

RENA L. REPETTI, BRIDGET M. REYNOLDS, AND MEREDITH S. SEARS
University of California Los Angeles

Families Under the Microscope: Repeated Sampling of Perceptions, Experiences, Biology, and Behavior

Families are not frozen dioramas; they are alive, active, and changing. Models of real-life marital and family processes require many moving pieces. An intensive repeated measures approach reaches beyond static representations of the family toward more dynamic models that depict "life as it is lived." The appearance of studies that use diaries and biological sampling in everyday life has burgeoned in the family research literature. These methods are part of a larger class of naturalistic methods that assess families in action and that includes direct video and audio recordings of families in their everyday environments. This article summarizes research that uses diaries, observations, and biological data collected over time in natural settings to study families. It provides an overview of the major research questions, designs, methods of data collection, and statistical models used in those literatures. Theoretical contributions and next steps in naturalistic research on families are discussed.

Questionnaires and laboratory observations have become so engrained in our research literature that it is easy to forget that neither family members' evaluations nor their behavior in situations structured by an investigator are necessarily the phenomena of interest. However, the study of life as it is actually lived is becoming more prominent in research on families. The

approaches described in this article prioritize ecological validity and emphasize the direct assessment of dynamic processes in real time. By tracking perceptions, behaviors, and biology over time, these methods put families under the microscope, recording experiences and events as they play out in the natural environment. The focus on short-term processes is giving rise to new concepts and paradigms and strengthening theory.

Language in this rapidly developing field is still in flux. *Ambulatory, intensive longitudinal, and experience sampling* are just a few of the terms that are commonly used to describe these assessment strategies. We adopt the label *intensive repeated measures (IRM)* for designs that collect data—whether perceptions (diaries), live observations (scan sampling), physiological recordings (blood pressure [BP] monitoring), or biological samples (saliva)—on multiple discrete occasions over relatively brief periods of time, such as every few minutes or hours or every day. We cast our net wide for this review and also included direct observational studies of families going about their daily lives inside and outside of the home where the data can be continuous streams of information from video or audio recordings. The overarching goal of all the approaches discussed in this article is the study of individuals and families in action in everyday environments. We use the broad term *naturalistic methods* to encompass both IRM and continuous observational or recording strategies.

The article is organized in four sections. We begin with descriptions of three types of data—diaries, observations, and biological

Department of Psychology, 1285 Franz Hall, University of California, Los Angeles, CA 90095-1563
(repetti@psych.ucla.edu).

Key Words: field research, longitudinal, multilevel models, observation, relationship processes, within-family design.

assessments—that are collected in naturalistic studies of families. For each category, we describe the variety of research designs and questions that are addressed, present a selection of major findings, and summarize the challenges faced by researchers using those methods. In the second section we provide a brief overview of statistical models for the analysis of naturalistic data. Next, we highlight a number of ways in which these methodological approaches are currently advancing family theory. Finally, we discuss emerging trends and promising future directions for naturalistic research on families.

INTENSIVE SAMPLING AND RECORDING METHODS USED TO STUDY FAMILIES

Modern technology has offered researchers electronic collection of diary data; miniaturized audio, video, and physiological recording devices; and procedures to assay hormones from saliva. Below we show how each of these innovations has been applied to the study of families in their natural settings. This section is divided into three parts: (a) intensive repeated measurement of perceptions collected in diaries, (b) continuous and intensive repeated observations of families via video and audio recording devices and by live observers, and (c) repeated sampling of saliva to assay cortisol and repeated measurement of BP. These approaches can provide powerful insights into how short-term fluctuations in states, behaviors, and physiology interact with individual and contextual factors to shape daily family life. The potential of these methods to advance theory is illustrated later in this article by highlighting progress in two areas: understanding how, over short periods of time, daily stressors influence families and dyads and individuals within families affect each other.

Repeated Measurement of Perceptions Through Diaries

The most commonly used repeated measures method asks participants to describe experiences or events that occurred over relatively brief periods, such as the past few hours or the past day. The data describe the unfolding of behavior, emotions, and social interactions in families' everyday lives. Cognitive science has taught us much about the systematic biases associated with autobiographical memory and heuristic

strategies that can introduce error in questionnaire or interview research (Hufford, 2007; Kihlstrom, Eich, Sandbrand, & Tobias, 2000; Schwarz, 2007). Traditional self-report methods ask family members not only to recall all relevant experiences within a given reference period but also to summarize those experiences in a way that they believe addresses the question at hand. The measurement error associated with these cognitive biases is attenuated in repeated measure designs that ask participants to report on immediate experiences or on events that occurred within relatively short time frames, rather than asking them to generalize across multiple situations and over lengthy time spans.

Scheduling of data collection. The category of methods that use repeated sampling to capture perceptions of states and behaviors that occur in everyday natural settings is sometimes referred to as *ecological momentary assessment* (Stone & Shiffman, 1994) or, more generally, as *diary methods*, the term we adopt here. Under this umbrella category are designs that differ primarily with respect to the conditions under which participants complete reports (for a detailed history and comparison of methods, see Reis & Gable, 2000). There are advantages and disadvantages to each approach. *Experience sampling methods* (ESM) use signal-contingent recording to randomly sample immediate experiences in natural, everyday contexts. These methods were first deployed using preprogrammed devices that beeped participants at random times throughout the day, prompting them to complete surveys assessing current mood, thoughts, and activities. Technological developments have allowed for increasingly sophisticated signaling schedules, often programmed into the data collection device itself (e.g., a tablet computer, cell phone). A primary disadvantage is that signals can be intrusive, interrupting ongoing activity. *Daily diary* studies use interval-contingent sampling, wherein family members are asked to report on their states and/or experiences at regular, predetermined intervals, such as before bed each night or at scheduled times throughout the day. Compared to other methods, predictable reports that are spaced out over longer periods of time reduce participant burden but are subject to some of the retrospection biases described above, because participants might not accurately remember everything that has happened since the previous report. *Event sampling* involves

completing a survey whenever an event meeting a predetermined definition has occurred. This type of event-contingent recording is ideal when the events of interest are rare and unlikely to occur during predetermined intervals; however, compliance can be difficult to verify.

Of course, the phenomena of interest and underlying theory shape the design of a diary study. The frequency and timing of data collection are tailored to capture the process under investigation. Protocols can also combine two or more sampling formats, such as interval-contingent and event sampling, within the same study. It is crucial that designs be pilot tested to ensure that constructs of interest are adequately sampled while minimizing participant burden.

Research questions addressed through diary data. Diary methods allow researchers to describe the characteristics of daily family life with greater precision and ecological validity than is possible with traditional questionnaire or laboratory studies. For example, in contrast to laboratory-based findings suggesting that money is the most frequent source of marital disagreements, spouses who completed diaries following each episode of marital conflict at home for 15 days most often identified children as the topic of disagreement (Papp, Cummings, & Goeke-Morey, 2009). Diaries have also been used to chronicle details of children's and adolescents' daily family lives, such as the frequency and characteristics of time spent with family members. An experience sampling study found that about 35% of adolescents' time was spent with family (Schneiders et al., 2007), and daily diary research has revealed that siblings spend about 17 hours in shared activities during an average week (Updegraff, McHale, Whiteman, Thayer, & Delgado, 2005), with the most frequent topics of sibling conversation being extracurricular activities, media, and academics (Tucker & Winzeler, 2007). IRM data have also shown how family members caring for patients with dementia adapt to stressful symptoms of the disease; over 3 months, the patients' daily problems with memory and sleep became less upsetting to the caregivers (Fauth, Zarit, Femia, Hofer, & Stephens, 2006).

Aside from describing characteristics of daily family life, there are three common types of research aims addressed with diary data. First, researchers test whether stable

individual-difference variables predict daily descriptions of states and behaviors within the family. For example, daily diary studies have examined racial, ethnic, and cultural differences in adults' experience of daily family stressors (Cichy, Stawski, & Almeida, 2012) and in adolescent reports of time spent assisting the family (Hardway & Fuligni, 2006; Telzer & Fuligni, 2009) as well as sex differences in daily family activities and interactions (Lam, McHale, & Crouter, 2012; Lee & Waite, 2005; Neff & Karney, 2005; Offer & Schneider, 2011). Researchers have also considered how daily reports of family stress, conflict, or warmth vary as a function of chronic psychological symptoms (Papp, Goeke-Morey, & Cummings, 2007; Schneiders et al., 2006) or more stable family characteristics, such as chronic home stress and global marital adjustment (Laurenceau, Barrett, & Rovine, 2005; Serido, Almeida, & Wethington, 2004).

The second type of question asks whether micro-level fluctuations in characteristics of daily family life are associated with short-term changes in the states, behaviors, or perceptions of individual family members. Perhaps the most common of these within-subjects designs test associations between day-to-day fluctuations in family interactions and changes in the mood of individual family members. For instance, adolescents report more positive affect on days when they spend more time assisting family members (Telzer & Fuligni, 2009) and report less negative affect and more positive affect when in the presence of family members than when alone (Schneiders et al., 2007), although these emotional benefits may depend on the nature of the shared activity (Offer, 2013; Pomerantz, Wang, & Ng, 2005). In general, diary studies have shown that daily family demands and stressors, including negative parent-child and marital interactions, are associated with greater same-day child and adult reports of emotional distress (Almeida, Wethington, & McDonald, 2001; Chung, Flook, & Fuligni, 2009; DeLongis, Capreol, Holtzman, O'Brien, & Campbell, 2004; Kiang & Buchanan, 2014; Savla, Almeida, Davey, & Zarit, 2008; Smith, Breiding, & Papp, 2012) and that positive interactions are linked with same-day psychological well-being (DeLongis et al., 2004; Fuligni & Masten, 2010; Gable, Reis, Impett, & Asher, 2004; Gleason, Iida, Bolger, & Shrout, 2003; Graham, 2008; Hicks

& Diamond, 2008; Meegan & Goedereis, 2006). Recent studies also suggest that on days when children and adults report more family stress or less positive family interactions they describe more problems with sleep that night (Fulgini & Hardway, 2006; Hicks & Diamond, 2011; Kane, Slatcher, Reynolds, Repetti, & Robles, 2014), although this association might be bidirectional (Gordon & Chen, 2014; Hasler & Troxel, 2010).

A large body of diary research has focused on micro-level couple processes, linking greater daily levels of self-disclosure and receipt of emotional support, for example, with increased reports of intimacy or closeness in the spousal relationship (Belcher et al., 2011; Gleason et al., 2003; Laurenceau et al., 2005) and showing that support provision is more likely on days when both members of the couple feel more satisfied with the relationship and on days when support has also been received by the provider (Iida, Seidman, Shrout, Fujita, & Bolger, 2008). These approaches are also used to study how marital partners influence each other's health. Using an objective measure of physical activity, one study found that adults with knee osteoarthritis were more active on days when their spouses were more supportive (Martire, Stephens, et al., 2013). Daily diary data from both members of the couple indicated that the more arthritis pain the patient experienced, the less well his or her spouse slept that night, independent of the patient's sleep pattern (Martire, Keefe, Schulz, Stephens, & Mogle, 2013).

Finally, diary data are used to test between-person or between-family differences in micro-level, within-subject associations. Often the analyses focus on sex or ethnic differences in within-person associations between daily family demands or stressors and the emotional or physical well-being of members (Chung et al., 2009; Cichy et al., 2012; Hasler & Troxel, 2010; Kiang & Buchanan, 2014; Telzer & Fulgini, 2009). Dispositional traits, such as attachment style or symptoms of psychopathology, have also been tested as moderators of short-term associations between couple processes and mood, perceptions, or behavior (Birnbaum, Reis, Mikulincer, Gillath, & Orpaz, 2006; Hicks & Diamond, 2008, 2011; Papp, Goeke-Morey, & Cummings, 2013; Schoebi, Perrez, & Bradbury, 2012; Smith et al., 2012). Other work has shown that high levels of chronic stress and more global indicators of family dysfunction, typically assessed at baseline via

interview or single-administration questionnaire measures, can exacerbate within-person associations between daily family hassles and psychological distress (DeLongis et al., 2004; Koerner, Shirai, & Kenyon, 2010; Schneiders et al., 2006; Serido et al., 2004).

A growing research literature based on diary and other naturalistic methods has advanced our understanding of individual and social processes within families and between families and the outside world. We elaborate on those conceptual and theoretical yields in a later section.

Compliance and measurement reactivity.

Though diaries are beneficial in terms of increasing the resolution with which temporal processes are described, reducing recall-related measurement error, and improving ecological validity compared to single-administration questionnaire or interview designs, they also present unique methodological challenges. The comparatively heavy burden of frequent reports raises concerns about compliance and fatigue. Fortunately, electronic devices now allow researchers to randomize the order of items and to use logic and question branching based on previous responses, which minimizes repetitiveness and time burden. Researchers may also capture compliance information by digitally recording time of survey completion. Compliance in diary studies using electronic date-time stamping is generally good, with on-time completion rates around 90% (Hufford, 2007; Shiffman, Stone, & Hufford, 2008). Our own work involving the collection of online daily diaries from multiple family members across 56 consecutive days has resulted in excellent compliance, with an average of 94%–95% of diaries completed, 98% of which were done on time (Reynolds, Robles, & Repetti, 2014; Robles, Reynolds, Repetti, & Chung, 2013). Strategies such as bonus incentives contingent on 100% compliance and regular telephone communication with families likely increased participant motivation and fostered a sense of accountability for the data (see Beckham et al., 2008; Hufford, 2007). Reducing participant burden may also increase compliance; for example, rather than complete online or paper diaries, IRM data have been collected through daily telephone calls (Wethington & Almeida, 2009).

Measurement reactivity represents another potential challenge. Anticipation of the need to report on events might affect one's experience

of those events, for example, by fostering higher levels of self-monitoring or introspection (see Barta, Tennen, & Litt, 2012). One study found that husbands who completed diaries following marital disagreements showed declines in reports of marital quality across 15 days (Merrilees, Goeke-Morey, & Cummings, 2008). By calling attention to disagreements it is possible that the measurement procedure itself influenced husbands' perceptions of the marital relationship. It is worth noting, however, that when marital interactions were later observed in the laboratory, the emotional expressiveness of these husbands could not be distinguished from that of a control group who had not taken part in the diary study. Our own work has uncovered only minimal evidence of measurement reactivity, when operationalized by systematic changes in diary ratings of family interactions or by systematic changes in the strength of associations between variables, as a function of time in the study (Reynolds et al., 2014). Combining diary methods with pre- and post-assessments and/or with more objective recordings of behavior, while experimentally manipulating diary frequency between families, will provide further insight into whether the observed temporal trends can be attributed to the effects of repeated sampling.

Direct Observations of Behavior in Natural Settings

Another way to assess life as it is lived in families is through *direct* observational techniques that capture family members' actions and reactions to each other and to their environments in real time. This approach avoids the recall, response, and item interpretation biases of *indirect* observations derived from the retrospective reports of family members and instead relies on trained coders and statistical techniques that ensure interrater reliability (Repetti, Wang, & Sears, 2013). Observational techniques take many forms and can be applied in both laboratory and more natural settings. Laboratory studies, however, risk eliciting unusual behavior by creating unusual situations. For example, a parent and child may be asked to discuss several specific emotionally laden topics in the laboratory (Fivush, Brotman, Buckner, & Goodman, 2000), but this dyad may not have similar conversations under normal circumstances and may rarely be together without others present or the

typical disruptions that characterize everyday family life. Naturalistic observational studies offer unique information to a research literature that is often driven more by methods that maximize standardization and controllability than those that maximize generalizability or applicability to daily life. Data may be collected in any setting in which participants find themselves—in a playground, at home, even in a family car—and methods of observation include audio recordings, video recordings, and live observation.

Audio recorders are sufficient when researchers are interested in aspects of speech, such as content and interaction frequency. Positive and negative couple and parent-child interactions have been examined by placing stationary audio recording equipment in high-traffic areas of families' homes (Christensen, Phillips, Glasgow, & Johnson, 1983). A novel ambulatory audio recording apparatus, the Electronically Activated Recorder (EAR), functions as an experience sampling device by unobtrusively recording brief clips of participants' acoustic environments: everything from self-talk, to laughter, to conversations in everyday life (for detailed descriptions of the EAR technology and uses, see Mehl, Pennebaker, Crow, Dabbs, & Price, 2001; Mehl & Robbins, 2012). EAR data have been used to count preschoolers' conflicts with others on a weekend day, when they were presumably mostly with family members (Slatcher & Robles, 2012). Participants rate EAR devices as unobtrusive and show high rates of compliance with their use (Mehl & Holleran, 2007).

Small stationary or ambulatory cameras as well as live videographers may also be used to record family life. To increase standardization, some studies use semi-naturalistic settings or tasks, such as an "apartment laboratory" set up to feel like a regular apartment but equipped with cameras (Driver & Gottman, 2004), or a home observation of parents asked to engage in a play task with their infants for a specified period of time using toys provided by the experimenters (Bakeman & Adamson, 1984). These studies trade some ecological validity for increased control. Other studies may sacrifice standardization entirely to examine situations that are not necessarily uniform in real life. For example, researchers at the Sloan Center on Everyday Lives of Families (CELFL) at the University of California, Los Angeles, collected more than 1,400 hours of video recordings from

a sample of 32 families going about their normal lives on two weekdays and two weekend days (Ochs, Graesch, Mittmann, Bradbury, & Repetti, 2006; Ochs & Kremer-Sadlik, 2013). Each family included two parents and at least one child between the ages of 7 and 12; ambulatory cameras followed family members as they moved about—at home, in the car, and in public settings. Activities were captured throughout the day, including events such as parents' reunions with their families after work (Campos, Graesch, Repetti, Bradbury, & Ochs, 2009) and evening meals (Ochs, Shohet, Campos, & Beck, 2010).

Making comparisons when family settings and activities vary as widely as they do in the CELF study can pose a difficulty that is not present in controlled laboratory studies. Several solutions exist; one is to measure events in situations that provide some inherent standardization. For example, stationary video recorders in a day-care center captured end-of-workday reunions between mothers and children (Repetti & Wood, 1997), and cameras positioned on a street corner captured parents' behavior while crossing the street with their children (Morrongiello & Barton, 2009). A second solution is to record what are presumed to be common occasions in families. For example, "dinner table" studies have placed stationary cameras in homes facing a table to record affect in parent-child interactions (Boyum & Parke, 1995), third-party interference in family conflicts (Vuchinich, Emery, & Cassidy, 1988), communication patterns in children with autism (Jones & Schwartz, 2009), and parents' behavioral regulatory comments (Tulviste, Mizera, De Geer, & Tryggvason, 2002). Ambulatory videographers may also record conversations regardless of when, where, or how a "family dinner" occurs (Campos et al., 2013).

Last, investigators may be present with families to observe and code behavior in real time. In the CELF study, in addition to two ambulatory videographers, a separate researcher also noted the physical location and activity of each family member every 10 minutes. These scan sampling data have been used to examine the physical proximity of family members to each other (Campos et al., 2009) and division of labor in the home (Saxbe, Repetti, & Graesch, 2011).

Advantages and disadvantages of direct naturalistic observations. Observing families in their natural settings affords ecological validity

and avoids many of the problems with participants' reports because the burden of accurately recording behavior and other setting characteristics shifts from the participant to the researcher. Instead of assessing a member's evaluation of the family, the family reveals its behavior, emotions, and attitudes through the recordings. Researchers later define variables and interpret behavior by breaking down the moment-to-moment actions and reactions that make up everyday human exchanges. Compared to self-report data, the indicators or manifestations of constructs are more explicit, more clearly defined, and applied in a more uniform manner. The resulting reliability comes at the cost of the substantial time and effort needed to develop and use coding systems, a process that is particularly challenging when observations are made in uncontrolled and nonstandardized settings. In addition, observational techniques cannot directly assess participants' internal experiences, and the range of physical locations captured with direct observations are more limited than with diary methods.

Researchers have expressed concern that observational techniques may introduce behavioral reactivity; however, the presence of recording equipment and even live observers does not appear to have a significant impact on participant behavior (Christensen & Hazzard, 1983; Gardner, 2000; Jacob, Tennenbaum, Seilhamer, Bargiel, & Sharon, 1994). Consider the alternative of questionnaire assessments; participants surely find it much easier to indulge self-presentation biases when asked to simply circle a number on a response scale compared to responding to the moment-by-moment challenges of real social interactions. Engaging in prescribed, unfamiliar tasks also seems more likely to elicit behavior outside of the participants' norms than interactions that occur while participants are conducting their daily routines and responding in the moment to family members' demands (Gardner, 2000). Thus, even relatively intrusive naturalistic observational techniques have advantages over questionnaires or laboratory observational techniques with respect to behavioral reactivity to measurement.

Ambulatory Assessments of Biological Processes

Research showing that social and emotional stressors in the family predict future physical

health has prompted interest in understanding the unfolding of biological stress responses in the context of family life (Repetti, Taylor, & Seeman, 2002; Robles, Slatcher, Trombello, & McGinn, 2013). Although some of those investigations take place in laboratory settings, there is a growing body of research that uses noninvasive methods to monitor the spontaneous activity of stress-response systems. Two types of data collected in real time through IRMs are described here: (a) salivary cortisol to assess activity of the hypothalamic–pituitary–adrenal (HPA) axis and (b) ambulatory BP monitoring to assess sympathetic–adrenomedullary functioning. The studies we summarize here connect these indicators of physiological processes with measures of everyday family life.

Diurnal cortisol. The release of the hormone cortisol is triggered by activation of the HPA system. Research on HPA activity has advanced in the past two decades thanks to the relative ease with which cortisol can now be assayed from saliva. Although most studies assess reactions to acute stressors in the laboratory, salivary cortisol is also used to measure spontaneous activity of the HPA axis and the diurnal patterning of the hormone's secretion. Cortisol levels show a strong diurnal cycle that typically includes an abrupt rise within the hour after awakening and a rapid decline during the next few hours, followed by a more gradual drop over the rest of the day. Naturalistic studies typically collect two or more samples of saliva (ideally at least four) each day for one or more days; levels of cortisol at these multiple time points are used to construct a variety of measures. The total cortisol released during the day is usually estimated by an area-under-the-curve (AUC) computation. The most frequently targeted indicators of diurnal rhythm are the rapid rise in cortisol that occurs upon awakening, known as the *cortisol awakening response* (CAR), and the slope of the decline across the day. Although all of these measures have been linked to health outcomes, the evidence is clearest for a connection between flatter cortisol slopes and adverse health, including an increased risk of mortality (Kumari, Shipley, Stafford, & Kivimaki, 2011). Details about the collection, analysis, and health correlates of salivary cortisol are presented elsewhere (Nicolson, 2008; Saxbe, 2008).

Daily cortisol has been related to day-to-day fluctuations in family variables

in within-subjects analyses. For example, one study found that less cortisol was secreted (AUC) on days when couples reported more exchanges of physical affection (e.g., touching, hugging, and kissing), an effect that was mediated by daily positive affect (Ditzen, Hoppmann, & Klumb, 2008). A separate article reported that more cortisol was produced on days with more time spent on housework or in paid employment (Klumb, Hoppmann, & Staats, 2006). That finding is consistent with research showing stressful events at home linked with a same-day increases in cortisol secretion (AUC; Stawski, Cichy, Piazza, & Almeida, 2013). Other researchers have considered how within-subject associations between measures of diurnal cortisol and daily stressors might vary according to trait-level marital or family variables. For instance, there is evidence that happy marriages can buffer the short-term effects of stressors on cortisol. In one study, wives with higher levels of marital satisfaction had lower evening cortisol after a stressful day at work (Saxbe, Repetti, & Nishina, 2008). In an ESM diary study, worrisome thoughts about work were associated with higher levels of cortisol at that moment, but only among women who reported low levels of marital satisfaction or marital disclosure (Slatcher, Robles, Repetti, & Fellows, 2010). The same type of design has been used to investigate how daily stressor–cortisol associations differ depending on the quality of the parent–child relationship. The association between daily cortisol secretion (AUC) and the seriousness of the most severe stressors experienced that day was stronger for college students who reported less warmth in their childhood relationships with parents (Hanson & Chen, 2010). Other evidence may point to the role of chronic parenting stress in moderating the effects of stressors on a parent's cortisol. Compared to other parents, those whose offspring had a psychiatric diagnosis showed a less pronounced CAR and a flatter slope on the days that followed high-stress days (Barker, Greenberg, Seltzer, & Almeida, 2012).

Diurnal cortisol data can be averaged across days to create an individual-difference variable that is then related to a marital or family variable in between-subjects analyses. For example, adults who experienced the death of a spouse within the last couple of years, on average, released less cortisol at waking and their daily slopes were flatter compared

to a matched sample of nonbereaved adults (Ong, Fuller-Rowell, Bonanno, & Almeida, 2011). In a study mentioned above, women who reported more marital satisfaction had, on average, higher morning values and steeper declines across the day (Saxbe et al., 2008). Consistent findings have been reported with cortisol collected on only a single day; men and women who reported more marital problems had lower CARs and flatter diurnal slopes (Barnett, Steptoe, & Gareis, 2005), and married participants who received more affection from their spouses had higher waking cortisol and greater cortisol change over the day (Floyd & Riforgiate, 2008). However, not all studies have detected associations between marital quality variables and diurnal cortisol (cf. Vedhara, Tuinstra, Miles, Sanderman, & Ranchor, 2006). Individual diurnal cortisol rhythms have been correlated with other indicators of stress at home. Flatter slopes were observed in women who, while conducting a tour of their homes, described them as stressful environments, using words suggesting a sense of messiness, chaos, clutter, and need for repair (Saxbe & Repetti, 2010). In a finding that may reflect the effects of parenting demands, mothers with more children had lower morning cortisol as well as lower average cortisol levels and a less steep decline across the day (Adam & Gunnar, 2001).

Some investigators have overcome the challenges of collecting saliva from children to test how their patterns of diurnal cortisol relate, on a between-subjects basis, to family variables. In a study mentioned above, preschoolers who engaged in more interpersonal conflicts, as indicated by EAR data, had flatter diurnal cortisol slopes and lower cortisol levels upon waking (Slatcher & Robles, 2012). The diurnal cortisol rhythms of children ranging from kindergarteners to adolescents have also been related to parents' descriptions of their marriages and parenting. More maternal involvement and warmth have been associated with steeper cortisol slopes and better marital functioning with lower daily cortisol secretion (Pendry & Adam, 2007). Higher morning cortisol levels have been observed in children whose parents described themselves as more involved with and accepting of their children (Booth, Granger, & Shirtcliff, 2008). Observed parental behavior has also been related to children's diurnal cortisol. Preschoolers whose mothers were rated as more supportive during a structured task

had higher post-awakening cortisol values and steeper cortisol slopes across the day (Ben-Dat Fisher et al., 2007).

Ambulatory recordings of BP. The sympathetic-adrenomedullary, or fight/flight, response to threats encompasses a wide range of biochemical and physiological changes, including increases in heart rate and BP. Most family scholars are familiar with studies that test cardiovascular reactivity to laboratory stressors, such as a conflict discussion with a spouse. This approach is now supplemented by a small literature that uses ambulatory monitoring of cardiovascular activity throughout the day. A cuff automatically inflates according to a prearranged schedule, and measures of diastolic and systolic blood pressure (DBP and SBP, respectively) are taken repeatedly while participants carry out their ordinary activities.

Ambulatory data have been used to examine how BP may be linked to family interaction. Within-subjects analyses have shown that both SBP and DBP were lower during everyday social interactions with family members compared to interactions with others (Holt-Lunstad, Uchino, Smith, Olson-Cerny, & Nealey-Moore, 2003). Most studies analyze ambulatory BP data in between-subjects designs, such as a study that assessed the effectiveness of a 4-week "warm touch" intervention, in which couples were taught to increase awareness of their partner through sensitive touching and massage. After controlling for pre-intervention SBP, husbands in the treatment group had lower post-intervention SBP than did husbands in the control group (Holt-Lunstad, Birmingham, & Light, 2008).

Ambulatory BP patterns have also been associated with household demands and responsibilities. In a sample of hypertensive and overweight men and women, greater perceived responsibility for household tasks, but not hours spent on those tasks, was associated with higher ambulatory SBP and DBP (Thurston, Sherwood, Matthews, & Blumenthal, 2011). More family responsibilities, such as the number of children in the household and greater quantity of housework, were associated with higher SBP and DBP among women with a university degree, but not among women without a degree (Brisson et al., 1999). In contrast, a study of teachers suggested that being married and having children may have a favorable effect on markers of recovery from

the physiological activation of the workday. The decline in DBP and SBP from day at work to evening at home varied depending on family status: Parents showed the greatest decrease, the married group showed an intermediate decrease, and there was no change in the sample of singles (Steptoe, Lundwall, & Cropley, 2000).

Research challenges associated with ambulatory biological data. Biological data collection procedures can be costly, demanding, difficult for children, and uncomfortable or even embarrassing (e.g., spitting into a tube in public settings). Compliance can also be problematic because of the need to record additional information at each reading. With respect to the assessment of cortisol, the storage of saliva samples adds logistical complications, and laboratory processing adds costs. Moreover, because a wide range of variables influences cortisol levels, exclusion criteria are applied when recruiting participants.

STATISTICAL MODELS

Multilevel modeling (MLM; Raudenbush & Bryk, 2002; Snijders & Bosker, 1999) is well suited for data structures in which many observations or data points are nested within each individual participant. This approach allows for the simultaneous estimation of within- and between-person effects and is flexible in handling an uneven number of observations at the within-person level, as is often the case with naturalistic designs in which the frequency and spacing of observations can vary both between and within participants. Although a detailed statistical discussion is beyond the scope of this article, we provide a brief overview of data-analytic considerations relevant to the types of research designs discussed here and refer interested readers to several recent edited volumes for more in-depth coverage of these methodological and statistical issues (Bolger & Laurenceau, 2013; Mehl & Conner, 2012; Stone, Shiffman, Atienza, & Nebeling, 2007; Walls & Schafer, 2006).

Typical MLMs in naturalistic designs assume that observational units, whether diary reports or biological samples, are collected at Level 1, or the within-person level, and are nested within individual participants at Level 2, or the between-person level. The first MLM typically fit to these data is an *unconditional means model*, which is characterized by the absence

of predictors at every level. Though rarely of research interest itself, this model allows for the calculation of an intraclass correlation coefficient, representing the percentage of the total variance in the outcome that is attributable to between-person (vs. within-person) differences. This model also serves as a benchmark against which to evaluate the fit of subsequent models.

MLM is well suited to the types of research questions that are addressed in the literature: It accommodates tests of whether relatively stable individual differences predict average levels of repeatedly assessed outcome variables; allows for tests of micro-level associations between time-varying constructs at the within-person level; and can evaluate whether such within-person associations are moderated by more stable individual or family characteristics at the between-person level, such as dispositional traits or global indicators of family functioning. In addition to modeling within-person predictor and outcome variables assessed concurrently, it is also possible to use time lags in MLM to examine whether measurements recorded at an earlier occasion predict an outcome assessed at a subsequent time point, which allows for stronger claims as to causality (see Larson & Almeida, 1999; Laurenceau & Bolger, 2005).

When constructs change according to known patterns over time, such as the diurnal rhythm of cortisol, then such temporal trends can and should be explicitly modeled in MLM. Multiple time scales can be incorporated into the same analysis to capture linear and nonlinear processes both within and across days, and elements of time series analysis can be used in combination with MLM to explore and model more complex temporal patterns. It should be noted that observations sampled closer together in time, including their residual terms, are likely to be more similar than those sampled further apart in time; the serial autocorrelation should be explicitly examined and, if necessary, corrected in multilevel models, typically through the specification of a first-order autoregressive pattern for the within-person residuals (see Bolger & Laurenceau, 2013; Schwartz & Stone, 2007).

Statistical methods developed primarily within the context of observational research, such as sequential analysis, have also addressed time dependencies in repeated measures data. Sequential analysis allows researchers to ask whether the presence of one code increases

the probability that another code will occur within a sequence of observed behavior or within a specified time window (Chorney, Garcia, Berlin, Bakeman, & Kain, 2010; Faraone & Dorfman, 1987; Howe, Dagne, & Brown, 2005). To accurately model this probability, the overall consistency in an individual's states or behavior from one observational unit to the next must be taken into account. This method has been used to examine temporal patterns in family interactions, including positive and negative reciprocity in marital communications (Margolin & Wampold, 1981) and associations between parental reassurance and child distress (Martin, Chorney, Cohen, & Kain, 2013).

IRM data collected from families and dyads pose unique analytic challenges due to the additional layer of interdependence in the data, given that observations are nested within individuals, who are in turn nested within dyads or families. Analysis of dyadic diary data usually involves actor-partner interdependence models, which make use of dummy variables to "trick" MLM software into nesting the data within dyads and examining outcomes from both partners simultaneously (Kenny, Kashy, & Cook, 2006; Laurenceau & Bolger, 2005). The analysis of repeated measures dyadic data using software typically associated with a multivariate, latent variable framework is a viable alternative approach (e.g., Laurenceau & Bolger, 2011).

The field is witnessing a rise in the application of sophisticated statistical techniques that combine elements of MLM, time series analysis, differential equation modeling, and latent variable/factor analysis, allowing researchers to quantify and test fascinating new theoretical concepts (see Walls, Höppner, & Goodwin, 2007; Walls & Schafer, 2006). Notable developments include the use of growth mixture modeling to identify profiles or classes of diurnal cortisol trajectories (Dmitrieva, Almeida, Dmitrieva, Loken, & Pieper, 2013); the application of differential equation modeling to examine the dynamics of intra-individual variability over a series of time (Deboeck, 2011); and the use of related statistical models to explore the complex dynamics of behavior, affect, or physiology of two individuals in a dyadic system across time (Butler, 2011), such as through dynamic systems modeling (Boker & Laurenceau, 2006; Ferrer & Helm, 2013; Schermerhorn, Chow, & Cummings, 2010) and dynamic factor analysis (Brose & Ram, 2011; Ferrer & Nesselroade, 2003).

ADVANCES TO THEORY

By repeatedly assessing behaviors, emotions, thoughts, and physiology in daily life, the methods described here provide a close-up view of biological, psychological, and social systems as they operate in the real world. These data have uncovered fresh empirical patterns and led to new constructs and ideas. We now highlight progress in two areas: (a) the influence that stressful experiences outside of the home have on families and (b) within-family processes, such as spillover, coregulation, and cross-over.

Linkages Between Experiences Inside and Outside of the Family

An early use of IRM methodology in family research focused on the influence that experiences at work have on family interactions. Capitalizing on day-to-day variability in individual and family variables, researchers observed how experiences earlier in the day "spill over" and shape later behavior at home (Bolger, DeLongis, Kessler, & Wethington, 1989; Repetti, 1989). This body of research has been showing how the mood and social behavior of spouses and parents change following more stressful days at work. The literature describes two common patterns of short-term responses to daily stress: social withdrawal and an increase in irritability and displays of anger (see Repetti, Wang, & Saxbe, 2009, for a review). A related line of research suggests that daily stressors at school are associated with similar changes in children's mood and interactions at home (Flook & Fuligni, 2008; Lehman & Repetti, 2007; Repetti, 1996). The most sophisticated and convincing investigations collect data in different settings (workplace, school, home) at multiple time points within the same day. Separating assessments of presumed precipitating conditions from hypothesized mediators and outcomes of interest allows researchers to test associations between experiences earlier in the day and later changes in mood, physiology, and social behavior. Some of these studies have also included objective measures, such as videotaped observations of family interaction, and spouse reports of behavior (Repetti et al., 2009).

These naturalistic data show how the emotional and physiological residue of stressors from work and school can be carried back into

the home at the end of the day, where they can change the rhythms of family life. However, individuals and families differ in the likelihood that events and experiences outside of the home will spill over into the family (Repetti & Saxbe, 2009). For example, the immediate impact of job stressors on after-work behavior is stronger among parents who report symptoms of depression and anxiety (Repetti & Wood, 1997) and in families with high levels of conflict (Story & Repetti, 2006).

Short-Term Social, Emotional, and Biological Processes That Link Family Members to Each Other

The concept of spillover applies not only to connections across boundaries that separate families from the outside world but also to connections between dyads and individuals within a family. For example, although cross-sectional and longitudinal studies have established associations between the extent and nature of marital and parent-child conflict (Erel & Burman, 1995), IRM designs have provided insights into the daily dynamics that give rise to these correlations. Daily diary reports indicate that the likelihood of hostile parenting behavior and parent-child conflict rise on days when spouses engage in conflict with each other (Erel & Burman, 1995; Sears, Repetti, Reynolds, Robles, & Krull, 2014). Almeida, Wethington, and Chandler (1999) found that marital tension on one day increased the likelihood of parent-child tension the next day by 41%–60% and that parent-child conflict raised the likelihood of same-day marital conflict. Another diary study found that the association between marital conflict and child distress was mediated by parent-child conflict in a diverse population of adolescents and their parents (Chung et al., 2009).

Diary studies have shown that daily within-family spillover processes are only one of many ways that members of a family are affected by each other's experiences. Terms like *coregulation* and *synchrony* are used to describe connections between the momentary physiological and emotional states of marital partners or within a parent-child dyad. IRMs of mood or emotion are used to model the transmission or contagion of positive and negative affect between family members. Larson and Almeida (1999) showed in a landmark special section of this journal how it was possible to chart "emotional chain

reactions" in families by testing which family member is the "sender" and which the "receiver" of the emotion. For example, both daily reports and ESM data suggest that mothers' negative emotions can be transmitted to their adolescent children (Downey, Purdie, & Schaffer-Neitz, 1999; Larson & Gillman, 1999). There is also evidence of emotional coregulation or transmission within adult couples based on diary data (Butner, Diamond, & Hicks, 2007; Ferrer & Nesselroade, 2003; Saxbe & Repetti, 2010; Schoebi, 2008; Song, Foo, & Uy, 2008; Thompson & Bolger, 1999). Some, but certainly not all, of the evidence from couples suggests that husbands' affect may be a stronger driving force than wives' affect in emotion transmission and that negative mood may be more contagious than positive mood. Streams of ambulatory biological data from family members are now used to investigate physiological coregulation or synchrony, a phenomenon by which one person is thought to up- or down-regulate the partner's psychophysiological arousal (Sbarra & Hazan, 2008). Significant covariation over time in diurnal cortisol has been observed in mother-child (Papp, Pendry, & Adam, 2009; Williams et al., 2013) and marital dyads (Liu, Rovine, Klein, & Almeida, 2013; Papp, Pendry, Simon, & Adam, 2013; Saxbe & Repetti, 2010).

Researchers are also exploring factors that shape emotional and physiological synchrony. For example, coregulation may vary depending on family members' physical proximity to each other and time spent together (Butner et al., 2007; Papp, Pendry, et al., 2009, 2013; Saxbe & Repetti, 2010; Song et al., 2008), whether they are coping with the same stressful event that day (Berg, Wiebe, & Butner, 2011), whether there are children in the family (Song et al., 2008), and exposure to life stressors (Downey et al., 1999; Larson & Gillman, 1999; Thompson & Bolger, 1999). Short-term connections between members' emotions and physiology also appear to be shaped by the quality of their relationships, as indicated by measures of marital strain and satisfaction (Liu et al., 2013; Saxbe & Repetti, 2010), couple collaboration in coping with daily stressors (Berg et al., 2011), family affective responsiveness (Williams et al., 2013), parenting behaviors (Papp, Pendry, et al., 2009), attachment style (Butner et al., 2007), and the importance and value placed on the family (Schoebi, Wang, Ababkov, & Perrez, 2010).

Coregulation effects are probably mediated by the changes in a social partner's behavior that go along with fluctuations in his or her emotion and physiology. Naturalistic research has shown how an individual's activities and behavior can influence the emotional and physiological states of other family members. For example, both a partner's disclosure of news about a positive event and supportive behaviors have been linked to short-term changes in a spouse's mood and diurnal cortisol slope (Bolger, Zuckerman, & Kessler, 2000; Crockett & Neff, 2013; Hicks & Diamond, 2008; Meegan & Goedereis, 2006; Shrout, Herman, & Bolger, 2006). Demanding or disapproving behaviors have been shown to be associated on a day-to-day basis with partner symptoms of anxiety (Zaider, Heimberg, & Iida, 2010) and negative mood (Kleiboer et al., 2007). A study that used in-home observers to track couples' daily activities over the course of a week found that diurnal cortisol was tied not only to the individual's own activities but also to the activities of his or her spouse. The healthier diurnal cortisol patterns—lower levels of evening cortisol and a steeper diurnal slope—were found in husbands whose wives spent less time involved in leisure activities and in wives married to men who devoted more time to housework (Saxbe et al., 2011).

What we are learning about the short-term social, emotional, and biological processes that tie family members to each other fits with another set of findings: Stressful experiences outside of the home can “cross over” and have a short-term impact on the mood and physiology of other family members. For example, daily job stress has been linked with an increase in a spouse's negative mood (Lavee & Ben-Ari, 2007), and husbands' worries about work are associated with short-term increases in their wives' cortisol levels (Slatcher et al., 2010). In another study, simply allocating more time to paid work was associated with greater daily cortisol secretion in a spouse (Klumb et al., 2006). By showing how family members' emotions and physiology are interlaced over minutes, hours, and days, naturalistic data are revealing the fabric of family life. The work we have discussed here indicates that the mood and physiology of one family member is affected by the behavior, mood, physiology, and experiences of another family member, even by events that occurred to the other person hours earlier in a different setting.

FUTURE DIRECTIONS

The pace of theoretical advancements should increase over the next decade as more and more investigators adopt methods that put families under the microscope. In this section, we identify several emerging trends and promising avenues for the next generation of naturalistic research.

Interdisciplinary Teams of Investigators

The everyday lives of families can be studied through the lens of members' perceptions, recordings or live observers, and indicators of biological functioning. By combining these different methods into the same investigation researchers can watch family life simultaneously unfolding at multiple levels. For example, studies that blend biological data with other naturalistic data can advance our understanding of the daily processes through which families influence health. Combinations of saliva sampling with diaries and with live observers in the home have shown that daily cortisol secretion is tied to couples' expressions of physical affection (Ditzen et al., 2008) and to a spouse's housework and leisure activities (Saxbe et al., 2011). These mixed methods studies illustrate how researchers can model family life “getting under the skin.” Studying the everyday lives of families with the assortments of data described in this article calls for collaboration with colleagues from different disciplines. The collection, analysis, and interpretation of such multifaceted data require specialist skills and knowledge that go beyond the expertise of any single researcher. In particular, ever more complex data sets will call for collaborators with statistical proficiencies to address the resultant data-analytic challenges.

Creative Explorations of Naturalistic Data

The ability to assess and model variability within individuals and within families is a hallmark advantage of the methods described in this article. In addition to understanding the situations and contexts that, on average, cause short-term changes in family members' states and behaviors, these methods also afford researchers an opportunity to explore between-person or between-family differences in the variability in individuals' responses over

time. This has been illustrated most clearly in diary research that examines affective variability or instability, a theoretically important correlate of several indices of poor mental health outcomes (Ebner-Priemer, Eid, Kleindienst, Stabenow, & Trull, 2009; Kuppens, Oravecz, & Tuerlinckx, 2010) and in work demonstrating the importance of heart rate variability in understanding regulated emotional responding (Appelhans & Luecken, 2006). Inasmuch as growing up in a stable, predictable home environment has beneficial implications for health and development, the extension of such work to the study of families would be an important contribution. In other words, by allowing for an examination of how variable or consistent the family environment is from day to day, IRM designs offer a novel way of operationalizing predictability and stability at home.

Other factors traditionally considered methodological or statistical nuisances could prove informative. Just as researchers have transitioned from treating interdependence in dyadic data as a statistical violation in need of correcting to modeling it as an important parameter in its own right, creative use of data from more than two family members may afford other theoretical advancements. For example, agreements and disagreements among family members describing the same event may offer important information. Researchers could, for instance, examine how the degree of consensus about an event relates to differences in the members' responses to it.

The research designs discussed here permit investigations of patterns of family interaction over varying time frames, from minutes, to hours, to days, to weeks. These data could uncover social rhythms that have not yet been identified, such as within-family processes of spillover or coregulation that occur over longer or shorter time lags than those that have been tested to date. Researchers are starting to explore different lagged effects with IRM data. Analyses of diurnal cortisol data have indicated same-day but not one-day lagged effects for couple coregulation (Liu et al., 2013) and no next-day effects of spouse support (Crockett & Neff, 2013). Although there is evidence of couple emotional interdependence from one day to the next (Schoebi et al., 2010), mood coregulation weakens as time elapses (Song et al., 2008). The assessment of rhythms that occur over different time periods could highlight

the variety and complexity of ways that family members influence each other.

It is clear that, among the many benefits of naturalistic methods, scholars must include the sheer volume of information that is amassed and the multiple ways the large and complex data sets that result can be exploited. There has been an incredible growth in the ability to collect and analyze vast amounts of information. The "big data revolution" has been compared to the spread of the Internet because of its potential to dramatically change business, health care, education, and politics (Mayer-Schönberger & Cukier, 2013). However, the density of naturalistic data represents both a blessing and a curse for family scholars. Possibilities for exploring a variety of patterns—across time, across individuals, across families—carry risks associated with data mining. By keeping theory prominent in plans for data analyses, statistical modeling will remain a means to an end rather than an end in itself. In addition, to facilitate the efficient accumulation of knowledge, the field should insist on comprehensive description of methods and reporting of all analyses; replication must occupy an essential place in the literature.

Use of Naturalistic Methods to Enhance Prospective Longitudinal Research and Family Interventions

IRM data can help us understand how everyday processes taking place on a short-term basis come to shape the future health and well-being of families and their individual members (Repetti, Robles, & Reynolds, 2011). Now that we are seeing how a family member's behavior, thoughts, emotions, and physiology have immediate repercussions for spouses, children, and parents, a logical next step is to embed repeated measures designs within prospective longitudinal studies to predict long-term individual and family outcomes. One investigation found that daily patterns of emotion fluctuations and overlaps in couple emotion fluctuations predicted whether the couple would still be together 1 year later (Ferrer, Steele, & Hsieh, 2012). Designs like this will allow researchers to study how biopsychosocial processes set in motion on a daily basis may accumulate over time and have a long-term impact on families and their members. In particular, naturalistic research opens a window onto the processes by which outside stressors may come to permeate

and change a family and by which stressors within families gradually influence the mental and physical health of members. Short-term processes uncovered by repeated measures designs can help us understand how families change over time and how individual members are gradually shaped by everyday experiences in the family.

IRM and recordings can also enhance clinical work with families and treatment research. Just as ecological momentary interventions are used for health behavior change and to address individual psychological problems, mobile technology can deliver therapist instructions to families in their natural settings. Interventions could be tailored, and their effectiveness assessed, through daily monitoring of family interaction and emotion (Bai & Repetti, in press).

*Video Recordings: Ecologically Valid,
Microscopic Analyses of Family Processes*

Just as early scientists put tissue samples under the microscope and were able to see cell structures and how they work, researchers can now do the same with the use of modern video technology to study families. Miniature cameras are ubiquitous in everyday life; they are part of laptop computers and mobile phones, worn on bike helmets, and used for security in public and private spaces. The new devices should herald a major turn in the road for the study of families. In comparison to *in vitro* observations made in laboratory settings, these *in vivo* observations greatly improve the ecological validity of family research (Repetti et al., 2013). The literature on emotional expression, for example, has already benefited greatly from the use of video recordings of minute changes in facial expression and vocal tone in the laboratory. Although much less work has capitalized on technological advancements to study emotion expression in everyday life, the CELF study demonstrated the feasibility of using this type of video recording to examine the facial, vocal, and physical characteristics of children's expressions of positive and negative emotion and the naturally occurring behaviors and situations in the family that evoke and sustain them (Bai, Repetti, & Sperling, 2014; Sears, Repetti, Reynolds, & Sperling, 2014) as well as the factors that affect general emotional tone and expressivity at home (Campos et al., 2013).

Direct observations of family members as they move into and out of interactions with

each other offers a granular approach to the study of family social processes by allowing the assessment of what happened *before* and *after* a particular emotion or behavior was displayed. The continuous streams of interaction that are captured by the camera preserve the normal sequencing of events, behaviors, and feelings that naturally precede, and give rise to, a particular type of interaction. For example, an investigation of spouses' exchanges of social support in the CELF recordings included scrutiny of the manner in which the exchange was initiated and was able to differentiate between two types of supportive interactions: those that arise in response to a spontaneous solicitation or request for help and those that follow a partner's unprompted offer of support (Wang & Repetti, 2014). The moment is right to harness the power of naturalistic video in family assessment. Given the novelty of the method and the ecological validity it brings to the field, the possibilities are wide ranging and exciting.

Modeling marital and family processes in real life is like trying to unravel a jumbled mass of yarn. The measurement approaches we have described in this article are beginning to disentangle the strands. Despite drawbacks such as the costs of data collection and analysis and the demands placed on participants, naturalistic methods are here to stay. They bring researchers much closer to the real world of families and take seriously the view of families as dynamic systems that change over time; they are poised to revolutionize the field.

NOTE

Meredith S. Sears's work on the article was supported by the National Science Foundation Graduate Research Fellowship Program. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation.

REFERENCES

- Adam, E. K., & Gunnar, M. R. (2001). Relationship functioning and home and work demands predict individual differences in diurnal cortisol patterns in women. *Psychoneuroendocrinology*, *26*, 189–208. doi:10.1016/S0306-4530(00)00045-7
- Almeida, D. M., Wethington, E., & Chandler, A. L. (1999). Daily transmission of tensions between marital dyads and parent-child dyads. *Journal of Marriage and the Family*, *61*, 49–61. doi:10.2307/353882

- Almeida, D. M., Wethington, E., & McDonald, D. A. (2001). Daily variation in paternal engagement and negative mood: Implications for emotionally supportive and conflictual interactions. *Journal of Marriage and Family, 63*, 417–429. doi:10.1111/j.1741-3737.2001.00417.x
- Appelhans, B. M., & Luecken, L. J. (2006). Heart rate variability as an index of regulated emotional responding. *Review of General Psychology, 10*, 229–240. doi:10.1037/1089-2680.10.3.229
- Bai, S., & Repetti, R. L. (in press). Short-term resilience processes in the family. *Family Relations*.
- Bai, S., Repetti, R. L., & Sperling, J. B. (2014). *Children's positive emotion is sustained by smiling, touching, and playing with parents and siblings: A naturalistic observational study of family life*. Manuscript submitted for publication.
- Bakeman, R., & Adamson, L. B. (1984). Coordinating attention to people and objects in mother–infant and peer–infant interaction. *Child Development, 55*, 1278–1289. doi:10.2307/1129997
- Barker, E. T., Greenberg, J. S., Seltzer, M. M., & Almeida, D. M. (2012). Daily stress and cortisol patterns in parents of adult children with a serious mental illness. *Health Psychology, 31*, 130–134. doi:10.1037/a0025325
- Barnett, R. C., Steptoe, A., & Gareis, K. C. (2005). Marital-role quality and stress-related psychobiological indicators. *Annals of Behavioral Medicine, 30*, 36–43. doi:10.1207/s15324796abm3001_5
- Barta, W. D., Tennen, H., & Litt, M. D. (2012). Measurement reactivity in diary research. In M. R. Mehl & T. S. Conner (Eds.), *Handbook of research methods for studying daily life* (pp. 108–123). London: Guilford Press.
- Beckham, J. C., Wiley, M. T., Miller, S. C., Dennis, M. F., Wilson, S. M., McClernon, F. J., & Calhoun, P. S. (2008). Ad lib smoking in post-traumatic stress disorder: An electronic diary study. *Nicotine & Tobacco Research, 10*, 1149–1157. doi:10.1080/14622200802123302
- Belcher, A. J., Laurenceau, J. P., Graber, E. C., Cohen, L. H., Dasch, K. B., & Siegel, S. D. (2011). Daily support in couples coping with early stage breast cancer: Maintaining intimacy during adversity. *Health Psychology, 30*, 665–673. doi:10.1037/a0024705
- Ben-Dat Fisher, D., Serbin, L. A., Stack, D. M., Ruttle, P. L., Ledingham, J. E., & Schwartzman, A. E. (2007). Intergenerational predictors of diurnal cortisol secretion in early childhood. *Infant and Child Development, 16*, 151–170. doi:10.1002/icd.474
- Berg, C. A., Wiebe, D. J., Butner, J. (2011). Affect covariation in marital couples dealing with stressors surrounding prostate cancer. *Gerontology, 57*, 167–172.
- Birnbaum, G. E., Reis, H. T., Mikulincer, M., Gillath, O., & Orpaz, A. (2006). When sex is more than just sex: Attachment orientations, sexual experience, and relationship quality. *Journal of Personality and Social Psychology, 91*, 929–943. doi:10.1037/0022-3514.91.5.929
- Boker, S. M., & Laurenceau, J. P. (2006). Dynamical systems modeling: An application to the regulation of intimacy and disclosure in marriage. In T. A. Walls & J. L. Schafer (Eds.), *Models for intensive longitudinal data* (pp. 195–218). New York: Oxford University Press.
- Bolger, N., DeLongis, A., Kessler, R. C., & Wethington, E. (1989). The contagion of stress across multiple roles. *Journal of Marriage and the Family, 51*, 175–183. doi:10.2307/352378
- Bolger, N., & Laurenceau, J. P. (2013). *Intensive longitudinal methods: An introduction to diary and experience sampling research*. New York: Guilford Press.
- Bolger, N., Zuckerman, A., & Kessler, R. C. (2000). Invisible support and adjustment to stress. *Journal of Personality and Social Psychology, 79*, 953–961. doi:10.1037/0022-3514.79.6.953
- Booth, A., Granger, D. A., & Shirtcliff, E. A. (2008). Gender- and age-related differences in the association between social relationship quality and trait levels of salivary cortisol. *Journal of Research on Adolescence, 18*, 239–260. doi:10.1111/j.1532-7795.2008.00559.x
- Boyum, L. A., & Parke, R. D. (1995). The role of family emotional expressiveness in the development of children's social competence. *Journal of Marriage and the Family, 57*, 593–608. doi:10.2307/353915
- Brisson, C., Laflamme, N., Moisan, J., Milot, A., Mâsse, B., & Vézina, M. (1999). Effect of family responsibilities and job strain on ambulatory blood pressure among white-collar women. *Psychosomatic Medicine, 61*, 205–213.
- Brose, A., & Ram, N. (2011). Within-person factor analysis: Modeling how the individual fluctuates and changes across time. In M. R. Mehl & T. S. Conner (Eds.), *Handbook of research methods for studying daily life* (pp. 459–468). London: Guilford Press.
- Butler, E.A. (2011). Temporal interpersonal emotion systems: The “TIES” that form relationships. *Personality and Social Psychology Review, 15*, 367–393.
- Butner, J., Diamond, L. M., & Hicks, A. M. (2007). Attachment style and two forms of affect coregulation between romantic partners. *Personal Relationships, 14*, 431–455. doi:10.1111/j.1475-6811.2007.00164.x
- Campos, B., Graesch, A. P., Repetti, R., Bradbury, T., & Ochs, E. (2009). Opportunity for interaction? A naturalistic observation study of dual-earner families after work and school. *Journal of Family Psychology, 23*, 798–807.

- Campos, B., Wang, S., Plaksina, T., Repetti, R. L., Schoebi, D., Ochs, E., & Beck, M. E. (2013). Positive and negative emotion in the daily life of dual-earner couples with children. *Journal of Family Psychology, 27*, 76–85.
- Chorney, J. M., Garcia, A. M., Berlin, K. S., Bakeman, R., & Kain, Z. N. (2010). Time-window sequential analysis: An introduction for pediatric psychologists. *Journal of Pediatric Psychology, 35*, 1061–1070. doi:10.1093/jpepsy/jsq022
- Christensen, A., & Hazzard, A. (1983). Reactive effects during naturalistic observation of families. *Behavioral Assessment, 5*, 349–362.
- Christensen, A., Phillips, S., Glasgow, R. E., & Johnson, S. M. (1983). Parental characteristics and interactional dysfunction in families with child behavior problems: A preliminary investigation. *Journal of Abnormal Child Psychology, 11*, 153–166. doi:10.1007/BF00912185
- Chung, G. H., Flook, L., & Fuligni, A. J. (2009). Daily family conflict and emotional distress among adolescents from Latin American, Asian, and European backgrounds. *Developmental Psychology, 45*, 1406–1415. doi:10.1037/a0014163.
- Cichy, K. E., Stawski, R. S., & Almeida, D. M. (2012). Racial differences in exposure and reactivity to daily family stressors. *Journal of Marriage and Family, 74*, 572–586. doi:10.1111/j.1741-3737.2012.00971.x
- Crockett, E. E., & Neff, L. A. (2013). When receiving help hurts: Gender differences in diurnal cortisol responses to spousal support. *Social Psychological and Personality Science, 4*, 190–197. doi:10.1177/1948550612451621
- Deboeck, P. R. (2011). Modeling nonlinear dynamics in intraindividual variability. In M. R. Mehl & T. S. Conner (Eds.), *Handbook of research methods for studying daily life* (pp. 440–458). London: Guilford Press.
- DeLongis, A., Capreol, M., Holtzman, S., O'Brien, T., & Campbell, J. (2004). Social support and social strain among husbands and wives: A multilevel analysis. *Journal of Family Psychology, 18*, 470–479. doi:10.1037/0893-3200.18.3.470
- Ditzen, B., Hoppmann, C., & Klumb, P. (2008). Positive couple interactions and daily cortisol: On the stress-protecting role of intimacy. *Psychosomatic Medicine, 70*, 883–889. doi:10.1097/PSY.0b013e318185c4fc
- Dmitrieva, N. O., Almeida, D. M., Dmitrieva, J., Loken, E., & Pieper, C. F. (2013). A day-centered approach to modeling cortisol: Diurnal cortisol profiles and their associations among U.S. adults. *Psychoneuroendocrinology, 38*, 2354–2365. doi:10.1016/j.psyneuen.2013.05.003
- Downey, G., Purdie, V., & Schaffer-Neitz, R. (1999). Anger transmission from mother to child: A comparison of mothers in chronic pain and well mothers. *Journal of Marriage and the Family, 61*, 62–73. doi:10.2307/353883
- Driver, J. L., & Gottman, J. M. (2004). Daily marital interactions and positive affect during marital conflict among newlywed couples. *Family Process, 43*, 301–314. doi:10.1111/j.1545-5300.2004.00024.x
- Ebner-Priemer, U. W., Eid, M., Kleindienst, N., Stabenow, S., & Trull, T. J. (2009). Analytic strategies for understanding affective (in)stability and other dynamic processes in psychopathology. *Journal of Abnormal Psychology, 118*, 195–202. doi:10.1037/a0014868
- Erel, O., & Burman, B. (1995). Interrelatedness of marital relations and parent-child relations: A meta-analytic review. *Psychological Bulletin, 118*, 108–132. doi:10.1037/0033-2909.118.1.108
- Faraone, S. V., & Dorfman, D. D. (1987). Lag sequential analysis: Robust statistical methods. *Psychological Bulletin, 101*, 312–323.
- Fauth, E. B., Zarit, S. H., Femia, E. E., Hofer, S. M., & Stephens, M. A. P. (2006). Behavioral and psychological symptoms of dementia and caregivers' stress appraisals: Intra-individual stability and change over short-term observations. *Aging & Mental Health, 10*, 563–573.
- Ferrer, E., & Helm, J. L. (2013). Dynamical systems modeling of physiological coregulation in dyadic interactions. *International Journal of Psychophysiology, 88*, 296–308.
- Ferrer, E., & Nesselroade, J. R. (2003). Modeling affective processes in dyadic relations via dynamic factor analysis. *Emotion, 3*, 344–360. doi:10.1037/1528-3542.3.4.344
- Ferrer, E., Steele, J. S., & Hsieh, F. (2012). Analyzing the dynamics of affective dyadic interactions using patterns of intra- and interindividual variability. *Multivariate Behavioral Research, 47*, 136–171. doi:10.1080/00273171.2012.640605
- Fivush, R., Brotman, M. A., Buckner, J. P., & Goodman, S. H. (2000). Gender differences in parent-child emotion narratives. *Sex Roles, 42*, 233–253.
- Flook, L., & Fuligni, A. J. (2008). Family and school spillover in adolescents' daily lives. *Child Development, 79*, 776–787. doi:10.1111/j.1467-8624.2008.01157.x
- Floyd, K., & Riforgiate, S. (2008). Affectionate communication received from spouses predicts stress hormone levels in healthy adults. *Communication Monographs, 75*, 351–368. doi:10.1080/03637750802512371
- Fuligni, A. J., & Hardway, C. (2006). Daily variation in adolescents' sleep, activities, and psychological well-being. *Journal of Research on Adolescence, 16*, 353–378. doi:10.1111/j.1532-7795.2006.00498.x
- Fuligni, A. J., & Masten, C. L. (2010). Daily family interactions among young adults in the United States from Latin American, Filipino, East Asian,

- and European backgrounds. *International Journal of Behavioral Development*, 34, 491–499. doi:10.1177/0165025409360303
- Gable, S. L., Reis, H. T., Impett, E. A., & Asher, E. R. (2004). What do you do when things go right? The intrapersonal and interpersonal benefits of sharing positive events. *Journal of Personality and Social Psychology*, 87, 228–245. doi:10.1037/0022-3514.87.2.228
- Gardner, F. (2000). Methodological issues in the direct observation of parent–child interaction: Do observational findings reflect the natural behavior of participants? *Clinical Child and Family Psychology Review*, 3, 185–198. doi:10.1023/A:1009503409699
- Gleason, M. E. J., Iida, M., Bolger, N., & Shrout, P. E. (2003). Daily supportive equity in close relationships. *Personality and Social Psychology Bulletin*, 29, 1036–1045. doi:10.1177/0146167203253473
- Gordon, A. M., & Chen, S. (2014). The role of sleep in interpersonal conflict: Do sleepless nights mean worse fights? *Social Psychological and Personality Science*, 5, 168–175. doi:10.1177/1948550613488952
- Graham, J. M. (2008). Self-expansion and flow in couples' momentary experiences: An experience sampling study. *Journal of Personality and Social Psychology*, 95, 679–694. doi:10.1037/0022-3514.95.3.679
- Hanson, M. D., & Chen, E. (2010). Daily stress, cortisol, and sleep: The moderating role of childhood psychosocial environments. *Health Psychology*, 29, 394–402. doi:10.1037/a0019879
- Hardway, C., & Fuligni, A. J. (2006). Dimensions of family connectedness among adolescents with Mexican, Chinese, and European backgrounds. *Developmental Psychology*, 42, 1246–1258. doi:10.1037/0012-1649.42.6.1246
- Hasler, B. P., & Troxel, W. M. (2010). Couples' nighttime sleep efficiency and concordance: Evidence for bidirectional associations with daytime relationship functioning. *Psychosomatic Medicine*, 72, 794–801. doi:10.1097/PSY.0b013e3181ecd08a
- Hicks, A. M., & Diamond, L. M. (2008). How was your day? Couples' affect when telling and hearing daily events. *Personal Relationships*, 15, 205–228. doi:10.1111/j.1475-6811.2008.00194.x
- Hicks, A. M., & Diamond, L. M. (2011). Don't go to bed angry: Attachment, conflict, and affective and physiological reactivity. *Personal Relationships*, 18, 266–284. doi:10.1111/j.1475-6811.2011.01355.x
- Holt-Lunstad, J., Birmingham, W. A., & Light, K. C. (2008). Influence of a "warm touch" support enhancement intervention among married couples on ambulatory blood pressure, oxytocin, alpha amylase, and cortisol. *Psychosomatic Medicine*, 70, 976–985. doi:10.1097/PSY.0b013e318187aef7
- Holt-Lunstad, J., Uchino, B. N., Smith, T. W., Olson-Cerny, C., & Nealey-Moore, J. B. (2003). Social relationships and ambulatory blood pressure: Structural and qualitative predictors of cardiovascular function during everyday social interactions. *Health Psychology*, 22, 388–397.
- Howe, G. W., Dagne, G., & Brown, C. H. (2005). Multilevel methods for modeling observed sequences of family interaction. *Journal of Family Psychology*, 19, 72–85. doi:10.1037/0893-3200.19.1.72
- Hufford, M. R. (2007). Special methodological challenges and opportunities in ecological momentary assessment. In A. A. Stone, S. Shiffman, A. A. Atienza, & L. Nebeling (Eds.), *The science of real-time data capture: Self-reports in health research* (pp. 54–75). New York: Oxford University Press.
- Iida, M., Seidman, G., Shrout, P. E., Fujita, K., & Bolger, N. (2008). Modeling support provision in intimate relationships. *Journal of Personality and Social Psychology*, 94, 460–478. doi:10.1037/0022-3514.94.3.460
- Jacob, T., Tennenbaum, D., Seilhamer, R. A., Bargiel, K., & Sharon, T. (1994). Reactivity effects during naturalistic observation of distressed and nondistressed families. *Journal of Family Psychology*, 8, 354–363. doi:10.1037/0893-3200.8.3.354
- Jones, C. D., & Schwartz, I. S. (2009). When asking questions is not enough: An observational study of social communication differences in high functioning children with autism. *Journal of Autism and Developmental Disorders*, 39, 432–443.
- Kane, H. S., Slatcher, R. B., Reynolds, B. M., Repetti, R. L., & Robles, T. F. (2014). Daily self-disclosure and sleep in couples. *Health Psychology*, 33, 813–822.
- Kenny, D. A., Kashy, D. A., & Cook, W. L. (2006). *Dyadic data analysis*. New York: Guilford Press.
- Kiang, L., & Buchanan, C. M. (2014). Daily stress and emotional well-being among Asian American adolescents: Same-day, lagged, and chronic associations. *Developmental Psychology*, 50, 611–621. doi:10.1037/a0033645
- Kihlstrom, J. F., Eich, E., Sandbrand, D., & Tobias, B. A. (2000). Emotion and memory: Implications for self-report. In A. A. Stone, J. S. Turkkan, C. Bachrach, J. B. Jobe, H. S. Kurtzman, & V. S. Cain (Eds.), *The science of self-report: Implications for research and practice* (pp. 81–99). Mahwah, NJ: Erlbaum.
- Kleiboer, A. M., Kuijer, R. G., Hox, J. J., Jongen, P. J. H., Frequin, S. T. F. M., & Bensing, J. M. (2007). Daily negative interactions and mood among patients and partners dealing with multiple sclerosis (MS): The moderating effects of emotional support. *Social Science & Medicine*, 64, 389–400. doi:10.1016/j.socscimed.2006.07.016
- Klumb, P., Hoppmann, C., & Staats, M. (2006). Work hours affect spouse's cortisol

- secretion—For better and for worse. *Psychosomatic Medicine*, *68*, 742–746. doi:10.1097/01.psy.0000233231.55482.ff
- Koerner, S. S., Shirai, Y., & Kenyon, D. B. (2010). Sociocontextual circumstances in daily stress reactivity among caregivers for elder relatives. *Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, *65B*, 561–572. doi:10.1093/geronb/gbq045
- Kumari, M., Shipley, M., Stafford, M., & Kivimaki, M. (2011). Association of diurnal patterns in salivary cortisol with all-cause and cardiovascular mortality: Findings from the Whitehall II Study. *Journal of Clinical Endocrinology & Metabolism*, *96*, 1478–1485. doi:10.1210/jc.2010-2137
- Kuppens, P., Oravecz, Z., & Tuerlinckx, F. (2010). Feelings change: Accounting for individual differences in the temporal dynamics of affect. *Journal of Personality and Social Psychology*, *99*, 1042–1060. doi:10.1037/a0020962
- Lam, C. B., McHale, S. M., & Crouter, A. C. (2012). The division of household labor: Longitudinal changes and within-couple variation. *Journal of Marriage and Family*, *74*, 944–952. doi:10.1111/j.1741-3737.2012.01007.x
- Larson, R. W., & Almeida, D. M. (1999). Emotional transmission in the daily lives of families: A new paradigm for studying family process. *Journal of Marriage and the Family*, *61*, 5–20.
- Larson, R. W., & Gillman, S. (1999). Transmission of emotions in the daily interactions of single-mother families. *Journal of Marriage and the Family*, *61*, 21–37. doi:10.2307/353880
- Laurenceau, J. P., Barrett, L. F., & Rovine, M. J. (2005). The interpersonal process model of intimacy in marriage: A daily-diary and multilevel modeling approach. *Journal of Family Psychology*, *19*, 314–323.
- Laurenceau, J. P., & Bolger, N. (2005). Using diary methods to study marital and family processes. *Journal of Family Psychology*, *19*, 86–97.
- Laurenceau, J. P., & Bolger, N. (2011). Analyzing diary and intensive longitudinal data from dyads. In M. R. Mehl & T. S. Conner (Eds.), *Handbook of research methods for studying daily life* (pp. 407–422). London: Guilford Press.
- Lavee, Y., & Ben-Ari, A. (2007). Relationship of dyadic closeness with work-related stress: A daily diary study. *Journal of Marriage and Family*, *69*, 1021–1035. doi:10.1111/j.1741-3737.2007.00428.x
- Lee, Y. S., & Waite, L. J. (2005). Husbands' and wives' time spent on housework: A comparison of measures. *Journal of Marriage and Family*, *67*, 328–336. doi:10.1111/j.0022-2445.2005.00119.x
- Lehman, B. J., & Repetti, R. L. (2007). Bad days don't end when the school bell rings: The lingering effects of negative school events on children's mood, self-esteem, and perceptions of parent-child interaction. *Social Development*, *16*, 596–618. doi:10.1111/j.1467-9507.2007.00398.x
- Liu, S., Rovine, M. J., Klein, L. C., & Almeida, D. M. (2013). Synchrony of diurnal cortisol pattern in couples. *Journal of Family Psychology*, *27*, 579–588. doi:10.1037/a0033735
- Margolin, G., & Wampold, B. E. (1981). Sequential analysis of conflict and accord in distressed and nondistressed marital partners. *Journal of Consulting and Clinical Psychology*, *49*, 554–567. doi:10.1037/0022-006X.49.4.554
- Martin, S. R., Chorney, J. M., Cohen, L. L., & Kain, Z. N. (2013). Sequential analysis of mothers' and fathers' reassurance and children's postoperative distress. *Journal of Pediatric Psychology*, *38*, 1121–1129. doi:10.1093/jpepsy/jst061
- Martire, L. M., Keefe, F. J., Schulz, R., Stephens, M. A. P., & Mogle, J. A. (2013). The impact of daily arthritis pain on spouse sleep. *Pain*, *154*, 1725–1731.
- Martire, L. M., Stephens, M. A. P., Mogle, J., Schulz, R., Brach, J., & Keefe, F. J. (2013). Daily spousal influence on physical activity in knee osteoarthritis. *Annals of Behavioral Medicine*, *45*, 213–223.
- Mayer-Schönberger, V., & Cukier, K. (2013). *Big data: A revolution that will transform how we live, work, and think*. Boston: Houghton Mifflin Harcourt.
- Meegan, S. P., & Goedereis, E. A. (2006). Life task appraisals, spouse involvement in strategies, and daily affect among short- and long-term married couples. *Journal of Family Psychology*, *20*, 319–327. doi:10.1037/0893-3200.20.2.319
- Mehl, M. R., & Conner, T. S. (2012). *Handbook of research methods for studying daily life*. London: Guilford Press.
- Mehl, M. R., & Holleran, S. E. (2007). An empirical analysis of the obtrusiveness of and participants' compliance with the Electronically Activated Recorder (EAR). *European Journal of Psychological Assessment*, *23*, 248–257. doi:10.1027/1015-5759.23.4.248
- Mehl, M. R., Pennebaker, J. W., Crow, D. M., Dabbs, J., & Price, J. H. (2001). The Electronically Activated Recorder (EAR): A device for sampling naturalistic daily activities and conversations. *Behavior Research Methods, Instruments, & Computers*, *33*, 517–523. doi:10.3758/BF03195410
- Mehl, M. R., & Robbins, M. L. (2012). Naturalistic observation sampling: The Electronically Activated Recorder (EAR). In M. R. Mehl, T. S. Conner, & M. Csikszentmihalyi (Eds.), *Handbook of research methods for studying daily life* (pp. 176–192). New York: The Guilford Press.
- Merrilees, C. E., Goeke-Morey, M., & Cummings, E. M. (2008). Do event-contingent diaries about marital conflict change marital interactions? *Behaviour Research and Therapy*, *46*, 253–262. doi:10.1016/j.brat.2007.11.007

- Morrongiello, B. A., & Barton, B. K. (2009). Child pedestrian safety: Parental supervision, modeling behaviors, and beliefs about child pedestrian competence. *Accident Analysis & Prevention, 41*, 1040–1046. doi:10.1016/j.aap.2009.06.017
- Neff, L. A., & Karney, B. R. (2005). Gender differences in social support: A question of skill or responsiveness? *Journal of Personality and Social Psychology, 88*, 79–90. doi:10.1037/0022-3514.88.1.79
- Nicolson, N. A. (2008). Measurement of cortisol. In L. J. Luecken & L. C. Gallo (Eds.), *Handbook of physiological research methods in health psychology* (pp. 37–74). Thousand Oaks, CA: Sage.
- Ochs, E., Graesch, A. P., Mittmann, A., Bradbury, T., & Repetti, R. L. (2006). Video ethnography and ethnoarchaeological tracking. In M. Pitt-Catsoupes, E. E. Kossek, & S. Sweet (Eds.), *The work and family handbook: Multi-disciplinary perspectives, methods, and approaches* (pp. 387–409). Mahwah, NJ: Erlbaum.
- Ochs, E., & Kremer-Sadlik, T. (2013). *Fast-forward family: Home, work, and relationships in middle-class America*. Berkeley: University of California Press.
- Ochs, E., Shohet, M., Campos, B., & Beck, M. (2010). Coming together at dinner: A study of working families. In K. Christensen & B. Schneider (Eds.) *Workplace flexibility: Realigining 20th-century jobs for a 21st-century workforce* (pp. 57–70). Ithaca, NY: Cornell University Press.
- Offer, S. (2013). Family time activities and adolescents' emotional well-being. *Journal of Marriage and Family, 75*, 26–41.
- Offer, S., & Schneider, B. (2011). Revisiting the gender gap in time-use patterns: Multitasking and well-being among mothers and fathers in dual-earner families. *American Sociological Review, 76*, 809–833. doi:10.1177/0003122411425170
- Ong, A. D., Fuller-Rowell, T. E., Bonanno, G. A., & Almeida, D. M. (2011). Spousal loss predicts alterations in diurnal cortisol activity through prospective changes in positive emotion. *Health Psychology, 30*, 220–227. doi:10.1037/a0022262
- Papp, L. M., Cummings, E. M., & Goeke-Morey, M. C. (2009). For richer, for poorer: Money as a topic of marital conflict in the home. *Family Relations, 58*, 91–103. doi:10.1111/j.1741-3729.2008.00537.x
- Papp, L. M., Goeke-Morey, M. C., & Cummings, E. M. (2007). Linkages between spouses' psychological distress and marital conflict in the home. *Journal of Family Psychology, 21*, 533–537. doi:10.1037/0893-3200.21.3.533
- Papp, L. M., Goeke-Morey, M. C., & Cummings, E. M. (2013). Let's talk about sex: A diary investigation of couples' intimacy conflicts in the home. *Couple and Family Psychology: Research & Practice, 2*, 60–72. doi:10.1037/a0031465
- Papp, L. M., Pendry, P., & Adam, E. K. (2009b). Mother-adolescent physiological synchrony in naturalistic settings: Within-family cortisol associations and moderators. *Journal of Family Psychology, 23*, 882–894. doi:10.1037/a0017147
- Papp, L. M., Pendry, P., Simon, C. D., & Adam, E. K. (2013). Spouses' cortisol associations and moderators: Testing physiological synchrony and connectedness in everyday life. *Family Process, 52*, 284–298. doi:10.1111/j.1545-5300.2012.01413.x
- Pendry, P., & Adam, E. K. (2007). Associations between parents' marital functioning, maternal parenting quality, maternal emotion and child cortisol levels. *International Journal of Behavioral Development, 31*, 218–231. doi:10.1177/0165025407074634
- Pomerantz, E. M., Wang, Q., & Ng, F. F. Y. (2005). Mothers' affect in the homework context: The importance of staying positive. *Developmental Psychology, 41*, 414–427. doi:10.1037/0012-1649.41.2.414
- Raudenbush, S. W., & Bryk, A. S. (2002). *Hierarchical linear models: Applications and data analysis methods*. Newbury Park, CA: Sage.
- Reis, H. T., & Gable, S. L. (2000). Event-sampling and other methods for studying everyday experience. In H. T. Reis & C. M. Judd (Eds.), *Handbook of research methods in social and personality psychology* (pp. 190–222). Cambridge, UK: Cambridge University Press.
- Repetti, R. L. (1989). Effects of daily workload on subsequent behavior during marital interaction: The roles of social withdrawal and spouse support. *Journal of Personality and Social Psychology, 57*, 651–659. doi:10.1037/0022-3514.57.4.651
- Repetti, R. L. (1996). The effects of perceived daily social and academic failure experiences on school-age children's subsequent interactions with parents. *Child Development, 67*, 1467–1482.
- Repetti, R. L., Robles, T. F., & Reynolds, B. M. (2011). Allostatic processes in the family. *Development and Psychopathology, 23*, 921–938.
- Repetti, R. L., & Saxbe, D. (2009). The effects of job stress on the family: One size does not fit all. In D. R. Crane & J. E. Hill (Eds.), *Handbook of families and work: Interdisciplinary perspectives* (pp. 62–78). New York: University Press of America.
- Repetti, R. L., Taylor, S. E., & Seeman, T. E. (2002). Risky families: Family social environments and the mental and physical health of offspring. *Psychological Bulletin, 128*, 330–366.
- Repetti, R. L., Wang, S., & Saxbe, D. E. (2009). Bringing it all back home: How outside stressors shape families' everyday lives. *Current Directions in Psychological Science, 18*, 106–111.
- Repetti, R. L., Wang, S., & Sears, M. S. (2013). Using direct observational methods to study the

- real lives of families: Advantages, complexities, and conceptual and practical considerations. In J. G. Grzywacz & E. Demerouti (Eds.), *New frontiers in work and family research* (pp. 191–210). New York: Psychology Press.
- Repetti, R. L., & Wood, J. (1997). Effects of daily stress at work on mothers' interactions with preschoolers. *Journal of Family Psychology, 11*, 90–108.
- Reynolds, B. M., Robles, T. F., & Repetti, R. L. (2014). *Compliance and measurement reactivity in daily diary research with families*. Manuscript submitted for publication.
- Robles, T. F., Reynolds, B. M., Repetti, R. L., & Chung, P. J. (2013). Using daily diaries to study family settings, emotions, and health in everyday life. *Journal of Social and Personal Relationships, 30*, 179–188. doi:10.1177/0265407512457102
- Robles, T. F., Slatcher, R. B., Trombello, J. M., & McGinn, M. M. (2013). Marital quality and health: A meta-analytic review. *Psychological Bulletin, 140*, 140–187. doi:10.1037/a0031859
- Savla, J., Almeida, D. M., Davey, A., & Zarit, S. H. (2008). Routine assistance to parents: Effects on daily mood and other stressors. *Journals of Gerontology Series B: Psychological Sciences and Social Sciences, 63*, S154–S161.
- Saxbe, D. E. (2008). A field (researcher's) guide to cortisol: Tracking HPA axis functioning in everyday life. *Health Psychology Review, 2*, 163–190. doi:10.1080/17437190802530812
- Saxbe, D. E., & Repetti, R. L. (2010). No place like home: Home tours correlate with daily patterns of mood and cortisol. *Personality and Social Psychology Bulletin, 36*, 71–81.
- Saxbe, D. E., Repetti, R. L., & Graesch, A. P. (2011). Time spent in housework and leisure: Links with parents' physiological recovery from work. *Journal of Family Psychology, 25*, 271–281.
- Saxbe, D. E., Repetti, R. L., & Nishina, A. (2008). Marital satisfaction, recovery from work, and diurnal cortisol among men and women. *Health Psychology, 27*, 15–25.
- Sbarra, D. A., & Hazan, C. (2008). Coregulation, dysregulation, self-regulation: An integrative analysis and empirical agenda for understanding adult attachment, separation, loss, and recovery. *Personality and Social Psychology Review, 12*, 141–167. doi:10.1177/1088868308315702
- Schermerhorn, A. C., Chow, S. M., & Cummings, E. M. (2010). Developmental family processes and interparental conflict: Patterns of microlevel influences. *Developmental Psychology, 46*, 869–885.
- Schneiders, J., Nicolson, N. A., Berkhof, J., Feron, F. J., DeVries, M. W., & Van Os, J. (2007). Mood in daily contexts: Relationship with risk in early adolescence. *Journal of Research on Adolescence, 17*, 697–722. doi:10.1111/j.1532-7795.2007.00543.x
- Schneiders, J., Nicolson, N. A., Berkhof, J., Feron, F. J., van Os, J., & DeVries, M. W. (2006). Mood reactivity to daily negative events in early adolescence: Relationship to risk for psychopathology. *Developmental Psychology, 42*, 543–554. doi:10.1037/0012-1649.42.3.543
- Schoebi, D. (2008). The coregulation of daily affect in marital relationships. *Journal of Family Psychology, 22*, 595–604. doi:10.1037/0893-3200.22.3.595
- Schoebi, D., Perez, M., & Bradbury, T. N. (2012). Expectancy effects on marital interaction: Rejection sensitivity as a critical moderator. *Journal of Family Psychology, 26*, 709–718. doi:10.1037/a0029444
- Schoebi, D., Wang, Z., Ababkov, V., & Perez, M. (2010). Affective interdependence in married couples' daily lives: Are there cultural differences in partner effects of anger? *Family Science, 1*, 83–92. doi:10.1080/19424620903471681
- Schwartz, J. E., & Stone, A. A. (2007). The analysis of real-time momentary data: A practical guide. In A. A. Stone, S. Shiffman, A. A. Atienza, & L. Nebeling (Eds.), *The science of real-time data capture: Self-reports in health research* (pp. 76–113). New York: Oxford University Press.
- Schwarz, N. (2007). Retrospective and concurrent self reports: The rationale for real-time data capture. In A. A. Stone, S. Shiffman, A. A. Atienza, & L. Nebeling (Eds.), *The science of real-time data capture: Self-reports in health research* (pp. 11–26). New York: Oxford University Press.
- Sears, M.S., Repetti, R.L., Reynolds, B.M., Robles, T.F., & Krull, J. L. (2014). *Spillover in the home: The effects of family conflict on parents' behavior*. Manuscript submitted for publication.
- Sears, M. S., Repetti, R. L., Reynolds, B. M., & Sperling, J. B. (2014). A naturalistic observational study of children's expressions of anger in the family context. *Emotion, 14*, 272–283. doi:10.1037/a0034753
- Serido, J., Almeida, D. M., & Wethington, E. (2004). Chronic stressors and daily hassles: Unique and interactive relationships with psychological distress. *Journal of Health and Social Behavior, 45*, 17–33. doi:10.1177/002214650404500102
- Shiffman, S., Stone, A. A., & Hufford, M. R. (2008). Ecological momentary assessment. *Annual Review of Clinical Psychology, 4*, 1–32. doi:10.1146/annurev.clinpsy.3.022806.091415
- Shrout, P. E., Herman, C. M., & Bolger, N. (2006). The costs and benefits of practical and emotional support on adjustment: A daily diary study of couples experiencing acute stress. *Personal Relationships, 13*, 115–134. doi:10.1111/j.1475-6811.2006.00108.x

- Slatcher, R. B., & Robles, T. F. (2012). Preschoolers' everyday conflict at home and diurnal cortisol patterns. *Health Psychology, 31*, 834–838. doi:10.1037/a0026774
- Slatcher, R. B., Robles, T. F., Repetti, R. L., & Fellows, M. D. (2010). Momentary work worries, marital disclosure, and salivary cortisol among parents of young children. *Psychosomatic Medicine, 72*, 887–896. doi:10.1097/PSY.0b013e3181f60fcc
- Smith, D. A., Breiding, M. J., & Papp, L. M. (2012). Depressive moods and marital happiness: Within-person synchrony, moderators, and meaning. *Journal of Family Psychology, 26*, 338–347. doi:10.1037/a0028404
- Snijders, T. A. B., & Bosker, R. J. (1999). *Multilevel analysis: An introduction to basic and advanced multilevel modeling*. London, UK: Sage.
- Song, Z., Foo, M. D., & Uy, M. A. (2008). Mood spillover and crossover among dual-earner couples: A cell phone event sampling study. *Journal of Applied Psychology, 93*, 443–452. doi:10.1037/0021-9010.93.2.443
- Stawski, R. S., Cichy, K. E., Piazza, J. R., & Almeida, D. M. (2013). Associations among daily stressors and salivary cortisol: Findings from the National Study of Daily Experiences. *Psychoneuroendocrinology, 38*, 2654–2665. doi:10.1016/j.psyneuen.2013.06.023
- Steptoe, A., Lundwall, K., & Cropley, M. (2000). Gender, family structure and cardiovascular activity during the working day and evening. *Social Science & Medicine, 50*, 531–539.
- Stone, A. A., & Shiffman, S. (1994). Ecological momentary assessment (EMA) in behavioral medicine. *Annals of Behavioral Medicine, 16*, 199–202.
- Stone, A. A., Shiffman, S., Atienza, A. A., & Nebeling, L. (2007). *The science of real-time data capture: Self-reports in health research*. New York: Oxford University Press.
- Story, L. B., & Repetti, R. L. (2006). Daily occupational stressors and marital behavior. *Journal of Family Psychology, 20*, 690–700.
- Telzer, E. H., & Fuligni, A. J. (2009). Daily family assistance and the psychological well-being of adolescents from Latin American, Asian, and European backgrounds. *Developmental Psychology, 45*, 1177–1189. doi:10.1037/a0014728
- Thompson, A., & Bolger, N. (1999). Emotional transmission in couples under stress. *Journal of Marriage and the Family, 61*, 38–48. doi:10.2307/353881
- Thurston, R. C., Sherwood, A., Matthews, K. A., & Blumenthal, J. A. (2011). Household responsibilities, income, and ambulatory blood pressure among working men and women. *Psychosomatic Medicine, 73*, 200–205. doi:10.1097/PSY.0b013e3182080e1a
- Tucker, C. J., & Winzeler, A. (2007). Adolescent siblings' daily discussions: Connections to perceived academic, athletic, and peer competency. *Journal of Research on Adolescence, 17*, 145–152. doi:10.1111/j.1532-7795.2007.00515.x
- Tulviste, T., Mizera, L., De Geer, B., & Tryggvason, M. T. (2002). Regulatory comments as tools of family socialization: A comparison of Estonian, Swedish and Finnish mealtime interaction. *Language in Society, 31*, 655–678.
- Updegraff, K. A., McHale, S. M., Whiteman, S. D., Thayer, S. M., & Delgado, M. Y. (2005). Adolescent sibling relationships in Mexican American families: Exploring the role of familism. *Journal of Family Psychology, 19*, 512–522.
- Vedhara, K., Tuinstra, J., Miles, J. N. V., Sanderman, R., & Ranchor, A. V. (2006). Psychosocial factors associated with indices of cortisol production in women with breast cancer and controls. *Psychoneuroendocrinology, 31*, 299–311. doi:10.1016/j.psyneuen.2005.08.006
- Vuchinich, S., Emery, R. E., & Cassidy, J. (1988). Family members and third parties in dyadic family conflict: Strategies, alliances, and outcomes. *Child Development, 59*, 1293–1302. doi:10.2307/1130492
- Walls, T. A., Höppner, B. B., & Goodwin, M. S. (2007). Statistical issues in intensive longitudinal data analysis. In A. A. Stone, S. Shiffman, A. A. Atienza, & L. Nebeling (Eds.), *The science of real-time data capture: Self-reports in health research* (pp. 338–360). New York: Oxford University Press.
- Walls, T. A., & Schafer, J. L. (2006). *Models for intensive longitudinal data*. New York: Oxford University Press.
- Wang, S., & Repetti, R. L. (2014). Psychological well-being and job stress predict marital support interactions: A naturalistic observational study of dual-earner couples in their homes. *Journal of Personality and Social Psychology, 107*, 864–878.
- Wethington, E., & Almeida, D. M. (2009). Assessment of stressor exposure using telephone diaries: The Daily Inventory of Stressful Events. In R. F. Belli, F. P. Stafford, & D. F. Alwin (Eds.), *Calendar and time diary methods in life course research* (pp. 87–107). Thousand Oaks, CA: Sage.
- Williams, S. R., Cash, E., Daup, M., Geronimi, E. M. C., Sephton, S. E., & Woodruff-Borden, J. (2013). Exploring patterns in cortisol synchrony among anxious and nonanxious mother and child dyads: A preliminary study. *Biological Psychology, 93*, 287–295. doi:10.1016/j.biopsycho.2013.02.015
- Zaider, T. I., Heimberg, R. G., & Iida, M. (2010). Anxiety disorders and intimate relationships: A study of daily processes in couples. *Journal of Abnormal Psychology, 119*, 163–173. doi:10.1037/a0018473