

Experience Sampling Methodology: A Systematic Review and Discussion for Organizational Research

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DOI: 10.34190/JBRM.18.2.005

Abstract: In organizational research, growing attention has been given to the dynamic nature of workplace relationships and how such dynamic processes shape key behavioural outcomes. Experience sampling methodology (ESM) brings more opportunity than any other research option to examine such fluctuations and relevant causal relationships. ESM can be described as a quantitative method which allows individuals to assess discrete evaluative states on multiple events by combining three distinct elements; person, variables and occasion. Despite its increasing prevalence and popularity, however, there has been only a few attempts to investigate the most appropriate design, measurement and analysis choices for experience sampling data. Even though ESM has been utilized in organizational research for some time, systematic investigations regarding how these issues have been addressed and how the method has been applied to specific organizational topics are limited. This study provides a systematic and critical assessment of the use of ESM in current organizational research (2010-2020) by reviewing a random sample of 50 ESM studies indexed in ISI Web of Science with the aim of identifying the current state of practice. The selected studies were analysed based on several methodological aspects including the type of ESM protocol applied, sample characteristics, data sources, specified interval and total duration of data collection, structure and properties of designated measures, analytic strategy, and the research model to be tested. Findings show that organization studies vary considerably based on how they design and implement ESM. Moreover, despite the availability of good practices, many studies fail to attain recommended standards about sample size, data collection procedures, data characteristics and measurement quality. As such, this paper offers several insights regarding how time-based within-person frameworks can be improved in future studies to account for dynamic organizational phenomena.

Keywords: experience sampling, event-sampling, dynamic processes, within-person studies, repeated measures, organizational research

1. Introduction

Experience sampling method (ESM) can be described as a data collection technique which allows capturing participants' affect, cognition, attitudes and behaviours as repeated experiences on multiple points. The experiences are collected in short term episodes (days or weeks) rather than long-term courses (months or years). A unique attribute of ESM is how it enables the investigation of dynamic phenomena at within-person level along with the more typical inter-person level of analysis (Beal, 2015). Repeated measurements of work states within certain intervals and the investigation of relationships at within-person level can be particularly achieved by utilizing ESM.

The key strengths of getting repeated measures in short intervals by ESM can be listed as follows: 1) It helps to understand how dynamic changes influence significant outcomes, 2) reduces the bias regarding the difficulty participants recall important events or aggregate them over long term, 3) increases the confidence in identifying causal relationships among constructs, 4) allows researchers to examine both within- and between-person processes, and 5) lets researchers evaluate events as they occur, capturing immediate experiences (Beal, 2015; Scollon, Kim-Prieto and Diener, 2003; Podsakoff, Spoelma, Chawla and Gabriel, 2019; Uy, Foo and Aguinis, 2010). According to Gabriel et al. (2019), issues that can be best assessed by ESM include within-person variability of attitudes and cognitions over a day or week, the relations of attitudes or cognitions to each other on a daily or weekly basis, the effects of an experience at one day on the experience at another, and how event- and person-level factors affect one's attitudes and behaviours over time.

Three distinct ESM protocols have been identified in the literature (Allen et al., 2019; Uy et al., 2010; Fisher and To, 2012; Scollon et al., 2003): In interval-contingent ESM studies, participants respond to a survey form in pre-determined time intervals such as in the morning, afternoon and evening in each day. In signal-contingent studies the participants are expected to respond on specific experiences once they receive a signal from the researchers to do so on random time points. Finally, in event-contingent protocol participants are demanded to provide a response whenever a certain type of event occurs such as when an employee experience an

unfavourable encounter with customers. The choice of the protocol depends on the research question being asked and the nature of the constructs.

In recent years, aforementioned benefits of ESM has also made it a popular research design in organizational studies, especially in the examination of employee behaviours at workplace. Understanding event-based experiences of organization members including affective and psychological states and how these experiences change over time has become particularly essential for organizational researchers. Researchers increasingly realize the opportunities ESM brings in capturing the episodic nature of organizational phenomena such as emotions, motivation, performance and interpersonal processes at within-person level and, how this makes it possible to test dynamic organizational theories which is impossible by using cross-sectional between-person designs (Gabriel et al., 2019).

Along with its benefits and opportunities, it can become very challenging to conduct ESM research because of the complex nature of data and several sensitive design characteristics. Researchers should navigate across multiple decision points so that they can ensure the accuracy of the findings. Therefore, the purpose of this study is to provide a comprehensive analysis of the adoption of ESM in organization studies with respect to its unique attributes, benefits and challenges. The ultimate goal is to provide valuable insights into best practices in the field and be able to provide useful suggestions to overcome the challenges of ESM. In order to do that, a random sample of 50 ESM studies published in the last ten years (2010-2020) were analysed.

2. Literature on Conducting ESM and Research Strategy

The systematic literature review was performed by searching all ESM studies published in organizational research field that were listed in ISI Web of Science (WoS) database by using relevant keywords (e.g. "ESM", "experience sampling", "event sampling", "sampling methodology"). This online search revealed that, in the 2000-2020 period, a total of 158 ESM studies were published in the database. Almost 60% of these studies were published in the last six years, indicating an increasing interest towards ESM. Accordingly, 50 ESM articles were randomly selected for a detailed investigation. These sampled studies were published in one of the following journals: *Academy of Management Journal (AJM)*, *Journal of Management (JOM)*, *Journal of Organizational Behavior (JOB)*, *Journal of Vocational Behavior (JVB)*, *Journal of Applied Psychology (JAP)*, *Journal of Occupational and Organizational Psychology (JOOP)*, *European Journal of Work and Organizational Psychology (EJWOP)*, *Human Relations (HR)*, *Personnel Psychology (PP)*, *Organizational Behavior and Human Decision Processes (OBHDP)*. (See Appendix for the complete list of articles).

Reviewing the previous literature describing and assessing the use of ESM techniques (e.g. Uy et al., 2010; Fisher and To, 2012; Beal, 2015; Allen et al., 2019; Gabriel et al., 2019; Podsakoff et al., 2019), the following methodological attributes were identified and investigated in each study.

2.1 Sample Characteristics

Knowledge of sample characteristics is essential in understanding whether the ESM techniques were established properly. Hence; country, industry, sample size and participant profile (the use of dyads) were coded. Here, sample size is particularly noteworthy as multilevel scholars highlight and give suggestions on the minimum sample sizes at Level 1 (within-employee) and Level 2 (between-employee) as well as the associated statistical power. For instance, Gabriel et al. (2019) recommends a minimum sample size of 83 at Level 2 and; at least 1,835 at Level 1 for ESM studies. Thus, whether studies report sample sizes at the two levels and what these sample sizes are examined.

2.2 Construct Category

Even though several different employee behaviours or attitudes can be investigated by ESM, so far no systematic research has been conducted on the most common theoretical constructs being surveyed through ESM techniques. Therefore, organizational topics that have been predominantly chosen to be analysed by ESM were identified.

2.3 Chosen ESM Protocol

As it is discussed in the Introduction, ESM studies can apply three different types of protocols; event-contingent, signal-contingent and interval-contingent. While the latter demands participants to give answers regarding their states, attitudes or behaviours regularly at predetermined times (e.g., in the morning of each work day), the

other two asks participants to record their response when a certain event occurs in their work environment or a signal is given (e.g., an alarm alerts them) irregularly at changeable times (Scollon et al., 2003; Uy et al. 2010). As such, the chosen ESM technique should be a proper match to the theoretical assumptions and the nature of the constructs and investigated relationships in the study. It is assumed that as interval-contingent data collection conduct measurement in predetermined consistent intervals and usually these intervals are short, it may produce less within-person variability as opposed to event-contingent designs (McCormick et al., 2020). This is because they will tend to give more familiar and consistent answers throughout the daily routine, especially when measurement intervals are very short. All in all, it is important to examine which ESM protocol was adopted in the study.

2.4 Scale Modifications

The use of efficient and practical measurement approaches is extremely important in ESM research because of the difficulty of collecting data on several constructs in a short interval, which brings a considerable burden on the participant (McCormick et al., 2020). To keep the irritation limited and motivate respondent to complete questions regularly, researchers often create or adapt shorter versions of existing measures. Fisher and To (2012) suggest that in ESM, a single report should not exceed 5-10 minutes. Typical practices include reducing the number of items or using single-item scales. In their research, Ohly et al. (2010) explain how increase in the number of scale items and the length of the total survey makes significant impact on participant responses and they endorse limiting the number of items. Another approach is to modify the scale items in order to capture experiences at day-level. Whatever the approach is, there is a need to obtain evidence if the scales are able to generate valid inferences.

2.5 Psychometric Properties of Measures

Concerns about measurement quality based on the issues of reliability and validity intensify when conducting ESM research as measurement becomes much more complicated through repeated data collection from the same person in a limited period of time. The first condition of identifying a multilevel model in any ESM study is the existence of significant within-person variability (Level 1) which is calculated by intra-class coefficient (ICC1). However, hierarchical data structure and measurement should as well be confirmed by checking multilevel reliability and validity (Gabriel et al. 2019). Computing Cronbach's Alpha focusing on between-person variation cannot capture the part of variance originating from within-person differences over time (Fisher and To, 2012), which seems to be the typical practice in existing ESM studies. Instead, other methods such as multilevel confirmatory factor analysis, hierarchical linear model procedures and calculation of Cronbach's Alpha by both levels work better in attaining measurement validity and reliability (Yang et al., 2019). Hence, one should investigate whether (and which) psychometric criteria were applied and reported in the selected studies.

2.6 Timing of Measurement & Data Collection Duration

Two key decisions in ESM is how often and how long the data will be collected. Since ESM studies seek to understand short-term changes in attitudes and behaviours, participants are supposed to respond to questions at specific time points during the day or when particular events occur. It is important to understand how many data points are determined and how this decision is linked to the research questions being asked. That is, the time frame over which participants will respond should be carefully chosen based on the time interval in which the psychological state or behaviour logically vary (Fisher and To, 2012). Total data collection period might also change from one study to another. One last issue is whether reminders are given to the participants encouraging them to fill in the survey form at specific time periods during the day. Hence, the daily measurement frequency, total data collection period and the availability of reminders were coded.

2.7 Elimination of Common Method Bias (CMB)

Two alternatives for daily reporting in ESM is measuring the same variables on each report or assessing diverse variables at different times of the day (Fisher and To, 2012). Researchers claim that the most common practice is to capture cross-sectional repeated data from the same person. However, ESM design allows testing lagged relationships where bias originating from participant's transient mood state is minimized by addressing temporal sequence (Gabriel et al. 2019). Another way of reducing common method bias is collecting data from different sources. It might be particularly necessary when the experience cannot be detected accurately or completely from self-reports of a single participant or when the experience is shared by others along with the focal participant in an interactive way. Thus, it is an important question whether the ESM study collects and matches responses from different sources. Overall, ESM research can make causal inferences stronger if 1) temporal

separation between dependent and independent variables, and 2) measurement from multiple sources are achieved. Whether this is the case in each study or not was checked.

2.8 Data Collection Tool

Advanced technologies have been increasingly used to collect experience sampling data. Digital technologies such as personal digital assistants (PDAs), personal computers or smart phones bring many advantages such as customized scheduling, systematic reminding, time stamping, direct data transfer for analysis and real-time monitoring of data collection compared to paper-and-pencil designs (Christensen et al. 2003; Fisher and To, 2012; French et al. 2019). PDAs are small, hand-held devices functioning as a personal information manager. However, these devices are quite expensive and difficult to manage and in recent years, they are replaced by more generic technologies such as smart phones applications and web-based survey tools capable of performing same functions in a more practical and cheaper way. More recently, another technology, interactive voice response (IVR) method has also been discussed as an alternative response mode in ESM research. Basically, IVR is a method in which participants are required to listen pre-recorded survey questions through phone and to answer them either by pressing a number or speaking into the phone (French et al. 2019). As unique advantages, IVR enables the use of landline phones and makes responding easier for individuals who have difficulties in reading, writing or speaking.

2.9 Analytic Strategy

How to effectively analyse complex multilevel data is another essential issue in ESM studies. Experience sampling data is both hierarchical and unbalanced where different number of observations are obtained from each respondent. As repeated measures from the same person are not independent from each other, a multilevel data structure should be applied. There are alternative statistical packages that can be used in ESM research, each having different characteristics, advantages and disadvantages. Among them, *Mplus* statistical package is particularly recommended by researchers as it enables the analysis of mediation models in an effective way (Gabriel et al. 2019). Hence, the type of research model developed and the statistical software being used to test it in each study were identified.

2.10 Instructions and Training

Once participants are recruited, they should be given necessary information regarding what is expected from them in the ESM study. Researchers should make participants understand the purpose of the study, when and how they will respond to questions and what they need to do if there is any problem. Thus, it is an important point whether instructions and/or training is given at the beginning of the study to clarify these issues.

2.11 Incentives

Since ESM includes intensive data collection in a relatively short period, it puts significant pressure on the participant. That's why, ESM researchers may offer some form of incentives as a compensation for the efforts of the participants. Such incentives, whether given as a flat rate or based on the number of surveys completed, are supposed to increase the response rate. In order to understand the impact of incentives, the existence of an incentive, the type of incentive (monetary or non-monetary) and in what way they are utilized were examined.

3. Findings

3.1 Overview of ESM Studies in Organizational Research

Figure 1 shows the trend of ESM studies in organizational research through the last decade. From 2000 until 2020, 156 ESM articles were published in nine different organization/management journals. It is noteworthy how the number of studies rapidly increased, especially in last years. While the total number of ESM article was only 9 until 2006, it became almost a hundred in ten years, and it increased by 60% in the last three years. The highest number of ESM studies was published in 2019 (28 articles), which doubles the figure in 2018. Until October, 15 more articles were published in 2020. More studies can be expected to be introduced until the end of the year.

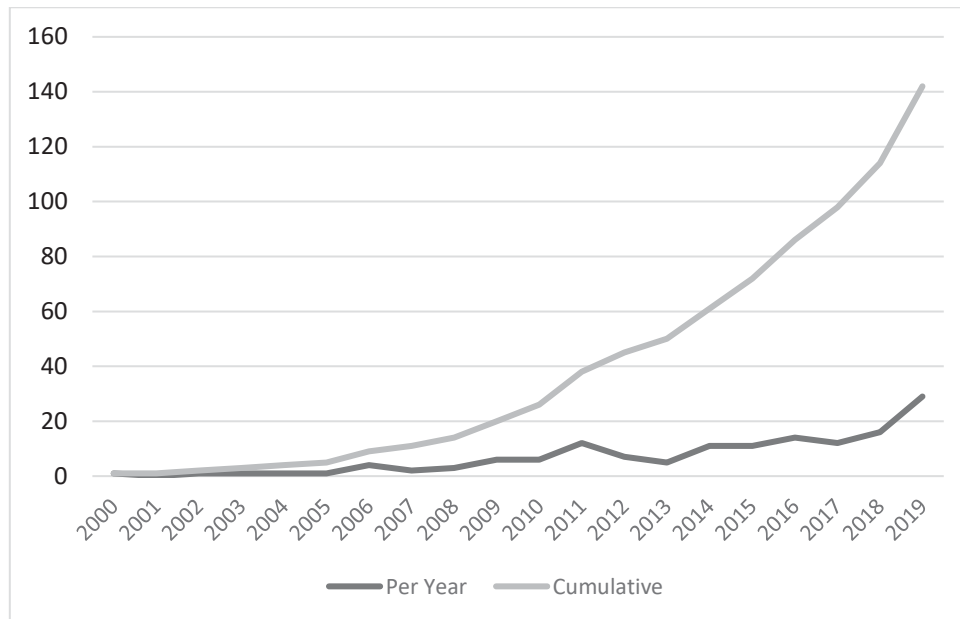


Figure 1: Published ESM studies in organizational research (2000 –2020)

With respect to where ESM studies taking organizational topics have been published, it can be seen that most of the articles have appeared in Journal of Applied Psychology (JAP), followed by Academy of Management Journal (AJM) (13%) and Personnel Psychology (PP) (12%), which makes more than half of all ESM research published in ISI WoS Index in the field of organizations and management. Below, Figure 2 shows the distribution of all ESM studies across organizational journals since 2000.

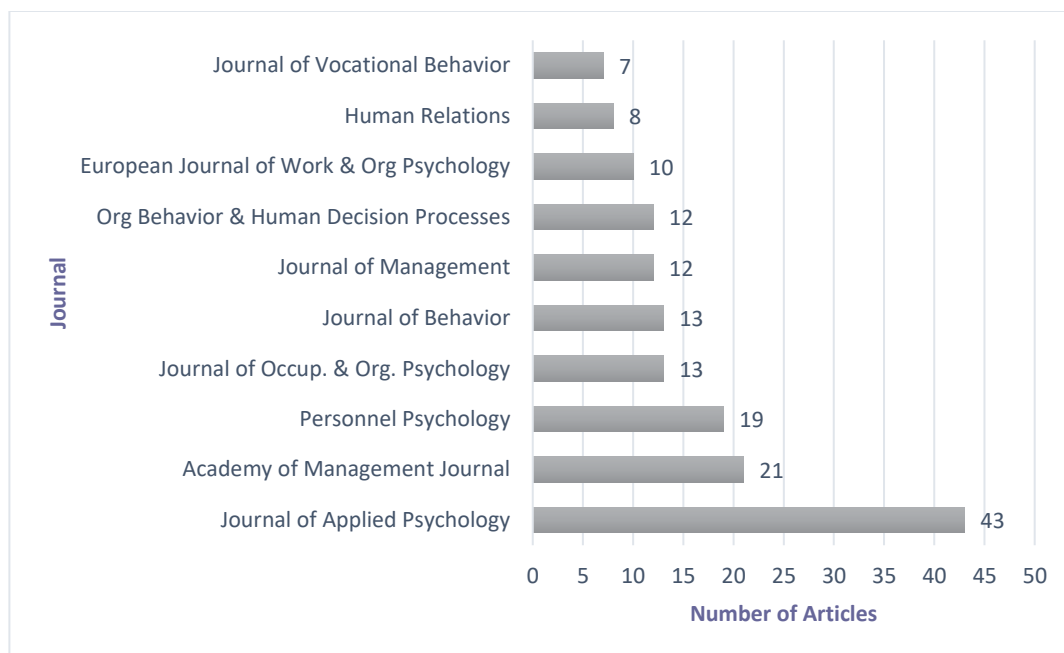


Figure 2: Organizational journals where ESM studies published (2000-2020)

3.2 Profiles of Examined ESM Articles

Among the articles examined; 42% of them comes from North America, 28% from Europe, 24% from Asia and 6% from Australia. China, Germany, UK and Singapore follows US in the number of ESM studies published. As the research setting, the majority of the studies collected data from multiple industries (74%) including higher education, banking, telecommunication, manufacturing, marketing, R&D and customer services. MBA class participations at universities and online platforms such as Amazon Mechanical Turk have often been adopted to reach potential participants employed in different industries.

Regarding what organizational topics and constructs have been examined via ESM, one can observe that various theoretical relationships and constructs were analysed in the sampled studies. In fact, almost thirty different conceptual categories can be identified. Nevertheless, more emphasis has been given on the topics of affect/emotions, work- family conflict or other adverse influences of work life on personal life, employee well-being and job satisfaction, job design, personal states, organizational citizenship behaviour (OCB) and helping behaviour, work engagement, resource depletion, counter-productive work behaviours, motivation, workplace mistreatment, leadership, justice perception, work stressors, and job performance. So it can be argued that ESM has been adopted as a key methodology to discover all dynamic relationships in work environment regarding different states, behaviours and situations altogether. Below, Table 1 shows how frequent these constructs appear in sample studies.

However, all states, tendencies, perceptions and behaviours may not fluctuate in the same way or in the same extent through daily experiences in organizations. For instance, personality traits, OCB, job satisfaction, perceived support have more consistent natures and may not show a significant within-person variance on a daily basis. Or for some constructs, within-person effects might not be significantly more or different than between-person effects (McCormick et al., 2020). Hence it is advised that the underlying theoretical assumptions and the choice of constructs should be carefully evaluated in organizational ESM studies when adopting a time-variant perspective.

Table 1: Constructs most frequently examined in organizational ESM studies

| Category | Percentage |
|--|------------|
| Affect/emotions | 24% |
| Work-family conflict | 22% |
| Well-being, work satisfaction | 22% |
| Job design and demands | 20% |
| Personal states/traits | 18% |
| OCB; helping behavior | 18% |
| Work engagement; pro-active work behavior | 16% |
| Resource depletion | 16% |
| CWB; deviant & unethical behavior | 16% |
| Workplace incivility & other mistreatments | 12% |
| Stress/ stressors | 10% |
| Social support & social relations at work | 10% |
| Motivation | 10% |
| Leadership | 10% |
| Justice perception | 10% |
| Job performance | 10% |
| Emotional exhaustion; psychological detachment | 8% |

The findings show that most of the studies have a sample size of 50-100 respondents at Level 2 (48%) while 34% of them have a sample of 100-200 individuals. Most noticeably, 30% of the studies provide a sample size which is smaller than 83 respondents, the minimum number recommended by Gabriel et al. (2019) for Level 2. As another important finding, only 5% of the studies have more than 200 participants and only one of them include more than 1,000 respondents. Overall, it can be argued that sample sizes are rather small and thus, many studies do not qualify for the advised levels regarding inter-person comparisons in ESM. As of the total number of observations (Level 1), except four studies which have more than 5,000 observations, the average data points of 936 is again quite below the minimum number recommended in the literature. While 34% of the studies have 500-1000, and 24% have 1000-2000 total data points, only 16% of them have more than 2,000 total observations. It is striking that 26% of the ESM analyses were conducted even with less than 500 data points. This may denote a general weakness and difficulty in collecting experience sampling data which requires strong commitment and discipline from the respondents where they need to answer a lot of questions on a daily or hourly basis through several weeks.

3.3 ESM Attributes

All findings of the systematic review are summarized in Table 2. The first attribute to examine is the type of protocol used. The review shows that the majority of the studies conducted interval-contingent ESM and only a small number of them adopted an event-contingent design (14%). No signal-contingent design was detected in the sample. A closer look to the event-contingent ESM studies suggests that the emphasis in these studies is on revealing how certain occasions influence them and make a significant change in their feelings, attitudes or behaviours, such as a particular type of customer transaction or service encounter (Dahling, 2017; Dong et al., 2015), an emotion-labour event (Diefendorff et al., 2019), specific workplace interactions with co-workers (King et al., 2017), work interruptions (Russell et al., 2017), managers' use of humour (Wijewardena et al., 2017), and employee voice situations (Li et al., 2019).

The results point out that most of the ESM studies applied at least one type of measurement modification (90%). A typical practice reported by authors in more than half of the articles is altering the time frame of the scale items to adapt them for daily-level experiences. Again, more than one-third of the articles mentioned shortening the scales by removing some items or using a single-item measure. With respect to using alternative and more flexible measures, four studies applied visual scales or measures (e.g. Foulk et al. 2020; Jung et al. 2015; Rosen et al. 2016; Spieler et al. 2017). Finally, four studies used experimental ESM approach and manipulated the independent variable (e.g. Foulk et al. 2018; 2019; Lanaj et al. 2019; Woolum et al. 2017). Considering the stated difficulties of receiving responses to experience sampling surveys and how participants can develop fatigue and insensitivity towards long and repeated questions, more studies can be recommended to use alternative measures that are both effective and creative.

Regarding psychometric properties of the measures adopted, intra-class coefficient (ICC1) was calculated in almost all ESM studies in the sample. However, only 40% of the articles reported conducting multilevel confirmatory factor analysis to assess measurement validity. Moreover, across all studies, reliability was only determined by internal consistency of the scales at a single level. At least, no reference was made to any other method for calculating multilevel reliability. This implies that even though significant theoretical insights regarding cross-level interactions are expected from ESM studies, up until today measurements have not been effective or reliable enough to do so.

Among all ESM studies investigated, 38% of them collected data from participants two times a day. The other common reporting schedules are once a day (24%) and three times a day (24%). Only three studies requested reporting five times a day. Besides, two studies imposed a system of collecting data once a week across several consecutive weeks as they focus on understanding weekly changes in employees' attitudes and behaviours rather than daily-based fluctuations (e.g. Urbach and Weigelt, 2019; Zhou et al. 2019). Data collection frequency is also determined based on whether an interval-contingent or event-contingent design is followed. Most of the event-contingent ESM studies in the sample demanded respondents to record their experience whenever possible, depending on whether they encounter a certain situation or event at that moment. Due to the unique data structure in this type of ESM, most of these studies do not request a concrete number of responses from the participants; the final number of answers remains unknown based on the chances of possible encounters. Finally, several ESM studies examined imposed some data inclusion criteria such as minimum number of responses for each person within a specific time interval. This has been done to ensure the validity of within-person data. Hence, participants who send less answers than the minimum criteria, their data is typically discarded from the study.

The total data collection period also varies significantly. While almost half of the ESM studies established a two-week time frame (48%), 28% of them collected data for one week, and 14% of them for three-weeks. Time frames beyond that is quite rare (8%). Only one study limited the data collection to a single day. It is interesting that only in 14 articles a participant-reminder procedure was clearly identified. These findings reveal that a two-week period is typically adopted by researchers to collect experience sampling data whereas a single week duration is also very common.

Temporal precedence between independent and dependent variables (lagged analysis) was utilized in 58% of the sample studies, which is an effective practice for reducing common method bias. Most of these studies collect data for independent and dependent variables on different times of the day; morning, afternoon and evening, depending on the research design. Still, a few of them create a lagged model considering daily or weekly

temporal distance, without any variable separation in data collection. These findings reveal that several studies were not able to test lagged relationships in any way as they remain cross-sectional repeated designs.

As another factor that helps minimize common method bias, only eight ESM studies (16%) collected data from multiple sources, three of them being supervisor-employee dyads (Courtright et al. 2016; Liao et al. 2018; Matta et al. 2017), another three of them being spouses (Lim et al. 2018; Pluut et al. 2018; Lin et al. 2017), and two of them being employee-customer dyads (Dong et al., 2015; Tang et al. 2020). Furthermore, Tang et al. (2020)'s recent study is also the only paper in the sample using triple-source as focal employee, co-workers and customers based on their daily contact with one another. Authors claim that it is also the first triple-source ESM study conducted so far. The limited number of multiple-source ESM designs suggests that more effort can be put to collect and match data from diverse sources as the single-source designs severely limit the chances of avoiding common method bias and getting accurate causal inferences.

As of the data collection technologies utilized, more than half of the ESM studies reported data gathering through online surveys (68%) whereas the rest of them show an even distribution in the use of PDAs, unique smart phone applications and paper-and-pencil survey forms. This finding is also in line with the arguments in the literature regarding how online ESM surveys may lessen burden, principally when measurement scales are long. Among fifty studies, IVR method was not applied in any ESM research. One also notices that while no studies have utilized PDAs in the last three years, the recent trend is definitely towards using online surveys adapted to and accessible by smart phones. Specific survey platforms are also increasingly used for making experience sampling data collection easier. All of these are essential indicators of the recent tendency towards adopting all-in-one practical online solutions.

Regarding the data analysis process, large number of ESM studies identified some mediating mechanism (82%). While several studies tested models including mediation and moderation relationships (54%) together, 28% of the studies utilized single, multiple or serial-mediation models without any moderation. The rest only tests a moderated relationship among variables (18%). These suggest that researchers use ESM designs typically to test complicated conceptual models which include large number of variables and complex causal relationships. Because of the very nature of experience sampling data, all studies in the sample assumed a multilevel model (or a hierarchical linear model) as their analysis strategy. All studies in the sample offer a two-level analysis, except one. In their study examining employee service creativity, Dong and his colleagues (2015) specified a three-level model including store level (Level 3) besides within-individual level (Level 1) and between-individual level (Level 2) to accurately reflect the data structure and account for key variables at store level. One can expect more three-level ESM designs in the future, taking the ongoing development in statistical softwares into consideration. With respect to such software, most frequently used statistical package is Mplus (by more than half of the studies), followed by the use of HLM and R packages. This choice also corresponds to the recommendations of the ESM scholars, especially for the analysis of mediation models.

An analysis of the data procedures described in each study makes it evident that more than half of the studies (52%) gave separate instructions or trainings to participants about the details of how they should provide their responses. Besides, a large number of studies declared using some sort of incentive for motivating respondents to participate (60%). While most of these incentives were given in the form of monetary payments on the basis of the total number of reports completed (e.g. Benedetti et al., 2015; Bindle et al., 2019; Foulk et al. 2020; van Dijke et al., 2019), gift cards and prize contests (e.g. Clark et al. 2018; Lei et al. 2019) were also utilized. Only three studies promised giving feedback on the research findings (Barnes et al. 2015; Hülshager et al. 2018; Russell et al., 2017) and two reported giving course credits to students (Matta et al. 2017; Urbach and Weigelt, 2019). These findings support the idea that motivating respondents for continuous participation is particularly critical in ESM and incentives (monetary or non-monetary) should be carefully chosen based on the profile of the respondents.

Table 2: Attributes of organizational ESM studies

| Attribute | Category | Frequency |
|------------------------------------|-------------------------------|------------------|
| <i>Sample Origin</i> | US | 42% |
| | Europe | 28% |
| | Asia | 24% |
| | Australia | 6% |
| <i>Sample Size</i> | Less than 50 | 2% |
| | 50-100 | 48% |
| | 101-200 | 34% |
| | 201-500 | 1% |
| | 501-1000 | 4% |
| | More than 1000 | 2% |
| <i>Multiple Industries</i> | Yes | 74% |
| | No | 26% |
| <i>Multiple Data Sources</i> | Yes | 16% |
| | No | 84% |
| <i>ESM Protocol</i> | Interval contingent | 86% |
| | Event contingent | 14% |
| <i>Measurement Modification</i> | Shortened scales/single items | 32% |
| | Altering time frame | 52% |
| | Experimental designs | 8% |
| | Visual/graphic scales | 8% |
| | No modification | 10% |
| <i>Measurement Separation</i> | Yes | 58% |
| | No | 42% |
| <i>Timing of Measurement</i> | Once a day | 24% |
| | Twice a day | 38% |
| | Three times a day | 24% |
| | Five times a day | 6% |
| | Ten times a day | 2% |
| | Once a week | 4% |
| <i>Data Collection Duration</i> | One week | 28% |
| | Two weeks | 48% |
| | Three weeks | 14% |
| | Four-five weeks | 8% |
| | One day | 2% |
| <i>Total Data Points</i> | Less than 500 | 26% |
| | 500-1000 | 34% |
| | 1000-2000 | 24% |
| | 2000-3000 | 4% |
| | 3000-5000 | 6% |
| | More than 5000 | 6% |
| <i>Incentive for Participation</i> | Financial | 36% |
| | Non-financial | 22% |
| | No incentive | 42% |

| Attribute | Category | Frequency |
|----------------------------------|------------------------------|-----------|
| <i>Data Collection Tool</i> | Online survey | 68% |
| | PDA | 8% |
| | Smart phone | 12% |
| | Paper-and-pencil | 12% |
| <i>Research Model</i> | Mediation and moderation | 54% |
| | Mediation/ series mediations | 28% |
| | Moderation | 18% |
| <i>Multilevel Validity Check</i> | Yes | 40% |
| | No | 60% |

4. Discussion

As a relatively new method embraced in organization studies compared to other fields such as health and social psychology, ESM has several benefits including seizing real-time data in a specific work context, getting subjective thoughts and feelings of employees, minimizing retrospective bias, allowing simultaneous analysis of intra-individual and inter-individual processes, and bringing stronger inferences of causality (Fisher and To, 2012). This study reveals the key decisions made by organization researcher when adopting experience sampling designs in the last six years by analysing 50 randomly selected articles. As such, it enhances our limited knowledge on the problems and concerns as well as the capabilities ESM may bring to empirical investigations on organizational life.

Overall, the study findings reveal that despite the prominence of ESM in organizational research and significant improvements in research designs, various methodological weaknesses do exist. For instance, even though the number of respondents has increased in years, the average number of data points is noticeably lower than what is recommended. Multilevel validity and reliability of the measures have been rarely checked or reported. Causal inferences can be stronger in several studies as they do not temporarily separate between dependent and independent variables and multi-source measurement are not achieved. There is also limited explanation and justification regarding how and why measures are modified, why a particular time frame is chosen over another and what specific steps and precautions (e.g. regarding instructions, trainings, incentives, reminders, data collection technology) are taken in implementation phase.

In that respect, the results of this study can support researchers in improving the precision of ESM conduct in multiple ways such as increasing the sample size and data points at each level, conducting necessary measurement adaptations and validations, developing alternative measures such as experimental and visual ones, temporally separating the variables, using multiple sources (e.g., supervisors, managers, co-workers, customers or spouses) in data collection, and adopting more event-contingent designs. The identified dimensions and suggestions will also help researchers in reporting the core aspects of ESM in a more precise manner. Future research may examine each of these dimensions and their effects separately in more detail.

Another significant issue is whether available experience sampling studies have been using the full potential of the method in exposing change in employee states and behaviours as well as in their work environment over time, identifying dynamic organizational phenomena and provide a novel understanding which is not possible with common between-person designs. This study shows that there is still plenty of room in organizational research to reflect ESM potential to the fullest. One prominent way is to theorize and hypothesize more carefully on how time and change reflect themselves on organizational situations and relationships. In other words, a better connection between theoretical questions and empirical analysis should be built and articulated through so that the unique contribution of between-person designs over static approaches becomes more evident. This would also make choosing complex, resource-consuming and costly methods like ESM more rational and justifiable.

The stated shortcomings as well as good practices and recent trends should be carefully evaluated so that more effective ESM studies can be conducted, which will in turn, help developing better research in capturing dynamic organizational processes and understanding employees' immediate experiences in work life above and beyond the dominant static research frameworks. Future research may also assess how ESM data can be enhanced or

supplemented by other quantitative (e.g. experiment, survey) and qualitative (e.g. interview, critical incident technique) methods. Finally, more ESM research is needed from settings other than Western and developed country contexts. Even though increasing number of studies are being conducted in Asian countries, there is considerable lack of research from other parts of the world, especially those representing distinct socio-economic and cultural conditions.

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Appendix. List of ESM Articles Analyzed

- Barnes, C.M., Lucianetti, L., Bhave, D. P. and Christian, M. S. (2015). You wouldn't like me when I'm sleepy': Leaders' sleep, daily abusive supervision, and work unit engagement. *Academy of Management Journal*, 58(5), pp. 1419–1437.
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