.

Job Demands/Control.

The HILDA survey included 12 items examining psychosocial aspects of the work environment, consistent with the job demands and control components of Karasek's (1979) demand-control model. All items (see Table 2) were assessed on a 7-point Likert scale ranging from strongly disagree to strongly agree. EFA was performed on a random 50% of the Time 1 sample. The MAP test indicated two factors that were extracted using Principal

Components Analysis with Direct Oblimin Rotation. Factor 1 assessed issues surrounding flexibility and autonomy at work and was consequently labeled job control. Factor 2 assessed intensity of work and time pressures and was labeled job demands.

Table 2. Factor loadings for the 12-items assessing job demands and job control (N = 702).^a

	Job Control	Job Demands
Lot of freedom to decide when to do work	.86	
Lot of choice in deciding what to do at work	.85	
Lot of freedom to decide how I do my own work	.80	
Lot of say about what happens on my job	.79	
Working times can be flexible	.78	
Can decide when to take a break	.75	
Have to work very intensely		.82
Job is complex and difficult		.73
Have to work fast		.67
Not enough time to do everything at work		.67
Job requires new skills		.64
Many skills and abilities used in my current job		.51

^a For clarity, loadings < 0.30 are not presented.

The CFA, performed on the second random half of the Time 1 sample, indicated that this model did not have a good model fit as reflected by the chi-square, $[\chi]^2(53, N = 702) = 608.3, p < .01$, GFI (.86), AGFI (.79), CFI (.84), and RMSEA (.12). Inspection of the standardized path coefficients indicated relatively low values for two items on the job demands factor: “My job often requires me to learn new skills” ($[\beta] = .46$) and “I use many of my skills and abilities in my current job” ($[\beta] = .35$). Job demands traditionally reflects workload demands, work conflicts, and other work-related stressors (e.g., Karasek, 1979). The four items with high loadings on this factor are consistent with this definition as they reflect work intensity, perceived job intensity, and perceived job complexity. The two items with low loadings are less consistent with traditional conceptions of job demands. Therefore, for theoretical and statistical reasons, the data were reanalyzed with these two items removed. The subsequent results indicated that the chi-square value was still significant, $[\chi]^2(34, N = 702) = 327.1, p < .01$, but was significantly lower than the previous model, $[\chi]^2$ for difference (19, N = 702) = 281.2, $p < .01$. The GFI (.91), AGFI (.86), CFI (.91), and RMSEA (.11) values also indicated an improved model fit. The final job demands (Cronbach's alpha = .75) and job control (Cronbach's alpha = .89) scales had appropriate levels of internal consistency.

Consistent with previous research, a ratio of job demands-to-control (herein referred to as job demands/control) was calculated by dividing scores on the job demand scale by scores on the job control scale (Kivimäki et al., 2006; László, Ahnve, Hallqvist, Ahlbom, & Janszky, 2009; Schnall, Landsbergis, & Baker, 1994).

Covariates.

Selected variables in the HILDA survey were included as covariates in the analyses. These variables included age, sex, the number of children aged under 25 years living at home (coded as ≤ 2 , > 2), and partner employment status (coded as “employed” and “not employed”).

Statistical Analysis

Hypotheses 1 and 2 were tested cross-sectionally (Time 1 data) to provide a comparison with existing findings and also using longitudinal data (Time 1, Time 2, and Time 3). The cross-sectional analyses were performed using bootstrapping (10,000 resamples) to determine the significance of the indirect path (i.e., ab) (MacKinnon & Fairchild, 2009; Preacher & Hayes, 2008; Rucker, Preacher, Tormala, & Petty, 2011). The cross-sectional model examined whether the association between job demands/control and self-reported mental and physical health was mediated by WFI and WFE. Age, sex, number of children, and partner employment status were included as covariates, and separate models were tested for each SF-36 subscale. Two indirect effects were tested: (1) job demands/control \rightarrow WFI \rightarrow SF-36 subscale; (2) job demands/control \rightarrow WFE \rightarrow SF-36 subscale.

A lagged panel mediation model examined the temporal associations between job demands/control, WFI, WFE, and each SF-36 subscale (Cole & Maxwell, 2003; Little, Preacher, Selig, & Card, 2007; Selig & Preacher, 2009). A simplified version of the model tested in the present paper is shown in Figure 1; omitted are covariances between variables at Time 2, covariates at baseline, and separate indirect paths for WFI and WFE. The analyses involved testing two separate indirect paths: (1) job demands/control (Time 1) \rightarrow WFI (Time 2) \rightarrow SF-36 subscale (Time 3); and, (2) job demands/control (Time 1) \rightarrow WFE (Time 2) \rightarrow

SF-36 subscale (Time 3). This model controlled for SF-36 subscale scores from Time 1 and Time 2, and WFI and WFE assessed at Time 1. Age, sex, number of children, and partner employment status were included as covariates (omitted from Figure 1). The significance of each indirect path was determined using a bootstrapping procedure with 10,000 resamples.

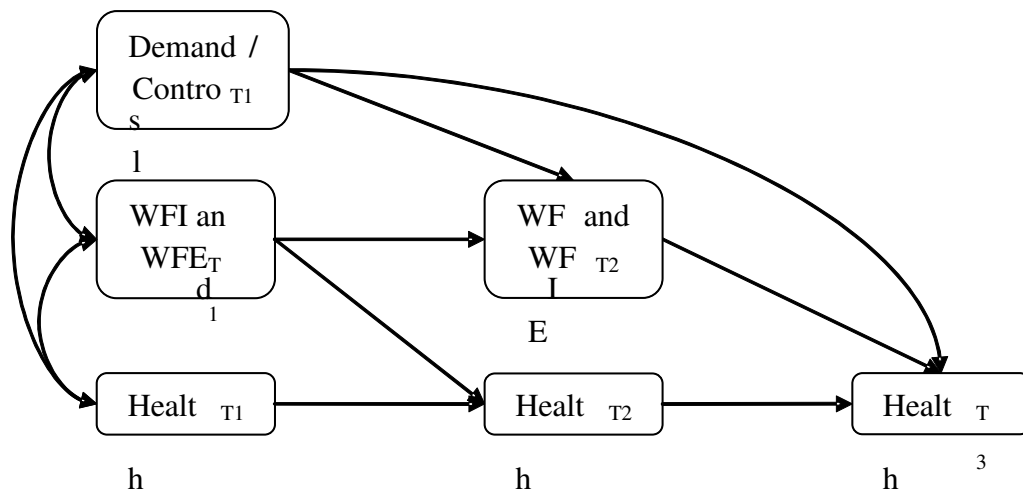


Figure 1. Lagged panel mediation model linking Job Demands/Control (Time 1) and Self-reported Mental and Physical Health (Time 3). For reasons of clarity, WFE and WFI (Time 3) are displayed together. In the analyses, these variables were examined as separate mediators (i.e., two indirect paths were tested)

The cross-sectional and lagged panel mediation models were tested using *Mplus* version 6.11 (Muthén & Muthén, 1998–2010). Consistent with current recommendations, we focus on the significance of each indirect effect rather than examining the significance of the *c* and *c'* paths (Rucker et al., 2011).

Results

Descriptives

At Time 1, there were a total of 1,404 employed parents (see Table 3), aged 18–64 years ($M = 40.73$; $SD = 7.80$), with more males (74.3%) than females (25.7%). The majority of participants had a partner who was also employed (78.8%). At Time 2, 948 participants (67.5%) provided data and still met the inclusion criteria (i.e., employed full-time, married or in a de facto relationship); while at Time 3, 820 participants (58.4% of the Wave 7 sample) provided complete data and met the inclusion criteria. Therefore, the longitudinal analyses were conducted on the sample of 820 employed parents who provided complete data across all waves. Table 3 also provides a comparison of participants who were included in the longitudinal sample with those who were excluded. This indicates a number of significant differences between the samples, particularly in relation to sex, with females more likely to be excluded. This was mostly due to changed employment status (e.g., no longer employed full-time), which may partially reflect a number of factors including having additional children, childcare responsibilities, and so forth. Excluded participants also had slightly lower scores on some SF-36 subscales at baseline, but the magnitude of these differences was minor and may not be clinically meaningful (e.g., Ware et al., 2000).

Table 3. Baseline characteristics of the cross-sectional sample (N = 1404) and longitudinal sample (820). Data presented as means (standard deviations) unless indicated otherwise.

	Baseline Sample (N = 1404)	Longitudinal Sample (N = 820)	Excluded Participants (N = 586)	P value ¹
Sex, n (%)				< .01
Male	1043 (74.3)	663 (80.9)	380 (65.1)	
Female	361 (25.7)	157 (19.1)	204 (34.9)	

Age	40.73 (7.80)	40.89 (7.55)	40.50 (8.13)	.35
Vitality	63.23 (16.92)	64.44 (16.06)	61.52 (17.93)	<.01
Mental Health	78.06 (13.22)	78.80 (12.55)	77.02 (14.04)	.01
Social Functioning	91.05 (15.40)	92.44 (13.65)	89.11 (17.40)	<.01
Role-Emotional	94.99 (15.43)	95.75 (14.43)	93.95 (16.70)	.03
Physical Functioning	92.20 (14.02)	93.24 (12.60)	90.74 (15.71)	< .01
Role Physical	92.13 (21.70)	93.07 (20.47)	90.81 (23.27)	.05
Bodily Pain	79.74 (19.0)	80.83 (18.38)	78.22 (17.75)	.01
General Health)	73.96 (16.58)	74.05 (15.85)	73.83 (17.58)	.80
Number of Children n (%)				.16
≤ 2 children	1109 (79.0)	637 (77.7)	472 (80.8)	
≥ 3 children	295 (21.0)	183 (22.3)	112 (19.2)	
Partner Status, n (%)				.04
Not employed	297 (21.2)	189 (23.0)	108 (18.5)	
Employed	1107 (78.8)	631 (77.0)	476 (81.5)	

¹ p value refers to the difference between the longitudinal sample and those excluded due to missing data.

Cross-sectional Results

In all models, job demands/control was positively associated with WFI ([beta] = 3.37, $p < .01$) and negatively associated with WFE ([beta] = -1.22, $p < .01$). In regard to the four mental health subscales, WFI was inversely associated with Vitality ([beta] = -1.06, $p < .01$), Mental Health ([beta] = -.57, $p < .01$), Role-Emotional ([beta] = -.36, $p < .01$), and Social Functioning ([beta] = -.47, $p < .01$). WFE was positively associated with Vitality ([beta] = .56, $p < .01$) and Mental Health ([beta] = .40, $p < .01$), but not Role-Emotional ([beta] = .11, $p = .27$) or Social Functioning ([beta] = .18, $p = .05$). WFI partially mediated the relationships of job demands/control with Vitality ([beta] = -3.56 [-4.45, -2.77]), Mental Health ([beta] = -1.93 [-2.55, -1.41]), Role-Emotional ([beta] = -1.21 [-1.87, -.63]), and Social Functioning ([beta] = -1.57 [-2.27, -1.01]). WFE was also found to partially mediate the relationships of job demands/control with Vitality ([beta] = -.63 [-1.09, -.29]), Mental Health ([beta] = -.45 [-.81, -.20]), and Social Functioning ([beta] = -.20 [-.50, -.01]), but not Role-Emotional ([beta] = -.13 [-.42, .08]).

The findings for the four physical health subscales were mixed. WFI was associated with lower General Health ([beta] = -.63, $p < .01$), Role Physical ([beta] = -.49, $p < .01$), and Bodily Pain ([beta] = -1.12, $p < .01$), but not Physical Functioning ([beta] = -.08, $p = .33$). WFE was associated with higher General Health ([beta] = .35, $p < .01$), but was not significantly related to Physical Functioning ([beta] = .05, $p = .59$), Role-Physical ([beta] = -.04, $p = .74$), or Bodily Pain ([beta] = .00, $p = .85$). The association between job demands/control and General Health was partially mediated by WFI ([beta] = -2.13, [-2.87, -1.48]) and WFE ([beta] = -.39 [-.77, -.16]).

WFI also partially mediated the relationships of job demands/control with Role-Physical ([beta] = -1.64 [-2.56, -.81]) and Bodily Pain ([beta] = -1.51 [-2.28, -.83]), but not Physical Functioning ([beta] = -.29 [-.85, .30]). WFE did not mediate the relationships of job demands/control with Physical Functioning ([beta] = -.06 [-.31, .14]), Role Physical ([beta] = .05 [-.23, .38]), or Bodily Pain ([beta] = -.03 [-.32, .21]).

Longitudinal Results: Self-Reported Mental Health

The results of each lagged panel mediation model for the Mental Health subscales are shown in Table 4. The Vitality model indicated that job demands/control at Time 1 was positively associated with WFI at Time 2 ([beta] = 1.46, $p < .01$). WFI at Time 2 was negatively associated with Vitality at Time 3 ([beta] = -.28, $p < .01$). The indirect path linking job demands/control (Time 1) to Vitality (Time 2) through WFI (Time 3) was significant ([beta] = -.41 [-1.01, -.09]). The indirect path linking job demands/control (Time 1) to Vitality (Time 2) through WFI (Time 3) was not significant ([beta] = -.07 [-.43, .05]). These results indicate that the association between job demands/control and Vitality was partially mediated by WFI. This model accounted for 42.9% of the variance in Vitality at Time 3. A similar pattern of results was observed for the Mental Health and Social Functioning subscales (see Table 4). However, neither WFI nor WFE (assessed at Time 2) mediated the association between job demands/control at Time 1 and Role-Emotional at Time 3.

Table 4. Unstandardized regression coefficients for the lagged panel mediation models linking Job Demands/Control to the four SF-36 Mental Health Subscales (N = 820)

	Vitality	Mental Health	Role Emotional	Social Functioning
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	β	95% CI	β	95% CI	β	95% CI	β	95% CI
Job	1.46	0.38,	1.46	0.38,	1.46*	0.38,	1.46	0.38,
Demands/Control _{T1} → WFI _{T2}	*	2.50	*	2.50		2.50	*	2.50
Job Demands/Control T1 → WFE _{T2}	-0.43	-1.34,	-0.43	-1.34,	-0.43	-1.34,	-0.43	-1.34,
		0.47		0.47		0.47		0.47
WFI _{T2} → SF-36 subscale _{T3}	-	-0.49, -	-	-0.34, -	-0.11	-0.36,	-0.18	-0.36,
	0.28	0.08	0.17	0.02		0.15		0.02
	*		*					
WFE _{T2} → SF-36 subscale _{T3}	0.15	-0.08,	0.09	-0.13,	0.14	-0.24,	0.16	-0.08,
		0.40		0.31		0.52		0.40
Job Demands/Control T1 → SF-36 subscale T3	-0.27	-3.07,	-0.57	-3.24,	0.58	-4.45,	1.18	-4.83,
		2.44		1.88		5.32		2.07
Total indirect effect	-	-1.07, -	-	-0.74, -	-0.22	-0.85,	-	-0.85, -
	0.48	0.10	0.29	0.03		0.15	0.33	0.01
	*		*				*	
Indirect effect (WFI)	-	-1.01, -	-	-0.69, -	-0.16	-0.73,	-	-0.75,
	0.41	0.09	0.25	0.03		0.17	0.27	0.00
	*		*				*	
Indirect effect (WFE)	-0.07	-0.43,	-0.04	-0.34,	-0.06	-0.59,	-0.07	-0.45,
		0.05		0.05		0.08		0.05
R ²	0.43		0.41		0.08		0.17	

*p < .05

T₁, Time 1; T₂, Time 2; T₃, Time 3.

Longitudinal Results: Self-Reported Physical Health

The results for the four physical health subscales are shown in Table 5. In the General Health model, job demands/control at Time 1 was associated with WFI at Time 2 ($\beta = 1.46, p < .001$), and WFI at Time 2 was inversely associated with General Health at Time 3 ($\beta = -.17, p = .04$). The indirect path linking job demands/control (Time 1) to General Health (Time 3) through WFI (Time 2) was significant ($\beta = -.25 [-.73, -.03]$), but this was not the case for the indirect path through Time 2 WFE ($\beta = -.03 [-.26, .04]$). These results indicate that the association between job demands/control (Time 1) and General Health (Time 3) was partially mediated by WFI (Time 2). This model accounted for 58.2% of the variance in General Health at Time 3. A similar pattern of results was observed for the Role Physical subscale, but neither WFI nor WFE assessed at Time 2 mediated the association between job demands/control (Time 1) and the Bodily Pain and Physical Functioning subscales assessed at Time 3.

Table 5. Unstandardized regression coefficients for the lagged panel mediation models linking Job Demands/Control to the four SF-36 Physical Health Subscales (N = 820).

	Bodily Pain		General Health		Role Physical		Physical Functioning	
	β	95% CI	β	95% CI	β	95% CI	β	95% CI
Job Demands/Control _{T1} → WFI _{T2}	1.46*	0.38, 2.50	1.46*	0.38, 2.50	1.46*	0.38, 2.50	1.46*	0.38, 2.50

Job Demands/Control _{T1} → WFE _{T2}	-0.43	-1.34, 0.47	-0.43 0.47	-1.34, 0.47	-0.43 0.47	-1.34, 0.47	-0.43 0.47	-1.34, 0.47
WFI _{T2} → SF-36 subscale _{T3}	-0.11	-0.33, 0.11	- 0.17 *	-0.34, - 0.01	- 0.33 *	-0.61, - 0.04	-0.08	-0.25, 0.10
WFE _{T2} → SF-36 subscale _{T3}	0.23	-0.05, 0.51	0.07	-0.12, 0.25	0.11	-0.25, 0.46	0.07	-0.16, 0.33
Job Demands/Control _{T1} → SF-36 subscale _{T3}	1.26	-2.13, 4.79	2.49 *	0.08, 4.92	4.02	-0.87, 9.07	1.05	-1.41, 3.47
Total indirect effect	-0.26	-0.82, 0.09	- 0.28 *	-0.76, - 0.04	- 0.53 *	-1.34, - 0.07	-0.15	-0.52, 0.09
Indirect effect (WFI)	-0.16	-0.63, 0.12	- 0.25 *	-0.73, - 0.03	- 0.48 *	-1.26, - 0.07	-0.12	-0.49, 0.10
Indirect effect (WFE)	-0.10	-0.54, 0.07	-0.03	-0.26, 0.04	-0.05	-0.51, 0.09	-0.03	-0.36, 0.06
R ²	0.25		0.58		0.08		0.23	

*p < .05

T₁, Time 1; T₂, Time 2; T₃, Time 3.

Discussion

This study further tested the job demands/control model by investigating whether WFI and WFE mediated the longitudinal relationship between high job demands/control and self-reported mental and physical health. The key contribution of this paper is the use of longitudinal data to examine the temporal relationships between these variables, along with the inclusion of WFE as a potential mediator. The remainder of this paper focuses primarily on the longitudinal results which are more meaningful when examining mediation (Selig & Preacher, 2009).

Theoretical Implications

Hypothesis 1 proposed that WFI would partially mediate the association between job demands/control and self-reported mental and physical health. This hypothesis was supported for three of the Mental Health subscales (Vitality, Social Functioning, and Mental Health) and two of the Physical Health Subscales (General Health, Role-Physical). The nonsignificant results for Role-Emotional, Physical Functioning, and Bodily Pain could reflect a number of factors. For example, the Role-Emotional subscale consisted of three items each with only two response categories (“yes” and “no”) and the Bodily Pain subscale consisted of only two items. These subscales may have lacked sufficient variability in responses over time to be sensitive to changes in Role-Emotional and Bodily Pain in this study compared to the other six SF-36 subscales. Furthermore, although the time-lags used in this study (12 months) are generally sufficient to observe changes on most SF-36 subscales (Hemingway et al., 1997), longer periods of follow-up may yield more substantial changes in Role-Emotional, Bodily Pain, and Physical Functioning, and provide more insight into these associations.

The mediating role of WFI in relation to Vitality, Mental Health, Social Functioning,

General Health, and Role-Physical is consistent with a number of cross-sectional studies (Franche et al., 2006; Geurts et al., 2003; Höge, 2009; Janssen et al., 2004; Montgomery et al., 2006; Parasuraman, Purohit, Godshalk, & Beutell, 1996). However, few longitudinal studies have examined these relationships with the exception of Peeters et al. (2004). Our findings therefore add to this work by showing that WFI mediates the relationship between job demands/control and multiple measures of self-reported mental and physical health.

The mediating role of WFI is consistent with existing theories of occupational stress. For example, the role-strain hypothesis proposes that jobs characterized by high demands and low control could deplete resources that would otherwise be available for family time, and promote conflict between work and family (Greenhaus & Beutell, 1985; Grzywacz & Marks, 2000). The resultant strain (WFI) may interfere with recovery from work demands and stressors. According to the effort-recovery model (Meijman & Mulder, 1998), this could impair mental and physical health via sustained overactivation of the psychophysiological stress response (e.g., increased blood pressure and elevated cortisol levels) (Geurts et al., 2003).

We also hypothesized that the association between job demands/control and self-reported mental and physical health would be partially mediated by WFE (Hypothesis 2). This hypothesis was supported in the cross-sectional analyses, but not longitudinally. It is possible that WFE does not link job demands/control to self-reported mental and physical health over time, and/or the effects are smaller compared with WFI and may take longer to influence certain health outcomes. Importantly, the hypothesized mediating role of WFE is consistent with theoretical perspectives (e.g., the role enhancement hypothesis) that certain aspects of work (e.g., income, coping skills, social support) can benefit the individual and have a positive impact on health and well-being (Carlson et al., 2006; Greenhaus & Powell,

2006; Grzywacz & Marks, 2000). Thus, it was expected that jobs characterized by high demands and low control would lead to reduced WFE and thus poorer health. Methodological issues might explain the lack of significant results for WFE. As discussed in the limitations section, the scale used to assess WFE may not have provided a sufficiently detailed measure of this construct. Furthermore, the job demand-control model is just one model of occupational health, and WFE may mediate the relationships between other work-related constructs and measures of mental and physical health. For example, factors associated with psychological ownership, work engagement, and job commitment may influence levels of WFE. Future research should therefore continue to investigate the role of WFE in the relationship between work-related factors and employee mental and physical health.

The present findings have important implications for understanding how job demands/control impact on health and well-being. Existing research indicates that a direct relationship is possible since the combination of high demands and low control could overactivate the stress response and increase the risk of chronic health conditions (e.g., hypertension) and mental illness (e.g., depression) (Sanne et al., 2005; Virtanen et al., 2007). High job demands/control may also indirectly affect health and well-being by influencing health enhancing and compromising behaviors (Landsbergis et al., 1998). The present findings provide support for an additional pathway linking job demands/control to poor mental and physical health involving elevated WFI. This suggests that examination of the job demands/control model in employed parents should be expanded to incorporate these role-strain theories. Although not supported in the present study, it may also be important to incorporate role-enhancement theories.

Practical Implications

WFE may link certain work characteristics with mental and physical health outcomes, but requires further investigation. However, the present findings for WFI have a number of practical implications. In particular, organizations need to address issues related to WFI for employed parents, especially given the rise in employed parents and dual-income families. This is important because WFI not only affects the health and well-being of employed parents, but it may also have an impact on workplace productivity. For example, poor mental and physical health are associated with increased absenteeism and presenteeism (where employees continue to work despite illness), which are linked with lower workplace productivity (Toppinen-Tanner, Ojajarvi, Vaananen, Kalimo, & Jappinen, 2005; Virtanen et al., 2007). Addressing high job demands/control and WFI in employed parents may benefit the well-being of both employees and organizations.

Organizations could implement a range of policies and programs to minimize the adverse effects of certain occupational factors (Allis & O'Driscoll, 2008; Geurts, Rutte, & Peeters, 1999). For example, workplace interventions aimed at modifying aspects of the psychosocial work environment may be effective in reducing high levels of job demands/control. These interventions could attempt to reduce high job demands by lessening workload and/or time pressures, but this may be difficult since some employees may resist changes in these types of job characteristics (Pelletier et al., 1999). It has been suggested that altering job control could offer a useful avenue for workplace interventions (Pelletier et al., 1999; Elo, Ervasti, Kuosama, & Matlila, 2008). Job control could be modified by involving employees in organization planning and goal setting, which may increase perceptions of job autonomy (Elo et al., 2008). In addition, workplace policies allowing for more flexible working arrangements (e.g., flexibility in work hours, job

sharing, and working from home) may also lead to increased perceptions of control and reduce high job demands/control.

Another strategy that is consistent with the effort-recovery model (Meijman & Mulder, 1998) is to provide training for employees on ways to minimize physical and emotional reactions to workplace stress and to facilitate subsequent recovery. For example, Hahn, Binnewies, Sonnentag, and Moja (2011) examined the effects of a workplace intervention aimed at educating employees on ways to facilitate recovery from work stress during nonwork hours. The intervention led to improved recovery from stressful work environments and better employee health. These types of interventions could be particularly relevant for employed parents as a way of balancing work and family life, and also in occupations where it may be difficult or not feasible to modify aspects of the work environment.

Limitations of the Present Study

As noted earlier, the key strengths of the present study were the evaluation of WFI and WFE using longitudinal data. There are, however, some important methodological limitations that warrant discussion. In particular, the measures used to assess WFI and WFE were broad and perhaps did not capture the complexity of these variables; this may partially explain the absence of a significant mediating role of WFE. It is recommended that future research consider scales such as the Work-Family Conflict Scale (Netemeyer, Boles, & McMurrian, 1996) and Work-Family Enrichment Scale (Carlson et al., 2006), which provide more detailed information on these constructs. Furthermore, WFI and WFE reflect two components of work-family balance, and future research will need to expand the models tested in this paper and clarify the roles that FWI/FWE play in the association between work

and mental/physical health. We hypothesize these factors may impact on the level of perceived job stress, which in turn could influence health by affecting WFI and WFE. This is consistent with work demonstrating that the links between work, family, and health are likely to be reciprocal and complex (Demerouti et al., 2004).

This study also relied on 12-month time lags, which is consistent with previous mediation studies in this context (e.g., Peeters et al., 2004) and other studies investigating the associations between work characteristics and physical and mental health (de Lange et al., 2003). In addition, 12 months is a sufficient period to observed changes on most SF-36 subscales (Hemingway et al., 1997). However, future research should investigate these relationships over a longer period of time to determine whether the observed changes become more pronounced or vary over time.

Finally, this study assessed a measure of perceived job strain in the context of the demand-control model. Future research should include measures of occupational social support, consistent with the demand-control-support model (Johnson & Hall, 1988; Johnson, Hall, & Theorell, 1989). For example, occupational social support may act as a buffer between high job demands and poor health by moderating the effects of WFI and WFE. Future work examining moderated mediation in these longitudinal associations will be important in further understanding the complex interplay between work, family, and health.

Conclusion

The present study provided new insight into the temporal associations between job demands/control, WFI, WFE, and self-reported health in a sample of Australian employees. The present study contributes to our understanding of how WFI may influence the association between job demands/control and measures of self-reported health. In particular, the

longitudinal results suggest that job demands/control could contribute to poorer health via WFI but not via WFE. These findings are consistent with theory and have a number of implications for employee health and workplace productivity. The key strengths of the present paper were the use of longitudinal data, the inclusion of WFE, and the analytic methods to formally test mediation. The present results require further investigation using longitudinal data with more comprehensive measures of WFI and WFE. This area of research will continue to be important as the proportion of dual-income families continues to increase in developed countries such as the U.S.A. and Australia.

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