

In the Moment: The Benefits of the Experience Sampling Method

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“Where did the time go?” is a common phrase used by individuals when reflecting on how their time was spent and their memories of recent experiences. In certain types of scientific experiments conducted in laboratories, researchers try to interpret how individuals feel when confronted with different simulated life experiences and their reactions to them. In contrast, the Experience Sampling Method (ESM) is a unique method for estimating how individuals actually spend their time, who they are spending it with, what activities they are engaged in, and how they subjectively interpret the experience. Unlike the laboratory experience, individuals are randomly notified by a beeper during everyday experiences and, when signaled, record what they are doing and how they are feeling. Developed by Mihaly Csikszentmihalyi and colleagues in the 1970s (Csikszentmihalyi, Larson, & Prescott, 1977; Csikszentmihalyi & Csikszentmihalyi, 1988; Csikszentmihalyi & Larson, 1984), the ESM is especially useful for revealing the subjective experiences of persons in their natural environments. The data obtained from the ESM make it possible to investigate how differences in location, time, and physical and social environments affect individuals’ quality of experience. Not without methodological problems, particularly with respect to sampling bias, burden, and nonresponse, the ESM continues to be one of the favored methods for studying time use and the emotional states associated with reported activities. This chapter describes the strengths and weaknesses of the ESM, how it compares with other methods for studying time use, and its advantages for understanding the daily experiences of adults and adolescents.

MEASURING TIME USE

One of the key problems in studying how individuals spend their time and how they feel when engaged in specific activities is finding the most efficient and accurate method for recording human behaviors and emotional responses. This can be challenging as people have a tendency to exaggerate time spent on socially desirable activities and underreport time spent on activities viewed as socially undesirable, such as excessive use of alcohol. Whatever method is used for

collecting time use information, it is likely subject to inherent sources of bias. Clearly, a preferable method would be direct and unobtrusive observations of human life, such as using some type of hidden surveillance device to record individual behaviors throughout the course of a day. While likely to be the most accurate for measuring time use, this method, even with the respondent's approval, raises ethical issues as well as being logistically problematic and prohibitively expensive. When people know they are being observed, they may change their behaviors, thus producing nontypical estimates of their time use. However, there are some studies that involve extensive videography that have been able to overcome this problem (see Ochs, this volume). When participants become accustomed to the researcher's presence, they are less likely to be defensive and alter their behavior. Over time, the camera is hardly noticeable and becomes an unobtrusive part of the environment.

The most common method for obtaining information on time use is to ask individuals retrospective questions, such as those traditionally used by the U.S. Census Bureau, which ask the respondent how many hours he or she worked in the previous week. Although less intrusive, this method and others that rely on retrospective questions have been shown to produce unreliable time use estimates (Mulligan, Schneider, & Wolfe, 2003). An alternative to retrospective survey questions is the time diary method, which requires individuals to record their activities and the times at which they occurred. There are several types of time diaries. Perhaps the most well known is the full-day diary, used in a series of studies at the Universities of Maryland and Michigan (Juster & Stafford, 1985; Robinson & Godbey, 1997; Bianchi, Milkie, Sayer, & Robinson, 2000). In full-day diary studies, respondents are asked to name the activity or activities they were engaged in during each of ninety-six 15-minute intervals over a 24-hour period. These full-day diaries are collected using a variety of procedures including in-person interviews, telephone interviews, or return mail surveys. Some studies ask individuals to report their previous day's activities, while others introduce respondents to the diary and ask them to begin using it when they wake up the next day. Another form of time diary, used primarily for estimating the number of hours worked, is the travel schedule diary (Jacobs, 1998). Individuals report what time they leave for work, how much time they spend commuting, and what time they return home.

The ESM is another method for studying time use (Csikszentmihalyi & Csikszentmihalyi, 1988; Csikszentmihalyi & Larson, 1984). The term "experience sampling" refers to the collection of data about individuals' self-reported feelings and actions within the context of everyday life. The common procedure used in an ESM study is to notify individuals by a beeper and have them, when signaled, record what they are doing and feeling. Experience sampling designs vary in terms of when events are sampled: at fixed intervals, randomly throughout the day, or in response to some event or set of events over the course of a few days to a month (for excellent reviews, see Bolger, Davis, & Rafaeli, 2003; Reis & Gable, 2000). A critically important aspect of the ESM is that it permits individuals to report on experiences as they occur in a natural setting, thus minimizing the likelihood of retrospective bias.

The Csikszentmihalyi studies typically ask participants to respond to eight signals per day over the course of a week, which has the advantage of sampling over 7 consecutive days rather than on a given day. Researchers have the option of choosing the frequency and duration of the signaling schedule. Obtaining sufficient responses allows investigators to address questions about within- and between-person differences in emotion. In contrast to a single-report item where respondents tend to give more weight to recent or intense experiences, the ESM captures how they feel at each moment signaled, thus minimizing systematic and random sources of measurement error (Redelmeier & Kahneman, 1996; Stone & Neale, 1980). One of the most valuable aspects of instruments like the ESM, where participants answer questions over several consecutive days, is that it is possible to learn how moods fluctuate from morning to night; are experienced over the weekend versus the weekday; and, if data are collected over a period of

months or years, how individuals change over time. The ability to measure temporal effects is one of the major strengths of this type of method.

One major investigation that used the ESM over the course of 5 years is the Alfred P. Sloan Study of Youth and Social Development. In this national initiative designed to learn how young people form ideas about careers, over 1,000 adolescents participated in the ESM through their teenage years into adulthood. This study was able to investigate not only variations across a week in how adolescents experienced their relationships with parents, friends, and teachers, but also replicated this methodology longitudinally over a 5-year period (Csikszentmihalyi & Schneider, 2000; and the special issue of *Applied Developmental Science*, edited by Csikszentmihalyi & Schneider, 2001).¹

ESM studies have been conducted with diverse populations, including adults and adolescents, and provide estimates on how much time adults watch television (Kubey & Csikszentmihalyi, 1990), do housework, and work at their jobs (Schneider & Waite, 2005) and how much time adolescents spend on homework, socializing with friends, or being home alone (Csikszentmihalyi, Rathunde, & Whalen, 1993; Csikszentmihalyi & Schneider, 2000). One of the major findings of the adolescent study was how much time adolescents actually spend at home alone, a finding that has been validated with data from other survey instruments. Unstructured time, particularly for adolescents, can be an especially negative experience. In the adolescent study, Hispanic high school students spent considerably more time than other groups milling around outside and inside school, and traveling to and from school and work. Milling around time, much like time alone, tends to promote low self-esteem and disengagement (Csikszentmihalyi & Schneider, 2000; Schneider & Stevenson, 1999).

There is considerable variation in ESM research technology, including beepers, watches, and handheld computers, such as Palm Pilots (see Bolger, Davis, & Rafaeli, 2003, for a review of the strengths and limitations of these methods). A new handbook is forthcoming that summarizes ESM procedures and the types of studies and findings that rely on the ESM (Csikszentmihalyi, Hektner, & Schmidt, forthcoming). Because there are so many new and extensive materials on ESM methods, rather than reviewing these sources, this chapter focuses on one major initiative, the 500 Family Study, which examines how working families and their children spend their time at work, at school, and at home and how they interpret these experiences (Schneider & Waite, 2005). To illustrate how the ESM can be used and its methodological strengths and limitations, this chapter reviews selected findings from ESM analyses.

In the 500 Family Study, researchers preprogrammed wristwatches (a Casio brand that emitted unobtrusive beeps) according to a schedule that signaled the parents and their children randomly seven times a day at different intervals from 7:30 A.M. through 10:30 P.M. over the course of a normal week. The beeping schedule was tailored to each family member's sleep and wake patterns, in order to take into account nonstandard work schedules. This procedure, it could be argued, more accurately captures the waking experiences of working parents and their children than methods that do not consider nonstandard work schedules. The predetermined schedule of signals was designed to be unpredictable to the respondent, thus providing a representative sample of each person's moods and activities for that day and week. The respondents were asked to fill out a one-page, two-sided form each time they were signaled. The form takes about 2 to 3 minutes to complete. Figure 22.1 displays the two-sided ESM form used in the 500 Family Study.

As seen in Fig. 22.1, the front page of the form asks the respondent to verify the date, time when signaled, and the time when responding. As might be expected, individuals are occasionally beeped at times when it is difficult to respond, for example, when in the shower, listening to a concert, or in the midst of an argument. Asking two questions, the time when signaled and the time when responding, allows the analyst to determine the time lapse from signal to response. If the duration between the time beeped and time answered is longer than

Date _____ Time you were beeped _____ am/pm Time you responded _____ am/pm

As you were beeped...

Where were you? _____
PLEASE BE SPECIFIC

What was the main thing you were doing? _____
PLEASE BE SPECIFIC

What else were you doing at the same time? _____
PLEASE BE SPECIFIC

What was on your mind? _____
PLEASE BE SPECIFIC

Were you alone... Yes ___ No ___ ... or were you with... (please check all that apply)

Your Spouse ___ Your Boss ___ Co-Workers ___ Friend(s) ___ Girl/Boyfriend ___

Your Mother ___ Your Father ___ Teacher ___ Classmates/Peers ___ Other(s) ___

Your Child(ren) ___ (please indicate who) _____

Your Sibling(s) ___ (please indicate who) _____

Think back on how you got into this activity...

Were you doing this **main activity** because you... (check all that apply)

(1) Wanted to ___ (2) Had to ___ (3) had nothing else to do ___

Indicate how you felt about the main activity.

(Please circle one number for each question)

	Not at All	A Little	Somewhat	Very Much
Did you enjoy what you were doing?	0	1	2	3
Was this activity interesting ?	0	1	2	3
How well were you concentrating ?	0	1	2	3
Were you living up to your expectations ?	0	1	2	3
Did you feel in control of the situation?	0	1	2	3
Did the situation allow you to be involved or to act ?	0	1	2	3
Did you have the abilities to deal with the situation?	0	1	2	3
Was the activity important to you ?	0	1	2	3
Were others expecting a lot from you?	0	1	2	3

Were you succeeding at what you were doing?	0	1	2	3
Did you wish you were doing something else ?	0	1	2	3
Did you feel good about yourself?	0	1	2	3

FIG. 22.1. The Experience Sampling Method (ESM) form.

How did you feel as you were beeped? (For every pair of opposites, please circle only one mark.)

<i>Happy</i>	<i>Sad</i>	<i>Weak</i>	<i>Strong</i>	<i>Passive</i>	<i>Active</i>	<i>Excited</i>	<i>Bored</i>
☐ ☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐ ☐

As you were being beeped, were you feeling...? (Circle one number for each question)

	Not at all	A little	Some what	Very Much		Not at all	A little	Somew hat	Very Much
Cheerful	0	1	2	3	Worried	0	1	2	3
Lonely	0	1	2	3	Caring	0	1	2	3
Nervous	0	1	2	3	Irritated	0	1	2	3
Cooperative	0	1	2	3	Relaxed	0	1	2	3
Angry	0	1	2	3	Stressed	0	1	2	3
Responsible	0	1	2	3	Proud	0	1	2	3
Frustrated	0	1	2	3	Friendly	0	1	2	3
Competitive	0	1	2	3	Hardworking	0	1	2	3
Strained	0	1	2	3	Productive	0	1	2	3

Did you feel any physical pain or discomfort as you were beeped? None Slight Bothersome Severe
(Please describe) _____ 0 1 2 3

If you were talking with people, please answer the following 3 questions:

	Not at All	A Little	Somewhat	Very Much
Were you able to express your opinion?	0	1	2	3
Were others really listening to what you had to say?	0	1	2	3
Did you care about what others were saying?	0	1	2	3

If you felt a strong emotion since the last report, what did you feel and why did you feel that way?

I felt _____ because _____
PLEASE BE SPECIFIC

If anyone else you were with expressed a strong emotion to you since the last report, what did they feel and why?

(who) _____ felt _____ because _____
PLEASE BE SPECIFIC

COMMENTS, ETC.

FIG. 22.1. (Continued).

20 minutes, the information is discarded as the responses are no longer regarded as "in the moment," but instead are retrospective analyses of the event. Time signaled is also important as it can be verified with the predetermined random time schedule and used to check the reliability of the participant's response patterns.

The place indicator is particularly valuable as it describes where the participant is. The place codes were constructed similar to a Dewey Decimal system with the first set of numbers as the main identifiers followed by additional numbers that signify more specific categories. Presently there are approximately 200 place codes used in various ESM studies conducted at the

University of Chicago (see Csikszentmihalyi & Schneider, 2000 and Schneider & Waite, 2005, for more detailed descriptions of these place codes). Following place codes are the “doing” or activity codes. Respondents report what activities they are engaged in when signaled, and these activities are coded using a classification system similar to that for the place codes. Because people spend so much time multitasking, participants are asked to report both their primary and secondary activities. Having both primary and secondary activity codes is valuable for estimating time use, especially at work and at home. For example, an individual at work could be beeped when eating lunch and reading e-mails, raising the question whether this activity should be considered as personal care or working. If seen as working, then the issue is whether the secondary activity should be assigned the same weight as the primary activity.

Primary and secondary activity codes are also helpful for more accurately estimating time spent on housework, such as doing laundry while cooking dinner (see Lee, 2005, on this issue). Wives are more likely to multitask, perhaps leading to an underestimate of how much time they spend on housework. The final code in this series is the thinking code, designed to determine congruence between cognitive engagement and activity codes. Returning to the housework example, most estimates of housework exclude the planning of household tasks. Thinking codes allow researchers to include in their estimates of time spent on housework these “invisible” mental tasks. Over 400 activity and thinking codes have been constructed for the 500 Family Study.²

To obtain the fraction of total time spent in an activity using ESM responses based on a beeping schedule that extends over a week, the typical calculation is made by dividing the number of beeps for which the respondent reports doing a particular task by the total number of beeps to which he or she responded. Ratios are then transformed into hours by multiplying that number by the number of days beeped and the number of waking hours in a day. For the 500 Family Study, the percentage of time would be this ratio times 112 hours (i.e., 7 days $\times$ 16 hours per day). In cases of secondary activities, analysts will sometimes add additional time to the primary activity to obtain more accurate estimates of time use. However, to minimize inflation of estimates, most analysts will add to the primary activity only a proportion of time for the secondary activity.

The next set of categories describes who the respondent is with. The codes for these items are useful for determining time spent with family, friends, and being alone. In the 500 Family Study, these items were particularly useful for determining how much time family members spent together and how they felt during shared activities. An additional item, sometimes referred to as the volition measure, asks respondents whether they were engaged in the activity because they had to, wanted to, had nothing else to do, or some combination of these response options. This item makes it possible to assess the strength of the respondents’ motivations for engaging in certain tasks such as housework, schoolwork, and paid work.

Following these items is a series of Likert-type scales that measure how the respondent feels about the activity, including such items as enjoyment, interest, concentration, control, and involvement. Embedded within this list of items are another series of questions that are internal assessments, including living up to one’s expectations of oneself and others, having the ability to deal with the situation, how successful and good the individual feels about what he or she is doing, and how motivated he or she feels about the activity. (The actual item asks the extent to which the respondent wishes to be doing something else.) In the 500 Family Study, issues of expectations are important for understanding whether individuals believe their actions are viewed as legitimate and meeting with others’ approval. Expectations can be assessed in reference to marriage, work, childbearing, and schoolwork.

The second side of the ESM form continues with more scaled items pertaining to the respondent’s emotional states, including measures of positive affect (happy, cheerful, and

friendly) and negative affect (irritated, angry, and worried). At the top of the page are a set of items designed as bipolar adjective pairs (e.g., sad-happy) and several monopolar ones. Both bipolar and monopolar items are used to determine relative degrees of stability and consistency across items (see Diener & Larson, 1984, and Diener, Smith, & Fujita, 1995, on this point). Some controversy exists regarding whether one type of scale is more accurate and reliable than the other. In the 500 Family Study, the decision was made to include both types of scales.

Several modifications to the ESM form were made in the 500 Family Study to accommodate the adult sample, including expanded activity, place, and thinking codes. To provide an additional view on physical health, an item was developed to detect instances of pain and their frequency. The third set of items on the second page of the ESM is an attempt to learn about perceptions of "voice." Several researchers have suggested that communication patterns differ markedly between men and women (see, e.g., Tannen, 1990). These items were constructed to obtain personal assessments of opportunities to express oneself and to learn if they vary from work to home. To provide more temporal contextual information for a specific beep, the last set of items before the comments section was designed to provide a self-report of prior emotional experiences.

Much like time diaries, the ESM has been criticized as being too burdensome; that is, the time and cognitive demands made on the respondent are more excessive than the demands typically made by surveys. There may also be an inherent selection bias with these methods if the people who agree to participate differ systematically from those who do not (Zuzanek, 1999). Critics have also suggested that individuals may underreport what they are doing simply because they do not wish to be interrupted. Such underreporting is often thought to occur more frequently outside the home where respondents may be unwilling to answer the beeps. Recent studies suggest that this is not the case and that people are more likely to respond at work and at school (Mulligan, Schneider, & Jeong, 2004).

USING THE ESM IN THE 500 FAMILY STUDY

The purpose of the 500 Family Study, conducted in 1999–2000, was to understand how working families balance work and life experiences. Recognizing that the composition of the family would likely make different demands on the responsibilities of mothers and fathers, the study was designed to include 300 families with adolescents and 200 with kindergarten children. Drawing from a sample of families from eight communities across the United States, multiple methods were used to explore a variety of questions regarding the influence work had on family life, the quality of relationships among working families, and stresses and conflicts parents and their children experience when both parents are working full-time.

The sites for the study were selected to vary in their levels of urbanization, labor force composition, and socioeconomic characteristics. Four of the communities are predominately upper-middle class, where the majority of the parents are college-educated professionals with family incomes above \$50,000. The four remaining communities are middle or lower-middle class in which 20 to 30% of the adults have earned college or advanced degrees and are employed in managerial or professional jobs; the median family income in these communities ranges from \$40,000 to \$44,000 per year (U.S. Department of Commerce, Bureau of the Census, 2002). Families in the study were recruited through solicitation by phone, mail, and newspaper advertisements. At each of the sites, permission to send out informational packets about the study was obtained from local high schools and elementary schools. Two sites included letters

in school newsletters inviting families to participate. Advertisements were also run in local newspapers asking families to contact the university if interested in participating in the study. Additionally, families were referred by parents already participating in the study, and these families were contacted by phone. (For a full description of the design, sample, and procedures for the 500 Family Study, see Hoogstra, 2005.)

Several methods were used to examine the family and work experiences of the parents and children in the study, including surveys, in-depth interviews, and the ESM. By triangulating data obtained through these different methods, a fairly comprehensive picture of work and family life can be constructed. Several items included in the survey correspond to questions in the ESM, thereby allowing analysts to assess reliability of time use estimates for such activities as housework and television viewing. Following procedures outlined by Csikszentmihalyi and Larson (1987), respondents were asked to wear wristwatches preprogrammed to emit several signals each day. The schedule was set so that the watch beeped at random times in 2-hour blocks during respondents' waking hours, with the restriction that no two signals occurred less than 30 minutes apart. To the extent possible, members of the same family were placed on identical signaling schedules so that it would be possible, as during the dinner hour, to analyze individuals' responses to shared activities. Trained coders, using detailed schemes, coded the open-ended responses. Inter-rater reliabilities on the ESM coding, based on person agreement, ranged from .79 to .95.

Respondents provided more than 45,000 ESM responses during the week of experience sampling. Participants were typically signaled eight times each day for 7 consecutive days, for a total of 56 signals per person for an entire week. Signaling schedules were modified slightly in cases where participants were typically awake for substantially fewer or greater than 16 hours each day. Although participants were asked to respond as often as possible, there were times when it was difficult or inconvenient to respond (e.g., while driving, attending religious services, or talking with a client). In such instances, participants were asked to complete the ESM form as soon as possible after being signaled. On average, mothers responded to 44 signals over the course of a week (a 78% response rate), and fathers responded to 41 signals (a 73% response rate). Response rates were slightly lower among adolescents. Teenagers responded to an average of 30 out of 56 beeps over the course of the week, with girls having higher response rates than boys (girls responded to 34 signals on average, while boys responded to 27). Thus, adults in the study only failed to respond to one in seven beeps, on average. In other words, they responded to most signals.

It is important to understand differences in response rates for the ESM in comparison with surveys or other types of instruments. In a typical national survey, the average nonresponse rate across items varies from 5 to as much as 30% (see, e.g., frequency distributions on items in *High School Beyond* and the *National Educational Longitudinal Study of 1988–2000*). Nonresponse to items is different than nonresponse by participants (i.e., failing to complete the survey at all). In large national surveys, the number of cases lost because of nonresponse to critical items can be considerable, and sophisticated imputation procedures have been developed for missing items so that the population estimates are not biased by nonresponse. For an individual's ESM records to be considered in an ESM analysis, he or she must have responded to, at a minimum, more than a fourth of the signals.

Nonresponse in ESM studies could be systematic; that is, there may be patterns across individuals, times, or places that influence when individuals respond. In analyzing ESM data, it is important to understand how missing responses are related to other variables in the data set. Jeong (2005) has developed new weighting procedures that take into account both response rates of individuals and the distribution of responses within clusters of activities. For example, adolescent boys tend to answer more beeps when in school than out of school (Mulligan,

Schneider, & Jeong, 2004). Jeong found that ESM response rates vary over the course of the week; the response rate for the first day of participation is greater than 83%, but gradually declines to 67% by the final day. Response rates also vary by day of the week, with higher response rates occurring on weekdays compared to weekends. Jeong cautioned potential ESM analysts to consider varying the days on which participants begin the ESM and to devise special incentives so that individuals will continue to participate throughout the course of the week.

ESM data are typically stored and analyzed at two levels: beep and person. In beep-level analyses, multiple beeps from the same individual are treated as independent records. Person-level analyses are based on percentages, means, and other aggregate scores of a group variable or variables for each respondent, often in conjunction with information from other instruments. In most statistical analyses of ESM data, mean values are calculated for each person's responses to a given item, and these means, rather than specific responses, are used in analysis. Thus, the unit of analysis is the person, not the response. In examining whether fathers or mothers report greater stress, for example, the appropriate comparison is between the mean stress scores of fathers and mothers. However, because ESM data consist of responses nested within individuals, it is possible to analyze the data at two levels—the beep level and person level—using multilevel modeling techniques, such as hierarchical linear modeling (HLM).

With respect to time use, ESM findings show that mothers spend less time than fathers on work-related activities, findings which were verified with survey results. In contrast to fathers, mothers spend more time engaged in social activities with family members and others, and on maintenance activities such as housework. Mothers and fathers in the sample spent comparable amounts of time in leisure activities and "other" activities such as commuting. Regarding measures of emotion obtained from the ESM, both mothers and fathers reported relatively low levels of stress, anger, worry, frustration, and irritation over the week of ESM participation. In contrast, they reported feeling moderately cheerful, cooperative, caring, relaxed, and friendly. While the general patterns of response are similar for mothers and fathers, some significant gender differences emerged. Mothers scored significantly higher than fathers on measures of caring, but reported feeling significantly more worried and significantly less cooperative, friendly, and relaxed.

Figure 22.2 shows the time period of 5 to 9 p.m. for one family, including the mother, father, and adolescent. The lines show individual responses for enjoyment at each beep relative to each family member's own mean. In ESM studies, analysts often use z scores in their analyses. Recognizing that people use scales differently and that some individuals may never feel very sad or happy, z scores allow the analyst to create a standardized score for each affect measure as well as more global mood scores. Comparisons of affect are consequently made in reference to an individual's overall mean. The benefit of the z score is that it is calculated relative to a person's entire schedule of beeps, not to a specific time. In this way it is possible to learn if a person, for example, feels more bored than average when working on the computer. Z scores also provide opportunities to compare and contrast different affective states on a standardized scale; it is thus possible to determine which person is happier and more cooperative at home than at work. Having a standardized score also allows for comparisons between individuals, so it is possible to ascertain whether fathers are happier than mothers at home taking into account both fathers' and mothers' average level of happiness. The formula for calculating the z score is $\frac{x - \mu}{\sigma}$, where x is the score to be standardized, μ is the mean, and σ is the standard deviation, resulting in a mean of zero and a standard deviation of 1.³

As shown in Fig. 22.2, the adolescent has the highest and lowest enjoyment score from 4:56 p.m. until 9:23 p.m. The father and mother show similar trends in enjoyment, although father's enjoyment remains higher than mother's until the final beep. Since the ESM also

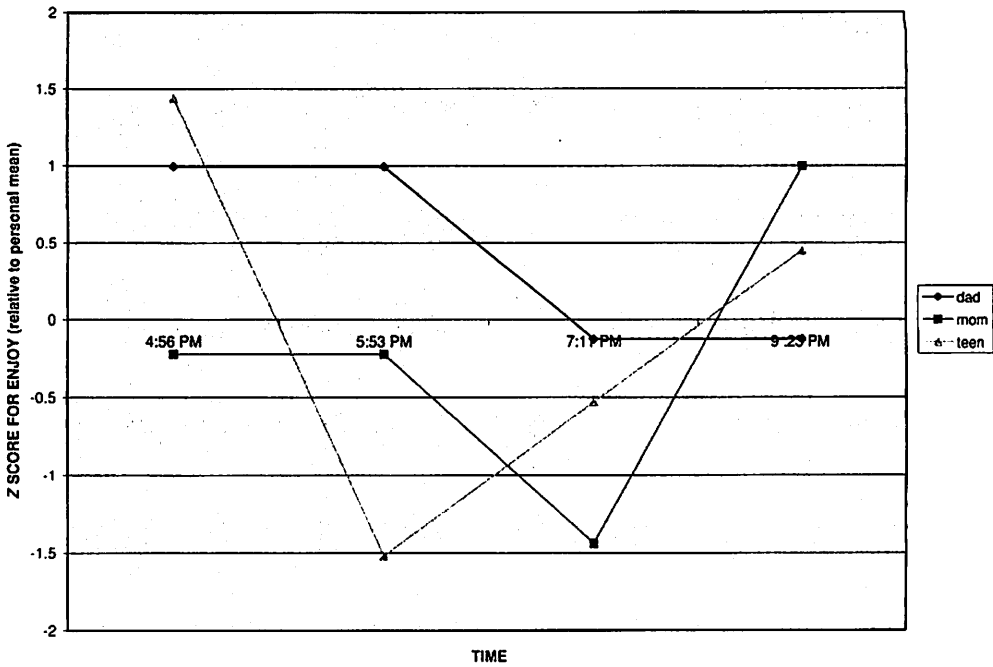


FIG. 22.2. Experience Sampling Method (ESM) reports of individual enjoyment (scaled as a z score relative to a personal mean) in an evening after work for mother, father, and adolescent.

includes place and activity codes, it is possible to determine what activities the family members were engaged in during each emotional state. Using the place and activity codes, at 4:56 p.m., the teenager was in the family room watching television, the mother was in the home-office writing and helping another child in the family, and the father was in the kitchen cooking while talking to the teenager watching television. The mother reports that writing was her primary activity while helping her child was secondary; the father indicated that cooking was his primary activity and talking was secondary. With the “who with” item, we are also able to learn that the father was talking with the teenager, who at the same time was watching television. The teenager, however, did not indicate that he was talking to his father.

At 5:53 p.m. the father continues cooking, but the mother has moved into the family room and is talking with the children. The teenager is engaged in general cleaning, which may account for his sharp decrease in enjoyment. By 7:11 p.m., the father has moved into the home office and is on the Internet engaged in job-related work. This decline in enjoyment while working at home is fairly consistent across mothers and fathers. Overall, when a mother or father is engaged in job-related work at home, he or she does not reap the same positive affective and cognitive benefits found when engaged in tasks at work (Schneider & Waite, 2005). By 7:00 p.m., the mother is now in the kitchen doing the dishes, and her enjoyment has clearly dropped from 5:53 p.m. when she was talking with her children. This is also fairly consistent with other trends in the 500 Family Study; that is, housework is a task disliked by all family members, and mood tends to be positive only when the whole family is involved in the task (Lee, 2005). The teenager is in the bathroom taking care of personal grooming, which may account for an increase in enjoyment. At the time of the last beep, both mother and father are in their bedroom watching a drama on television, and the teenager has returned to the living room and is also watching television.

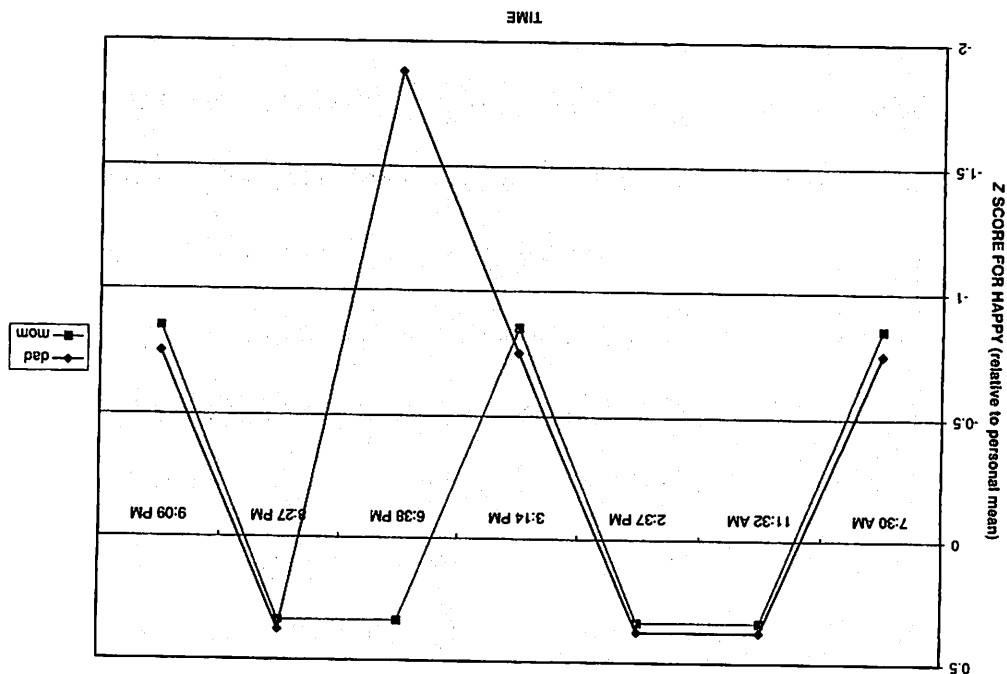


FIG. 22.3. Experience Sampling Method (ESM) reports of individual happiness (scaled as a z score relative to a personal mean) for a couple with similar levels of happiness throughout a regular day.

COMPARING COUPLES USING THE ESM

One advantage of using the ESM in a family is the ability to analyze triads, dyads, and individuals and examine different types of families. In the 500 Family Study, there are approximately 235 couples with children who have ESM measures that can be analyzed as triads or dyads. What is perhaps somewhat surprising is that many family and couple studies fail to extract information from all family members at the same time. A notable exception is the excellent work by Larson and Richards (1994), who have examined the emotional spillovers and crossovers among fathers, mothers, and children in the same family.

Studying couples can provide extraordinarily rich insights into the constancy and dissonance of emotion to similar situations, thus allowing a more penetrating look into issues of gender and the division of household labor. In the next example, Figs. 22.3 and 22.4 show for the same couple over the course of a day two emotional states—one positive (happiness) and one negative (frustration). What is most interesting is how similar their positive and negative emotional patterns are regardless of the activities in which they are engaged. In examining the emotional worlds of couples, Koh (2005) found that they appear to be more similar than when comparisons are made at the individual level, suggesting a selection effect; that is, people who are similar in emotional makeup tend to marry each other. Alternatively, over many years of sharing life together, spouses may become more alike in the emotional experiences.

In this example, when the beeping begins at 7:30 A.M., Dad is engaged in general cleaning and Mom is in the bathroom. At 11:30 A.M., Dad is at work talking over business matters with his coworker and Mom is at home talking in her office. These experiences for both the mother and father are reported as enjoyable and low on frustration. These patterns are also evident at 2:37 P.M., when Dad is in the mailroom faxing a document and Mom is at home preparing for a meeting. Forty-five minutes later, Mom is continuing to prepare for her meeting and Dad is

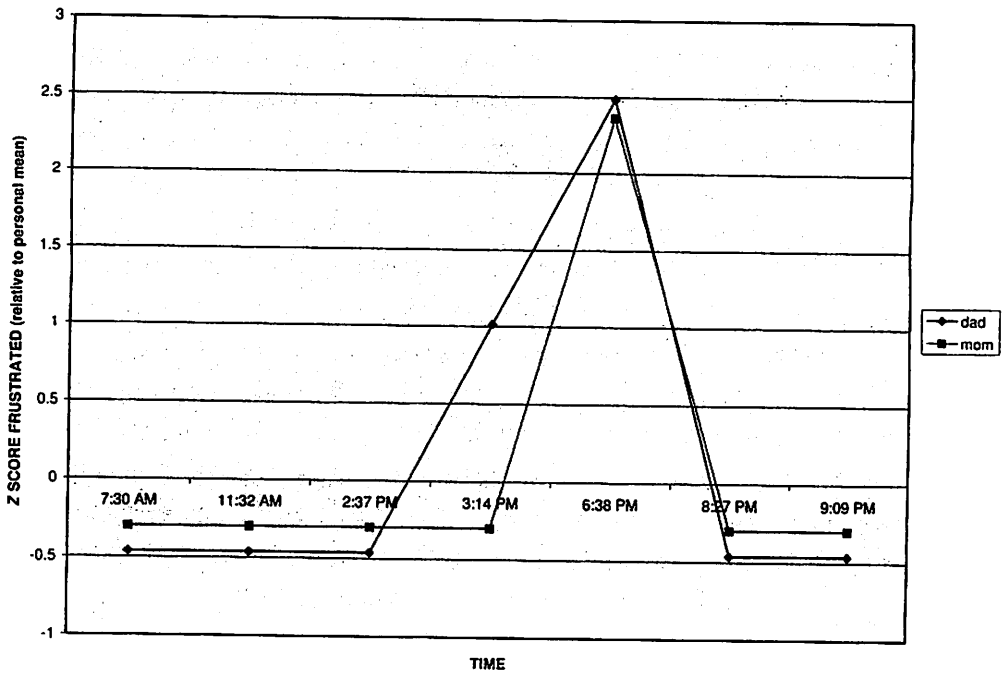


FIG. 22.4. Experience Sampling Method (ESM) reports of individual frustration (scaled as a zscore relative to a personal mean) for the same couple on the same day.

having a meeting. At this time, both parents' happiness begins to decline, and both report an increase in frustration that peaks at the next beep. At 6:38 P.M., Dad is at the subway waiting for his train and Mom is at her child's school coaching. While both parents report high levels of frustration, Mom's happiness does not seem to be affected, while Dad reports both frustration and unhappiness. Both parents report high levels of happiness and low levels of frustration at 8:27 P.M., when Dad is eating a meal and Mom is reading the newspaper. Happiness begins to decline, and frustration remains low when at 9:09 P.M. Dad is running errands for the family and Mom is making social plans on the phone.

In this example, mother's and father's experiences throughout the day appear quite similar to one another with the exception of the early evening, when the father is returning home from work and the mother is coaching at school. It has been suggested that workplace demands may carry over into the family and influence the emotions of other family members. The frustration experienced by the father while coming home from work may be transmitted to his spouse or child. Using the 500 Family Study ESM data, Matjasko and Feldman (2005) found evidence for emotional transmission between mothers and adolescents but not between fathers and adolescents. Mothers' happiness and anger are significantly related to adolescent happiness and anger. Fathers' and adolescents' reports of happiness are more in line with each other when fathers report working more than 40 hours a week. It may be that adolescents feel more secure when their fathers are working, or it could be that the time they have together is limited and so they are generally happier when with each other.

The Matjasko and Feldman analyses of ESM data were estimated using two-level Hierarchical Linear Modeling (HLM; Bryk & Raudenbush, 1992), a multivariate modeling procedure that allows for within- and between-person analyses. HLM is particularly advantageous for analyzing ESM data as it nests individual beeps within persons, eliminating the z-score computation. (For a more detailed description of HLM, see Swisher in this volume.) In the next

example, HLM is used to examine emotional states at work and at home for workers employed in different occupations.

NESTING EMOTIONS WITHIN INDIVIDUALS: MULTILEVEL MODELS

Multilevel modeling allows for the analysis of both real-time data (ESM beeps) and individual-level characteristics that may predict moment-to-moment emotional assessments. A second advantage of multilevel analysis is the ability to incorporate individual-level variables that otherwise would be difficult to include in an analysis at the "beep" level. Multilevel models, in this example, were constructed to examine the effects of both individual- and beep-level characteristics on emotional outcomes.⁴ The analysis was designed to examine emotions at work and at home. At work, the analysis focused on the task individuals were performing and how they felt when performing them.

An example of how HLM can be used is found in work by Sexton (2005), in which she examines differences in engagement at work and at home based on individual work orientations. Building on Kohn and Schooler's (1969, 1982, 1983) studies in which they distinguished between two work orientations, self-directed and conforming, all full-time workers ($n = 421$) in the 500 Family Study were categorized along these two dimensions. Workers with self-directed orientations were characterized by having more autonomy and flexibility over work tasks and finding their work cognitively engaging, whereas those identified as conforming were more likely to be closely supervised and be engaged in work tasks seen as routine and less substantively complex. The categories were created from ESM self-reports regarding control, interest, and intellectual complexity (among the sample of those identified as self-directed $n = 209$, and conforming $n = 212$). The emotional state that was examined was cognitive engagement, that is, how productive, concentrated, active, and responsible the individual felt. These variables were combined into a single composite measure. Specifically, the analysis was designed to learn if individuals who were self-directed felt more engaged at work and at home than those described as conforming.

In an HLM analysis using ESM data, all engagement beeps were considered at level 1, and a second variable was created indicating whether the beep occurred at home or work.⁵ Essentially, a level-1 analysis considers all the engagement beeps at home and school for a single individual, in this way obviating the need for a standardized score (z score). At level 2, individual person-level variables are entered into the model; they included work orientation (self-directed versus conforming) and other factors likely to influence engagement, such as gender, educational attainment, hours worked, occupation, and salary.

When conducting an HLM, the first consideration is whether there is sufficient variation at both levels. Initial analyses indicated sufficient variation both within and between individuals.⁶ This justified the addition of variables at level 2. Because individual-level characteristics are of primary interest, the proportion of between-person variance in the outcome variables was calculated. (This proportion is represented by the intraclass correlation and is calculated using the formula $\rho = \gamma_{00}/(\gamma_{00} + \sigma^2)$.) The coefficients for the final model for each outcome are presented in Table 22.1.

To determine the possible predictors of engagement, an initial random coefficient regression model was run with place entered as a level-1 predictor such that the intercept represented engagement at home. Adding place at level 1 accounts for approximately 19% of the variance within persons ($\sigma^2 = 5.31$, reduced from $6.56 : (6.56 - 5.31)/6.56 = .19$). The coefficients for both the intercept and slope are significant ($t = 83.75$, $p < .001$ and $t = 28.49$, $p < .001$, respectively). The positive t -value for the slope suggests that engagement increases when at

TABLE 22.1
Beep- and Individual-Level Effects on Engagement

Engagement	Home (level-1 intercept)	5.93***
	Self-Directed (level-2 slope)	7.04***
	Work (level-1 slope)	7.73***
	Conforming (level-2 intercept)	8.65**
	Self-Directed (level-2 slope)	0.19
	Proportion of variance within Individuals	0.16
	Proportion of variance between Individuals	
		* $p < .05$; ** $p < .01$; *** $p < .001$.

work versus at home. Therefore, individuals find their work experiences to be more engaging than their experiences at home. Overall, individuals show a 30% increase in engagement when moving from home to work.

The addition of self-directed/conforming on the level-1 intercept explains 16% of the variance in engagement between individuals at home ($\gamma_{00} = 1.65$, reduced from 1.96 in the random coefficient regression model: $(1.96 - 1.65)/1.96 = .16$). The coefficient for self-directed/conforming at the intercept (home) is significant ($t = 7.70$, $p < .001$), suggesting that being self-directed or conforming is highly associated with engagement at home. Individuals who are self-directed in work orientation score 18% higher on engagement at home than those who are conforming (coefficients are reported in Table 22.1).

The addition of the self-directed/conforming variable on the slope (work) explains approximately 10% of the variation in engagement between individuals ($\gamma_{11} = 0.98$, reduced from 1.09 in the random coefficient regression model: $(1.09 - 0.98)/1.09 = .10$). Again, the coefficient for self-directed/conforming on the slope is significant ($t = 2.97$, $p < .01$), suggesting that individuals who are self-directed have significantly higher engagement while at work. Self-directed individuals score 12% higher on engagement when at work compared to those who are conforming. Thus, while engagement is higher overall at work, those who are self-directed find both home and work experiences to be more engaging than individuals who are conforming in work situations. Being at work explains nearly one fifth of the variation that occurs within an individual's moment-to-moment assessments of engagement for beeps occurring at home and work. Similarly, incorporating self-direction at level 2 explains 16% of the variation in engagement that occurs between persons. It appears that self-direction has a strong association with task engagement. These analyses combine to suggest that it is not necessarily the characteristics of the job itself that determine whether someone is self-directed or not, but how engaged the individual is with the task.

Figure 22.5 shows these results in graph form. The difference in the slope for the two groups is significant, suggesting that individuals who are self-directed in work are more engaged at home and at work than those who are conforming. It would appear that work orientations may in fact be more encompassing with respect to a person's total life experiences than just their experiences on the job, at least with respect to engagement. Additional analyses (not shown) suggest that when moving from home to work, those who are self-directed are less likely than those who are conforming to experience negative affect.

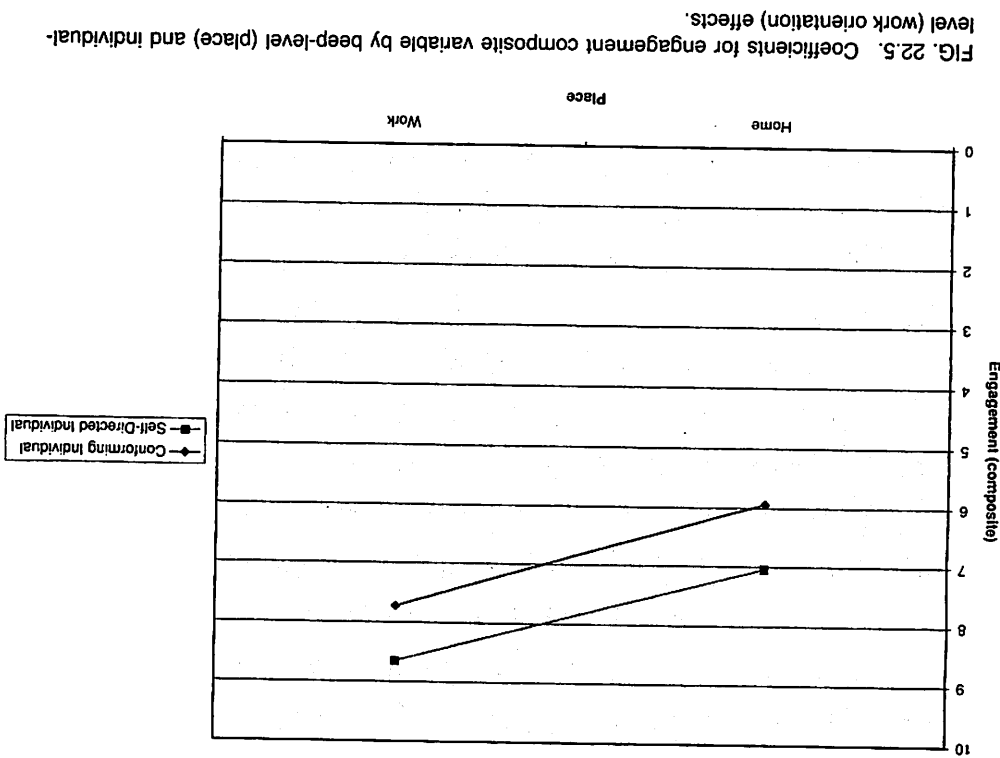


FIG. 22.5. Coefficients for engagement composite variable by deep-level (place) and individual-level (work orientation) effects.

These results, while interesting, represent an evaluation of emotional experiences and job satisfaction over the course of only a week, and drawing conclusions concerning long-term job satisfaction is problematic. However, it is important to stress that this ESM analysis is consistent with results reported by Kohn and Schooler (1969) and expands their focus into additional emotional states that appear to affirm their conclusions (see Sexton, 2005).

PROBLEMS IN MEASURING TIME USE

The ESM presents certain challenges and problems in measuring time use. Some of the measurement problems associated with the ESM also occur with other instruments designed to measure time use and affect. One major concern that researchers often face is whether the question asked results in a response that can be considered a valid measure of affect. The issue pertaining to the validity of self-report affect measures rests on the notion that people may be unable to recognize or admit their own feelings. However, extensive validation research conducted with the ESM has demonstrated that these concerns may be unwarranted since the average level of affect tends to be consistent over time and verifiable by other observers (see Schimmack, 2003; Csikszentmihalyi & Schneider, 2001; Csikszentmihalyi & Larson, 1987). In longitudinal studies, such measures also allow analysts to chart changes in emotion over time. Moneta, Schneider, and Csikszentmihalyi (2001), for example, used ESM longitudinal data to address the question: How real is the *Sturm und Drang* of adolescence? Items measuring self-esteem and locus of control show a steady linear improvement over several years. In contrast, living up to one's expectations and feeling successful in sixth grade are strong and positive, but begin to decline in eighth grade, fall further in 10th grade, and start moving upward after that time. Feeling good and feeling happy are positive but continue to fall through middle

and high school, showing no improvement by Grade 12. There was some variation in these general trends when considering certain adolescent background characteristics such as race and ethnicity and family composition (e.g., adolescents in single-parent homes and those in reconstituted families). However, even when considering these factors, there appears to be a 10th-grade trough, suggesting that the conventional view of a "sophomore slump" may be closer to reality than some have assumed.

Tied to the issue of validity of self-report is the problem of recall bias. Respondents may erroneously estimate the time they spend on a given activity or activities during the period in question. When such retrospective items are compared with answers obtained through other methods, they have been shown to be somewhat unreliable, with individuals tending to overestimate the amount of time spent on certain activities such as paid work or homework (Robinson and Bostrom, 1994; Lee, 2005). Comparisons of ESM data with survey data show that time diary data tend to be more accurate, especially when estimating time use for frequently occurring activities like homework (Juster & Stafford, 1991; Martini & Shelton, 1993). Surveys tend to produce estimates that can be as much as 50% higher than time diary estimates (Press & Townsley, 1998). Adults as well as children are prone to give socially desirable answers regarding a variety of tasks, raising time estimates for activities such as helping with homework and lowering time estimates for watching television. Thus, recall items not only are biased by memory failure and peak experiences, but also by social desirability.

One of the benefits of time diaries is that they account for an entire 24-hour period so that random errors occurring in one time use category are cancelled by random errors occurring in another category. Furthermore, time diaries obtain specific information about the day and time when an activity occurs. This is also the case for the ESM since respondents report their activities at the moment signaled. But, while time diaries can provide very comprehensive information on the daily life of a person, they do not necessarily provide accurate estimates of time use over the course of a week or a month. For example, suppose an individual, using the single-day diary method, reports spending 8 hours at work. Can we infer that person worked 40 hours in the week? Or 56 hours? This point is made by Jacobs (1998) where he argued that synthetic workweeks used in time diary studies are subject to regression to the mean, so that they tend to under- or overestimate time at work. Gershuny et al. (1986) suggested that people tend to organize their lives by weekly schedules. A study of one day may misrepresent a person's weekly schedule. For example, a person may typically work longer on Tuesdays but leave earlier on Fridays (see Gerson & Jacobs, 2004, on this issue).

There are other inference problems using full-day diaries that relate to reporting activities of short duration. Diaries may cause substantial under- or overestimates of activities of short duration, primarily because respondents may feel encouraged to report time use in regular blocks, such as 15- or 20-minute intervals, during which a short duration activity would either be ignored or grossly overstated. For this reason, it is important, regardless of the instrument, to include units of shorter and longer duration. In a recent study, Mulligan, Schneider, and Jeong (2004) compared ESM responses and time diary entries for the same time period and found that about 2% of nonidentical records seem to occur because respondents do not remember the exact time at which they were doing certain activities, especially those that were not work-related. For instance, while ESM records indicate that respondents were eating a meal when signaled, diary entries typically report that they were eating 20 minutes before or after the scheduled signal. The ESM has limitations, however, mainly because participants are asked to specify the activity they are engaged in at a given moment. They are not asked to specify the duration of the activity or prior or later activities. The duration and sequencing of activities are thus more likely to be better estimated using the time diary method.

One strength of the ESM is the inclusion of primary and secondary activities. By having respondents identify the main activity they were involved in and the secondary activity, it is

possible to gauge individual time use with respect to multitasking. With the changes in technology, such as e-mail, and the various types of codes in the ESM, it is possible to distinguish between times allocated for personal messaging in contrast to business messaging. However, such calculations in studies like the 500 Family Study are relatively unstable because of the number of times individuals report e-mailing. With larger population samples, it could be possible to assess such time use patterns on a momentary basis although adjustments, either through addition of items or changes in beeping times, would have to be made to incorporate issues of duration and sequencing.

Since the ESM covers an entire week, it enables researchers to examine respondents' activities across the week, thus allowing researchers to study individuals across time, thus minimizing the impact of inquiring about feelings before or after a single event. With the ESM, single events are examined in the context of daily life, allowing the researcher to investigate the subjective experiences of events that are routine or out of the ordinary. Considering that people tend to organize their lives on a weekly schedule (Gershuny et al., 1986), this aspect of the ESM is noteworthy.

Another problem with time diaries relates to respondent burden and its implications regarding sample selection. Assume time diaries could be obtained from an individual over the course of a week. Having to complete a diary every day may in fact be too burdensome, and individuals might over- or underreport activities or simply stop participating. Now assume a group of individuals agreed to participate in such a project. One might suspect that they represent a biased group since it is likely that few respondents would tolerate the burden of reporting for seven consecutive days. The question of selection bias—that is, who would willingly participate in an ESM study and comply with study demands—is a serious consideration in constructing such studies.

The ESM shares many of the problems of time diaries, including respondent burden, but has several advantages over both surveys and time diaries: immediate response to signals, which minimizes recall bias; randomization of beeps, which eliminates stereotypical categorizations of time use; and data collection over several consecutive days rather than on a single day. Several recent studies have been undertaken to evaluate the burden of the ESM and its effects on response bias and compare it with other instruments (see, e.g., Mulligan, Schneider, & Wolfe, 2003). Mulligan et al. compared adolescent time use across three different datasets, one of which uses the ESM. Results suggest that it may not be burden or "busyness" that dissuades people from responding to beeps. Rather, the problem may be one of compliance, and this is where systematic differences across respondents occur. To correct for such compliance factors, which will undoubtedly differ by the populations being surveyed, Mulligan et al. developed a demographic-weighting strategy to adjust for nonresponse.

ESM AND OTHER METHODS OF DATA COLLECTION: SOME CONCLUDING COMMENTS

Social scientists have a wide variety of instruments at their disposal in conducting their work. The ESM, though not without its own set of methodological constraints, fills an important gap in understanding time use and, more importantly, everyday emotional experiences. It is the small, often nuanced reactions of people to other people and particular events that cannot be overlooked when examining psychological states and change. Over 35 years of work has shown that the ESM can provide reliable quantitative measures of variation in individual experiences from the moment they wake up to the time they go to sleep. Recent studies that use the ESM including the 500 Family Study have shown the potential of this instrument for examining work-family conflict, shared family time, and experiences of

marriage, childrearing, and employment. One of the strengths of the ESM in the 500 Family Study is the ability to analyze individual experiences within the context of the family. Thus, the study has revealed how adolescents feel about their parents, how parents feel about themselves, and how both view parents' ability to manage work and family responsibilities. Combined with data from other instruments used in the 500 Family Study, including interviews, surveys, and census information, analyses of ESM data provide a comprehensive and in-depth picture of contemporary life in working families. Though not captured on videotape or simulated in a laboratory, these combined data sources provide a realistic view of "in the moment" experiences of parents and children.

NOTES

¹This special issue presents five articles that use the ESM to illustrate various applications of the method for studying both adolescents and families.

²The Alfred P. Sloan Study of Youth and Social Development constructed codes for place, activity, and thinking, building on earlier categories created by Csikszentmihalyi developed for his study with Reed Larson on adolescents, and a later study on Talented Teens co-authored with Samuel Whelan and Kevin Rathunde. In the 500 Family Study, which included both adults and children, the categories were expanded based on the verbatim responses of the participants.

³Some analysts have concerns with using z scores and suggest other transformations (see Rooney, 2003).

⁴For all multilevel analyses, the statistical package HLM (Raudenbush, Bryk, & Congdon, 2000) was used. Model development followed standard protocol by beginning first with the simplest model (unconditional), followed by the continual addition of predictors at both level 1 and level 2 based on statistics from previous models.

⁵The place variable was created as a dummy variable with home equal to 0 and work equal to 1. With this method, the place variable can be entered uncentered and the intercept then represents the value at home.

⁶This was an unconditional model conducted as a one-way ANOVA with random effects.

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