

The Remains of the Workday: Impact of Job Stress and Exhaustion on Marital Interaction in Police Couples

We examined the impact of job stress and physical exhaustion on the physiological and subjective components of emotional responding during marital interactions between 19 male police officers and their spouses. Couples completed 30-day stress diaries and participated in 4 weekly laboratory interaction sessions. During interactions on days of greater stress, both spouses were more physiologically aroused, husbands reported less positive and more negative emotion, and wives reported less emotion (both positive and negative). On days of greater exhaustion, husbands were more physiologically aroused. All of these findings are indicators of heightened risk for poor marital outcomes and thus document an emotional mechanism by which job stress and exhaustion can negatively impact marriage.

Work and family are two major domains in our lives. Research suggests that experiences from one domain can spill over into, or impact, the other (Staines, 1980; Zedeck, 1992). Drawing on descriptions of work-family spillover, researchers have developed increasingly sophisticated models explaining the interplay between work and family life. Current models of work and family encompass a myriad of work-related and family-related

variables, including work stress, psychological burnout, marital satisfaction, and social support (e.g., Burke, 1993; Kline & Cowan, 1988). Yet, amidst a host of new constructs and statistical models, the mechanisms responsible for the negative spillover of work and work stress onto marriage and family life remain unclear (see Barnett, 1998, for a review). Given that more than 50% of today's marriages end in divorce, with remarriages facing an even higher risk of divorce (Booth & Edwards, 1992), it is especially important to identify how something as fundamental as work may be exacerbating those behaviors known to be associated with marital instability and dissolution.

MARITAL INTERACTION: A WINDOW ONTO FAMILY FUNCTIONING

An examination of the effects of work on marriage and on marital interaction is an important starting point for achieving an understanding of the effects of work on the larger family unit. Several researchers have studied the effects of work on marriage using self-report questionnaires and interviews (e.g., Larson, Wilson, & Beley, 1994; Leiter & Durup, 1996), but there has been essentially no work on this question that has been based on the observation of actual couple interactions (Crouter & Helms-Erikson, 1997). Observing the interactions between spouses allows us to explore how the residue from a spouse's job is carried home at the end of the workday and whether the couple is affected in ways that are likely to jeopardize the future of their marriage.

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THE PREDICTIVE VALUE OF EMOTION

Emotion-related variables are consistently identified by marriage and family researchers as being highly predictive of a range of outcomes for individuals and couples. These include intentions to quit one's job, psychosomatic symptoms, decreased involvement in children's activities, and spouse's emotional stress (Burke, 1993; Zedeck, Maslach, Mosier, & Skitka, 1988; Levenson, Carstensen, & Gottman, 1994). Emotional exhaustion, "a chronic state of physical and emotional depletion that results from excessive job demands and continuous hassles" (Wright & Cropanzano, 1998, p. 486), is cited as one of the strongest predictors of negative outcomes for individuals in and out of the work environment. Qualitative reports from employees reveal the salience of the physical and emotional drain of work, showing that anger, impatience, and other negative feelings engendered at work are expressed later at home (Repetti, 1987). Jackson, Zedeck, and Summers (1985) found that spouses' satisfaction with the quality of family life was more closely related to the emotional interference from work (e.g., tension, irascibility) than to the structural interference from work (e.g., hours spent at work).

The relevance of emotion to the study of work and family is not surprising, given that emotions are intimately tied to how individuals think and act in response to environmental demands (e.g., Levenson, 1999; Tooby & Cosmides, 1990). Researchers have begun to identify patterns of "emotional transmission" within families, which include how emotions are carried from one context into another and how emotions from one family member are passed on to another (Almeida, Wethington, & Chandler, 1999; Larson & Almeida, 1999). For example, Thompson and Bolger (1999) found that the negative mood of one romantic partner was related to more feelings of negativity and fewer feelings of positivity about the relationship on the part of the other partner. These kinds of emotional patterns are important because they have been found to relate to the present quality and future course of relationships.

PREDICTORS OF MARITAL DISTRESS

Through the use of longitudinal designs, marriage researchers have been able to identify several "early warning signs" that lead to negative marital outcomes such as marital distress and dissolution (Gottman & Levenson, 1992; Kelly & Con-

ley, 1987; Stanley, Markman, St. Peters, Leber, & Douglas, 1995). These warning signs primarily involve a couple's ability to regulate their emotions, particularly negative emotions, during their interactions (e.g., Markman, Renick, Floyd, Stanley, & Clements, 1993). Couples who experience large amounts of negative affect and small amounts of positive affect during marital interactions are likely to be dissatisfied and to separate and divorce in future years (Levenson & Gottman, 1985). Couples on the path toward marital distress and dissolution also demonstrate elevated levels of physiological arousal, a correlate of negative emotions and of poor emotion regulation, during their interactions (Levenson & Gottman, 1983, 1985). Despite the progress made in identifying some of the precursors of marital distress, researchers who study marital interaction have paid little attention to demands from outside the marriage (e.g., those imposed by work) that may impinge upon the emotional quality of the marriage and precipitate marital distress (Bradbury, Cohan, & Karney, 1998).

THE EFFECTS OF JOB STRESS AND EXHAUSTION

Stress and exhaustion are two major job-related factors that have the potential to affect spouses' pattern of emotional responses, including their emotional experience and their level of physiological arousal. Researchers have found that individuals experience more intense negative affect under conditions of greater stress (Fabes & Eisenberg, 1997) and that greater amounts of daily life stress are associated with reports of greater negative mood and less positive mood (Clark & Watson, 1988; Eckenrode, 1984). Daily life stress resulting from interpersonal conflicts may have the greatest impact on an individual's mood (Bolger, DeLongis, Kessler, & Schilling, 1989). At the physiological level, both stress hormones and negative emotions produce increased autonomic nervous system (ANS) arousal (i.e., the "fight or flight" response), which helps prepare the organism to adapt to the demands of the environment (Cannon, 1929; Levenson, Ekman, & Friesen, 1990; Selye, 1956). Although this rapid response of the nervous system to environmental challenges is generally adaptive, it also can have detrimental consequences. Couples, especially those in troubled marriages, have been found to demonstrate increased emotional arousal during marital conflict, including high levels of ANS activation (Levenson & Gottman, 1983, 1985). Being in a state of

increased arousal can make it more difficult to think clearly and problem-solve effectively. We suspect that stress from one's job will precipitate this kind of arousal state, further potentiating ANS increases during marital interaction.

Physical exhaustion is another potentially important factor that may impact on marital processes. Exhaustion drains an individual's energy, making it more difficult to produce the kinds of affective responses that facilitate social interactions. Employees who come home exhausted have been found to be more angry, anxious, to complain more, and to be less cheerful (Zedeck et al., 1988). When fatigued, it becomes more difficult for couples to engage in positive interactions and to communicate and problem-solve effectively (Litterst, 1983). Physical exhaustion resulting from inadequate sleep can lower an individual's threshold for activating negative emotional responses (Dahl, 1996). Thus, it is important to examine the extent to which exhaustion (e.g., from working night shifts or from a physically active workday) negatively impacts marriage.

Although job stress and physical exhaustion often co-occur, this is not always the case. Thus, it is important to assess their effects on marital processes both separately and in concert.

STRESS AND EXHAUSTION IN POLICE MARRIAGES

Because police work is considered to be one of the most stressful occupations (Anshel, Robertson, & Caputi, 1997), police marriages are particularly well suited to research on the effects of job stress and exhaustion. Police officers must confront organizational and management stressors (e.g., labor shortages) as well as distressing routine operational stressors (e.g., dealing with perpetrators of violence). Police work is exhausting, with officers performing physically demanding duties and often working long shifts or night shifts (Violanti & Aron, 1994). Exemplifying how job stress can reverberate through all aspects of life, police officers are at high risk for divorce, alcoholism, domestic violence, emotional disturbances, and suicide (Anshel et al.; Beehr, Johnson, & Nieva, 1995; Lott, 1995). Research suggests that spouses absorb much of police officers' stress and emotional upset. Officers' reports of emotional exhaustion and negative affective states are associated with spouses' reports of family conflict (Burke, 1993). Further adding to this situation, police officers are trained to avoid displaying emo-

tions, and their reluctance to express emotions (including positive ones) or to communicate about their day can be frustrating to their spouses (Brown & Grover, 1998; Nordlicht, 1979).

OVERVIEW OF THE PRESENT STUDY

Our study aimed to determine whether the emotional cost of work, as indicated by measures of job stress and exhaustion, is related to patterns of emotional responding that have been shown to predict declines in marital dissatisfaction and ultimate marital dissolution. These patterns of emotional responding involve changes in both the physiological and affective components of emotion. We conducted our research with a sample of police officers and their spouses because of the aforementioned high levels of stress and exhaustion common to police officers, the wide variability in the amount of stress and exhaustion officers encounter from one day to the next, and the fact that police marriages are at heightened risk for negative outcomes.

In the first part of this study, 19 police officers (all male) and their spouses completed a questionnaire packet in which they recorded information about demographics, their marriage, and stress. In the second part of the study, officers and their spouses completed daily stress diaries for 30 days, in which they rated the amount of job stress they experienced each day. Once each week during this 30-day period (four times in total), officers and their spouses visited our laboratory to complete self-report exhaustion ratings and to participate in an observational paradigm we have used extensively for studying marital interaction (Levenson & Gottman, 1983). In this paradigm, couples engage in an unrehearsed, minimally structured conversation about the day's events. The conversation is videotaped, and a broad range of physiological measures is obtained continuously from both spouses. Subsequently, spouses view the video recording of their interaction and provide continuous self-ratings of their affect during the interaction.

HYPOTHESES

Longitudinal studies of marriage conducted by Levenson and Gottman (e.g., Levenson & Gottman, 1985) have identified three emotion-related variables that, when apparent during conversations between spouses, can be predictive of future marital dissatisfaction and marital dissolution: (a)

increased ANS arousal, (b) decreased self-reported positive affect, and (c) increased self-reported negative affect. Based on past research suggesting that negative emotional states can result from stress and exhaustion, we hypothesized that on days when police officers reported greater amounts of job stress and physical exhaustion, they would be more likely to show these three emotional changes. Moreover, we would expect to find similar emotional changes on the part of spouses on these high-stress days. This latter prediction is based on research findings that one spouse's stress can affect the other spouse (e.g., Thompson & Bolger, 1999; Westman & Etzion, 1995) and that spouses of police officers may experience psychological and physical symptoms commensurate with the officer's job stress (Beehr et al., 1995).

Support for our hypotheses would suggest a process whereby stress and exhaustion are related to patterns of emotional responding on the part of both spouses that have been found to be associated with marital distress and dissolution.

METHOD

Participants

Nineteen married police couples participated in this research. In all cases, the male partner was a police officer. Police couples were recruited using several methods. Letters were attached to officers' paychecks, announcements were made via electronic mail and at officer meetings, and flyers were posted in the departments. Officers and their spouses participated on a voluntary basis, and each couple received \$100 for their participation. Police department officials did not have access to information about officers participating in the project.

Husbands' mean age was 36.5 years ($SD = 5.9$), and wives' mean age was 34.2 years ($SD = 6.1$). Couples had been married an average of 7.9 years ($SD = 7.6$). In 11 couples, both partners were in their first marriage, and in eight couples one or both partners had been married and divorced previously (six husbands and three wives). Our sample was ethnically diverse, with partners representing a combination of European American, African American, Asian American, and Mexican American backgrounds. The mean gross income of participating couples was approximately \$75,000 per year ($SD = \$18,500$). Fourteen couples had one or more children, and five did not

have any children. We computed a marital satisfaction score for each couple by averaging both spouses' scores on the Locke-Wallace marital adjustment test (Locke & Wallace, 1959). The mean marital satisfaction score for our sample was 115.7 ($SD = 24.0$), and the median was 122.0 (range = 53–142).

Fourteen of the officers in our sample were from the Oakland, California, Police Department. Of the remaining officers, two were from the City of Berkeley Police Department, two were from the University of California—Berkeley Campus Police Department, and one was from the Alameda, California, Police Department. Twelve officers were patrol officers, and seven officers held desk jobs (e.g., investigative work). Thirteen officers worked day shifts, and six officers worked night shifts. Officers had belonged to the police force a mean of 9.4 years ($SD = 5.2$). Seven of the wives in our sample held full-time employment outside the home, seven were full-time homemakers or students, and five were self-employed or held part-time employment outside the home.

Procedure

Questionnaires. Spouses completed a packet of questionnaires sent to their home. The questionnaires obtained information about demographics, marital satisfaction (Locke & Wallace, 1959), areas of disagreement in the couple's relationship (Gottman, Markman, & Notarius, 1977), health (the Symptom Checklist-53, Derogatis & Lazarus, 1994; the Wahler Symptom Checklist, Wahler, 1968), and recent life stress (Horowitz, Schaefer, Hiroto, Wilner, & Levin, 1977). Officers completed the Police Stress Survey (Spielberger, Westberry, Grier, & Greenfield, 1981), which assesses the extent to which officers perceive 60 job-related events as stressful (using a 0–100 scale; $\alpha = 0.95$). Officers' ratings on the Police Stress Survey were totaled, and the average rating of perceived stress was calculated.

Daily stress diaries. Over a 30-day period, officers and their spouses completed daily stress diaries. Diaries were completed at the end of the day (or at the end of the shift for shift workers) and were turned in each week to ensure their completion. On laboratory session days, diaries were completed before the laboratory session to minimize possible effects of the laboratory situation on reported ratings. In these diaries, officers and their spouses used a 9-point Likert-type scale (anchored

by *none* and *most in my life*) to rate the following as it applied to that day: (a) how much stress they experienced related to their job, (b) how much pleasure they experienced related to their job, (c) how much stress they experienced related to their marriage, (d) how much pleasure they experienced related to their marriage, (e) how many hours they worked, and (f) how many hours they spent with their spouse.

Interaction sessions. Couples visited our laboratory at the University of California—Berkeley for a 1.5-hour session once each week (four times total) during the 30-day period in which they were completing the daily stress diaries. The majority of the laboratory sessions (74%) occurred at the end of the officer's work shift. Laboratory data collection was modeled after a paradigm developed by Levenson and Gottman (1983), which provides a dynamic context from which to draw conclusions about the emotional quality of a couple's marital interaction.

The same procedure was used for each of the four laboratory sessions. Couples were asked to refrain from speaking to each other for 8 hours before their laboratory session. Upon arriving at the laboratory, spouses rated how physically and mentally exhausted they were feeling using 9-point Likert-type scales anchored by *none* and *most exhausted I've ever felt*. After the recording devices were attached (see below), couples sat silently for 5 minutes and then engaged in a 15 minute conversation about the events of their day. Couples were asked to discuss what had happened during the day, behaving as normally and naturally as possible. During the silent period and conversation, a broad sample of physiological measures was obtained and a video recording of the interaction was made.

Immediately after their conversation, couples watched the videotaped recording of their interaction (silent period and conversation). While viewing the videotape, each spouse manipulated a rating dial that traversed a 180-degree path, with the face of the dial depicting a 9-point scale (anchored by *extremely negative* and *extremely positive* on the ends and by *neutral* at the center). Spouses were instructed to adjust the dial continuously so that it always reflected how they had been feeling at each moment during their interaction (not how they felt while watching the videotape). A screen was placed between partners to ensure privacy of ratings. The rating dial ratings

were input directly into a computer, which averaged the position of the dial every second.

Apparatus

Physiological measures. Seven physiological measures, sampling from the cardiovascular, electrodermal, and somatic systems, were collected from each spouse before and during their conversation. The specific measures collected were as follows: heart rate, measured by the cardiac inter-beat interval (IBI), pulse transmission time to the finger (FPT; the time interval between the R-wave on the electrocardiogram and the arrival of the pulse pressure wave at the finger tip), finger pulse amplitude (FPA; the amplitude of the pulse pressure wave at the finger tip), pulse transmission time to the ear (EPT; the time interval between the R-wave on the electrocardiogram and the arrival of the pulse pressure wave at the ear), skin conductance level (SCL), and general somatic activity (ACT; measured by a platform under each spouse's chair). Physiological measures were collected using a Grass Model 7 polygraph and were input into a Gateway microcomputer, which provided second-by-second averages of each measure. These physiological measures were selected because they enabled physiological data to be obtained from participants continuously and fairly unobtrusively. Taken together, they provide an index of somatic and ANS functioning, including the functioning of both the sympathetic and parasympathetic branches of the ANS. In previous research, these measures have proven useful in detecting individuals' positive and negative emotional states (e.g., Fredrickson & Levenson, 1998; Levenson et al., 1990) and in distinguishing the marital interactions of distressed and nondistressed couples (e.g., Levenson, Carstensen, & Gottman, 1994).

Nonphysiological measures. Two remotely controlled high-resolution video cameras, which were partially concealed behind darkened glass, were used to obtain frontal views of each spouse's face and upper torso. These images were combined into a single split-screen image using a video special effects generator and were recorded on a VHS videocassette recorder. Two lavalier microphones were used to record spouses' conversations.

Data Reduction

Daily stress diaries. Participants provided daily ratings of job stress in the stress diaries. We used

their stress rating on the day of the laboratory session as our measure of job stress. There were several instances (8 of 76 cases) when officers failed to complete their diary ratings on the day of the laboratory session. In those cases, we used the average job stress ratings from the 6 days before the laboratory session as our measure of job stress.

Physiological data. Using the second-by-second physiological data, we computed means and standard deviations for each spouse for the 5-minute preconversation period and for the entire 15-minute conversation.

Self-report affect data. Spouses' second-by-second rating dial data were averaged into 10-second periods and then converted to z scores. Each 10 second period was classified as "positive," "negative," or "neutral" based on consideration of both the actual rating dial position and its position in relation to that spouse's range of ratings during the conversation. Specifically, to be coded as positive, the raw scores had to be 6.0 or higher (based on the rating dial scale of 1 to 9) and z scores had to be greater than or equal to 0.5. "Negative" periods were determined in the same way, with raw scores for negative periods being 4.0 or lower and z scores being less than or equal to -0.5 . The remaining periods were classified as "neutral."

For each spouse, we calculated two variables that reflected the amount of affect felt during the conversation: the number of positive periods and the number of negative periods. We then calculated six variables that reflected the amount of affect reciprocated between partners: (a) positive reciprocity at lag zero—the number of 10-second periods that both spouses rated as positive; (b) negative reciprocity at lag zero—the number of periods that both spouses rated as negative; (c) positive reciprocities at lag one (two variables)—the number of periods rated by the husband as positive where the following period was rated as positive by the wife; the number of periods rated by the wife as positive where the following period was rated as positive by the husband; and (d) negative reciprocities at lag one (2 variables)—the number of periods rated by the husband as negative where the following period was rated as negative by the wife; the number of periods rated by the wife as negative where the following period was rated as negative by the husband.

RESULTS

Data Analytic Strategy

Although additional data (e.g., daily ratings of marital stress and marital pleasure) were obtained from participating couples, the analyses presented in this article focus on the relationship of husbands' diary ratings of job stress and husbands' ratings of physical exhaustion to husbands' and wives' emotional responses (i.e., physiological and affective responses) measured during their conversations in the laboratory. We examined these relationships separately for each of the four laboratory sessions, using data from all couples. Analyzing the 4 weeks of data using this session-by-session method allowed for potential internal replication of our findings.

There was one couple in which the female spouse was also a police officer; however, all of the findings presented are based on the effects of the stress and exhaustion reported by husbands (reanalysis of the data using the wife's data for this couple in place of the husband's did not change the pattern of reported findings.)

To ensure that our decision to examine husbands' ratings of job stress reported on the day of the laboratory session did not unduly bias our findings, we also examined husbands' diary ratings of job stress averaged over the week before the laboratory session. Examining these weekly ratings served two purposes: (a) to ensure that our findings were not an artifact of additional stress incurred on the day of the laboratory session and (b) to determine whether there were effects of accumulated job stress on marital interaction. t tests revealed that stress reported on the day of the laboratory session did not differ from the weekly average of stress reported on nonlaboratory session days. Moreover, stress ratings obtained on the day of the laboratory session and weekly stress ratings were significantly correlated (session 1, $r = 0.68$, $p < .01$; session 2, $r = 0.55$, $p < .05$; session 3, $r = 0.61$, $p < .05$; session 4, $r = 0.54$, $p < .05$). Therefore, we will only present findings using job stress rated on the day of the laboratory session. (Reanalyses of the data using weekly averages of job stress revealed a similar pattern of significant correlations.) Although we did not obtain daily ratings of physical exhaustion, we do not believe that participation in the laboratory session exacerbated officers' level of exhaustion.

TABLE 1. HUSBANDS' MEAN JOB STRESS AND EXHAUSTION RATINGS ON DAY OF LABORATORY SESSION

Laboratory Session	Husbands' Mean Job Stress Rating (SD)	Husbands' Mean Exhaustion Rating (SD)
1	3.3 (2.4)	4.1 (1.2)
2	2.5 (2.0)	3.6 (1.7)
3	3.3 (2.0)	3.5 (1.6)
4	2.2 (2.2)	3.7 (2.0)

Note: Ratings are based on a 9-point scale, anchored by 0 (*none*) and 8 (*most in my life*).

Stress and Exhaustion Ratings

Husbands' mean level of perceived stress on the Police Stress Survey ($M = 46.8$, $SD = 19.1$) was comparable to that of published data from a large sample of metropolitan officers ($M = 54.2$, $SD = 26.0$; Martelli, Waters, & Martelli, 1989). Across the 30 days of diary ratings, husbands' mean level of job stress was 2.8 ($SD = 2.1$). Husbands' mean level of job stress reported across all four laboratory sessions also was 2.8 ($SD = 2.2$). Husbands' mean level of physical exhaustion reported across all four laboratory sessions was 3.7 ($SD = 1.6$). Husbands' mean job stress ratings and mean physical exhaustion ratings on each of the four laboratory session days are presented in Table 1. To capture the variability in ratings, our analyses used mean stress and exhaustion ratings reported on the day of each laboratory session.

Job stress and physical exhaustion were uncorrelated. Thus, we initially considered them separately in terms of their relationship with our physiological and affective variables. Subsequently, we conducted hierarchical regression analyses to examine their additive effects.

Job Stress

To test the hypothesis that increased self-reported job stress is associated with a more negative pattern of emotional responding during marital interaction (i.e., increased autonomic nervous system arousal, less positive affect, and more negative affect) for both spouses, we examined the relations between husbands' job stress ratings on the day of the laboratory session and husbands' and wives' (a) physiological levels during the 5-minute preinteraction period, (b) physiological levels during the 15-minute conversation period, and (c) affect ratings during the 15-minute conversation. All correlations are presented in Table 2. In the description of findings that follows, the session

numbers in which significant correlations were found are in parentheses.

In the physiological domain, during the pre-conversation period, high levels of job stress on the day of the laboratory session predicted shorter finger pulse transmission times for wives (2) and lower levels of somatic activity for husbands (3) and wives (1, 3). During the conversation period, high levels of job stress predicted shorter finger pulse transmission times for husbands (2) and wives (2), shorter ear pulse transmission times for husbands (2) and wives (1), and lower levels of somatic activity for husbands (3) and wives (1, 2, 4). These shorter pulse transmission times reflect changes in cardiac contractility and vascular distensibility and indicate increases in cardiovascular arousal. As noted in Table 2, the significant correlations between stress and our physiological measures are in the predicted direction, with greater stress relating to greater physiological arousal. (For cardiac interbeat interval, finger pulse transit time, ear pulse transit time, and finger pulse amplitude, smaller values indicate greater physiological arousal, thus for these variables negative correlations with stress indicate the predicted relationship between greater stress and greater physiological arousal.)

In the affective domain, high levels of job stress predicted low levels of positive affect for husbands (1) and wives (4). High levels of job stress predicted low levels of positive affect reciprocity when positive affect was rated by both spouses in the same rating period (1, 4), when positive affect was rated by the husband and reciprocated by the wife in the next period (1, 4), and when positive affect was rated by the wife and reciprocated by the husband in the next period (4). High levels of job stress predicted high levels of negative affect for husbands (1) and low levels of negative affect for wives (3). High levels of job stress predicted low levels of negative affect reciprocity when negative affect was rated by both spouses in the same rating period (3), when negative affect was rated by the husband and reciprocated by the wife in the next period (3), and when negative affect was rated by the wife and reciprocated by the husband in the next period (3).

To summarize, high levels of job stress were associated with a physiological pattern characterized by high levels of cardiovascular activation and low levels of somatic activity (i.e., bodily movement) in both spouses. This pattern was clearly present in the preinteraction period and became even more pronounced during the conver-

TABLE 2. CORRELATIONS BETWEEN HUSBANDS' JOB STRESS AND SPOUSES' PHYSIOLOGY AND AFFECT

		Husbands' Physiology											
		IBI		FPT		EPT		FPA		SCL		ACT	
Session		Before	During	Before	During	Before	During	Before	During	Before	During	Before	During
Correlations with Husbands' Stress	1	-.01	-.00	.25	.28	.30	.33	-.26	-.21	-.02	-.10	-.26	.39
	2	.04	-.00	-.37	-.47*	-.38	-.44*	-.27	.02	.11	.15	.31	.31
	3	-.32	-.38	-.07	-.28	.13	.10	-.33	-.26	.37	.45	-.52*	-.67*
	4	-.10	-.13	-.21	-.37	.01	-.26	.20	.40	.05	.06	-.01	-.28
		Wives' Physiology											
		IBI		FPT		EPT		FPA		SCL		ACT	
Session		Before	During	Before	During	Before	During	Before	During	Before	During	Before	During
Correlations with Husbands' Stress	1	.16	.10	-.07	.06	-.37	-.52*	-.14	-.43	-.05	-.03	-.55*	-.57*
	2	-.30	-.35	-.51*	-.58*	-.31	.33	.02	.06	.05	-.01	-.42	-.55*
	3	.08	.00	.31	.23	.18	.25	.00	-.08	.25	.29	-.54*	-.31
	4	.15	-.01	-.23	-.28	-.15	-.15	.31	.25	-.09	-.12	-.34	-.46*
		Spouses' Positive and Negative Affect											
		Positive					Negative						
Session		H	W	H-W 0	H > W 1	W > H 1	H	W	H-W 0	H > W 1	W > H 1		
Correlations with Husbands' Stress	1	-.55*	-.02	-.45*	-.51*	-.39	.56*	.05	.17	.17	.19		
	2	-.36	.09	-.21	-.19	-.21	.17	-.28	-.13	-.15	-.12		
	3	-.36	.17	-.38	-.34	-.37	-.04	-.47*	-.50*	-.50*	-.50*		
	4	-.40	-.70*	-.81*	-.81*	-.79*	.31	-.14	-.04	-.03	-.01		

Note: Before = the 5-minute preinteraction period; during = the 15-minute interaction period.

Physiological variables: IBI = cardiac interbeat interval; FPT = pulse transmission time to the finger; EPT = pulse transmission time to the ear; FPA = finger pulse amplitude; SCL = skin conductance level; ACT = general somatic activity; for IBI, FPT, EPT, and FPA, negative correlations indicate that greater stress is related to greater arousal; for SCL, positive correlations indicate greater stress is related to greater arousal.

Affect rating variables: Pos H = periods of positive affect (husband); Pos W = periods of positive affect (wife); Pos H-W 0 = positive affect (husband and wife) in same rating period; Pos H > W 1 = positive affect (husband) reciprocated by wife in next period; Pos W > H 1 = positive affect (wife) reciprocated by husband in next period; Neg H = periods of negative affect (husband); Neg W = periods of negative affect (wife); Neg H-W 0 = negative affect (husband and wife) in same rating period; Neg H > W 1 = negative affect (husband) reciprocated by wife in next period; Neg W > H 1 = negative affect (wife) reciprocated by husband in next period.

* $p < .05$ (one-tailed).

sation. High levels of job stress were associated with an affective pattern consisting of low levels of positive affect for both spouses, high levels of negative affect for husbands, low levels of negative affect for wives, and a "disconnected" pattern of affect reciprocity consisting of low levels of both positive and negative affect reciprocity.

Physical Exhaustion

The analyses for physical exhaustion were conducted in a similar manner to those conducted for job stress. Specifically, to test the hypothesis that increased physical exhaustion is associated with a more negative pattern of emotional responding during marital interaction (i.e., increased autonomic nervous system arousal, less positive affect, and more negative affect) for both spouses, we examined the relationships between husbands' physical exhaustion ratings on the day of the laboratory session and husbands' and wives' physiological and affect rating variables. All correlations are presented in Table 3.

In the physiological domain, during the 5-minute preinteraction period, for husbands, high levels of physical exhaustion predicted shorter finger pulse transmission times (1), shorter ear pulse transmission times (1), larger finger pulse amplitudes (4), and higher skin conductance levels (2, 4). During the conversation period, for husbands, high levels of exhaustion predicted shorter cardiac interbeat intervals (1), shorter finger pulse transmission times (1), shorter ear pulse transmission times (1), larger finger pulse amplitudes (4), and higher skin conductance levels (2, 4). Shorter pulse transmission times and higher skin conductance levels both indicate higher levels of autonomic arousal. Larger finger pulse amplitudes indicate vasodilation, which generally is a sign of physiological relaxation. In this case, however, the vasodilation may be serving to accommodate increased cardiac output associated with physical exhaustion.

In the affective domain, high levels of physical exhaustion predicted high levels of positive affect reciprocity when positive affect was rated by both spouses in the same rating period (1), when positive affect was rated by the husband and reciprocated by the wife in the next period (1), and when positive affect was rated by the wife and reciprocated by the husband in the next period (1). High levels of physical exhaustion predicted low levels of negative affect for wives (1, 4), low levels of negative affect reciprocity when negative

affect was rated by the husband and wife in the same period (1), low levels of negative affect reciprocity when negative affect was rated by the husband and reciprocated by the wife in the next period (1), and low levels of negative affect reciprocity when negative affect was rated by the wife and reciprocated by the husband in the next period (1). There were two exceptions to this pattern of physical exhaustion predicting lower levels of negative affect, both occurring in the third session: physical exhaustion predicted high levels of negative affect reciprocity when negative affect was rated by the wife and reciprocated by the husband in the next period (3) and high levels of negative affect reciprocity when negative affect was rated by the husband and wife in the same period (3).

To summarize, high levels of physical exhaustion were associated with a physiological pattern characterized by high levels of cardiovascular activation (except for finger pulse amplitude) and high levels of electrodermal activation in husbands. This pattern was present in the preconversation period and became even more pronounced during the conversation. There was no relationship between physical exhaustion and wives' physiology during the preconversation or conversation periods. High levels of physical exhaustion were predominately associated with a shift toward more positive affect in the dyad, as indicated by low levels of negative affect for wives, greater reciprocity of positive affect by both spouses, and less reciprocity of negative affect by both spouses. The exception to this was in session 3, where physical exhaustion was associated with more negative affect reciprocity by both spouses.

Type I Error

The nature of the experimental design, with its multiple physiological and affective variables and multiple sessions, meant that a large number of correlations were conducted, thus raising concerns about Type I error. Of the 136 correlations conducted with job stress, 24 (17.6%) were significant at the $p < .05$ level (one-tailed tests). Of the 136 correlations conducted with physical exhaustion, 21 (15.4%) were significant at the $p < .05$ level (one-tailed tests). Although our study design is advantageous in that it evaluates independent measures (i.e., job stress and physical exhaustion) that occur before the dependent measures (i.e., physiology and affect during marital conversations), we recognize that correlational analyses cannot be

TABLE 3. CORRELATIONS BETWEEN HUSBAND'S PHYSICAL EXHAUSTION AND SPOUSES' PHYSIOLOGY AND AFFECT

		Husbands' Physiology											
		IBI		FPT		EPT		FPA		SCL		ACT	
Session		Before	During	Before	During	Before	During	Before	During	Before	During	Before	During
Correlations with Husbands' Exhaustion	1	-.35	-.43*	-.41*	-.44*	-.51*	-.58*	.21	.31	.30	.22	-.03	-.15
	2	-.13	-.22	-.29	-.30	-.15	-.17	.11	.09	.47*	.49*	.23	.04
	3	.02	.07	.16	.10	.19	.05	-.32	-.02	-.33	-.12	.13	.22
	4	-.14	-.15	.00	.02	-.01	.18	.54*	.44*	.53*	.63*	-.25	-.17
		Wives' Physiology											
		IBI		FPT		EPT		FPA		SCL		ACT	
Session		Before	During	Before	During	Before	During	Before	During	Before	During	Before	During
Correlations with Husbands' Exhaustion	1	-.13	-.17	-.05	-.12	-.11	-.10	-.18	-.09	-.29	-.25	-.22	-.12
	2	.00	.02	.23	.24	.18	.19	-.09	-.31	-.05	.03	-.10	-.05
	3	.14	.19	.11	.09	-.34	-.26	-.23	-.17	.02	-.25	-.20	.09
	4	-.26	-.23	.30	.20	-.29	-.28	.25	-.03	.10	.23	.23	.40
		Spouses' Positive and Negative Affect											
		Positive						Negative					
Session		H	W	H-W 0	H > W 1	W > H 1	H	W	H-W 0	H > W 1	W > H 1		
Correlation with Husbands' Exhaustion	1	.10	.29	.44*	.40*	.43*	-.08	-.59*	-.51*	-.54*	-.49*		
	2	-.22	.05	.18	.17	.16	.18	-.24	.09	.08	.09		
	3	-.21	-.07	-.19	-.24	-.20	.32	.14	.42*	.39	.43*		
	4	-.02	.04	.08	.07	.07	-.23	-.43*	-.40	-.34	-.31		

Note: Before = the 5-minute preinteraction period; during = the 15-minute interaction period. For Key to abbreviations, see Table 2.
 * $p < .05$ (one-tailed).

used to test causal predictions. With a larger sample, we hope to take advantage of other statistical techniques for analyzing time series data (e.g., Larson & Almeida, 1999), and to consider more fully our multilevel (i.e., within-subjects and between-subjects) design (e.g., Almeida et al., 1999; Judd, McClelland, & Smith, 1996).

Additive Effects of Stress and Exhaustion

Because of the nonsignificant correlations between job stress and exhaustion ratings, we thought it important to determine how stress and exhaustion combined additively to predict our self-report and physiological variables. Thus, whenever a univariate correlation involving our stress or exhaustion measures was significant, we conducted a follow-up hierarchical regression to determine whether the addition of the other measure would account for significant additional variance. In all of these regression analyses, adding the second measure did not account for significant additional variance.

Potential Mediating Variables

Police couples differed on several key dimensions that could potentially influence the relations that job stress and exhaustion have with the emotional qualities of marital interaction. We examined three of these variables: parenthood, shift work, and marital satisfaction, all of which have been found in previous research to have implications for marital outcomes (e.g., Presser, 2000; White & Booth, 1991; White & Keith, 1990).

Parenthood. Husbands with and without children did not differ significantly in their mean reports of job stress on the day of the laboratory session, nor in their mean reports of physical exhaustion on the day of the laboratory session. We should note that the majority of couples in our sample had children (15 out of 19), thus this sample may not have been ideal for investigating the effects of parenthood on the relation of stress and exhaustion to emotion.

Shift work. The majority of the officers in our sample worked a night shift (13 out of 19). For two laboratory sessions, officers who worked at night (coded as 1) reported significantly more stress than those who worked during the day (coded as 0; session 1, $t [13] = 0.96$, *ns*; session 2, $t [13] = 3.62$, $p < .01$; session 3, $t [12] = 1.81$,

ns; session 4, $t [12] = 3.99$, $p < .01$). Officers reported similar amounts of physical exhaustion on the day of the laboratory session, regardless of whether they worked at night or during the day.

Marital satisfaction. We found a relationship between marital satisfaction and job stress ratings for one experimental session. Husbands in more satisfied marriages reported less stress on the day of the third laboratory session ($r = -.54$, $p < .05$). Conversely, husbands in more satisfied marriages reported more physical exhaustion on the day of the first laboratory session ($r = .43$, $p < .05$).

Partial correlations revealed that controlling for marital satisfaction did not change the pattern of significant correlations between stress ratings on the day of the laboratory session and husbands' and wives' physiological and affective variables. Marital satisfaction also did not influence the relation between physical exhaustion ratings on the day of the laboratory session and couples' physiology, but it did influence the relations between physical exhaustion and affect. When controlling for marital satisfaction, greater physical exhaustion on the day of the laboratory session was related to greater negative affect reciprocity on the part of both spouses. (In prior analyses that did not control for marital satisfaction, greater physical exhaustion was related to greater positive affect reciprocity and a mixed pattern of negative affect reciprocity.)

To summarize, the relations that job stress and exhaustion have with the emotional qualities of marital interaction were generally consistent across variations in parenthood status, shift work, and level of marital satisfaction. The one exception was the relation between physical exhaustion and the emotional qualities of marital interaction, where controlling for marital satisfaction revealed an additional relation (i.e., greater exhaustion was related to greater negative affect reciprocity).

DISCUSSION

Our results supported previous findings that residual job stress has potentially negative consequences for marriages. Specifically, we used an observational approach to analyze emotion (indicated by autonomic and somatic physiology and by self-reported affect) during actual marital interaction, a paradigm that we have used previously to identify physiological and affective variables predictive of marital distress and dissolution. Our pre-

sent study used a sample of police couples, a group for whom job stress can reach considerable heights and show considerable variability, and who is thought to be at elevated risk for a wide range of negative outcomes. In addition to evaluating the impact of job stress, we also examined how physical exhaustion impacts marital interaction and learned that the physical drain of work (i.e., physical exhaustion) is not necessarily tied to the emotional drain of work (i.e., job stress). Furthermore, as we will discuss below, our results suggest that the effects of job stress are more costly and more widespread than those of physical exhaustion.

Limitations

Before discussing our findings and their implications further, we should mention several limitations of this study. The most notable of these is our small sample size, which engenders concerns about statistical power and the stability of correlations. Clearly, replication of these results is advisable before any definitive conclusions can be drawn. Second, we did not randomly select our sample of police couples, and thus our findings are not necessarily generalizable to all such couples. Third, our sample confounds police work and gender, in that all officers are husbands and all nonofficers are wives. Fourth, we examined the potential effects of work on marital interaction, but not the converse. Although some researchers have concluded that stress from the work domain is more likely to affect the family domain than vice versa (e.g., Leiter & Durup, 1996; Repetti, 1987), we recognize the potential bidirectional impact of these two domains. Fifth, we used sensitive measures of marital interaction (i.e., continuous measures of physiology and self-reported affect) but did not have equally sensitive measures of work variables (i.e., on-line repeated measures of stress and exhaustion or qualitative data about the nature of the stress experienced each day).

Effects of Job Stress on Police Marriages

Our findings suggest that the officers in our sample carried their job stress home with them and that it influenced their interactions with their wives. These influences of job stress were found regardless of couples' marital satisfaction, husbands' work shift, and couples' parenthood status. Interestingly, we found no evidence that stress accumulated over a week's time was a better predictor of spouses' emo-

tional responses during marital interaction than stress on the day of the interaction. In the physiological realm, our general finding was that on days when officers experienced more stress, both officers and their wives showed greater levels of autonomic arousal during their conversations. Within this general pattern, however, there was variation in terms of which physiological indicators were related to reports of job stress from session to session. This is not unusual with these kinds of psychophysiological measures, which indicate physiological processes that are influenced by many other factors besides emotion. In this study, job stress was most consistently related to shorter pulse transit times, which indicate greater sympathetic nervous system-mediated cardiovascular arousal. Importantly, this kind of sympathetically mediated cardiovascular arousal has been found to be activated when individuals attempt to regulate their emotions (Gross & Levenson, 1993). In the kinds of physiologically aroused states experienced by couples on high-stress days, it can be difficult to think clearly and to solve problems effectively. Rather, people often fall back on overlearned, defensive, and self-protective behaviors. Consistent with this, past research has demonstrated that elevated levels of physiological arousal before and during marital interactions are a sign that couples are on a trajectory toward marital distress and dissolution (Gottman & Levenson, 1992; Levenson & Gottman, 1985).

One particularly interesting aspect of our physiological findings involved the cardiovascular and somatic measures. Although greater cardiovascular arousal is generally associated with greater somatic activity (e.g., Obrist, 1981), we found that officers and their wives showed greater cardiovascular levels but lower levels of bodily movement on high-stress days (both before and during their conversations). This pattern of high cardiovascular arousal with low somatic levels suggests the kind of "freeze" response associated with states of intense fear. Moreover, this pattern may reflect a psychological stance of vigilance and defensiveness, a state thought to facilitate quick responses to the kinds of events encountered in police work (Kurke, 1995). We suspect that on highly stressful days, police officers continue to maintain this stance at home (or in the laboratory) when they interact with their wives. When wives sense that their husbands have had a stressful day, they may also assume a defensive and vigilant posture (i.e., high autonomic arousal, minimal bodily movement), either in anticipation of diffi-

cult marital interactions or in an effort to avoid exacerbating their husbands' stress.

In addition to these carryover effects of job stress seen at the physiological level, we also found evidence that job stress dampens the positive quality of marital interaction. When husbands reported experiencing more job stress, there were fewer moments when they and their wives reported feeling positive affect, and fewer moments when they reciprocated one another's positive affect. Without an exchange of positive affect, it is difficult to maintain enjoyable, satisfying interactions. On days with high levels of job stress, husbands also reported feeling more moments of negative affect. High levels of cardiovascular arousal, low levels of positive affect, low levels of positive affect reciprocity, and high levels of negative affect are all danger signs that suggest marital distress and heightened risk for marital dissolution (Gottman & Levenson, 1992; Levenson & Gottman, 1985).

Although we found many negative qualities in the marital climate on days of high job stress, there were a few encouraging signs as well. On days when husbands experienced high job stress, their wives reported fewer moments of negative affect, and there was less reciprocity of negative affect. We believe that this reflects an attempt by wives to improve the emotional climate of the interaction when they sense that their husbands have had a difficult day at work. It has been our observation that wives typically take the lead in regulating the emotional exchange in a marriage, especially in marriages where the husband is the primary wage earner (Gottman & Levenson, 1992). In the short term, this down-regulation of negative affect may have beneficial effects for couples' interactions. Nonetheless, in the long term it may foreshadow a kind of emotional withdrawal and distancing that will not serve the couple well. Levenson and Gottman (1985) have reported that this kind of withdrawal can be particularly difficult for wives, who generally place a high value on emotional engagement in marriage (e.g., Komarovsky, 1962). Therefore, in trying to protect their husbands from negative affect on high-stress days, wives may be contributing to an emotional distance in their marital interactions that they will find to be increasingly unsatisfying over the long term.

Effects of Physical Exhaustion on Police Marriages

In our data, physical exhaustion was quite orthogonal to job stress, which provided an opportunity

to examine its effects on marital interaction and to contrast those effects with those associated with job stress.

On days when husbands reported feeling greater physical exhaustion, they showed generally elevated levels of cardiovascular and electrodermal arousal during marital interaction. This physiological state (which is different than the high cardiovascular, low somatic arousal state associated with elevated job stress) coupled with reports of exhaustion may represent a "tense-tired" state, in which husbands experience low levels of energy while feeling tense and physiologically aroused (Thayer, 1996, p. 62). Our findings suggest that work-related physical exhaustion can deplete officers' resources (e.g., for responding to emotional events; Repetti, 1987) and make it more physiologically taxing (i.e., as evidenced by greater physiological arousal) for them to engage in interactions with their spouses. Interestingly, whereas the physiological correlates of husbands' job stress were found strongly in both husbands and wives, husbands' physical exhaustion was reflected only in husbands' physiology and not that of their wives. We suspect that wives do not have to "mobilize" for dangerous and difficult marital interactions when dealing with an exhausted husband in the same way that they would when dealing with a stressed husband.

Our affective findings are consistent with the view that physical exhaustion does not produce the kind of highly charged, "dangerous" marital climate that is associated with job stress. Rather, the bulk of our findings suggested that the entire marital climate shifts in the positive direction on days of greater exhaustion, with greater positivity on the part of the wife and more positive affect reciprocity on the part of both spouses. It was only after statistically controlling for marital satisfaction that a negative effect of exhaustion emerged—greater negative affect reciprocity on the part of both spouses.

Despite the findings of greater positive affect, we do not believe that exhaustion is good for marriage. Husbands' anecdotal reports suggest that when they come home feeling exhausted they often feel too tired to engage in serious attempts to resolve conflicts. Thus, job-related exhaustion may produce temporary positive relief from having to deal with marital problems and issues, but putting aside such issues is, at best, only a temporary solution. Moreover, we suspect that the positive effects will lessen if exhaustion occurs at

extremely high levels or is accumulated over long periods of time.

Summary

Our study aimed to determine whether job stress and physical exhaustion affected the way couples typically interact at the end of the workday. We chose to examine police marriages because police work can be highly stressful and exhausting and because police marriages are at heightened risk for a number of negative outcomes. We examined whether the strain of work, operationalized using daily reports of job stress and physical exhaustion, gets carried over into the emotional life of a marriage (assessed via direct observation of marital interaction and measured by physiology and subjective report).

Our findings suggest that job stress is far more toxic for marital interaction than is physical exhaustion. Husbands' job stress produces a physiological and affective climate in which both spouses show many of the signs associated with future marital distress and dissolution (i.e., heightened cardiovascular arousal, increased negative affect, decreased positive affect, and greater emotional distance and disconnectedness; Gottman & Levenson, 1992; Levenson & Gottman, 1985). Husbands' physical exhaustion, in contrast, is reflected in a state of heightened physiological arousal only in the husband, and the affective climate of the marriage generally becomes more positive (negative effects only appear after accounting for marital satisfaction levels).

Implications

Upon entering a marriage, there is at least a 50% chance that it will end in divorce. Our findings suggest that something as ubiquitous as job stress can exacerbate the very characteristics that have been found to predict marital unhappiness and divorce. Even for those who attempt to leave their stress at work or keep their lingering stress to themselves, stress is likely to have a pernicious effect on the emotional balance of marital interactions. Importantly, it appears that these negative effects result from job stress itself and are not the result of the fatigue and exhaustion that may or may not be associated with such stress.

There are a number of practical implications of these findings. Couples need to be attuned to the days when working spouses have experienced high levels of job stress so that they can find ways

to manage this stress constructively. This may include employing stress management techniques, making an effort to infuse positive emotions into marital conversations, and finding ways to talk about job stress rather than avoiding it. Employers should be made aware that job-related stress could have serious consequences, not only for employees, but also for their families. In our contemporary culture, experiencing high levels of workplace stress may be inescapable. Given this, it is important to devote resources to finding ways of dealing more effectively with job stress in the context of marriage and other intimate relationships. Raising the awareness of the emotional impact of job stress and exhaustion on interpersonal relationships is a critical step toward more successfully negotiating the competing demands of work and family.

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