Journal of Family Psychology
2011, Vol. 25, No. 2, 271–281

0893-3200/11/$12.00 DOI: 10.1037/a0023048

Time Spent in Housework and Leisure: Links With Parents' Physiological Recovery From Work

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Spouses' balancing of housework and leisure activities at home may affect their recovery from work. This paper reports on a study of everyday family life in which 30 dual-earner couples were tracked around their homes by researchers who recorded their locations and activities every 10 min. For women, the most frequently pursued activities at home were housework, communication, and leisure; husbands spent the most time in leisure activities, followed by communication and housework. Spouses differed in their total time at home and their proportion of time devoted to leisure and housework activities, with wives observed more often in housework and husbands observed more often in leisure activities. Both wives and husbands who devoted more time to housework had higher levels of evening cortisol and weaker afternoon-to-evening recovery. For wives, husbands' increased housework time also predicted stronger evening cortisol recovery. When both spouses' activities were entered in the same model, leisure predicted husbands' evening cortisol, such that husbands who apportioned more time to leisure, and whose wives apportioned less time to leisure, showed stronger after-work recovery. These results suggest that the division of labor within couples may have implications for physical health.

Keywords: division of labor, recovery from work, HPA axis, cortisol, housework, leisure

Families reunite after work or school with dual goals: to recover from the stresses of the day and to tackle the evening's agenda. Within the contemporary family, these goals often compete, as parents must unwind from increasingly longer workdays while continuing to coordinate the home-based demands of chores and childcare. Dual-income families with children now comprise the predominant household composition in the United States (Bianchi & Raley, 2005), and the parents in these families spend an average of 91 hr per week engaged in paid work (Bond, Thompson, Galinsky, & Prottas, 2003). Both parents' participation in market work compresses families' downtime and makes the division of housework especially fraught. Researchers have chronicled families' time use patterns in detail (e.g., Bianchi, Milkie, Sayer, and Robinson, 2000; Lee & Waite, 2005). This study builds on that work through a live observational approach, and by sampling cortisol, a stress hormone, to understand how parents' activities affect end-of-the-day physiological recovery.

Cortisol shows a strong diurnal rhythm, peaking shortly after waking and then dropping over the course of the day. Many studies have found the steepness of this decline to be positively associated with health and well-being, whereas elevated end-of-the-day cortisol has been linked to burnout, depression, and even earlier mortality (e.g. Sephton, Sapolsky, Kraemer, & Spiegel, 2000). This study examines after-work recovery, the drop from afternoon to evening cortisol levels, as a function of dual-income parents' engagement in housework and leisure activities.

Many studies of families' everyday activities have used survey methods, for example, by asking participants to estimate the number of hours they spend on various household tasks. More recently, researchers have introduced time-diary or experience sampling methodology (ESM), in which participants report on their activities on a daily basis or multiple times a day. ESM may present an advantage over retrospective surveys because, by capturing people "in the moment," it eliminates some of the bias that can arise with spontaneous recall. One study that included both retrospective survey data and ESM data found discrepancies in

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The authors wish to thank Alfred P. Sloan Foundation's Workplace, Work Force, and Working Families Program for their generous support of the Center on Everyday Lives of Families at UCLA. We also wish to thank the families who participated in this study. Thomas Bradbury, Andrew Christensen, Theodore Robles, and Teresa Seeman provided feedback on this work, and Marie Alvik made important contributions to data collection and analysis. Darby Saxbe was supported by a UCLA Chancellor's Dissertation Year Fellowship and the Dr. Ursula Mandel Fellowship during the development and completion of this work.

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participants' estimates of their own and their spouses' housework time (Lee & Waite, 2005). While ESM may offer more precision than survey methodology, it still retains some of the limitations of self-report data and imposes a burden on participants, potentially leading to the undersampling of especially busy or stressful time periods. The current study employs live, in-situ observation of family members' activities to enhance existing knowledge about how working parents spend their time at home.

Couples' Division of Household Labor: Housework and Leisure

As women's workforce participation continues to rise, men's and women's time allocation to unpaid domestic labor has begun to converge, but women still devote almost twice the number of hours to housework work that men devote (17.5 hr per week for women compared to 10 hr per week for men, according to data collected from the National Survey of Families and Households; Bianchi et al., 2000); in 1965, women devoted 30 hr per week and men 4.9 hr per week to housework). Time diary research has documented a 30-min "leisure gap" between U.S. men and women, such that men tend to enjoy about a 0.5 hr more "free time" than women do each day (Mattingly & Sayer, 2006). An ESM study (Larson & Richards, 1994) found that husbands and wives in dual-income families showed different patterns of time allocation and affect in the early evening. Husbands appeared to spend this time relaxing, recovering, and engaged in leisure activities; wives were focused on housework and childcare responsibilities.

In predicting well-being, spouses' relative contribution to the household may be just as important as each spouse's absolute contribution. An examination of daily housework and relationship satisfaction in 52 affluent, German dual-income couples (Klumb, Hoppmann, & Staats, 2006a) found that the time allocated by each partner did not influence relationship satisfaction, but the absolute difference between the partners' contributions did. If housework was not distributed equally, both partners reported lower satisfaction. However, this effect disappeared when the appreciation partners received for their household contributions was included in the model.

The present study examines whether and how husbands and wives differ in their engagement in housework and leisure, and focuses only on couples in which both spouses are employed full-time (at least 30 hr per week).

Physiological Recovery From Work

Effective recovery from everyday stress is important to physical health (McEwen, 1998). However, only a handful of studies have explored physiological "unwinding" from work in a marital or family context. Some of these have identified gender differences, suggesting that women may recover less effectively from work-related stressors. One early study (Frankenhaeuser et al., 1989) compared male and female employees of a Swedish company. Upon returning home from work, male managers recovered quickly from the workday, showing decreases in blood pressure, norepinephrine excretion, and cortisol excretion during the evening hours. However, female managers' after-work blood pressure, NE, and cortisol levels stayed constant or even increased. A follow-up study of white-collar workers also found elevated evening epinephrine and NE levels in working women compared to working men (Lundberg & Frankenhaeuser, 1999), and another study found that women with children excreted more evening cortisol than women without children (Luecken et al., 1997). Working women also appear more physiologically aroused on "rest days" than working men do, suggesting that women might be recovering less fully on days off (Pollard, Ungpakorn, Harrison, & Parkes, 1996).

Several recent studies examine work and family variables in conjunction with the stress hormone cortisol. A study of dual-income parents found that individuals' daily cortisol excretion increased with every hour allocated to paid or to household work, while spouses' time in paid work was linked with higher, and spouses' time in household work with lower, total cortisol concentration (Klumb, Hoppmann, & Staats, 2006b). Within the same sample of dual-income parents, daily activities that furthered individuals' personal goals were linked with lower, and goal-hindering activities with higher, momentary cortisol (Hoppmann & Klumb, 2006), and work-related elevations in cortisol levels were buffered by marital intimacy (Ditzen, Hoppmann, & Klumb, 2008). Another study of dual-income parents found that wives' work worries were associated with higher momentary cortisol for wives, while husbands' work worries were linked to increases in both wives' and husbands' cortisol levels (Slatcher, Robles, Repetti, & Fellows, in press). Wives who reported lower marital satisfaction and less marital disclosure had stronger associations between work worries and cortisol, suggesting that the marital environment may moderate the impact of work-related stress on physiological arousal.

A study using the sample of couples examined in this paper (Saxbe, Repetti, & Nishina, 2008) found that among wives, but not husbands, marital satisfaction was associated with physiological recovery from work, or the drop in cortisol from afternoon to evening, such that maritally distressed women appeared to show weaker end-of-the-day recovery in cortisol. It is possible that gender differences in unwinding or in the division of domestic labor contributed to these effects. For example, the more maritally satisfied women may have experienced a more balanced distribution of household labor or been more able to relax and withdraw after a high-workload day. This study aims to extend and contextualize those findings by exploring whether spouses' after-work engagement in housework and leisure are associated with evening cortisol levels and with changes in cortisol from the workday to the evening, and whether these associations persist when marital satisfaction is controlled. Given that elevated end-of-the-day cortisol has been linked both with chronic stress and with adverse health outcomes, including earlier mortality (e.g. Sephton et al., 2000), after-work cortisol may be a useful marker of the impact of everyday domestic activities on health.

Research Questions and Hypotheses

This study is the first, to our knowledge, to employ in situ, observational coding of family members' activities, integrated with cortisol sampling. We focus on two research questions:

1) To what kinds of activities do dual-income parents devote their time at home, and do husbands and wives differ in their time allocation? We expect that housework and leisure activities will be among the most frequently observed at-home activities. Based on prior research and on established gender roles (e.g. Coltrane, 2000), we hypothesize that wives will devote more time to housework and husbands will devote more time to leisure. We will also examine whether spouses' work hours are linked with their activity participation rates.

2) Are spouses' evening activities associated with their physiological recovery from the workday? We hypothesize that spouses who devote more time to housework and less time to leisure activities will show less of a drop in cortisol at the end of the day. We also hypothesize that, given evidence that the distribution of labor within couples may be meaningful, cortisol patterns will be better predicted when both spouses' activities are included in the same model. Finally, we expect wives to be more sensitive to time spent in housework and husbands to time spent in leisure.

Method

Participants

Thirty families in a West Coast U.S. city were recruited for a larger study of dual-earner middle class families. Criteria for recruitment included that both parents work at least 30 hr a week, own their own home and pay a mortgage, have at least one child between 8–10 years of age, and do not have any health problems or regularly take any medications known to affect cortisol (such as steroid medications, diabetes medications, and others). Of the 60 adults included in the final sample, the median age was 41 years (range 28–58 years). Parents' ethnicities include white of non-Hispanic descent (65%), African descent (9%), East or Southeast Asian descent (9%), Hispanic descent (10%), and South Asian descent (7%). Couples had a median of two children, and their median marriage length was 13 years (range 3–18 years). The median annual family income in 2002–2005 dollars was $100,000 (range $51,000 to $196,000). Families were recruited for a study of everyday family life, primarily through advertisements placed in local newspapers, and were compensated $1,000 for their week of participation. All procedures were approved by the Institutional Review Board of the University of California, Los Angeles, and included detailed consent procedures for all family members.

Procedure

The study sought to capture a "week in the life" of each family. During the study week, family members were physically tracked by researchers for 4 days (2 weekdays and 2 weekend days). On 3 weekdays, two of which overlapped with scan sampling days, family members provided four self-collected saliva samples for cortisol analysis. Before the study week began, parents filled out a questionnaire collecting demographic information, including their work hours and income. After completing the study week, parents filled out a questionnaire on marital quality.

Observational data. "Scan sampling" observations were made every 10 min by an in-situ observer who recorded each family member's location (e.g., the kitchen, hallway, or living room, using a floor plan of the home to designate spaces) and activity (e.g., watching TV, talking on the telephone, preparing dinner), as described in Graesch (2009) and Ochs, Graesch, Mittman, Bradbury, & Repetti (2006). Scan sampling was conducted by a postdoctoral fellow with training in ethnographic research and by graduate- and postdoctoral-level project ethnographers who he trained and supervised. All observations were entered into a handheld computer, with each entry including the "primary" activity, a "secondary" activity (if applicable), and any objects and other people the family member may have engaged with. On weekdays, scan sampling was conducted in the mornings, before family members left for work or school, and then resumed in the afternoons and evenings, beginning when the first parent returned home from work and ending when family members went to bed. Weekend scan sampling occurred on one Saturday morning and on one Sunday morning and evening. The time of day that the observations were recorded varied from one family to another based on their daily routines. However, most weekday morning data were recorded between 6:30 and 8:30 am, while the after-work observations usually started around 4:00 pm and ended between 8:10 and 10:20 pm. On Saturdays, scan sampling started in the morning when the family awakened (around 8:00 am) and continued until noon. The latest observation on a Saturday was made at 12:30 pm. On Sundays, the pattern was similar to Saturdays, except that data were also collected in the evenings, beginning at around 4:00 pm and typically ending between 7:40 and 9:50 pm. The weekend scan sampling period averaged 3 hr on Saturdays and 5 hr on Sundays.

Over all 4 days, the total number of scan sampling observations averaged 76.6 observations for husbands (representing about 12 hr and 45 min of scan sampling) and 92.7 observations for wives (representing about 15 hr and 30 min of scan sampling); range 38–111 observations for husbands, 64–135 observations for wives. Therefore, the least amount of time that any spouse was tracked was about 6 hr and 20 min (38 observations), and the most any spouse was tracked about 22 hr and 30 min (135 observations). The entire dataset of scan sampling observations describing spouses' locations and activities contained 5,503 entries. Activity descriptors were typically just a word or a few words (e.g., "sleeping," or "playing a video game") but were sometimes more detailed (e.g., "brings son's pajamas into the bedroom," "digs through backpack for homework materials"). In cases when family members were clearly engaged in more than one distinct activity, as occurred in 17% of scan

sampling occasions, the tracker designated one activity the primary activity and the other activity the secondary activity; this paper reports on primary activities only.

The descriptions of activities recorded by the tracker were sorted into 13 categories by two coders who worked independently and then met to compare results and resolve discrepancies. The activity categories, which were derived from a previous study that combined a portion of this dataset with data from a 500-family experience sampling study (Broege, Owens, Graesch, Arnold, & Schneider, 2007) were leisure, housework, communication, childcare, schoolwork supervision, paid work at home, eating/drinking, study-related activities, spouse care, transit, personal care, personal time, and missing or unintelligible data. See Appendix for descriptions of each category. Inter-rater reliability was very high: before pooling their coding results, the two coders agreed over 97% of the time. This was due in part to the fact that the same activity descriptors tended to recur often in the dataset (for example, the descriptor "watching TV" appeared almost 400 times). The earlier study using part of this dataset with the same categories also found high inter-rater agreement (.92) when the data were combined with data from the 500-family ESM study (Cronbach's alpha = .78, split-half reliability coefficient = .82), suggesting good generalizability of trackers' observations to other studies using different methods (Broege et al., 2007).

The number of observations was summed within each of the 13 categories for each participating spouse. Wives' and husbands' averages and ranges for the total observations in each category for all of the scan sampling data collected (the 2 weekdays and 2 weekend days) are presented in Table 1, and averages and ranges for just the weekday evening data (representing at-home after-work activities on 2 weekdays) are presented in Table 2.

Cortisol data. Family members were instructed to self-collect saliva samples and report collection times at four time points on 3 weekdays, two of which overlapped with scan sampling days: 1) early morning, upon awakening; 2) late morning, before eating lunch; 3) afternoon, before leaving work, and 4) evening, before going to bed. Mean collection times were 6:25 am (early morning), 12:20 pm (late morning), 4:30 pm (afternoon), and 10:10 pm (evening). Concurrent with sampling, family members filled out a questionnaire indicating time of day and compliance with saliva sampling instructions; samples that violated these guidelines (e.g., the participant had eaten within 30 min of saliva collection) were dropped (10% of samples were skipped, missing, and/or dropped due to noncompliance). Saliva vials were shipped under climate-controlled conditions to Salimetrics (State College, PA), a research facility that assayed samples using a highly sensitive enzyme immunoassay US FDA (510k) cleared for use as an in vitro

Table 1
Descriptive Data for At-Home Activities (Total Frequencies and Percentages)

	Wives			Husbands		
	Mean	*SD*	Range	Mean	*SD*	Range
Total observations	92.77	16.96	64–135	76.6	21.22	38–111
Activity frequencies						
Housework	28.57	10.25	14–54	15.33	9.32	3–44
Communication	17.50	7.82	3–36	14.73	8.15	2–32
Leisure	10.00	6.19	0–21	15.13	9.72	5–46
Child care	9.00	5.94	1–25	4.43	3.46	0–11
Eating	7.70	3.47	1–15	7.23	3.03	3–18
Study activities	5.50	3.57	1–13	3.43	3.15	0–14
Personal care	4.70	5.13	0–28	3.47	2.99	0–11
Schoolwork supervision	3.53	3.63	0–18	1.90	2.54	0–9
Work at home	1.33	2.45	0–12	2.23	4.07	0–13
Personal time	1.07	1.74	0–7	4.23	5.00	0–22
Transit	1.00	1.05	0–3	1.10	1.19	0–4
Spouse care	.03	.18	0–1	.17	.75	0–4
Missing	2.83	2.98	0–13	3.20	3.97	0–18
Activity percentages						
Housework	30.52	8.36	17.2–46.3	19.98	9.95	3.9–46.3
Communication	18.48	6.83	3.6–32.4	18.82	8.10	4.1–33.0
Leisure	10.63	6.51	0–22.1	19.44	9.90	7.1–48.9
Child care	9.72	5.92	1–20.0	5.75	4.85	0–22.2
Eating/drinking	8.60	4.26	1.1–18.8	10.10	4.90	4.2–26.3
Study activities	6.34	4.54	.8–15.6	4.51	4.02	0–14.3
Personal care	5.03	5.41	0–30.1	4.89	4.42	0–18.3
Schoolwork supervision	3.86	4.04	0–20.0	2.56	3.33	0–11.8
Paid work at home	1.44	2.86	0–14.8	2.57	4.42	0–12.9
Personal time	1.21	2.10	0–8.2	5.40	6.23	0–23.0
Transit	1.11	1.17	0–3.6	1.48	1.81	0–8.2
Spouse care	.04	.20	0–1.1	.31	1.50	0–8.2
Missing/unintelligible data	3.03	3.15	0–13.0	4.17	5.76	0–27.7

Table 2
Descriptive Data for At-Home Activities (Total Frequencies and Percentages), Weekday Evenings Only

	Wives			Husbands		
	Mean	*SD*	Range	Mean	*SD*	Range
Total observations	34.57	9.49	14–52	28.33	13.13	5–56
Activity frequencies						
Housework	9.30	4.71	2–17	5.43	4.60	0–19
Communication	6.77	4.00	0–17	5.23	3.26	1–14
Leisure	4.23	3.49	0–12	6.53	5.38	0–23
Child care	3.37	2.44	0–9	2.00	2.21	0–9
Eating	3.23	1.76	0–7	2.80	1.24	0–6
Study activities	2.27	1.98	0–8	1.20	1.54	0–6
Schoolwork supervision	2.73	2.72	0–12	1.17	1.90	0–8
Work at home	.83	2.33	0–12	1.27	2.99	0–13
Transit	.53	.82	0–3	.33	.71	0–3
Personal care	.50	.68	0–2	.70	1.06	0–4
Personal time	.27	.45	0–1	.77	.94	0–3
Spouse care	.00	.00	0–0	.03	.18	0–1
Missing	.53	.73	0–2	.90	1.16	0–4
Activity percentages						
Housework	26.93	11.66	6–52	18.25	13.28	0–58
Communication	18.74	8.60	0–38	19.58	9.92	5–40
Leisure	11.46	8.46	0–25	22.58	12.66	0–48
Eating/drinking	10.05	6.49	0–32	11.38	7.11	0–33
Child care	9.90	7.56	0–27	6.75	6.71	0–25
Schoolwork supervision	7.68	7.11	0–34	3.54	5.68	0–26
Study activities	7.01	6.16	0–21.70	4.99	8.36	0–33.35
Paid work at home	2.45	6.94	0–33	3.04	6.42	0–24
Transit	1.79	2.84	0–11.50	1.10	2.29	0–8.35
Personal care	1.64	2.69	0–12.50	2.96	4.82	0–17.45
Personal time	.82	1.46	0–4.55	2.86	4.00	0–14.30
Spouse care	.00	.00	0–0	.09	.51	0–2.80
Missing/unintelligible data	1.52	2.12	0–7.15	3.04	4.79	0–18.75

diagnostic measure of adrenal function. The average of duplicate assays for each sample was used in all analyses and units are reported in μg/dl (micrograms per deciliter). To correct for positive skewness, a natural log transformation was performed on the cortisol data before analyses were conducted. This study focuses on afternoon and evening cortisol only.

All cortisol data were analyzed using Hierarchical Linear Modeling (HLM), Version 6.01 (Raudenbush, Bryk, & Congdon, 2004). Because of the nesting of participants within couples, a dyadic multilevel modeling strategy was employed, based on one described by Laurenceau and Bolger (2005). Models used input data files that contain dummy-coded husband and wife data on separate lines, and included separate intercept and predictor terms for both husbands and wives. The application of this analytic strategy to the cortisol data is described in more detail in Saxbe and Repetti (2010).

Marital adjustment. The Marital Adjustment Test (MAT), completed by both spouses after their study week, is a well-validated sixteen-item measure that assesses spouses' satisfaction with their marriage and the degree of closeness they feel to their partner (Locke & Wallace, 1959). In this study, Cronbach's alpha was .82 for women and .81 for men, and sample means and distributions were consistent with the norming sample and other studies of married couples. Scores were centered before analyses were conducted.

Paid work hours. On a questionnaire completed prior to the study week, spouses were asked to check off "hours spent at paid work, away from home, each week," with six possible ranges (50 or more, 40–49, 30–39, 20–29, etc.). For the purpose of this study, work hours were approximated as being in the middle of the range, and at 55 hr/week for spouses who checked "50 or more" (likely a conservative estimate of actual work hours for spouses in this range). Both wives' and husbands' median score was 45, indicating that most participants worked between 40–49 hr a week; husbands' mean was 47 hr/week (range 25–55, $SD = 6.64$), while wives' mean was 41 hr/week (range 25–55, $SD = 7.92$).

Results

Research Question 1: Spouses' At-Home Activities

This research question focuses on dual-income couples' at-home activities: which activities recurred most often, and whether husbands and wives differed in their time allocation. We also examine whether spouses' work hours were linked with their time at home and their rates of participation in at-home activities.

Tables 1 and 2 present mean frequencies and percentages of observations within each activity category. Table 1 shows values for total scan sampling time (including both weekdays and 2 weekend days). On most of the scan sampling

occasions, wives were observed engaged in housework (30.5% of their total observations), communication (18.5% of observations), and leisure (10.6% of observations). The same three categories also captured most of husbands' scan sampling occasions, but they were more likely to be observed in leisure than were wives [19.4% of their observations; paired-sample $t(29) = -5.40$, $p < .001$], were less likely to be involved in housework [20% of observations; $t(29) = 4.49$, $p < .001$], and devoted a similar proportion of their scan sampling observations to communication [18.8% of observations; $t(29) = .23$, $p = .81$]. Husbands were also less likely to be observed engaged in childcare than wives [$t(29) = 3.52$, $p = .001$].

Because of our interest in after-work recovery, we also examined weekday evenings only, as shown in Table 2. On weekday evenings, activity patterns were similar, with housework, communication, and leisure once again the three most often pursued activities for wives and leisure, housework, and communication the most often pursued for husbands. Compared to the total scan sampling data, the weekday evening data included a greater proportion of observations of eating/drinking (likely due to scan sampling during dinner) and schoolwork supervision. On weekday evenings, wives (as compared to husbands) were more often seen doing housework, $t(29) = 2.68$, $p = .01$, and supervising schoolwork, $t(29) = 3.07$, $p = .005$, and less often seen engaged in leisure, $t(29) = -6.72$, $p < .001$. Spouses did not differ in the percentage of observations allotted to communication, $t(29) = -.39$, $p = .70$, eating/drinking, $t(29) = -.84$, $p = .41$ or childcare, $t(29) = 1.65$, $p = .11$.

Husbands and wives differed in their total number of scan sampling observations, a reflection of the time they spent at home during the 4 days of study, with wives accumulating more scan sampling observations ($x = 92.77$, $SD = 16.96$) than husbands ($x = 76.60$, $SD = 21.22$), $t(29) = 4.07$, $p < .001$. Similarly, on weekday evenings, wives were also observed more often at home than husbands, $t(29) = 2.20$, $p = .04$. Therefore, the above-reported differences in spouses' percentages of time devoted to housework, childcare, and leisure should be seen as conservative estimates of the real differences between husbands and wives. For example, over the 4 days of study, wives had an average of 28.57 observations coded as housework, which translates roughly into about 4 hr and 45 min of housework time (given that scan sampling was conducted every 10 min), while husbands had an average of 15.33 observations coded as housework, around 2.5 hr.

Husbands' work hours were positively associated with husbands' leisure percentage, $r(29) = .50$, $p = .004$, and, at a marginal level of significance, were negatively associated with husbands' total time at home, $r(29) = -.31$, $p = .09$, and positively associated with wives' total time at home, $r(29) = .35$, $p = .06$. However, husbands' work hours were not associated with wives' leisure time or with either spouse's weekday evening percentages of chores and communication, and wives' work hours were not associated with either spouse's time at home or time spent in leisure, chores, or communication.

Research Question 2: Physiological Recovery From the Workday

The second research question asks whether spouses' leisure and housework time affect their physiological recovery from work (specifically, the drop in cortisol at the end of the workday). We addressed this question with a series of HLM models that had evening cortisol as the outcome variable and afternoon cortisol level as a predictor, with the time elapsed between afternoon and evening sampling included as a covariate. As described in the Methods section, to adjust for the interdependency within couples a dyadic HLM model was used with separate intercept and slope terms for husbands and wives. After-work activity variables were then introduced at Level 2, typically used for between-person (or, in this case, between-couple) predictors in multilevel models.

First, we tested the number of scan sampling observations on weekday evenings (labeled "Total Observations" in Table 2) as a Level 2 predictor. As shown in Table 3, the number of at-home observations was not linked with either husbands' or wives' evening cortisol or the drop in cortisol from afternoon to evening, suggesting that individual differences in spouses' total time at home after work did not affect their cortisol "recovery" at the end of the day.

We next examined leisure and housework time allocation on two weekday evenings as predictors of evening cortisol. First, we tested each spouse's percentage of scan sampling observations devoted to each activity as a predictor of their own cortisol, with results shown in Table 3. Next, we included both spouses' activity percentages in the same model, with results shown in Table 4. In a third set of analyses, shown in Table 5, we also included marital satisfaction as a control variable when testing both spouses' activities, since, as described earlier, a previous study using this sample found that marital satisfaction predicted wives' evening cortisol (Saxbe et al., 2008). Leisure and housework were tested in separate models, but the results are shown together (in the same tables) to conserve space. The coefficients of spouses' Level 1 intercept and Level 1 predictors (afternoon cortisol and afternoon-to-evening sampling time lapse) changed slightly from model to model depending on which Level 2 variables was used, but did not alter substantively.

Housework. As shown in Table 3, both husbands' and wives' percentages of after-work housework observations were positively associated with the intercept of evening cortisol, and the steepness of the slope of afternoon cortisol predicting evening cortisol (results were the same whether or not we included the total number of after-work observations as a control variable, so we present models without that control variable, here and elsewhere). In other words, men and women who were more occupied with housework showed higher evening cortisol and less "recovery" from their afternoon cortisol levels. When we entered both spouses' housework percentages together, as shown in Table 4, husbands who did more housework continued to show higher evening cortisol and a steeper afternoon-to-evening slope, with both results reaching a marginal level of signif-

Table 3
Own Weeknight Activity Percentages Predicting Evening Cortisol

	Evening cortisol intercept	Level 2 effect on evening cortisol intercept	Level 1 predictor: Afternoon cortisol	Level 2 effect on afternoon cortisol slope	Level 1 predictor: Afternoon-to-evening time elapsed
Husbands	−2.75 (.90), −3.04**[a]		.29 (.25), 1.13		0.00 (.00), 1.66+
Wives	−2.44 (.69), −3.51***		.51 (.13), 3.99***		0.00 (.00), 0.84
Model 1: Total observations					
Husbands		−.01 (.05); −0.20		.01 (.02); 0.05	
Wives		−.01 (.03); −0.35		.01 (.01); 0.30	
Model 2: Housework					
Husbands		10.06 (4.96); 2.03*		3.76 (1.92); 1.96+	
Wives		10.26 (5.03); 2.04*		4.20 (1.69); 2.48*	
Model 3: Leisure					
Husbands		−1.39 (4.85); −0.29		−1.17 (2.05); −0.57	
Wives		−5.99 (4.68); −1.28		−2.04 (1.83); −1.11	

[a] Coefficient (standard error), T-ratio.
+ $p < .10$. * $p < .05$. ** $p < .011$. *** $p < .001$.

Table 4
Own and Spouse's Weeknight Activity Percentages Predicting Evening Cortisol

	Evening cortisol intercept	Level 2 effect of activity % on evening cortisol intercept	Level 1 predictor: Afternoon cortisol	Level 2 effect of activity % on afternoon cortisol slope	Level 1 predictor: Afternoon-to-evening time elapsed
Husbands	−2.75 (.90), −3.04**[a]		.29 (.25), 1.13		0.00 (.00), 1.66+
Wives	−2.44 (.69), −3.51***		.51 (.13), 3.99***		0.00 (.00), 0.84
Model 1: Housework					
Husbands		Own: 9.48 (5.05), 1.88+		Own: 3.39 (2.01), 1.64+	
		Spouse: −10.67 (8.32), −1.28		Spouse: −3.60 (3.17), −1.13	
Wives		Own: 13.88 (6.05), 2.29*		Own: 5.99 (2.08), 2.88**	
		Spouse: −3.36 (1.91), −1.76+		Spouse: −1.88 (.81), −2.31*	
Model 2: Leisure					
Husbands		Own: −15.35 (4.76), −3.23**		Own: −5.71 (1.89), −3.01**	
		Spouse: 26.51 (7.61), 3.49**		Spouse: 9.31 (2.99), 3.11**	
Wives		Own: −10.10 (7.27), −1.39		Own: −4.37 (3.28), −1.33	
		Spouse: 3.39 (5.21), 0.65		Spouse: 1.80 (2.21), 0.82	

[a] Coefficient (standard error), T-ratio.
+ $p < .10$. * $p < .05$. ** $p < .0l$. *** $p < .001$.

Table 5
Couples' Activities Predicting Evening Cortisol, With Marital Satisfaction Included

	Level 2 effect of activity % on evening cortisol intercept	Level 2 effect of marital satisfaction on evening cortisol intercept[b]	Level 2 effect of activity % on afternoon cortisol slope	Level 2 effect of marital satisfaction on afternoon cortisol slope
Model 1: Housework				
Husbands	Own: 10.07 (5.42), 1.88^{+} Spouse: −11.98 (8.06), −1.49	−0.02 (.04), −.61	Own: 3.58 (2.14), 1.67 Spouse: −4.10 (3.04), −1.35	−0.09 (0.28), −0.31
Wives	Own: 15.73 (5.49), 2.86** Spouse: −2.47 (2.01), −1.23	−0.02 (.02), −1.57	Own: 6.83 (1.83), 3.73*** Spouse: −1.46 (.78), −1.86^{+}	−0.01 (.01), −1.88^{+}
Model 2: Leisure				
Husbands	Own: −14.25 (5.23), −2.73** Spouse: 28.60 (7.54), 3.79^{***a}	0.04 (.03), 1.53	Own: −5.24 (2.00), −2.62* Spouse: 10.02 (2.76), 3.64***	0.01 (.01), 1.34
Wives	Own: −9.71 (6.91), −1.41 Spouse: −1.73 (5.07), −.34	−.04 (.02), −1.94^{+}	Own: −4.19 (3.02), −1.39 Spouse: −0.38 (2.14), −.18	−0.02 (.01), −2.07*

[a] Coefficient (standard error), T-ratio. [b] The values for the evening cortisol intercept and the Level 1 predictors (afternoon cortisol and afternoon-to-evening time elapsed) are the same as those shown in Tables 3 and 4.
$^{+}$ $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

icance. Husbands' cortisol was not affected by their spouses' housework contribution. For wives, both own and spouse housework were significant predictors of cortisol: wives who devoted more time at home to housework had higher evening cortisol, and wives whose partners devoted more time to housework had lower evening cortisol. The results remained similar when marital satisfaction was controlled, as shown in Table 5. However, husbands' housework became a weaker predictor of their own cortisol and a weaker predictor of wives' cortisol, suggesting that the link between husbands' housework contribution and both partners' evening cortisol might be related to the quality of the marriage.

Leisure. As shown in Table 3, the percentage of observations each spouse devoted to leisure was not significantly associated with their intercept of evening cortisol or the slope of their change from afternoon to evening cortisol. However, when both spouses' leisure was included in the model (shown in Table 4), significant results for husbands emerged: own leisure was linked with lower evening cortisol and stronger recovery from afternoon to evening, while spouse's leisure was linked with higher evening cortisol and weaker recovery from afternoon to evening. In other words, husbands showed more of an end-of-the-day drop in cortisol when they devoted a greater proportion of their time to leisure, controlling for their wives' leisure time, and when their spouses devoted less time to leisure, controlling for their own leisure time. Results for wives were in the same direction but did not reach statistical significance. These results held when marital satisfaction was included in the model, as shown in Table 5, and marital satisfaction also emerged as a predictor of lower evening cortisol and stronger afternoon-to-evening cortisol recovery for wives.

Discussion

We investigated the at-home activities pursued by dual-income couples with children over several days of intensive, in-situ scan sampling observations. Both spouses were employed full-time, and both shared the same three most frequently observed activities: leisure, housework, and communication. Supporting our hypotheses, wives spent more time engaged in housework, while husbands spent more time engaged in leisure. Given that wives also spent more total time at home than husbands, differences in activity percentages provide a conservative estimate of differences between spouses' actual time allocations to housework and leisure.

Both husbands' and wives' evening activities were associated with physiological recovery from work at the end of the day. However, these associations differed by gender and type of activity. In support of our hypotheses, devoting more time to housework was associated with poorer end-of-the-day recovery in cortisol levels for both husbands and wives. When both spouses' activity allotments were considered in the same model, wives showed the expected pattern: less effective unwinding linked with their own housework time, and more effective unwinding linked with their spouses' housework time. This finding is consistent with

evidence than an unbalanced division of household labor appears to compromise women's well-being, for example contributing to depression and marital dissatisfaction (Coltrane, 2000). In contrast, the distribution of leisure time seemed to be a better predictor of husbands' cortisol: husbands appeared to unwind better when more of their own time at home and less of their wives' time at home was devoted to leisure. However, leisure time did not appear to be linked with wives' cortisol patterns.

These results support our hypotheses, suggesting that couples' evening activities may affect their physiological recovery from work and that spouses may be sensitive to both their own and to their partner's engagement in housework and leisure pursuits. Social comparison effects may play a role: perhaps it feels more stressful to do housework while one's partner is relaxing, or more restful to pursue leisure while someone else is taking care of household duties. The greater importance of housework to wives' cortisol may reflect cultural expectations, for example, women identifying more closely with the task of household maintenance and feeling less autonomy over the decision to spend time in chores. As a preponderance of research has demonstrated, gender still appears to play a determining role in the division of household labor, such that women often assume greater household responsibilities even when both spouses are employed outside the home (Coltrane, 2000). In any case, our results suggest that the observed patterns of husbands' greater involvement in leisure and less involvement in housework relative to their wives may benefit husbands' recovery and detract from wives' recovery after work. They also highlight the interdependence of the family system (Minuchin, 1974). Husbands and wives appear physiologically sensitive not just to their own but to their partners' contribution to the household and may adjust to maintain homeostasis, exerting more effort when one partner is relaxing and relaxing more when the other partner is helping to relieve the housework burden. Clinicians who work with couples can use these findings to illustrate the effects that spouses' everyday activities can have on each other as well as the repercussions not just for emotional but potentially for physical health. Elevated evening cortisol levels have been associated with disease and mortality risk (e.g., Sephton et al., 2000), making it important to better understand the phenomenon of "unwinding" and the instrumental, cultural, and psychological circumstances that may influence it.

Our findings contribute to the research literature on everyday household activities and stress in a number of important ways. The sample was comprised solely of dual-income couples with children, a group likely to be experiencing considerable time demands after work. Rather than relying on self-report data about spouses' evening activities, this study analyzes scan sampling observations made by researchers who were physically stationed in families' homes, an unusually intensive approach. This is the first study to make use of such rich observational data to explore not just couples' everyday activities, but also their patterns of physiological recovery from work. Dyadic multilevel modeling was used to analyze the data, an approach that accounts both for the nesting of individuals within couples and of cortisol samples within individuals.

This study had several limitations. For example, the sample was small and fairly homogenous, although that homogeneity was advantageous in limiting some of the outside factors (like employment status and age and number of children) that could influence household activities. Additionally, the scan sampling observations were subjective, and vulnerable to bias and error, although any inaccuracies present in the observational coding approach are likely matched by the error associated with self-report approaches, such as experience sampling or retrospective reporting. Having an observer present in families' homes may have also affected participants' evening behavior. While it cannot be determined exactly how participants' behavior may have altered, this limitation would affect all the families in the study and would be unlikely to affect the individual differences we found. Finally, physical exertion is known to affect cortisol, and it is possible that our findings could be due to differences in the physical demands of different activities: Many housework activities are more strenuous than many leisure activities, for example. While physical activity might explain our finding that housework was linked with weaker recovery, it does not explain why spouses' activities also appeared to be linked with cortisol recovery, for example, husbands' housework associated with wives' cortisol and wives' leisure associated with husbands' cortisol.

While the three cortisol sampling days and the two weekday scan sampling days overlapped, our study design does not allow us to examine day-to-day changes in scan sampling activities and cortisol; with only 2 days on which both scan sampling and cortisol data were collected, we could not construct multilevel models to detect within-person change. Couples' evening activity pursuits may have affected their cortisol patterns, but it is also possible that couples' cortisol levels affected their choice of evening activities. Couples were asked to choose a "typical" week in which to participate in the study (no trips, no unusual events or commitments) so we assume that couples' activities on the two-scan sampling weekdays reflected their usual behavior, but we cannot confirm this assumption.

In conclusion, this study used a unique, intensive observational methodology to report on dual-income couples' engagement in housework, leisure, communication, and other activities. Not only did differences emerge within couples, but those differences appeared to have implications for partners' physiological stress and recovery from work, even after marital adjustment was controlled. Given that daily cortisol patterns have been linked with long-term health and longevity, these findings suggest that the repercussions of couples' engagement in everyday household tasks may extend beyond arguments about who's doing the dishes and who's flipping through channels. Further research is needed to better understand how working couples and parents manage the challenges of daily life, and how their apportionment of housework and restorative activities affect their physical and psychological well-being.

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Appendix

Definitions of Activity Categories

Leisure	Activities pursued for enjoyment or relaxation, for example, watching TV, reading (non-homework- or work-related), playing games or puzzles, video games, sports, and free play.
Housework	Tasks necessary to maintain the household, for example, preparing meals, washing dishes, folding laundry, taking out trash, mowing lawn, paying bills, and repairing household objects.
Communication	Communicating with another person, for example, phone calls, talking/listening in person, and writing notes. Also, computer time, if not specified as leisure, school, or work-related.
Childcare	Caring for children, for example, bathing child, dressing or grooming child, putting child to bed, feeding child, and monitoring/ supervising child (except with schoolwork activities).
Schoolwork supervision	Facilitating children's school-related work, for example, checking homework and signing forms.
Paid work at home	Job-related activities, for example, sorting through work papers, writing reports, or doing research.
Eating/ drinking	Consumption of food or drink; cigarette smoking also included in this category.
Study-related activities	Talking to researchers, sampling saliva, filling out questionnaires, and using video equipment.
Spouse care	Showing affection to the spouse, for example, massaging spouse, hugging, and kissing spouse.
Transit	Arriving at or leaving the home and walking from one part of the home to another.
Personal time	Resting or daydreaming, for example, napping, looking out the window, and staring into space.
Personal care	Self-care activities, for example, grooming, showering, brushing teeth, and getting dressed.
Missing data/no data	No activity label provided, or label too vague to code, for example, "door closed," "getting something," or "holding something."

Received September 30, 2010
Revision received January 21, 2011
Accepted January 25, 2011 ■