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RESEARCH REPORT

The Chicken or the Egg? A Meta-Analysis of Panel Studies of the Relationship Between Work–Family Conflict and Strain

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Does work–family conflict predict strain, does strain predict work–family conflict, or are they reciprocally related? To answer these questions, we used meta-analytic path analyses on 33 studies that had repeatedly measured work interference with family (WIF) or family interference with work (FIW) and strain. Additionally, this study sheds light on whether relationships between WIF/FIW and work-specific strain support the popular cross-domain perspective or the less popular matching perspective. Results showed reciprocal effects; that is, that WIF predicted strain (β = .08) and strain predicted WIF (β = .08). Similarly, FIW and strain were reciprocally related, such that FIW predicted strain (β = .03) and strain predicted FIW (β = .05). These findings held for both men and women and for different time lags between the 2 measurement waves. WIF had a stronger effect on work-specific strain than did FIW, supporting the matching hypothesis rather than the cross-domain perspective.

Keywords: work–family conflict, strain, matching perspective, meta-analysis, longitudinal

Many employees face the challenge of combining work and family roles. This can result in work–family conflict, which has been defined as "a form of interrole conflict in which the role pressures from the work and family domains are mutually incompatible in some respect" (Greenhaus & Beutell, 1985, p. 77). Work–family conflict can occur in two directions: Work can interfere with family (WIF) and family can interfere with work (FIW; Frone, Yardley, & Markel, 1997). WIF and FIW are reciprocally related but are distinct constructs (Mesmer-Magnus & Viswesvaran, 2005). Over the last three decades, a multitude of studies have examined the relationship between work–family conflict and strain (Allen, Herst, Bruck, & Sutton, 2000; Amstad, Meier, Fasel, Elfering, & Semmer, 2011). Strains are the psychological, behavioral, and physiological reactions to environmental demands, threats, and challenges (i.e., stressors) and include responses such as burnout, depression, and headache (Ganster & Rosen, 2013; Griffin & Clarke, 2011). Although empirical evidence consistently supports positive correlations between both forms of work–family conflict and strain, certain controversies in the literature remain unresolved.

First, the direction of effect between work–family conflict and strain is still unclear. Does work–family conflict predict strain or vice versa? Or are there reciprocal effects, such that work–family conflict and strain predict each other? Most previous studies and existing meta-analyses cannot provide insights into the direction of effect due to their cross-sectional designs. From a theoretical point of view, the assumption that work–family conflict predicts strain is a core component of many work–family models (e.g., Allen et al., 2000; Frone, Russell, & Cooper, 1992). However, research proposing and testing reverse and reciprocal relationships has only begun to accumulate (e.g., Demerouti, Bakker, & Bulters, 2004). Thus, the debate about the direction of the relationship between work–family conflict and strain has not been settled.

Second, there is an ongoing debate about the pattern of relationships of work–family conflict with domain-specific consequences. The notion that conflict originating in one domain (e.g., WIF) is mainly causing problems in the other domain (e.g., family) has dominated the field (cross-domain perspective; Bellavia & Frone, 2005). More recently, scholars have proposed an alternative perspective, assuming that work–family conflict mainly has an impact on the domain where the conflict originates (e.g., WIF on work-related outcomes; matching hypothesis; Amstad et al., 2011; Shockley & Singla, 2011). As a result, an enriching controversy

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has emerged about the primary effect of WIF and FIW on domain-specific consequences.

Our aim in the current study was to work toward resolving these controversies. In particular, this study provides a meta-analytic test of the direction of effects between both forms of work–family conflict and strain. In contrast to previous meta-analyses (Allen et al., 2000; Amstad et al., 2011), which included only cross-sectional studies, the current meta-analysis focused on panel studies of the relationship between work–family conflict and strain. Thus, the extent to which work–family conflict predicts strain could be disentangled from the extent to which strain predicts work–family conflict. Additionally, this study sheds some light on the relative merits of the cross-domain versus the matching perspective for the relationship of work–family conflict and work-related strain.

Insights into the direction of effect and the pattern of relationships between work–family conflict and strain are important for both research and practice. Given the emergence of alternative perspectives that challenge the traditional views of unidirectional cross-domain effects of work–family conflict on strain, it seems imperative to examine which perspective is empirically justified. Examining reciprocal effects also addresses one of the less studied tenets of conservation of resources (COR) theory (Hobfoll, 1989), a framework frequently used to better understand work–family relationships: If work–family conflict and strain can be shown to have reciprocal relationships in our meta-analysis, this pattern of results would support COR's notion of loss spirals. Additionally, by including studies that used different time lags between the measurement waves, this meta-analysis can test whether the relationships between work–family conflict and strain depend on the length of the time lag. Finally, to design organizational interventions targeted at improving employees' work–life balance and health, practitioners need to understand how these factors influence each other. For example, work–life balance interventions are typically assumed to improve employee health (Hammer, Kossek, Anger, Bodner, & Zimmerman, 2011; Sonntag, 2014). However, if strain can be shown to influence work–family conflict, organizations should be informed that their initiatives to foster employee health by reducing strain can help to reduce work–family conflict.

The Relationship Between Work–Family Conflict and Strain

Work–family conflict generally refers to the extent to which work and family roles are mutually incompatible (Greenhaus & Beutell, 1985). The construct is primarily grounded in role theory and the scarcity of resources hypothesis, which proposes that demands of one role deplete personal resources, such as time and physical or mental energy, thereby leaving insufficient resources to allocate to activities in other roles (Edwards & Rothbard, 2000; Goode, 1960; Marks, 1977).

Strains can be at the psychological and physiological level. Frequently studied psychological strains comprise constructs such as emotional exhaustion and irritation (e.g., Maslach & Leiter, 2008), anxiety and depression (e.g., Hammer, Cullen, Neal, Sinclair, & Shafiro, 2005), and general psychological distress (e.g., Kelloway, Gottlieb, & Barham, 1999). Physiological strains include, for example, somatic complaints (e.g., Frese, 1985) and cardiovascular disease (e.g., Belkic, Landsbergis, Schnall, & Baker, 2004). In the work–family literature, strains are typically classified into three categories: work-related strain (e.g., burnout), family-related strain (e.g., parental stress), and domain-unspecific strain (e.g., somatic complaints and depression; Allen et al., 2000; Amstad et al., 2011).

Previous studies have consistently found positive concurrent correlations of WIF and FIW with strain (Amstad et al., 2011). Although the most popular interpretation assumes both forms of work–family conflict to precede strain, there are at least three alternative explanations of these positive correlations.

Case 1: Work–family conflict causes strain. This view assumes work–family conflict to be a potential stressor that leads to various forms of strain. Arguments that support this view have been based on Meijman and Mulder's (1998) effort–recovery (E-R) model (for an example, see Geurts, Kompier, Roxburgh, & Houtman, 2003). According to the E-R model, exerting effort at work can result in negative load reactions, such as sleep problems and fatigue. The model further proposes that these negative load reactions are reversible through the process of recovery that occurs when the functional systems challenged during work go untaxed. However, when the individual is continuously exposed to these demands, no recovery can occur and psychobiological systems do not return to a baseline level. As a result, load reactions accumulate and may lead to longer term negative effects, such as impaired well-being. Through the lens of the E-R model, work–family conflict causes strain because it reduces opportunities for recovery in the family domain.

Besides the E-R model, Hobfoll's (1989) COR theory has been used to explain why work–family conflict causes strain (for an example, see Grandey & Cropanzano, 1999). The theory proposes that individuals are motivated to gain or maintain resources, including "objects, personal characteristics, conditions, or energies that are valued by the individual or that serve as a means for attainment of these objects, personal characteristics, conditions or energies" (Hobfoll, 1989, p. 516). The theory further proposes that individuals experience stress when they face actual or possible loss of such resources. As a result of actual or potential loss, individuals strive to protect resources by seeking to gain new or alternative resources. According to this perspective, work–family conflict leads to stress, because resources are lost in the process of juggling work and family roles (Grandey & Cropanzano, 1999). To protect or replace the threatened resources, coping behaviors (e.g., leaving the work role) are needed. If no coping behaviors are used, resources may become more and more depleted, resulting in exhaustion. In this meta-analysis, such a view would receive support if work–family conflict predicted strain.

Case 2: Strain causes work–family conflict. There are arguments suggesting that strain is likely to affect the perception and experience of work–family conflict. Kelloway et al. (1999) suggested that individuals with high strain undergo selective recall and attention, such that availability of negative thoughts and information is increased.[1] Thus, distress is likely to affect the perceived frequency and intensity of difficulties of combining work and family roles. Similarly, strain is

[1] Various models exist for how affect has an influence on judgments. For example, the affect-as-information model assumes effects on the judgmental stage (Schwarz & Clore, 1988), whereas affect-priming models (e.g., Bower, 1991) also predict effects on attention, encoding, and learning. Process models further suggest effects on the processing strategy (Forgas, 1995). A systematic overview on these models can be found in Forgas (1992).

also likely to have an impact on the evaluation of one's work conditions. For example, high levels of distress and exhaustion are related to perceived high workload and low social support (e.g., De Jonge et al., 2001; Finne, Knardahl, & Lau, 2011; Ibrahim, Smith, & Muntaner, 2009). Stressful work conditions, in turn, may lead to more work–family conflict (e.g., Ford, Heinen, & Langkamer, 2007). Thus, strain is assumed to have a negative impact on work–family conflict that is transmitted by perceived work conditions. This view would receive support if strain predicted work–family conflict.

Case 3: Work–family conflict and strain cause each other. Arguments supporting this view typically refer to the notion of "loss spirals" as described in Hobfoll's (1989, p. 519) COR theory (for an example, see Demerouti et al., 2004). As explained above, this theory proposes that individuals strive to obtain and protect valued resources. When resources are initially lost, individuals become more vulnerable to future losses because replenishing and protecting resources requires the investment of other resources. That is, restoring one resource can deplete another resource. As a result, loss spirals can follow initial losses. This view would receive support if work–family conflict and strain predicted each other.

Case 4: Work–family conflict and strain are causally unrelated. In this case, the positive concurrent correlations between work–family conflict and strain could be due to research artifacts, such as common source bias, or third variables influencing both constructs. The problem of third variables occurs when an unmeasured variable is correlated with the presumed cause and predictive of the presumed effect (James, 1980). By controlling for baseline levels of a variable, cross-lagged designs rule out the possibility that constant background variables (e.g., personality, gender) influence estimates of cross-lagged effects (Lang, Bliese, Lang, & Adler, 2011; Zapf, Dormann, & Frese, 1996); however, the influence of a nonconstant third variable cannot be ruled out by cross-lagged designs (Finkel, 1995) and, thus, Case 4 can hardly be ruled out with correlational data. Nevertheless, the present meta-analysis examines one possible implication of Case 4: Work–family conflict and strain do not predict each other over time. Additionally, if work–family conflict and strain can be shown to have lagged relationships, a common factor model can be specified and contrasted with the cross-lagged model to determine whether common factors might explain the lagged relationships (Finkel, 1995; Lang et al., 2011).

The current meta-analysis tested all four cases by estimating the unique effects of WIF and FIW on later strain (with baseline levels of strain controlled) and of strain on WIF and FIW (with baseline levels of WIF and FIW controlled, respectively). We propose the following research question:

> *Research Question 1:* How are WIF/FIW and strain related over time?

The Relation Between WIF/FIW and Strain: Cross-Domain Versus Matching Hypothesis

Work–family researchers use the term *cross-domain* to refer to relationships between WIF (FIW) and variables within the family (work) domain. For example, the relationships of WIF with parental stress and FIW with job stress are cross-domain relationships. The term *matching relationships* refers to relationships between WIF (FIW) and variables within the work (family) domain (Amstad et al., 2011). For example, relationships of WIF with job stress and FIW with family stress are matching relationships. Although models on cross-domain relationships have generally dominated the literature (Bellavia & Frone, 2005), recent work has challenged this traditional view (e.g., Peeters, ten Brummelhuis, & van Steenbergen, 2013), leading to an ongoing debate about whether the primary effect of WIF and FIW on outcome variables lies within the domain where the conflict originates (matching hypothesis) or within the other domain (cross-domain relationships).

The influential models of Frone and colleagues (Frone et al., 1992, 1997) exemplify the notion of cross-domain relationships. The rationale behind these cross-domain relationships is that when one role (e.g., work) interferes with another (e.g., family), individuals will have problems fulfilling demands in the receiving role (e.g., family). As a consequence of struggle in meeting receiving role demands, well-being related to the life domain of the receiving role suffers (Frone et al., 1992). According to these models, work–family conflict is a mediator between work and family domains. The models assume in particular that job stressors and job involvement antecede WIF and family stressors and family involvement antecede FIW. Of particular importance for the present study, Frone et al. (1992) further proposed that WIF affects family distress and FIW is assumed to affect job distress. In contrast, effects of WIF on job distress and effects of FIW on family distress are not assumed.

Other researchers have, however, argued that a matching hypothesis seems at least as plausible (Amstad et al., 2011; Shockley & Singla, 2011). According to this perspective, WIF predominantly affects work-related outcomes, and FIW predominantly affects family-related outcomes. The notion behind this assumption is grounded in appraisal theories. Appraisal theories assume that when self-relevant roles are threatened, people are likely to appraise the cause of the threat negatively (Lazarus, 1991; Shockley & Singla, 2011). For example, when one role (e.g., work) interferes with another role (e.g., family), individuals will appraise the role (e.g., work) that the conflict stems from negatively. Negative appraisals are likely to go along with a negative affective tone, which, when experienced frequently, could result in strain in the domain from which the conflict originates (Amstad et al., 2011).

Although the models of Frone and colleagues (Frone et al., 1992, 1997) on cross-domain relationships have dominated the literature (Bellavia & Frone, 2005), recent meta-analyses on cross-sectional studies provide support for the matching hypothesis. For example, Shockley and Singla (2011) reported stronger associations of job (marital) satisfaction with WIF (FIW) than with FIW (WIF). Similarly, Amstad et al. (2011) found stronger associations of burnout with WIF than with FIW.

To meta-analytically test the cross-domain perspective versus the matching hypothesis for the relationships of WIF and FIW with strain, one would ideally categorize strain into work-related and family-related types of strain. If the cross-domain perspective is accurate, WIF should be related to family-related strain but not (or to a lesser degree) to work-related strain. Correspondingly, FIW should be related to work-related strain but not (or to a lesser degree) to family-related strain. According to the matching hypothesis, however, WIF should be mainly related to work-related strain, whereas FIW should be mainly related to family-related strain. In the current meta-analysis, family-related strain could not be coded due to a lack of panel studies covering this type of strain. Therefore, our subsequent tests focused on work-related strain and do not include family-related strain. Because of this limitation, we cannot provide a complete test of the cross-domain or the matching perspective. However, we can provide a comparison of the two perspectives regarding relationships of WIF and FIW with work-related strain. The part of the cross-domain perspective that focuses on work-related strain suggests that FIW has a stronger relationship with work-related strain than does WIF. The part of the matching perspective that focuses on work-related strain suggests that WIF has a stronger relationship with work-related strain than does FIW. To compare the parts of each perspective that focus on work-related strain, we propose the following research question:

> *Research Question 2:* Does WIF or FIW have a stronger relationship with work-related strain?

Method

Inclusion Criteria and Literature Search

The following six criteria were applied to determine study eligibility. First, the study assessed work–family conflict in a direction-specific way. If the measure referred to a mixture of WIF and FIW or if the direction was not clear, the study was not included. Second, the study assessed at least one strain-related variable. We included strain measures of exhaustion, fatigue, psychological distress, depression, irritation, anxiety, parental stress, and physical symptoms. Third, the study had a panel design. That is, work–family conflict and strain were measured at each of at least two measurement waves. Fourth, measures of work–family conflict and strain had the same person as referent. Fifth, the study did not explicitly focus on major events or changes that occurred between the measurement waves, such as the birth of a child. Finally, the complete zero-order correlations matrix for work–family conflict and strain was available for at least two measurement waves. That is, the article had to report two synchronous correlations, two lagged correlations, and two stability correlations for work–family conflict and strain. If some correlations were not reported, we contacted the authors. If they did not provide correlation coefficients, the study was excluded.

We used different search procedures in identifying studies that met these criteria. First, we conducted an electronic keyword search within the databases PsycINFO, Web of Science, and PubMed. Keywords used included the typical terms used to label WIF and FIW, such as *work-family conflict, family-work conflict, work-to-family conflict, family-to-work conflict, work-life conflict, life-work conflict, work-home interference, home-work interference, work interfering with family,* and *family interfering with work*. To restrict the literature search to longitudinal studies, we combined these keywords with the additional terms (*longitudinal* OR *lagged* OR *panel*). Second, we inspected the reference lists of previous meta-analyses, qualitative reviews, and several papers on cross-lagged panel analyses to identify more articles relevant to our study (most notably, Allen et al., 2000; Amstad et al., 2011; Eby et al., 2005). Fourth, conference proceedings of the last 5 years for the Society for Industrial and Organization Psychology and Academy of Management were inspected for relevant studies. If potential studies were identified, we contacted the authors. If they did not provide the necessary information, the study could not be included. Finally, we sent e-mails to the Academy of Management and Occupational Health Psychology list servers in which we encouraged researchers to send us unpublished studies. The literature search was conducted from February to October 2012 and was updated in April 2013.

The search yielded 30 relevant papers (17 published journal articles, 11 unpublished papers, and 2 conference papers). The articles of Hammer et al. (2005); Kinnunen, Feldt, Mauno, and Rantanen (2010); and Kinnunen, Geurts, and Mauno (2004) provided two relevant samples each. Thus our data set comprised 33 samples. Of these, 32 samples provided information on the longitudinal relationship between WIF and strain, and 20 samples provided information on the longitudinal relationship between FIW and strain. Appendix A shows the effect sizes for each included study, separated for WIF and FIW (see Appendix B for examined but excluded studies).

Coding

We coded the following data: sample size, country of origin, participants' mean age, proportion of women in the sample, participants' mean tenure, measures used to assess WIF and FIW, measure used to assess strain, internal consistencies, effect sizes, and the time lag between the measurement waves. We did not code work–family conflict according to its time-based, strain-based, and behavior-based nature due to a lack of studies that used this distinction. To test the matching hypothesis against the cross-domain perspective, we coded type of strain (i.e., work-specific strain) following the category system reported in Amstad et al. (2011). We coded the following variables as work-specific strain: burnout, cynicism, depersonalization, disengagement, emotional exhaustion, irritation, need for recovery, and personal accomplishment.

All articles were coded by the first author of this meta-analysis, who was a doctoral student at the time of coding. A random sample of 15 studies was coded by a student assistant holding a bachelor's degree in psychology to estimate interrater agreement. One study was jointly coded to ensure a mutual understanding of the variables. The interrater agreement was high ($r \geq .91$), and all diverging ratings were discussed until consensus was reached.

Features of the Analyzed Studies

The 33 studies included in the meta-analysis had an average sample size of 395, with a range of 66 to 2,235. At the time of the first assessment, participants' mean age was 39.7 years (range = 24.9–46.4; $k = 27$) and mean organizational tenure was 10.0 years (range = 4.0–20.4; $k = 17$). Mean proportion of women was 46% (range = 0%–100%). Mean time lag between the coded waves was 13.7 months, with a range from around 1 week to 72 months. Nine studies were conducted in Switzerland, six in Finland, five in the Netherlands, four in Germany, three in the United States, two in Canada, and one each in Israel, New Zealand, and Norway. One study used a sample from several different countries. For WIF, the most frequent measures used were Netemeyer, Boles, and McMurrian (1996; eight studies) and the SWING (Geurts et al., 2005; eight studies). For FIW, the most frequent measure used was Netemeyer et al. (1996; seven studies). Twenty-one studies assessed work-related strain.

Analysis

We followed the procedures described by Hunter and Schmidt (2004). For the statistical analyses, we used an SPSS macro developed by Field and Gillett (2010a) and Maja Osolnik (Field & Gillett, 2010b). Correlations obtained from the studies were weighted for sample size and corrected for unreliability using artifact distribution. We report uncorrected, sample-size-weighted mean correlations (r) and reliability-corrected, sample-size-weighted mean correlations (ρ). Ninety-five percent confidence intervals (CI) and 80% credibility intervals (CrI) were calculated around each corrected population estimate ρ. The CI reflects the accuracy of a parameter estimate and can be used to examine the significance of an effect-size estimate. A CI that includes zero indicates that the estimate is nonsignificant. CrI indicate whether there are possible moderators of a relationship. Narrow CrI suggest that the relationship does not depend on moderators, and wide CrI indicate the existence of possible moderators.

One requirement of a meta-analysis is independence of the correlations included (Lipsey & Wilson, 2001); that is, a sample must not contribute more than one correlation per construct. However, some samples (e.g., Innstrand, Langballe, Espnes, Falkum, & Aasland, 2008; Leiter & Durup, 1996) contained correlations of WIF/FIW with two or more measures of strain. The issue of independent correlations is also relevant to studies with more than one type of WIF/FIW (here, two studies had time-based and strain-based WIF/FIW). To ensure independence, we used Fisher's z scores to average multiple correlations derived from the same sample.

We performed a set of meta-analytic path analyses (Cheung & Chan, 2005; Riketta, 2008; Viswesvaran & Ones, 1995). For these computations, the matrix of the sample-size-weighted mean correlations served as input. The software Mplus 7.0 (Muthén & Muthén, 2012) with maximum likelihood estimation was used for these analyses. The sum (rather than, e.g., the average) of the studies' sample sizes was used to compute the standard errors for the path coefficients. This practice increases the sensitivity of significance tests (Cheung & Chan, 2005).

To examine the direction of effect between work–family conflict and strain, we tested cross-lagged panel models for WIF and FIW separately. Specifically, WIF (or FIW) and strain at Time 2 were regressed on both WIF (or FIW) and strain at Time 1. We ran these analyses for WIF (or FIW) and all types of strain (called *overall analyses* in the following). To examine the relative merits of the cross-domain versus matching perspective, we tested a model comprising WIF, FIW, and work-related strain. That is, we simultaneously regressed (a) work-related strain at Time 2 on WIF and FIW at Time 1 and (b) WIF and FIW at Time 2 on work-related strain at Time 1. The standardized path coefficients obtained from these analyses indicated how well WIF (or FIW) and strain predicted each other, with baseline scores of the criterion variable controlled for. In all models, we included all lagged correlations between the variables (e.g., correlation between Time 1 WIF and Time 2 strain), all synchronous correlations (e.g., correlation between Time 1 WIF and Time 1 strain), and all stability correlations (e.g., correlation between Time 1 WIF and Time 2 WIF). Additionally, in all models, synchronous relationships between variables assessed at the same time were allowed to be freely estimated.

To comprehensively test the direction of effect (Research Question 1), we used an additional meta-analytical procedure. That is, we used HLM 7 (Raudenbush, Bryk, Cheong, Congdon, & du Toit, 2011) to yield estimates from a random-effects model in which effect sizes from primary studies were nested under samples (for examples, see Erez, Bloom, & Wells, 1996; Kish-Gephart, Harrison, & Treviño, 2010). As we were interested in the lagged relationships, we first computed these lagged effect sizes using the zero-order correlations between the variables. For the computations we used the following equation, which can be applied when an outcome variable is influenced by two predictors (Cohen, Cohen, West, & Aiken, 2003, p. 68):

$$\beta_{Y1.2} = \frac{r_{Y1} - r_{Y2}r_{12}}{1 - r_{12}^2}$$

$\beta_{Y1.2}$ is the standardized regression coefficient of X_1 predicting Y, controlling for the effect of X_2; r_{Y1} and r_{Y2} are the zero-order correlations between each predictor (X_1 and X_2) and the criterion Y; and r_{12} is the correlation between the two predictors (X_1 and X_2). As a result of applying this formula, we got effect sizes for four lagged relationships (see Table 4). Then we used HLM to run four unconditional multilevel models following the procedures described by Hox (2010). At the first level, we used the sampling variance (computed as $1/(n - 3)$; Hox, 2010, p. 209) as a weight and constrained the variance to one. The intercepts of these four unconditional multilevel models are the average effect sizes for the four lagged relationships.

Results

Tables 1 and 2 show the meta-analytical correlations, 80% CI, 95% CrI, and residual standard deviations. Results are shown separately for WIF and FIW. In the overall analysis, the mean cross-sectional correlations between WIF and all strain types were positive and statistically significant (rs of .41 and .42, $p < .05$). The magnitudes of these correlations fall within the range of correlations reported in previous meta-analyses (Allen et al., 2000; Amstad et al., 2011). Similarly, mean cross-sectional correlations between FIW and all strain types were positive and statistically significant (rs of .23, $p < .05$, in the overall analysis) and were consistent with results reported in a recent meta-analysis (Amstad et al., 2011). The stabilities of WIF, FIW, and strain were high (rs $> .55$, $p < .05$, in the overall analysis).

Direction of Effect

Tables 3 shows the results of the meta-analytic path analyses based on the correlations from Tables 1 and 2. To examine the direction of effect between WIF/FIW and strain (Research Question 1), we combined all strain types. Results showed that WIF and strain predicted each other; that is, WIF predicted strain, $\beta = .08$, $p < .05$; 95% CI [.07, .10], and strain predicted WIF, $\beta = .08$, $p < .05$; 95% CI [.06, .09]. To examine whether the coefficients for the

Table 1
Weighted and Corrected Mean Correlations for Work Interference With Family (WIF) and Strain

Analysis	Statistic	W_1-S_2	S_1-W_2	W_1-S_1	W_2-S_2	W_1-W_2	S_1-S_2
All strain types (overall analysis)							
	r	.32	.32	.41	.42	.61	.62
k = 32	ρ	.40	.39	.51	.51	.77	.75
N = 12,906	SD_{ρ}	.14	.14	.18	.17	.13	.11
	95% CI	0.34; 0.45	0.34; 0.44	0.45; 0.57	0.45; 0.57	0.72; 0.81	0.71; 0.79
	80% CrI	0.21; 0.58	0.22; 0.56	0.28; 0.74	0.29; 0.73	0.60; 0.94	0.61; 0.89
Work-specific strain							
	r	.39	.37	.51	.52	.62	.62
k = 20	ρ	.48	.46	.64	.64	.80	.74
N = 9,130	SD_{ρ}	.12	.12	.12	.13	.12	.11
	95% CI	0.42; 0.54	0.40; 0.52	0.59; 0.69	0.58; 0.69	0.74; 0.85	0.69; 0.79
	80% CrI	0.33; 0.63	0.31; 0.61	0.49; 0.79	0.48; 0.80	0.64; 0.95	0.60; 0.88

Note. k = number of studies; N = sample size; W_1 and W_2 = work interference with family at first and second coded wave, respectively; S_1 and S_2 = strain at first and second coded wave, respectively; effect size ρ = weighted mean correlation corrected for unreliability; CI = confidence interval; CrI = credibility interval; SD_{ρ} = standard deviation of ρ.

cross-lagged effects differ, we constrained the cross-lagged paths to be equal and compared this constrained model with the unconstrained model. The unconstrained model does not provide chi-square model fit indices because it is fully saturated. Therefore, we used log-likelihood values to compare models. The difference in fit was nonsignificant (Δ–2 × log-likelihood (1) = .04, *ns*). Consequently, we favored the more parsimonious constrained model and concluded that the cross-lagged paths did not differ. As for WIF and strain, the results of the overall analysis for FIW and strain suggested that there are reciprocal effects. FIW predicted strain, $\beta = .03, p < .05$; 95% CI [.02, .05], and strain predicted FIW, $\beta = .05, p < .05$; 95% CI [.03, .07]. Model comparisons did not reveal differences between the unconstrained model and a model with cross-lagged paths that were constrained to be equal (Δ–2 × log-likelihood (1) = 2.12, *ns*), indicating that the cross-lagged paths did not differ. To sum up, results of the overall analysis suggested a symmetric reciprocal relationship of WIF and FIW with strain, supporting the loss-spiral model.

Besides using meta-analytical path analysis, we used a multilevel random-effects model to additionally test the direction of effect (Research Question 1). Results confirmed the reciprocal relationships (see Table 4): WIF predicted strain (coefficient = .08, $p < .01$) and strain predicted WIF ($\beta = .08$, $p < .01$); similarly, FIW predicted strain ($\beta = .04$, $p < .05$) and strain predicted FIW ($\beta = .06$, $p < .01$). Thus, the results of the random-effects approach are virtually identical to the results of the meta-analytical path analysis and strengthen confidence in the reciprocal relationships found in this meta-analysis.

We conducted several additional analyses. First, we tested whether the reciprocal relationships of WIF and FIW with strain depended on the distribution of gender in the sample. That is, we repeated the meta-analytic path analyses for studies that reported a proportion of women higher than 85% (WIF: $k = 6$, $N = 2{,}117$; FIW: $k = 3$, $N = 624$) and for studies that reported a proportion of men higher than 85% (WIF: $k = 9$, $N = 3{,}079$; FIW: $k = 4$, $N = 1{,}405$). We found that all significant effects remained significant and concluded that the reciprocal relationships between WIF/FIW and strain held for both men and women. Additionally, a multilevel random-effects model with percentage of women in the sample as Level 2 moderator did not show moderating effects of gender either. Second, we tested whether the lagged relationships of WIF and FIW with strain depend on the length of the time lag

Table 2
Weighted and Corrected Mean Correlations for Family Interference With Work (FIW) and Strain

Analysis	Statistic	F_1-S_2	S_1-F_2	F_1-S_1	F_2-S_2	F_1-F_2	S_1-S_2
All strain types (overall analysis)							
	r	.18	.18	.23	.23	.56	.64
k = 20	ρ	.22	.22	.29	.28	.73	.76
N = 8,983	SD_{ρ}	.10	.07	.09	.08	.12	.11
	95% CI	0.17; 0.27	0.18; 0.26	0.24; 0.34	0.24; 0.32	0.68; 0.79	0.71; 0.81
	80% CrI	0.10; 0.35	0.13; 0.31	0.17; 0.41	0.17; 0.39	0.58; 0.88	0.61; 0.90
Work-specific strain							
	r	.16	.17	.22	.21	.55	.64
k = 7	ρ	.20	.21	.28	.25	.73	.76
N = 7,070	SD_{ρ}	.07	.00	.07	.05	.10	.12
	95% CI	0.16; 0.25	0.19; 0.24	0.23; 0.32	0.22; 0.29	0.67; 0.79	0.69; 0.82
	80% CrI	0.12; 0.29	0.21; 0.21	0.18; 0.37	0.19; 0.32	0.61; 0.85	0.61; 0.90

Note. k = number of studies; N = sample size; F_1 and F_2 = family interference with work at first and second coded wave, respectively; S_1 and S_2 = strain at first and second coded wave, respectively; effect size ρ = weighted mean correlation corrected for unreliability; CI = confidence interval; CrI = credibility interval; SD_{ρ} = standard deviation of ρ.

Table 3
Meta-Analytic Path Analyses for All Strain Types (Overall Analysis)

Statistic	k (N)	Cross-lagged effects $W_1 \rightarrow S_2$	Cross-lagged effects $S_1 \rightarrow W_2$	Synchronous effects $W_1 \leftrightarrow S_1$	Synchronous effects $W_2 \leftrightarrow S_2$	Stability effects $W_1 \rightarrow W_2$	Stability effects $S_1 \rightarrow S_2$
Work interference with family (WIF)							
Coefficient (*SE*)	32 (12,906)	.08 (.01)	.08 (.01)	.41 (.01)	.30 (.01)	.58 (.01)	.59 (.01)
95% CI		.07; .10	.06; .09	.39; .42	.28; .31	.57; .59	.57; .60
Family interference with work (FIW)							
Coefficient (*SE*)	20 (8,983)	.03 (.01)	.05 (.01)	.23 (.01)	.15 (.01)	.55 (.01)	.63 (.01)
95% CI		.02; .05	.03; .07	.21; .25	.13; .17	.53; .56	.62; .65

Note. Coefficients are standardized path coefficients. Analyses are based on weighted mean correlations. W_1 and W_2 = work–family conflict at first and second coded wave, respectively; S_1 and S_2 = strain at first and second coded wave, respectively; CI = confidence interval; *k* = number of studies; *N* = sample size; *SE* = standard error.

between the measurement waves. We grouped the studies into three categories (i.e., time lags of 1–6 months, 7–12 months, and 13+ months) and repeated the meta-analytic path analyses for each category. The results of the analyses were virtually unaltered, and all significant effects remained significant. Third, we tested whether the lagged effects differ between published and unpublished studies. We did not find differences between published and unpublished studies, except that for unpublished studies the lagged effect of FIW on strain was not significant, $\beta = .02$, $p = .11$; 95% CI [−.004, .041]. Finally, to examine whether common factors might explain the cross-lagged relationships between work–family conflict and strain, we compared the cross-lagged models with a common factor model (Finkel, 1995; Lang et al., 2011). The common factor does not need to be measured. Rather, it is specified as a higher order factor of the measured variables. We specified a common factor of the two measured variables at Time 1 and allowed this factor to correlate with a common factor of the two measured variables at Time 2. As the common factor model and the cross-lagged models are non-nested and the (fully-saturated) cross-lagged models do not provide chi-square model fit indices, we assessed model fit with the Bayesian information criterion (BIC). Absolute BIC values cannot be interpreted, but when comparing models, lower BIC values indicate better model fit. For WIF and strain, results indicated that the cross-lagged model (BIC = 130,552.72) had a better fit to the data than the common factor model (BIC = 134,390.75). Similarly, for FIW and strain, the cross-lagged model (BIC = 93,203.20) showed a better fit to the data than the common factor model (BIC = 96,135.25). Thus, the rejection of the common factor models strengthens confidence in the results of the cross-lagged models.

Matching Hypothesis Versus Cross-Domain Perspective

To compare the parts of the matching and cross-domain perspectives that focus on work-related strain, we tested whether WIF or FIW has a stronger lagged relationship with work-related strain (Research Question 2). According to the cross-domain perspective, FIW should have a stronger relationship with work-related strain than does WIF. However, according to the matching perspective, WIF should have a stronger relationship with work-related strain than does FIW. Correlations among WIF, FIW, and work-related strain were included in the same meta-analytical path model. In addition to using the correlations provided in Tables 3 and 4, we used the following four sample-size-weighted correlations between WIF and FIW as input ($k = 16$; $N = 7{,}989$): WIF and FIW at Time 1: .31, WIF and FIW at Time 2: .31, WIF at Time 1 and FIW at Time 2: .21, and FIW at Time 1 and WIF at Time 2: .24.

In this combined model, WIF significantly predicted work-related strain, $\beta = .09$, $p < .05$; 95% CI [.08, .11], whereas FIW did not predict work-related strain, $\beta = -.01$, *ns*; 95% CI [−.02, .01]. To test whether these two coefficients differed, we constrained them to be equal and compared this constrained model with the unconstrained model. Model comparisons revealed that the unconstrained model, $\chi^2(2) = 30.47$, $p < .001$, comparative fit index (CFI) = 1.00, Tucker–Lewis index (TLI) = .99, root-mean-

Table 4
Results From Four Unconditional HLM Models

Lagged relationship	*m*	Fixed effect Coefficient	Fixed effect *SE*	Fixed effect *p*	Random effect τ^2	Random effect χ^2 (*df*)	Random effect *p*
WIF (T1) → strain (T2)	67	.080	.009	.001	.001	42.319 (31)	.084
FIW (T1) → strain (T2)	36	.037	.013	.012	.002	40.144 (19)	.003
strain (T1) → WIF (T2)	67	.076	.011	.001	.002	75.336 (31)	.001
strain (T1) → FIW (T2)	36	.056	.009	.001	.0003	21.261 (19)	.322

Note. HLM = hierarchical linear modeling; *m* = number of effect sizes; *SE* = standard error; *df* = degree of freedom; WIF = work interference with family; FIW = family interference with work; T1 = Time 1; T2 = Time 2.

square error of approximation (RMSEA) = .04, fit the data better than the constrained model, $\chi^2(3) = 85.84$, $p < .001$, CFI = .99, TLI = .98, RMSEA = .06, as indicated by a significant chi-square difference test, $\Delta\chi^2(1) = 55.37$, $p < .001$. Consequently, we favored the unconstrained model. These results suggested that the two paths from WIF and FIW to work-related strain differed from each other (i.e., WIF had a stronger relationship with work-related strain than did FIW). Thus, results supported the matching hypothesis rather than the cross-domain perspective.

We also tested whether the coefficients of the two paths from work-related strain to WIF, $\beta = .08$, $p < .05$; 95% CI [.06, .09], and FIW, $\beta = .05$, $p < .05$; 95% CI [.03, .07], differed. We constrained the two paths to be equal and compared this constrained model with the unconstrained model. Model comparisons revealed that the unconstrained model fit the data better than did the constrained model, $\Delta\chi^2(1) = 4.29$, $p < .05$. Consequently, we favored the unconstrained model and concluded that work-related strain had a stronger influence on WIF than on FIW.

Discussion

This meta-analysis examined the direction of effect between WIF/FIW and strain by applying meta-analytic path analyses to longitudinal studies. The results support the common assumption that WIF and FIW predict strain. The results also reveal that strain predicts WIF and FIW. Thus, the results provide support for reciprocal effects and challenge the common assumption that WIF and FIW antecede strain in a unidirectional way. Additionally, WIF had a stronger effect on work-specific strain than did FIW. This pattern of results supports the matching hypothesis rather than the cross-domain perspective.

Implications for Research

Our results have important theoretical implications. Most models in the work–family literature assume that work–family conflict influences strain (e.g., Frone et al., 1992, 1997), but they do not acknowledge potential influences of strain on work–family conflict. As our results reveal reciprocal relationships between both forms of work–family conflict and strain, existing models could be extended by taking reciprocal effects into account. Similarly, researchers aiming at building future models of work–family conflict and strain should explicitly acknowledge reciprocal effects. These models would provide a more complete picture of how WIF and FIW are related to strain. Although COR is not a genuine theory of work–family relationships, scholars have proposed that COR theory (Hobfoll, 1989) may offer an appropriate framework for work–family researchers (Grandey & Cropanzano, 1999). Indeed, the reciprocal relationships found in this meta-analysis are consistent with COR's notion of loss spirals. Thus, Hobfoll's COR theory seems to be a valuable lens that can be used to better understand the relationship between work–family conflict and strain.

Although this meta-analysis provides a rigor test of the direction of effect, we could not examine why work–family conflict and strain are related. Insights into the underlying mechanisms are important to more fully understand the relationship between work–family conflict and strain. We encourage future research to address mediators and suggest compensatory effort as a prime candidate. People experiencing WIF or FIW may try to invest more effort than usual (i.e., compensatory effort) to meet the role demands of the receiving role (Hockey, 1997). Sustaining compensatory effort is likely to drain individuals' energy, which should lead them to feel worn out and exhausted (Demerouti, Nachreiner, Bakker, & Schaufeli, 2001).

In additional analyses, we found that the reciprocal relationships between WIF/FIW and strain held for both men and women. According to gender role theory, women tend to place greater identity and value on the family role than do men, and men are more concerned with the work role than are women (Gutek, Searle, & Klepa, 1991). Consequently, one could argue that women (vs. men) experience more strain when facing WIF, and men (vs. women) experience more strain when facing FIW. However, because gender roles are becoming more egalitarian (e.g., Brewster & Padavic, 2000), men and women may react to WIF and FIW similarly.

Moreover, it is noteworthy that the time lag between the measurement waves did not influence the magnitude of the reciprocal effects between work–family conflict and strain. As the time lags of the analyzed studies were rather long, future research should explore whether stronger effects emerge for very short time lags (e.g., a few hours). Diary studies could provide insights into the short-term dynamics of WIF, FIW, and strain (Butler, Song, & Ilies, 2013). It is also noteworthy that for published and unpublished studies the relationships between work–family conflict and strain were virtually the same, except that for unpublished studies the lagged effect of FIW on strain was not significant. Thus, a publication bias is unlikely to exist.

Additionally, our results shed light on an aspect of the debate about matching versus cross-domain relationships. We compared the parts of each perspective that focus on work-related strain and found that WIF has a stronger effect on work-specific strain than does FIW, supporting the matching hypothesis. A recent meta-analysis on cross-sectional studies found that WIF was more strongly correlated with emotional exhaustion than was FIW, although both correlations were significant (Amstad et al., 2011). We found, however, that only WIF (but not FIW) predicted work-related strain over time. In contrast to the prior meta-analysis, we used path analysis and regressed work-related strain on WIF and FIW simultaneously thereby accounting for the shared variance between the two constructs. Thus, our results suggest that when accounting for the shared variance between WIF and FIW, only WIF and not FIW predicts work-related strain.

In line with the current debate, this meta-analysis applied the cross-domain and matching perspective to the influence of WIF and FIW on work-related strain. As suggested by an anonymous reviewer, the two perspectives could also be applied to the reversed effect of work-related strain on WIF and FIW. Results of this meta-analysis revealed that the influence of work-related strain was stronger on WIF than on FIW, thereby supporting the matching perspective. Thus, both directions of effect between WIF/FIW and work-related strain are in line with the matching perspective. The implication here is that future research should further examine the relative merits of the two perspectives and address the circumstances under which matching versus cross-domain relationships are stronger.

In general, the lagged effects were rather small. Prior meta-analysis that used cross-sectional studies reported stronger relationships between work–family conflict and strain (Allen et al., 2000; Amstad et al., 2011). The difference in magnitude might be caused by factors such as research artifacts (e.g., common method bias) inflating the cross-sectional relationships (Zapf et al., 1996) or stabilized levels of work–family conflict and strain over time minimizing the lagged relationships. Of note, the magnitude of lagged relationships we found is within the range of effects reported in other cross-lagged panel analyses controlling for baseline scores, for example, in studies on work stressors and strain (Dormann & Haun, 2010; Ford et al., 2014) and on job attitudes and performance (Riketta, 2008). Notwithstanding this, future studies should examine whether the lagged relationships of work–family conflict with strain are stronger under certain conditions. Thus, more nuanced theoretical insights and practical recommendations could be gained.

Limitations

This meta-analysis has some limitations. First, all studies used self-report measures of strain, which might have increased common method bias. Future research on work–family conflict and strain should use objective strain indicators as alternative or additional measures. Second, we could not differentiate between time-, strain-, and behavior-based WIF/FIW (Greenhaus & Beutell, 1985) due to a lack of studies distinguishing between these three forms of conflict. The relationship of WIF and FIW with strain may unfold differently depending on the type of conflict. Third, a lack of studies also prevented us from coding family-related strain. Consequently, we could not fully test the cross-domain and matching hypotheses; rather, we could only compare the parts of the perspectives that focus on work-related strain. Future studies should, therefore, address the longitudinal relationships of work–family conflict with family-related strain. Fourth, as our meta-analysis is based on correlational data, it does not allow us to draw strong causal conclusions. Although this study provides a more rigorous test of the direction of relationships than have previous meta-analyses, experiments are required to establish causality between WIF/FIW and strain. Finally, the number of available longitudinal studies is rather small and may limit the generalizability of our findings. However, the magnitude of mean concurrent correlations found in the present study is consistent with the results reported in previous meta-analyses on cross-sectional data (Allen et al., 2000; Amstad et al., 2011), alleviating the concern that there are systematic differences between longitudinal and cross-sectional studies.

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Appendix A

Coding Information for Samples Included in the Meta-Analysis

Table A1

Longitudinal Studies of the Relationship Between Work Interference With Family (WIF) and Strain

									Coded correlations for the overall analysis					
Study	*N*	Participants	Country	Strain	Reliabilities	% women	Publication status	Lag	W_1-S_2	S_1-W_2	W_1-S_1	W_2-S_2	W_1-W_2	S_1-S_2
Britt & Dawson (2005)	489	Soldiers	United States	Depression, physical health[a]	0.94, 0.94, 0.80, 0.80	15	P	3.0	.22	.24	.29	.27	.58	.57
Demerouti et al. (2004)	335	Employment agency employees	the Netherlands	Exhaustion	0.79, 0.81, 0.85, 0.89	70	P	1.5	.41	.41	.53	.54	.57	.68
Ford (2010)	328	Heterogeneous online panel from different countries	United States	Depression, physical symptoms[a]	0.80, 0.81, 0.82, 0.84[c]	49	U	1.0	.32	.26	.35	.30	.75	.74
Hammer et al. (2005), female subsample	234	Wives from dual-earner couples	United States	Depression	0.91, 0.91, 0.90, 0.90	100	P	12.0	.22	.30	.32	.30	.57	.43
Hammer et al. (2005), male subsample	234	Husbands from dual-earner couples	United States	Depression	0.90, 0.90, 0.87, 0.87	0	P	12.0	.17	.21	.19	.30	.54	.60
Innstrand et al. (2008)	2,235	Professionals	Norway	Exhaustion, disengagement[a]	0.70, 0.70, 0.86, 0.88	46	P	24.0	.31	.30	.42	.44	.63	.62
Jacobshagen et al. (2006)	76	Blue- and white-collar workers	Switzerland	Exhaustion, irritation, somatic complaints[a]	0.70, 0.80, 0.76, 0.84	26	U	24.0	.38	.29	.46	.44	.50	.64
Kälin et al. (2008)	94	Government agency employees	Switzerland	Exhaustion, irritation, depression, anxiety, somatic complaints[a]	0.77, 0.79, 0.74, 0.70	13	U	6.0	.28	.26	.42	.38	.52	.54
Kelloway et al. (1999)	236	Hospital and grocery store employees	Canada	Stress symptomatology	0.79, 0.80, 0.89, 0.91	69	P	6.0	.43	.48	.55	.46	.71	.72
Kinnunen et al. (2010), female subsample	239	Wives from dual-earner couples	Finland	Parental distress	0.65, 0.74, 0.83, 0.86	100	P	12.0	.18	.18	.11	.22	.57	.71
Kinnunen et al. (2010), male subsample	239	Husbands from dual-earner couples	Finland	Parental distress	0.72, 0.65, 0.81, 0.85	0	P	12.0	.17	.17	.13	.23	.59	.62
Kinnunen et al. (2004), female subsample	138	Female employees with family	Finland	Psychological and physical symptoms, parental distress[a]	0.83, 0.84, 0.85, 0.86	100	P	12.0	.31	.27	.28	.34	.71	.61
Kinnunen et al. (2004), male subsample	160	Male employees with family	Finland	Psychological and physical symptoms, parental distress[a]	0.81, 0.84, 0.81, 0.84	0	P	12.0	.24	.35	.30	.38	.63	.65
Leiter & Durup (1996)	151	Female hospital employees with family	Canada	Exhaustion, depersonalization, accomplishment[a]	0.75, 0.75, 0.77, 0.86	100	P	3.0	.29	.35	.33	.42	.61	.67
Mauno (2010)	409	Hospital employees	Finland	Exhaustion	0.86, 0.83, 0.89, 0.91	88	P	24.0	.45	.34	.54	.65	.66	.56
Meier et al. (2007)	78	Government agency employees	Switzerland	Exhaustion, irritation, depression, anxiety, somatic complaints[a]	0.75, 0.80, 0.76, 0.78	71	U	6.0	.40	.37	.42	.56	.57	.64
Meier et al. (2010)[b]	256	Managers and professionals	Switzerland	Exhaustion, depression, somatic complaints[a]	0.78, 0.83, 0.76, 0.79	56	U	9.0	.33	.25	.40	.47	.65	.60

(*Appendices continues*)

Table A1 (*continued*)

Study	N	Participants	Country	Strain	Reliabilities	% women	Publication status	Lag	Coded correlations for the overall analysis					
									W_1-S_2	S_1-W_2	W_1-S_1	W_2-S_2	W_1-W_2	S_1-S_2
Meier et al. (2010)	260	Hospital employees	Switzerland	Exhaustion, depression, somatic complaints[a]	0.78, 0.81, 0.76, 0.78	78	U	12.0	.27	.29	.49	.40	.57	.56
Meier et al. (2010)	600	Professionals	Switzerland	Exhaustion, depression, somatic complaints[a]	0.80, 0.79, 0.79, 0.80	24	U	15.0	.28	.23	.41	.40	.58	.56
Meier et al. (2010)	462	Managers and professionals	Switzerland	Exhaustion, depression, somatic complaints[a]	0.77, 0.81, 0.80, 0.83	9	U	12.0	.33	.28	.42	.51	.56	.53
Meier et al. (2010)	215	Managers and professionals	Switzerland	Exhaustion, depression, somatic complaints[a]	0.76, 0.82, 0.81, 0.82	48	U	15.0	.31	.32	.41	.48	.58	.64
Nohe & Sonntag (2010)	1,292	Managers and professionals	Germany	Exhaustion	0.80, 0.83, 0.83, 0.84	17	U	9.0	.54	.50	.62	.66	.71	.75
Nohe & Sonntag (2010)	470	Blue-collar workers	Germany	Exhaustion	0.73, 0.78, 0.79, 0.84	6	U	9.0	.36	.51	.63	.34	.66	.46
Nohe & Sonntag (2014)	665	Managers and professionals	Germany	Exhaustion	0.80, 0.82, 0.86, 0.88	21	U	5.0	.59	.60	.68	.69	.75	.82
O'Driscoll et al. (2004)	403	Employees from different organizations	New Zealand	Psychological strain, physical health[a]	0.91, 0.92, 0.84, 0.83	54	P	3.0	.15	.20	.24	.14	.70	.70
Rantanen et al. (2008)	153	Employees with a family	Finland	Exhaustion, psychological distress, parental distress[a]	0.83, 0.68, 0.84, 0.84	49	P	72.0	.07	.24	.14	.16	.54	.51
Schaufeli et al. (2009)	201	Telecom managers and executives	the Netherlands	Exhaustion, cynicism[a]	0.85, 0.88, 0.82, 0.82	11	P	12.0	.41	.18	.46	.36	.50	.65
Semmer et al. (2005)	382	Professionals	Switzerland	Irritation, somatic complaints[a]	0.71, 0.73, 0.85, 0.87	63	U	72.0	.17	.16	.30	.33	.23	.51
Steinmetz et al. (2008)	130	Convenience sample of employees	Germany	Depression	0.88, 0.89, 0.71, 0.72	60	P	12.0	.25	.34	.25	.39	.82	.62
van der Heijden et al. (2008)	946	Nurses	the Netherlands	General health	0.84, 0.88, 0.70, 0.70	94	P	12.0	.18	.20	.23	.22	.48	.59
van Hooff et al. (2005)	730	Police officers	the Netherlands	Exhaustion, depression	0.75, 0.79, 0.71, 0.83	9	P	12.0	.22	.20	.28	.31	.62	.44
Westman et al. (2008)	66	Managers and professionals	Israel	Burnout	0.84, 0.84, 0.92, 0.92	30	P	0.3	.32	.29	.41	.46	.64	.81

Note. Reliabilities = Cronbach's alpha of work interference with family at first and second coded wave and of strain at first and second coded wave; Lag = time lag between the coded measurement waves in months; W_1 and W_2 = work interference with family at first and second coded wave, respectively; S_1 and S_2 = strain at first and second coded wave, respectively; P = published in a peer-reviewed journal; U = unpublished studies including conference papers and manuscripts under review at time of data analysis.

[a] Reliabilities were averaged; correlations were averaged using Fisher's *z* scores. [b] Part of a large research project; see also Brauchli, Schaufeli, Jenny, Füllemann, and Bauer (2013). [c] Average reliabilities from other studies included in this meta-analysis were used, because reliability estimates were not available for this study.

(*Appendices continue*)

Table A2
Longitudinal Studies of the Relationship Between Family Interference With Work (FIW) and Strain

Study	N	Participants	Country	Strain	Reliabilities	% women	Publication status	Lag	Coded correlations for the overall analysis					
									F_1-S_2	S_1-F_2	F_1-S_1	F_2-S_2	F_1-F_2	S_1-S_2
Demerouti et al. (2007)	123	Employees from different companies	the Netherlands	Need for recovery	0.79, 0.75, 0.82, 0.83	39	P	1.0	.19	.18	.19	.14	.66	.70
Ford (2010)	328	Heterogeneous online panel from different countries	United States	Depression, physical symptoms[a]	0.74, 0.76, 0.82, 0.84[b]	49	U	1.0	.31	.34	.34	.37	.72	.74
Hammer et al. (2005), female subsample	234	Wives from dual-earner couples	United States	Depression	0.88, 0.88, 0.90, 0.90	100	P	12.0	.24	.12	.28	.22	.49	.43
Hammer et al. (2005), male subsample	234	Husbands from dual-earner couples	United States	Depression	0.88, 0.88, 0.87, 0.87	00	P	12.0	.19	.09	.18	.24	.45	.60
Innstrand et al. (2008)	2,235	Professionals	Norway	Exhaustion, disengagement	0.79, 0.76, 0.86, 0.88	46	P	24.0	.19	.18	.24	.23	.63	.62
Kelloway et al. (1999)	236	Hospital and grocery store employees	Canada	Stress symptomatology	0.80, 0.8, 0.89, 0.91	69	P	6.0	.50	.39	.47	.47	.76	.72
Kinnunen et al. (2010), female subsample	239	Wives from dual-earner couples	Finland	Parental distress	0.54, 0.66, 0.83, 0.86	100	P	12.0	.40	.32	.41	.41	.44	.71
Kinnunen et al. (2010), male subsample	239	Husbands from dual-earner couples	Finland	Parental distress	0.53, 0.53, 0.81, 0.85	00	P	12.0	.21	.28	.26	.30	.56	.62
Leiter & Durup (1996)	151	Female hospital employees with families	Canada	Exhaustion, depersonalization, accomplishment[a]	0.72, 0.7, 0.77, 0.86	100	P	3.0	.08	.15	.09	.20	.51	.67
Meier et al. (2010)	256	Managers and professionals	Switzerland	Exhaustion, depression, somatic complaints[a]	0.74, 0.73, 0.76, 0.79	56	U	9.0	.19	.19	.22	.16	.51	.60
Meier et al. (2010)	600	Professionals	Switzerland	Exhaustion, depression, somatic complaints[a]	0.74, 0.75, 0.79, 0.80	24	U	15.0	.20	.22	.30	.28	.48	.56
Meier et al. (2010)	462	Managers and professionals	Switzerland	Exhaustion, depression, somatic complaints[a]	0.79, 0.78, 0.80, 0.83	09	U	12.0	.15	.14	.31	.25	.46	.53
Meier et al. (2010)	215	Managers and professionals	Switzerland	Exhaustion, depression, somatic complaints[a]	0.73, 0.73, 0.81, 0.82	48	U	15.0	.29	.18	.28	.26	.48	.64
Nohe & Sonntag (2010)	1,292	Managers and professionals	Germany	Exhaustion	0.74, 0.78, 0.83, 0.84	17	U	9.0	.11	.12	.16	.14	.54	.75
Nohe & Sonntag (2010)	470	Blue-collar workers	Germany	Exhaustion	0.68, 0.75, 0.79, 0.84	06	U	9.0	.19	.19	.22	.11	.53	.46
Nohe & Sonntag (2014)	665	Managers and professionals	Germany	Exhaustion	0.81, 0.81, 0.86, 0.88	21	U	5.0	.12	.14	.13	.20	.66	.82
O'Driscoll et al. (2004)	403	Employees from different organizations	New Zealand	Psychological strain, physical health[a]	0.87, 0.88, 0.84, 0.83	54	P	3.0	.08	.11	.13	.18	.62	.70
Rantanen et al. (2008)	153	Employees with a family	Finland	Exhaustion, psychological distress, parental distress[a]	0.79, 0.71, 0.84, 0.84	49	P	72.0	−.03	.16	.16	.17	.39	.51
Semmer et al. (2005)	382	Professionals	Switzerland	Irritation, somatic complaints[a]	0.59, 0.7, 0.85, 0.87	63	U	72.0	.07	.11	.16	.23	.26	.51
Westman et al. (2008)	66	Managers and professionals	Israel	Burnout	0.83, 0.83, 0.92, 0.92	30	P	0.3	.37	.34	.50	.47	.64	.81

Note. Reliabilities = Cronbach's alpha of family interference with work at first and second coded wave and of strain at first and second coded wave; Lag = time lag between the coded measurement waves in months; F_1 and F_2 = family interference with work at first and second coded wave, respectively; S_1 and S_2 = strain at first and second coded wave, respectively; P = published in a peer-reviewed journal; U = unpublished studies including conference papers and manuscripts under review at time of data analysis.
[a] Reliabilities were averaged; correlations were averaged with Fisher's z scores. [b] Average reliabilities from other studies included in this meta-analysis were used, because reliability estimates were not available for this study.

(*Appendices continue*)

Appendix B

References Considered but Ultimately Excluded From the Meta-Analysis

1. Studies That Used Measures Referring to a Mixture of Work Interference With Family (WIF) and Family Interference With Work (FIW)

Danes, S. M., & Morgan, E. A. (2004). Family business-owning couples: An EFT view into their unique conflict culture. *Contemporary Family Therapy: An International Journal, 26,* 241–260.

Grant-Vallone, E. J., & Donaldson, S. I. (2001). Consequences of work–family conflict on employee well-being over time. *Work & Stress, 15,* 214–226. doi:10.1080/02678370110066544

Jansen, N. W. H., Kant, I., Kristensen, T. S., & Nijhuis, F. J. N. (2003). Antecedents and consequences of work–family conflict: A prospective cohort study. *Journal of Occupational & Environmental Medicine, 45,* 479–491.

2. Studies That Did Not Assess at Least One Strain-Related Variable

Dikkers, J. S. E., Geurts, S. A. E., Kompier, M. A. J., Taris, T. W., Houtman, I. L. D., & van den Heuvel, F. (2007). Does workload cause work–home interference or is it the other way around? *Stress and Health, 23,* 303–314. doi:10.1002/smi.1151

Hammer, L. B., Neal, M. B., Newsom, J. T., Brockwood, K. J., & Colton, C. L. (2005). A longitudinal study of the effects of dual-earner couples' utilization of family-friendly workplace supports on work and family outcomes. *Journal of Applied Psychology, 90,* 799–810. doi:10.1037/0021-9010.90.4.799

Hornung, S., Glaser, J., Rousseau, D. M., Angerer, P., & Weigl, M. (2011). Employee-oriented leadership and quality of working life: Mediating roles of idiosyncratic deals. *Psychological Reports, 108,* 59–74. doi:10.2466/07.13.14.21.PR0.108.1.59-74

Huang, Y.-H., Hammer, L. B., Neal, M. B., & Perrin, N. A. (2004). The relationship between work-to-family conflict and family-to-work conflict: A longitudinal study. *Journal of Family and Economic Issues, 25,* 79–100.

Kelly, E. L., Moen, P., & Tranby, E. (2011). Changing workplaces to reduce work–family conflict: Schedule control in a white-collar organization. *American Sociological Review, 76,* 265–290. doi:10.1177/0003122411400056

3. Studies That Did Not Have a Panel Design

Frone, M. R., Russell, M., & Cooper, M. L. (1997). Relation of work–family conflict to health outcomes: A four-year longitudinal study of employed parents. *Journal of Occupational and Organizational Psychology, 70,* 325–335.

Grandey, A. A., Cordeiro, B. L., & Crouter, A. C. (2005). A longitudinal and multi-source test of the work–family conflict and job satisfaction relationship. *Journal of Occupational and Organizational Psychology, 78,* 305–323. doi:10.1348/096317905x26769

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Kubicek, B., Korunka, C., Hoonakker, P., & Raymo, J. M. (2010). Work and family characteristics as predictors of early retirement in married men and women. *Research on Aging, 32,* 467–498. doi:10.1177/0164027510364120

Marks, N. F. (1998). Does it hurt to care? Caregiving, work–family conflict, and midlife well-being. *Journal of Marriage and Family, 60,* 951–966.

Matthews, R. A., Kath, L. M., & Barnes-Farrell, J. L. (2010). A short, valid, predictive measure of work–family conflict: Item selection and scale validation. *Journal of Occupational Health Psychology, 15,* 75–90. doi:10.1037/a0017443

4. Studies That Did Not Provide the Complete Zero-Order Correlation Matrix for Work–Family Conflict and Strain for at Least Two Measurement Waves

Peeters, M. C. W., de Jonge, J., Janssen, P. P. M., & van der Linden, S. (2004). Work–home interference, job stressors, and employee health in a longitudinal perspective. *International Journal of Stress Management, 11,* 305–322. doi:10.1037/1072-5245.11.4.305

5. Studies That Used Different Measures for Work–Family Conflict at Time 1 and Time 2

Hall, G. B., Dollard, M. F., Tuckey, M. R., Winefield, A. H., & Thompson, B. M. (2010). Job demands, work–family conflict, and emotional exhaustion in police officers: A longitudinal test of competing theories. *Journal of Occupational and Organizational Psychology, 83,* 237–250. doi:10.1348/096317908X401723

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