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Supervisor Support Buffers Daily Psychological and Physiological Reactivity to Work-to-Family Conflict

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Abstract

Using a daily diary design, the current study assessed within-person associations of work-to-family conflict with negative affect and salivary cortisol. Furthermore, we investigated whether supervisor support moderated these associations. Over eight consecutive days, 131 working parents employed by an information technology company answered telephone interviews about stressors and mood that occurred in the previous 24 hours. On Days 2–4 of the study protocol, they also provided five saliva samples throughout the day that were assayed for cortisol. Results indicated a high degree of day-to-day fluctuation in work-to-family conflict, with employed parents having greater negative affect and poorer cortisol regulation on days with higher work-to-family conflict compared to days when they experience lower work-to-family conflict. These associations were buffered, however, when individuals had supervisors who offered support. Discussion centers on the use of dynamic assessments of work-to-family conflict and employee well-being.

Keywords

conflict; diary methods; health; social support; spillover; stress

Work-to-family conflict, or stress produced when demands from work interfere with family responsibilities, has continued to rise in the United States (Edwards & Rothbard, 2000;

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Greenhaus & Beutell, 1985; Nomaguchi, 2009). This increase is disconcerting given that this type of stress can take a toll on employees' psychological and physical health. Workers who report higher average levels of work-to-family conflict (WTFC) are more likely to experience symptoms of depression and anxiety (Greenhaus, Allen, & Spector, 2006), to have poorer sleep (Berkman, Buxton, Ertel, & Okechukwu, 2010), and to be at higher risk for obesity (Grzywacz, 2000) and high cholesterol (Thomas & Ganster, 1995) than employees who report lower WTFC. The present study extends this research by examining the daily psychological and physiological reactivity to WTFC. In addition, we examine the extent to which supervisor support is a resource that can help manage this reactivity.

Work–Home Resources Perspective

This study is informed by the Work–Home Resources Model (W-HR) (ten Brummelhuis & Bakker, 2012), which posits that work-to-family conflict is the process whereby work stressors negatively influence the family through an individual's loss of personal resources, including time, psychological resources, and physical resources. The W-HR model asserts that contextual resources, such as workplace policies and supervisor support, can attenuate the negative effects of work–family conflict. Finally, the model recognizes that work demands and resources can be dynamic and volatile and can produce related volatile changes in personal resources (e.g., physical energy). Specifically, they propose that short-term work–family conflict reflects daily processes between work and family domains. Here, we directly test the daily associations between work-to-family conflict and a loss of psychological and physical personal resources, as well as whether a contextual work resource—supervisor support—attenuates these associations.

Most research examining WTFC and health has used employees' cross-sectional, global reports, often using recollections of conflict across the previous month. Although this research is valuable in showing between-person associations (i.e., employees with higher WTFC are in worse health than workers with lower WTFC), this static approach cannot reveal how workers psychologically and physically react on days when conflicts occur (Larson & Almeida, 1999). We answer the call to move from studying aggregated "levels" of WTFC to studying "specific episodes of work-to-family conflict" (Williams, Suls, Alliger, Lerner, & Wan, 1991, p. 665) that provide insights into the phenomenology of WTFC (Maertz & Boyar, 2011).

This study capitalizes on the strengths of daily diary designs. First, by obtaining information daily, diary designs help alleviate memory distortions and self-concept biases that can occur in more traditional questionnaire and interview methods in which individuals are asked to recall experiences over long and often unspecified time frames (Bolger, Davis, & Rafaeli, 2003). Perhaps the most valuable feature of a diary design is the ability to assess within-person processes. This approach represents a shift from identifying *between-person* patterns of association linking WTFC and health to charting day-to-day fluctuations in stress and well-being *within individuals*. Rather than solely asking whether individuals with high levels of WTFC experience poorer well-being than those with lower levels of WTFC, we also ask whether workers experience worse well-being on days when they report more WTFC than on days they experience less WTFC. The within-person approach allows us to rule out stable

personality and contextual factors as third-variable explanations for the link between WTFC and well-being (Almeida, 2005). Furthermore, within-person associations provide an index of daily stressor reactivity by assessing emotional and physiological changes to WTFC within individuals over time (Almeida, 2005; Cacioppo, 1998).

Understanding the daily ebb and flow of the working lives of adults and the toll it takes on their health better positions researchers to design effective supports and programs to reduce this stress. Using a daily diary design, the current study assesses within-person associations between the occurrence of WTFC and negative affect and salivary cortisol over eight consecutive days in a sample of information technology workers. The study had three specific aims: (a) to assess variation in work-to-family conflict across work days, (b) to examine psychological and physiological reactivity to the daily occurrence of WTFC, and (c) to investigate whether supervisor support buffers psychological and physiological reactivity to WTFC.

Daily Variation in Work-to-Family Conflict

The workplace and home are two dynamic contexts, and friction between the two roles can change from one day to the next (Almeida, 2005). To date, limited research has examined daily variation in WTFC; one exception is Butler, Grzywacz, Bass, and Linney's (2005) study of employees in nonprofessional occupations. The degree of daily fluctuation in experiences of work-to-family conflict for employees in various occupations is not well known, and the present study addresses this gap in the literature by assessing WTFC across multiple workdays in a sample of white-collar parents in an information technology (IT) division of a Fortune 500 company. To do this, we distinguished between-person variation (i.e., the extent that employees differ from one another in WTFC) from within-person person variation (i.e., the extent that employees vary from day to day in WTFC). This decomposition permits an assessment of whether WTFC is more a characteristic of dynamic work and family responsibilities or stable features of a person and his or her life circumstances. Given previous research on daily experiences including work and family stressors (Almeida & Davis, 2011), we expected that there would be more within-person variation than between-person variation in WTFC.

Daily Stressor Reactivity

To better understand how WTFC has implications for employee psychological and physiological resources, the research focus needs to move beyond exposure to WTFC to reactivity to WTFC. The present study draws from the daily stress perspective that highlights the assessment and importance of how individuals react to daily stressors (Bolger & Zuckerman, 1995; Cacioppo, 1998). Stressor reactivity is the likelihood that an individual will show emotional or physical reactions to the stressors he or she encounters (Almeida, 2005). In this sense, stressor reactivity is not defined as internal psychological or biological state (i.e., negative affect or heightened cortisol); it is operationally defined as the within-person relationship between stressors and those states. Previous research has shown that people who are more reactive to daily stressors are more susceptible to physical disease than are people who are less reactive (Cacioppo, 1998; Charles, Piazza, Mogle, Sliwinski, & Almeida, 2013; Mroczek et al., 2015). Because resources of individuals and their

environments (e.g., education, income, chronic stressors) limit or enhance coping resources (Lazarus, 1999; ten Brummelhuis & Bakker, 2012), reactivity to stressors is likely to differ across people and across situations. In this article, we view WTFC as a daily stressor that can have same-day effects on individual psychological and physiological well-being (Almeida, McGonagle, & King, 2009; Lazarus, 1999). Our daily diary design allows for testing stressor reactivity by capturing the within-person association between stressors and the stress response, such as negative affect and salivary cortisol (Almeida, Wethington, & Kessler, 2002; Stawski, Cichy, Piazza, & Almeida, 2013). Thus, the second aim of this study was to investigate the amount of daily psychological and physiological reactivity to WTFC, measured by the daily within-person association between WTFC and negative affect and salivary cortisol, respectively.

Psychological reactivity to daily work-to-family conflict—WTFC has been linked to many indicators of psychological problems, including depression, anxiety, anger, frustration, and resentment (Allen, Herst, Bruck, & Sutton, 2000; Frone, 2000; Frone, Russell, & Cooper, 1997; Greenhaus, Allen, & Spector, 2006). WTFC can be distressing for individuals because work responsibilities inhibit their time and/or performance at home; at the same time, individuals may feel like they are not performing either role well. Individuals preoccupied with work while at home inhibit their time available for their family and for themselves to recover from work. Family time and relationships can be a source of recovery and coping from the workday. This psychological interference between work and family may result in reduced energy and inadequate recovery. Not being able to take time to rest and recover from work demands may lead to psychological distress. Thus, we hypothesize that on days with higher work-to-family conflict, employees will experience greater negative affect than on days when they experience lower WTFC.

Physiological reactivity to daily work-to-family conflict—Past research has linked WTFC with both subjective (Frone et al., 1997; Grzywacz, 2000) and objective measures of physical health, such as obesity (Grzywacz, 2000), cardiovascular health (Frone et al., 1997; Shockley & Allen, 2013), and high cholesterol (Thomas & Ganster, 1995; see Greenhaus et al., 2006, for a review on the associations between WTFC and health). Relatively little research has focused on the association between WTFC and hypothalamic-pituitary-adrenal axis (HPA axis) functioning. The HPA axis is one of the main neuroendocrine stress systems, and in humans, the end product of HPA axis activation is cortisol (Goldstein & Kopin, 2007; McEwen, 1998). Cortisol has been of increasing interest to work–family researchers because it is a primary biomarker of stress and can be assessed outside the laboratory through a relatively noninvasive saliva collection procedure (Buxton, Klein, Whinnery, Williams, & McDade, 2013; Granger & Kivlighan, 2003). Cortisol is a glucocorticoid that is secreted in response to physical or psychological stress, and also has a distinct diurnal secretion pattern (Sapolsky, Romero, & Munck, 2000). Cortisol levels are highest in the morning and gradually decline throughout the day with the lowest levels in the early part of the night (Sapolsky et al., 2000). Repeated exposure to stress can result in “wear and tear” on the HPA axis and can lead to alterations HPA axis functioning, such as hypoactivity (e.g., low daily cortisol output, blunted stress reactivity) and hyperactivity (e.g.,

high daily cortisol output, blunted daily decline, exaggerated stress reactivity) (Kiecolt-Glaser, Garner, Speicher, Penn, & Glaser, 1986; Segerstrom & Miller, 2004).

Preliminary research suggests that high job strain and work stress are associated with increased levels of cortisol in the morning (Ritvanen, Louhevaara, Helin, Vaisanen, & Hanninen, 2006; Steptoe, Cropley, Griffith, & Kirschbaum, 2000). Concerns about work have also been found to be associated with cortisol levels throughout the day (Slatcher, Robles, Repetti, & Fellows, 2010). In addition, research by Goldstein, Shapiro, Chicz-DeMet, and Guthrie (1999) indicates that cortisol levels often remain elevated for married women after work—and the effect was even greater for married women with children—whereas cortisol levels decrease after work for unmarried women.

Our study extends these findings by investigating the extent to which experiences of parents' WTFC on a given day predict higher levels of cortisol at the end of the same day as well as less diurnal decline in cortisol across the evening hours. Diurnal decline reflects the HPA recovery from daily stresses (Almeida, McGonagle, & King, 2009; Almeida, Piazza, & Stawski, 2009). On the basis of previous research, we hypothesize that cortisol is higher and evidences less diurnal decline on days when parents experience higher work-to-family conflict than on days when they experience lower work-to-family conflict.

Moderating Effect of Supervisor Support on Stressor Reactivity

The study's third aim was to test whether a workplace contextual resource—supervisor support—can buffer the extent to which employees are psychologically and physically reactive to experiences of WTFC on a daily basis. Perceptions and use of resources are important for individuals coping with competing demands on their time and energy (ten Brummelhuis & Bakker, 2012). The benefits of social support in dealing with stressors have been well documented (Cohen & Wills, 1985), and supervisor support has been shown to be an important factor in helping employees combine work and family roles (Carlson & Perrewe, 1999; Glass & Finley, 2002). A growing body of research has documented the benefits of family-supportive supervisor behaviors on employee health (Hammer, Kossek, Anger, Bodner, & Zimmerman, 2011). Family-supportive supervisors empathize with an employee's desire to effectively manage work and family responsibilities while engaging in emotional support, instrumental support, role-modeling behaviors, and creative work–family management practices (Hammer, Kossek, Yragui, Bodner, & Hanson, 2009). However, to the best of our knowledge, there is a lack of research that has examined supervisor support as a moderator of daily stressor reactivity. Therefore, this study tested whether employee perceived supervisor support moderates the relationship between daily WTFC and psychological distress and salivary cortisol.

In summary, based on the Work–Home Resources Model (ten Brummelhuis & Bakker, 2012), the aims of the present study were to investigate psychological and physiological reactivity to daily WTFC and whether supervisor support buffers daily reactivity. The specific research questions follow.

Research Question 1—How much does WTFC fluctuate from day-to-day? We expected that there would be more within-person variation than between-person variation in WTFC.

Research Question 2—To what extent is there evidence of psychological and physiological reactivity to WTFC? At the between-person level, we hypothesized that employees who experienced more WTFC would also report more negative affect and exhibit higher cortisol levels, on average. At the within-person level, we expected that on days when employees experienced more WTFC, they would also report more negative affect and exhibit higher cortisol levels on those days.

Research Question 3—Does supervisor support serve as a buffer of stressor reactivity in employed parents? At the between-person level, we expected that the effect of daily WTFC on stressor reactivity would weaken for employees who perceived more supervisor support (with less negative affect and healthier cortisol levels). At the within-person level, we hypothesized that the effect of daily WTFC on stressor reactivity would weaken on days when employees perceived more supervisor support (with less negative affect and healthier cortisol levels).

Method

Participants and Procedure

Data for the current analyses came from the Work, Family, and Health Study (WFHS), a study of the effects of workplace practices on employee, family, and organizational well-being (Bray et al., 2013; King et al., 2013). The present study focused on employees in the IT division of a U.S. Fortune 500 company. Employees in the IT division worked as project managers, software developers, or administrative staff. The jobs require working with high demands in general, because the employees worked closely with clients to plan how applications could meet their needs and responded to problems in applications and related networks. Moreover, the jobs are prone to high WTFC, because many employees routinely participated in early morning conference calls, usually from home, to coordinate work with their offshore collaborators (primarily in India) (Kelly et al., 2014). Trained interviewers conducted computer-assisted personal interviews with employees at the workplace. Data collection began with informed consent and assent procedures, and then interviewers read questions to employees about their work experiences, individual well-being, and their family relationships. At baseline, 823 employees from 13 work sites in the IT division (located in Colorado and Ohio) completed the workplace interview (response rate = 69.6%). Among those respondents, parents who had children aged 9–17 who lived at home at least four days a week (n = 222, 26.97%) were invited to participate in the daily diary study. For employee-parents with more than one eligible child, the child closest in age to 13 years participated. A total of 131 employees (59% of eligible employees) participated in the daily diary study. Comparisons (t-tests and chi-square analyses) between those who chose to participate (n = 131) and those who chose not to participate in the daily diary (n = 91) indicated that the two groups did not significantly differ in basic demographic characteristics (parents' education, parents' age, number of children living in the household, child gender, marital status) or parents' work variables (tenure at work, schedule control, family-supportive supervisor behaviors, work–family conflict), with the exceptions of youth age (those who participated were older, 13.38 vs. 12.16, $t(2, 220) = –3.67$, $p < .001$), income (those who participated

earned less money, 8.67 vs. 9.55, $t(2, 201) = 2.14$, $p < .05$), and minority status (those who participated were less likely to be a minority, $\chi^2 = 7.92$, $p < .01$).

The daily diary study aimed to obtain in-depth information about daily experiences, including mood and stressful events. Daily diary data collection involved a series of eight consecutive nightly telephone interviews in the period of October 2009 to August 2011, conducted by Penn State University's Survey Research Center. Each telephone interview averaged 25 minutes. On Days 2–5 of the diary, a subset of diary respondents participated in a biomarker study, in which they provided five samples per day (20 samples total) using Salivettes with cotton swabs (Sarstedt Inc., Newton, NC). Participants were instructed to roll the cotton swab across their tongue for two minutes until the swab was completely saturated with saliva. Participants also were provided with written instructions and an instructional DVD to explain the daily saliva collection procedures. Penn State University's Institutional Review Board approved the data collection protocol.

Consistent with prior studies (Granger & Kivlighan, 2003; Stawski et al., 2013), participants were asked during the daily interviews to report saliva collection times on a home saliva collection sheet. Instructions for saliva collection and questionnaire completion also were reviewed during the first daily diary telephone interview. Participants were asked to keep samples refrigerated until the end of the saliva collection period, when they shipped saliva samples via overnight preaddressed, prepaid courier packages to the Biomarker Core Laboratory at Penn State University. This study used data from 131 employees who participated in the daily diary and biomarker components. Employees received $150 for diary and biomarker study participation.

Of participants, 45% were female, and the mean age was 45.14 (*SD* = 6.32). All participants had at least one child; the mean number of children was 2.11 (*SD* = 1.07). Seventy-eight percent of employed parents had four or more years of college education, and 19.6% had some college (1–3 years) or were technical school graduates. The average tenure at the company was 13.08 years (*SD* = 6.55). The mean annual household income was in the range of $110,000–$129,999, and the average number of work hours per week was 45.89 (*SD* = 5.86).

Measures

The work-to-family conflict scale was adapted from the measure created by Netemeyer, Boles, and McMurrian (1996). Five questions measured the amount of daily WTFC. An example item is "Since this time yesterday, how much did the demands of your work interfere with your family or personal life?" Responses ranged from 1 (*not at all*) to 4 (*a lot*). We used the sum of the five items. The questions were asked only if employed parents had worked in the previous 24 hours. Reliability was calculated at the within- and between-person levels (see Cranford et al., 2006). For the daily WTFC scale, the reliability was adequate (between-person reliability = .85; within-person reliability = .76). The person mean of WTFC across days was correlated with the global measure of WTFC, which asked about the degree of conflict across the previous month using the same set of questions ($r = .64$, $p < .001$), suggesting that daily WTFC moderately overlaps with global assessments (Maertz & Boyar, 2011; Williams et al., 1991).

Supervisor support was assessed with two items that were adapted from the National Study of Daily Experiences (Almeida, McGonagle, & King, 2009; Almeida, Piazza, & Stawski, 2009). The items were "(Since this time yesterday), how supportive was your supervisor on a scale from 1 to 7, with 1 being not supportive at all and 7 being very supportive?" and "How supportive was your supervisor about work and family issues on a scale from 1 to 7?" We used the mean of the two items, such that larger numbers represented more daily supervisor support. The between-person correlation of the two items was .88, and the within-person correlation was .82. The person mean of supervisor support across diary days was weakly correlated with the global measure of Family Supportive Supervisor Behavior (FSSB) (Hammer et al., 2009), which measured employee perceived supervisor support on family issues (r = .21, p = .0168).

Negative affect was assessed using items from the Positive and Negative Affect Scale (PANAS) by Watson, Clark, and Tellegen (1988). Negative affect is a general dimension of subjective distress that subsumes a variety of aversive mood states, including anger, contempt, disgust, guilt, fear, and nervousness, with low negative affect being a state of calmness and serenity. The PANAS scale consists of 10 items for negative affect (scared, afraid, upset, distressed, jittery, nervous, ashamed, guilty, irritable, and hostile). An example item is "How much of the time today did you feel nervous?" Responses were coded as 1 (*none of the time*) to 5 (*all of the time*). The negative affect score was also calculated by averaging responses to all 10 items assessing negative affect. Higher scores reflected more negative affect. The daily correlation among the items was .83, and the person-mean correlation was .90.

Salivary cortisol determination—Saliva samples were assayed for salivary free cortisol in duplicate in a single-assay batch at the Biomarker Core Laboratory at Penn State University via a commercially available enzyme immunoassay (EIA; Salimetrics LLC, State College, PA). The sample test volume was 25 μl of saliva (for singlet determinations). The assay had a range of sensitivity from 0.007 μg/dl to 1.8 μg/dl, with average inter- and intra-assay covariances of less than 10% and 5%, respectively. Cortisol values were converted from μg/dl to nmol/L (μg/dl X 27.59). Values greater than 82.77 ug/dL were considered outliers, on the basis of previous research from a national sample (Stawski et al., 2013). These samples were rerun on a 1:8 dilution. Assayed samples that remained high (>82.77 nmol/L) were considered invalid and removed from the data set (n = 5 before dinner and n = 4 before bed). In total, there were 504 cortisol days across the four days from 126 employees. We used three cortisol variables—before dinner, before bed, and the slope from before dinner to bedtime. The selection of these cortisol variables was based on our assumption that the effect of WTFC can be seen after the workday ends (a time when employees are engaging in household activities yet may be recovering from work). We collected 469 valid saliva samples for before dinnertime and 479 valid samples for bedtime. The slope from before dinner to bedtime was calculated as subtracting the before dinner value from the bedtime value. To account for duration between the time points, the difference scores were divided by the time difference between the two time points. A high slope indicates that the body was unable to recover from the stress and activity of the day.

Because of the skew of the data, cortisol values were natural log transformed before analyses (Stawski et al., 2013).

Covariates—We controlled for employees' gender (0 = *male*, 1 = *female*), age, race (0 = *minority*, 1 = *White*). Moreover, to examine unique implications of WTFC, incidence of any work-related stressor on a given day (0 = *no*, 1 = *yes*) was considered. The proportion of any work-related stressor (i.e., work demands, argument or disagreement, and any other stressful events happened at work) on workdays was calculated and included as the between-person-level variable. For cortisol analyses, we also controlled for factors found to be associated with cortisol: the use of tobacco products (0 = *no*, 1 = *yes*), smoking status (0 = *no*, 1 = *yes*), medications known to affect cortisol secretion (e.g., estrogen, Depo-Provera; 0 = *no*, 1 = *yes*), time of saliva sample, and body mass index (BMI). In addition, a "cortisol flag" variable was created to indicate whether an individual was awake for less than 12 hours or more than 20 hours, whether an individual woke up after noon, if there was an increase in cortisol greater than 10 nmol/L between Sample B and C, or if there was less than 15 minutes or more than 60 minutes between the first and second cortisol samples (Stawski et al., 2013).

Analytic Strategies

For Research Question 1, we examined the variability in WTFC. To decompose Level 1 (within-person level) and Level 2 (between-person level) variances in negative affect and cortisol as a function of changes in WTFC, multilevel modeling (MLM) was conducted using SAS 9.3. First, unconditional means models were executed to examine the relative amount of variances in the outcome variables at within-person- and between-person-level (i.e., intraclass correlations or ICCs). For example, the Level 1 model of negative affect was specified as follows:

$$Negative\ Affect_{di} = \beta_{0i} + e_{di},$$

where person *i*'s amount of negative affect on day *d*, Negative affect$_{di}$, is a function of a person-specific intercept β_{0i}, which represents the person's average amount of negative affect, and residual error e_{di}, denoting random variation of the person on the *d*th day from the person mean. The Level 2 model, between-person-level intercepts were modeled as follows:

$$\beta_{0i} = \gamma_{00} + \mu_{0i},$$

with γ_{00} being the sample mean and u_{0i} denoting random deviations of *i*th person mean from the sample mean.

For Research Question 2, we examined the effects of between- and within-person-level WTFC on negative affect and cortisol (separately). To do this, we entered WTFC and supervisor support as predictors in four separate models (negative affect, before-dinner cortisol, bedtime cortisol, and slope between before-dinner and bedtime cortisol). The example equation for the model of negative affect is the following:

$$Negative\ Affect_{di}=\beta_{0i}+\beta_{1i}(WP\ \ WTFC)_{di}+e_{di},$$

where person *i*'s amount of negative affect on day *d*, Negative affect$_{di}$, is a function of a person-specific intercept β_{0i}, which represents the person's average amount of negative affect when daily WTFC is at the person-mean. β_{1i} captures change in negative affect as a function of change in daily WTFC, and residual error e_{di} is the leftover variance in negative affect that is not explained by daily WTFC. The person-specific intercepts, β_{0i}, and the slopes, β_{1i}, were modeled as follows:

$$\beta_{0i}=\gamma_{00}+\gamma_{01}(BP\ \ WTFC)_{i}+\mu_{0i}$$

$$\beta_{1i}=\gamma_{10}+\mu_{1i},$$

with γ_{00} and γ_{10} being the sample mean, u_{0i} and u_{1i} denote random deviations of the person from those means, correlated with each other, and uncorrelated with the residual errors e_{di}.

For Research Question 3, to test supervisor support as a buffer of stressor reactivity, we included WTFC, supervisor support, and interactions between the two in our models. The example equations for the model of negative affect are as follows:

$$Negative\ Affect_{di}=\beta_{0i}+\beta_{1i}(WP\ \ WTFC)_{di}+\beta_{2i}(WP\ SS)_{di}+\beta_{3i}(WP\ \ WTFC)_{di}*(WP\ SS)_{di}+e_{di}$$

$$\beta_{0i}=\gamma_{00}+\gamma_{01}(BP\ \ WTFC)_{i}+\gamma_{02}(BP\ SS)_{i}+\gamma_{03}(BP\ \ WTFC)_{i}*(BP\ SS)_{i}+\mu_{0i}$$

$$\beta_{1i}=\gamma_{10}+\mu_{1i}$$

$$\beta_{2i}=\gamma_{20}+\mu_{2i}$$

$$\beta_{3i}=\gamma_{30}+\mu_{3i},$$

with β_{2i} being the main effect of within-person-level supervisor support and γ_{02} being the main effect of between-person-level supervisor support, β_{3i} and γ_{03} capture interaction effects between supervisor support and between-person level WTFC at within- and between-person-level respectively.

Results

Day-to-Day Fluctuations in Work-to-Family Conflict

Table 1 presents the means, standard deviations, interclass correlations (ICCs), and between- and within-person correlations among variables. On average, respondents reported relatively low levels of WTFC and negative affect and moderate levels of supervisor support. The bold coefficients on the diagonal of the correlation matrix are ICCs, which can be interpreted as the amount of variance attributable to between-person differences. The ICC for WTFC addresses the first aim of the study and indicated a fairly large degree of day-to-day fluctuation in WTFC. Of the total variation in WTFC, 58% was due to differences between respondents and 42% was attributable to day-to day differences within respondents. The other ICCs indicated that these variables also vary at both the between- and within-person levels (range = .11–.70), which suggests that it is appropriate to use multilevel models (Bryk & Raudenbush, 1992). The ICC of negative affect indicated that 42% of variance was explained by between-person differences and 58% was attributable to day-to-day fluctuation. For cortisol variables, the ICCs ranged between .11 and .19, which indicates more variance at the within-person level than at the between-person level.

The patterns of correlations indicated that higher WTFC was associated with lower supervisor support and higher negative affect at both the between- and the within-person levels and with flatter slopes between dinner and bedtime cortisol at the within-person level. As the correlation matrix shows, WTFC was associated with having work-related stressors (between- and within-person levels). We examine these associations in more detail in the next set of analyses.

Psychological and Physiological Reactivity to Daily Work-to-Family Conflict

Negative affect—Table 2 presents results for all MLM analyses. The first column shows the findings for negative affect. Results of Step 1 (main effects models) indicated that WTFC was associated with negative affect at both the between- and within-person levels independent of other work-related stressors. On average, individuals who experienced more WTFC also reported more negative affect. Furthermore the within-person effects suggested that, on days when people experienced more WTFC, they also reported more negative affect on those days. Supervisor support was not associated with negative affect at the between- or within-person level.

Cortisol—Table 2 also shows the results for models predicting salivary cortisol before dinner, at bedtime, and before dinner to bedtime. Gender, age, race, BMI, smoking status, steroid medications, time of saliva sample, and work stressors (between- and within-person levels) were included as covariates in these models. Beginning with the effects of covariates on before-dinner cortisol, females, older employees, and those who took steroid medications ($\beta = 0.27$, $p = .0089$) exhibited higher levels of before-dinner cortisol than their counterparts. With regard to bedtime cortisol, taking steroid medications also predicted higher bedtime cortisol levels ($\beta = 0.47$, $p < .001$). There were no significant effects of the covariates on the slope for before dinner to bedtime cortisol. After controlling for the effects of covariates, results of Step 1 indicated that WTFC and supervisor support were not significant predictors

of before dinner and bedtime cortisol levels. However, daily WTFC and supervisor support were significant predictors of the slope between before dinner and bedtime cortisol. On days when participants reported higher WTFC, they had less diurnal cortisol recovery (i.e., flatter slopes from dinner to bedtime cortisol) than on days when they had lower WTFC. In contrast, the within-person effect for supervisor support indicated that on days respondents reported higher levels of supervisor support, they had greater diurnal cortisol recovery (i.e., steeper slopes) than on days they reported lower levels of support.

Supervisor Support as a Moderator of Stressor Reactivity

The results of the third aim can be seen in Step 2 of Table 2; the results, first of all, indicated that average levels of supervisor support moderated the within-person association between WTFC and negative affect. Figure 1 depicts the nature of this interaction. For individuals with low between-person-level supervisor support on average, on days when they experienced high WTFC, they reported more negative affect ($\beta = 0.05$, $p < .001$). However, the association between daily WTFC and negative affect became weaker for individuals with high supervisor support ($\beta = 0.02$, $p = .1923$). Specifically, the region-of-significance test (Preacher, Curran, & Bauer, 2006) showed that the reactivity slope was not significant when supervisor support was higher than 6.1. In other words, high supervisor support served as a buffer for daily reactivity to WTFC.

Moreover, daily supervisor support moderated the within-person effect of daily WTFC on both negative affect and dinner to bedtime cortisol slopes. Figure 2 shows that, on days when high WTFC was coupled with low supervisor support, cortisol increased from dinner to bedtime ($\beta = 0.17$, $p < .001$). In contrast, on days with high supervisor support, daily WTFC was not significantly associated with the cortisol slope ($\beta = –0.04$, $p = .4478$). The region-of-significance test (Preacher et al., 2006) showed that the effect of daily WTFC on cortisol slope was not significant when daily supervisor support was higher than 5.7.

Discussion

Experiencing the multiple and competing demands of work and family responsibilities fluctuates from day to day and carries psychological and physiological costs. According to the Work-Home Resources Model, work-to-family conflict is the process whereby work stressors negatively influence the family through an individual’s loss of personal resources (ten Brummelhuis & Bakker, 2012). The results of the present study indicate quite clearly that employed parents experience stressor reactivity on days when they experience WTFC. Employed parents have greater psychological distress and alterations in diurnal cortisol diurnal on days with high WTFC than on days when they experience less WTFC. These costs are buffered, however, when individuals have supervisors who offer support, a workplace contextual resource.

The study highlights the importance and value of assessing day-to-day variability in, or episodes versus aggregated levels of, WTFC (Maertz & Boyar, 2011). Consistent with the WH-R model (ten Brummelhuis & Bakker, 2012) and prior work (Butler et al., 2005), we show substantial daily variation in WTFC. As a construct, WTFC should be used to characterize not solely how workers differ from one another but also how workdays differ

from one another (as well as non-workdays). Indeed, 42% of the total variation in WTFC was attributable to the within-person-level daily fluctuations. Workplaces and family settings are dynamic contexts: Some days are more demanding and stressful than others, and the experience of WTFC reflects those fluctuating demands.

Furthermore, this daily approach allowed us to capture how workers react to WTFC on days that this type of stress occurs. In the present study we showed within-person psychological and physiological reactivity to WTFC. The within-person coupling (i.e., daily reactivity) of WTFC with distress and cortisol provides stronger evidence of health effects of WTFC than do typical cross-sectional designs, because in daily designs participants serve as their own controls, thereby controlling for potential stable third-variable explanations for those associations (Bolger et al., 2003). Regardless of sociodemographic (e.g., age, education, ethnicity) or stable psychosocial characteristics of individuals (e.g., personality, IQ), on occasions when individuals have more WTFC than they typically do, they experience greater negative affect and less diurnal cortisol recovery in the evening.

Daily reactivity to WTFC provides important information on the overall health effects of WTFC. Affective reactivity to daily stressors in general have been linked to longitudinal changes in affective disorders such as depression and anxiety (Charles et al., 2013), chronic health conditions (Piazza, Charles, Sliwinski, Mogle, & Almeida, 2013), and mortality (Mroczek et al., 2015). These findings highlight the proximal and cumulative health effects of common daily stressors. It is not surprising that individuals experience more negative affect on days when they have WTFC. Over time, however, this affective reactivity carries major health risks. This affective reactivity to WTFC may be an important mechanism for more general links of WTFC and health as found in other studies (Berkman et al., 2010; Greenhaus et al., 2006; Grzywacz, 2000; Thomas & Ganster, 1995).

This article moves beyond self-reported affective reactivity to show physiological reactivity to WTFC using salivary cortisol. Many studies have documented elevated cortisol levels in response to laboratory-controlled acute psychological stressors (Dickerson & Kemeny, 2004). Less is known about the relationship between naturally occurring stressors and cortisol (Dettenborn et al., 2005; Polk, Cohen, Doyle, Skoner, & Kirschbaum, 2005), however. The present study fills gaps in prior research by showing that daily WTFC is related not to the amount of cortisol levels at specific occasions in the evening but rather to change (i.e., slope) in cortisol across the evening. On days with high WTFC, employees' cortisol remained elevated at the end of the day. Failure to deactivate cortisol secretion in the evening may indicate a difficulty in disengaging from external demands, which thus leads to inhibition of restoration and recovery processes (Sapolsky, Krey, & McEwen, 1986). Persistently elevated levels of cortisol are symptomatic of general poor physical health, often interpreted as wear and tear on the HPA axis (Kiecolt-Glaser et al., 1986; Segerstrom & Miller, 2004). Our research shows that WTFC may play a more important role in the regulation of cortisol and as such lead to health complications down the road. An important step in future research is to explore long-term implications of WTFC on physical health via disrupted HPA-axis regulation.

This study also has emphasized the important role of supervisors in daily reactivity to WTFC. Daily WTFC reactivity is buffered when supervisors support their employees. On high-WTFC days, employees with supportive supervisors on average experienced lower affective reactivity than did employees with less supportive supervisors. For physiological reactivity, the effect of supervisor support was more proximal. On high-WTFC days, evening cortisol was better regulated (greater decrease throughout the evening) if workers reported supervisor support on that day. Training supervisors to be supportive of their employees at work and for their lives outside of work has been shown to be beneficial for health outcomes (Hammer et al., 2011). Supervisors providing support can benefit the employees' health also in addition to employees' productivity and retention by increasing their personal resources.

Limitations and Suggestions for Future Study

Although this study has provided evidence of the daily costs of WTFC, there are some important limitations. We assessed WTFC over a relatively small number of days in a homogeneous sample of well-educated working parents. Sampling more days from a varied sample of workers would allow us to examine other situational and sociodemographic modifiers of affective and physiological reactivity to WTFC. For example, our previous work has shown that stressor reactivity is greater on days when there is a pile-up of stressors and among individuals with low socioeconomic status (Almeida, Neupert, Banks, & Serido, 2005). It would be important to assess similar moderators in future studies. In addition, potential selection may limit our generalizability, because employees who participated in the daily diary study had older children, earned less money, and were less likely to be an ethnic minority than those who did not. Second, it is import to mention that this study did not assess the daily effects of family-to-work conflict. This type of conflict is often forgotten in research. It would be interesting to assess whether work interferences due to family responsibilities act in a similar fashion as work-to-family conflict. Future work would also benefit by assessing the long-term outcomes of daily reactivity to WTFC. As previously mentioned there is emerging evidence that suggests the long-term health effects of reactivity to general daily stressors (Mroczek et al., 2015; Piazza et al., 2013). The next step would be to document how affective and physiological reactivity to work and family conflict predicts later health.

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Figure 1. Moderating effect of supervisor support in the relation between work-to-family conflict and negative Affect

Note. Between-person level supervisor support moderated the within-person association between work-to-family conflict and negative affect. For both supervisor support and work-to-family conflict, low and high levels were a half standard deviation below and above the sample mean, respectively. Employees reported more negative affect on higher work-to-family conflict days than lower work-to-family conflict days, when they perceived lower supervisor support on average. The region-of-significance test (Preacher et al., 2006) indicated that the slope was not significant when supervisor support was greater than 6.1.

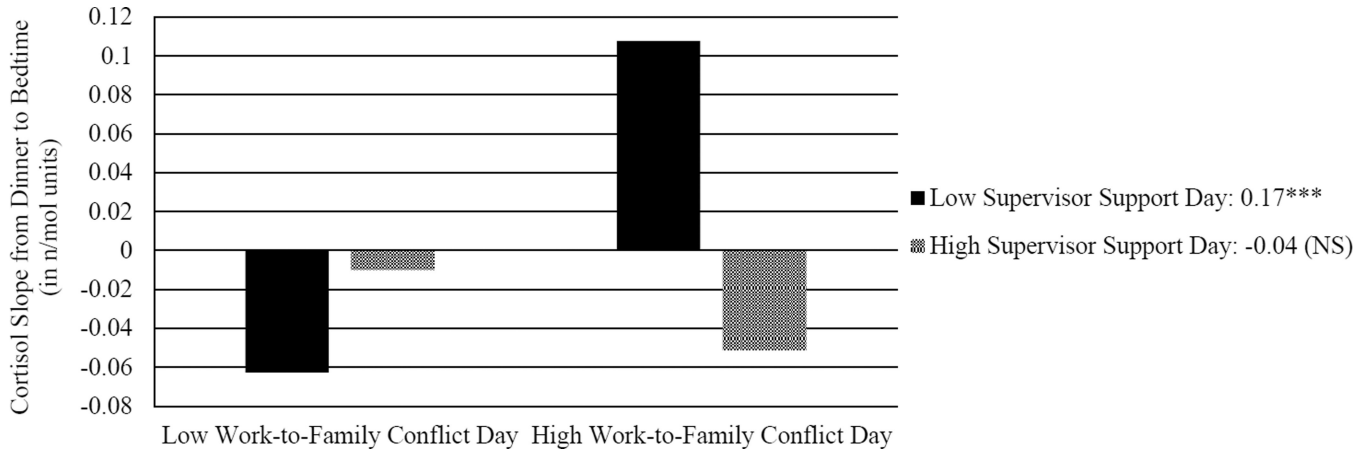

Figure 2. Moderating effect of supervisor support in the relation between work-to-family conflict and before dinner to bedtime cortisol slope

Note. Within-person level supervisor support moderated the within-person association between work-to-family conflict and cortisol slope from dinner to bedtime. For both supervisor support and work-to-family conflict, low and high levels were one standard deviation below and above the sample mean, respectively. Cortisol slope exhibited less recovery on days with higher work-to-family conflict and lower supervisor support than days with lower work-to-family conflict and/or higher supervisor support. The region-of-significance test (Preacher et al., 2006) indicated that the effect was not significant when supervisor support was greater than 5.7.

Table 1

Summary of Correlations Between Key Variables

	Mean (SD)	1	2	3	4	5	6	7	8	9	10
1. Age	45.14 (6.32)										
2. Gender, women (vs. men)	0.45 (0.50)	–0.06									
3. Race, White (vs. non-White)	0.70 (0.46)	0.05	–0.15								
4. Any work-related stressors	0.44 (0.30)	0.15	0.15	0.05	**0.21**	0.43***	–0.10*	0.36***	0.06	0.07	0.07
5. Work-to-family conflict	8.39 (3.35)	0.03	0.08	0.02	0.61***	**0.58**	–0.24***	0.40***	0.04	0.08	0.19***
6. Supervisor support	5.69 (1.41)	0.07	0.10	0.05	–0.14	–0.24**	**0.70**	–0.21***	–0.01	0.04	–0.09
7. Negative affect	1.27 (0.25)	0.02	0.01	0.02	0.44***	0.53***	–0.28**	**0.42**	0.00	0.14**	0.09
8. Before dinner cortisol level	2.49 (2.47)	0.12	–0.18*	0.05	–0.04	–0.09	0.03	0.05	**0.19**	0.14**	–0.30***
9. Bedtime cortisol level	2.55 (4.48)	0.06	0.01	0.01	0.05	0.08	0.01	0.20*	0.46***	**0.17**	0.42***
10. Before dinner to bedtime cortisol slope	–0.02 (0.16)	–0.09	0.14	–0.08	0.11	0.09	–0.01	0.10	–0.13	0.23*	**0.11**

Note. Diagonals (bold) show interclass correlation (*ICC* = between-person level variance divided by total variance) of the variable. Numbers below the diagonal represent between-person correlations, and numbers above the diagonal indicates within-person correlations; the within-person level any work-related stressors were coded as 1 (*yes*) or 0 (*no*); $N = 131$ (ranged from 124 to 131).

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 2

Negative Affect, Before Dinner Cortisol Level, Bedtime Cortisol Level, and Slope Between Before Dinner and Bedtime Cortisol as a Function of Work-to-Family Conflict and Supervisor Support

	Negative affect	Before dinner cortisol level	Bedtime cortisol level	Before dinner to bedtime cortisol slope
	Estimate (SE)	*Estimate (SE)*	*Estimate (SE)*	*Estimate (SE)*
Step 1: Main effects				
Fixed effects				
Intercept	1.265 (.048)***	1.001 (.099)***	.806 (.118)***	.012 (.050)
Age	–.002 (.003)	.017 (.007)*	.013 (.008)	–.005 (.004)
Gender, women (vs. men)	–.025 (.044)	–.208 (.087)*	–.105 (.103)	.045 (.043)
Race, White (vs. non-White)	–.032 (.046)	.036 (.096)	.089 (.111)	–.053 (.047)
Work-related stressors				
BP	.001 (.098)	–.014 (.205)	–.076 (.244)	–.016 (.104)
WP	.147 (.030)***	.020 (.074)	.055 (.096)	.002 (.037)
Work-to-family conflict				
BP	.037 (.008)***	–.022 (.018)	–.010 (.020)	.009 (.009)
WP	.016 (.005)**	–.014 (.014)	.007 (.017)	.013 (.007)*
Supervisor support				
BP	–.027 (.016)†	–.019 (.033)	–.063 (.039)	–.005 (.016)
WP	–.020 (.017)	.095 (.053)†	.015 (.068)	–.053 (.027)*
Random effects				
Intercept	.034 (.007)***	.091 (.026)***	.090 (.039)*	.022 (.011)*
Residual	.077 (.005)***	.157 (.020)***	.291 (.038)***	.037 (.007)***
Step 2: Interactions				
Fixed effects				
BP WTFC × BP SS	–.005 (.005)	.014 (.010)	.004 (.013)	–.002 (.005)
BP WTFC × WP SS	.003 (.005)	–0.00001 (.018)	.016 (.021)	–.006 (.009)
WP WTFC × BP SS	–.010 (.004)**	.009 (.010)	–.002 (.014)	–.005 (.005)
WP WTFC × WP SS	–.009 (.006)	.026 (.021)	.013 (.026)	–.028 (.010)**
Random effects				
Intercept	.034 (.007)***	.085 (.026)***	.087 (.040)*	.012 (.010)
Residual	.076 (.005)***	.160 (.021)***	.297 (.039)***	.041 (.008)***

Note. BP means between-person level effects and WP indicates within-person level effects; BMI, smoking status, medications, and time of first saliva sample of the day (for the cortisol slope analyses), a cortisol flag were entered as additional covariates in the cortisol models.

† $p < .10$.

* $p < .05$.

** $p < .01$.

*** $p < .001$.