

How to Start an Experience Sampling Study

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How to Start an Experience Sampling Study

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Introduction to the Experience Sampling Method

In the past, many types of research were limited to giving people surveys and observing them in the laboratory. However, these methods have limitations.

First, people taking surveys are subject to recall bias – or inaccurate memory recall due to the passage of time. Second, surveys can only provide global assessments - or asking about what is typically the case or how things are as a whole. For example, a survey might ask about one’s vacation. A person might say the vacation was good overall. However, traditional surveys can’t get at variability, or change across time. They can’t tell us if a person enjoyed the vacation more at the beginning or end, or whether there were multiple high points and low points. We might think of global surveys as providing a blurred “snapshot” of what is more like a “movie”: a person’s daily life.

The lab - on the other hand - allows for controlled, isolated observations. However, the lab isn’t a naturalistic environment

- people don’t typically live in the lab (except for a few researchers). This creates a problem. People respond differently in different environments and situations. Think of how you might act with your friends versus your grandparent’s friends. Or at a museum versus at a restaurant. So while laboratory studies can provide a more accurate - and less “blurry” - view of peoples’ responses in isolated situations, we still don’t get a view of their responses across daily life.

More and more, over the past 30 years, researchers have turned to the

Other names for ESM

There are various names for the experience sampling method. The most common ones are

- >> **Ecological momentary assessment**
- >> **Ambulatory assessment**
- >> **Intensive longitudinal studies**

Introduction to Experience Sampling

experience sampling method (ESM) to address the limitations of traditional surveys and laboratory observations. ESM is a way to learn about people in, or close to, “real-time” and in “real-life” situations (Schiffman, Stone, and Hufford, 2008) by repeatedly asking questions as they go about their day. Here, it is worth noting that experience sampling methods can go by different names, including ecological momentary assessment, ambulatory assessment, and intensive longitudinal methods.

As we will see, experience sampling can be done in various ways. However, it most commonly involves having participants answer questions on paper or an electronic device multiple times per day over a certain period of time. Using this simple technique we can get more accurate glimpses into peoples’ lives, and how they respond across various situations.

Now that you have an idea of why ESM is so great, let’s move on to how to set up an ESM study.

Identifying Your Objectives

Before starting your study, you need to identify your research aims. Is ESM the right way to address your aims? If so, what is the best way of setting up your ESM study? You will have a lot of choices to make along the way.

To start, you will need to choose:

- Participants
- Questions
- Reporting methods
- How many questions to deliver
- Technology

We will provide an overview of each choice you will have to make. However, your research aims should guide your choices. So let's start with those.

Specifying an Aim

You will want to make sure your aims address micro-changes over time; that is, changes that occur over the course of relatively short periods of time. In this case, you will want to examine variables that might change over hours, days, weeks, or months - not years (Conner & Lehman, 2012). For example, you might want to study how mood changes over the course of the day, instead of one's mood in a particular, isolated situation, such as while getting a root canal.

The experience sampling method can be used to study aspects of peoples' actions as well as what they are thinking, feeling, perceiving or sensing across the situations of daily life. It can also be used to measure

Identifying Your Objectives

physiological responses, such as heart rate, blood sugar, or cortisol levels (a physiological measure of stress). In sum, experience sampling might be used to ask the following types of questions:

- Behavior: What are people doing?
- Experience: What are people thinking, feeling, and perceiving?
- Physiology: What's happening in the moment at a biological level?

Addressing these questions might require person reports (active recordings) or automated sensor reports (passive recordings).

As you identify your questions, make sure you're taking advantage of the unique advantages of the experience sampling method. Focus on examining at least one of the following:

Within-person differences: How do variables vary within a single person?

Longitudinal changes: How do variables change across hours, days, weeks or months?

Contextual associations: What happens before, during, and after a behavior, thought, experience, or physiological event of interest?

Temporal sequences: In what sequence do behaviors play out over time? Is there a consistent pattern?

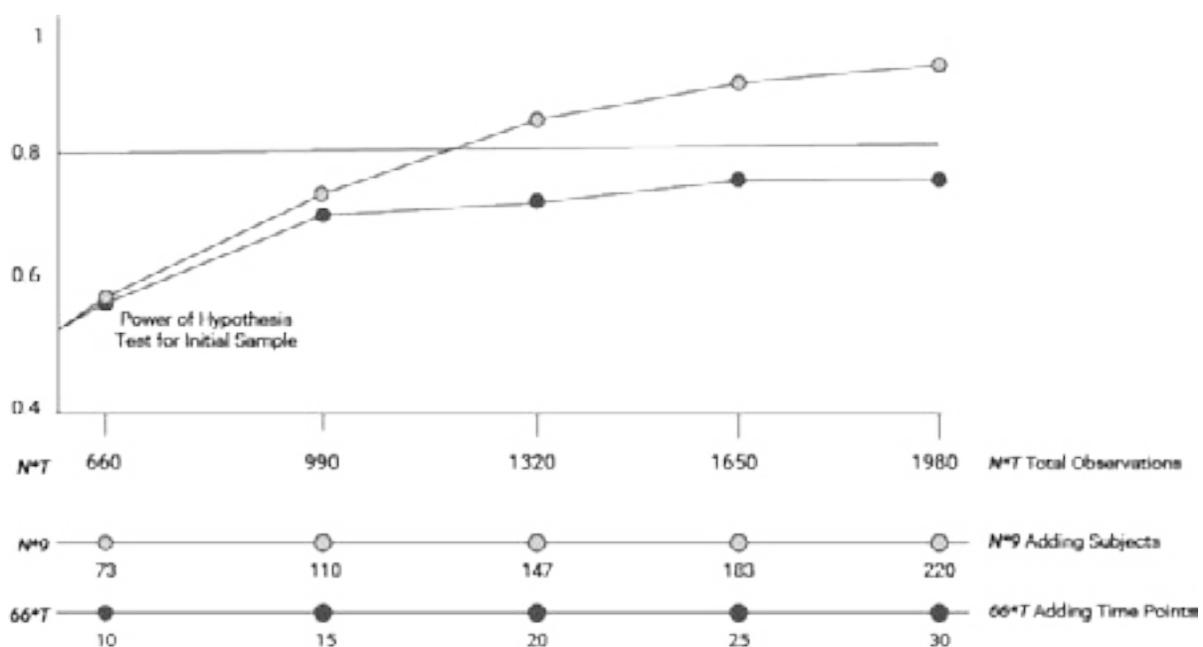
Figured out what you want to study? Now you can move on to identifying your participants.

Participants

Participants are one of the most important parts of your study. (Without them, you don't have people, which makes it hard to study a peoples' daily lives.) Before starting, you'll want to make sure you know how many participants you need and their demographics.

First, you want to make sure you have enough of your participants to make sure your study has enough power - or is able to find significant associations and differences, where they are present. The statistics for figuring this out can be tricky; but, basically, the power of a study is higher the more participants you have, and the more times you sample them (e.g., ask them a question or collect a physiological report). That being said, adding participants has less limitations in increasing power.

An example of this principle is shown in the graph below. For a study repeatedly sampling depression symptoms, after 990 total observations ($N \times T$), adding participants (N) increases power more than adding sampling points (T).



Participants

Second, it is important to know the demographics of your participants. What are their ages, socio-economic status, and ethnicity/culture? This information will help you determine your schedule (ex. School children, workplace studies), and technology to use (kids and elderly can use smartphones; lots of people around the world have smartphones but not everybody). More on scheduling and technology in later chapters.

Selecting Questions

Designing questions for real-time assessment is different than designing questions for traditional surveys in that your questions should address what happened in a discrete, relatively recent moment of time. Also, you have to keep in mind that you are asking these questions in the midst of a person's daily life. So you will need to keep the number of questions and time required to answer them to a minimum. There is only so much time you can demand from your participants. What this means is that, if you are wanting to use traditional validated measures for an ESM study, you will probably need to:

- (1) Modify the wording of questions. Instead of asking about what is typically the case, you will need to ask about what has happened in the past few minutes to hours.
- (2) Reduce the number of questions delivered at any sampling session.

Beyond this, there isn't a prescribed way of translating traditional surveys to ESM. However, a best practice is to: choose top-loading questions from a validated measure; modify the wording of questions as outlined above; then run statistical tests for reliability.

For validated measures, you will be able to find published studies that provide validity and reliability tests for the measure. Usually these studies have a section or table that shows the factor analysis for each question. From here, you can choose the top-loading factors to include in your ESM study.

To learn more about how to convert a traditional survey to an ESM measure, check out this resource: [How to Convert a Traditional Survey to an Experience Sampling Study](#)

Reporting Methods

The After identifying your aims, participants, and questions, you're ready to determine when and how to collect reports from them. There are several possibilities:

1. **Signal-contingent reporting:** Participants respond to a signal or notification that a researcher schedules.
2. **Interval-contingent reporting:** Participants respond at a certain times, or time of day.
3. **Daily Diary:** Participants respond once, at the end of the day.
4. **Event-contingent reporting:** Participants respond after a defined event.
5. **Continuous reporting:** Recordings are continually taken from participants. This is usually reserved for passive physiological recordings.

When choosing a reporting method, it is important to consider what you are studying. Some schedules are better for routine activities, and others for easily biased or forgotten activities. We'll go into each here.

1. **Signal-contingent** reporting involves participants responding to questions in response to some kind of signal. The signal could be a number of things, like a beeper on a wristwatch, or a notification on a phone. These signals can be scheduled for fixed times (ex., 10am and 9pm), regular, repeating times (ex., on the hour between 9am-5pm), random times (ex., 3 times between 8am-10pm), or semi-random times (ex, one random time for each of three time intervals: 9am-12pm, 12pm-3pm, 3pm-6pm). This type of schedule is best for variables that are constantly in flux, easily biased, or difficult to remember (such as mood, or inner speech). Because this requires considerable engagement from the participant, these studies usually only last between 1-2 weeks.

2. **Interval-contingent** reporting involves having participants respond at certain times (ex. every 12 hours) or times of day (ex. Morning, afternoon,

Reporting Methods

evening). This schedule is best for routine activities, or things that are easy to remember; for example, when examining how much one has exercised or eaten. These studies usually last about 1-2 weeks, as well.

3. **Daily diaries** are a type of interval contingent schedule, and they involve answering questions once at the end of the day. This schedule is best for asking reflective questions, or when asking about things that are easily remembered. Daily diaries are also useful when you feel the need to include complete versions of surveys. Because this schedule requires relatively little commitment, studies using daily diaries can last longer; about 1-4 weeks.

4. **Event-contingent** reporting involves having participants' respond to questions after a certain event, such as after they have smoked a cigarette. This schedule is best for events that clearly stick out, and for irregular or relatively rare occurrences. As participants might not respond very often, these studies can last longer – from 1 week to several months.

5. **Continuous reporting** involves monitoring variables continuously (obviously). Although this can be employed for studying some behavioral or experiential factors over short periods of time (ex., reporting one's mood while watching a short video clip), it is generally used for physiological variables, such as heart rate. Because this schedule can require a lot from participants when used for active reporting, and passive recording generates large amounts of data, generally this schedule rarely lasts for more than several days.

How many questions to deliver

After choosing your reporting method, next you will need to figure out how many questions to include in each session. This is pretty much be up to you. However, Tamlin Conner recommends a “burden cap” of about 20 minutes per day (Conner, 2015). The “burden cap” for your study really depends on

Reporting Methods

how motivated your participants are, and how many days your study will last. Demanding too much from your participants, or not keeping them motivated enough, can affect your response rate, which you want to keep at or above 70-75%. This makes it very important to:

- (1) Make sure your participants are motivated. While your participants may be intrinsically motivated, motivation might be increased using some form of incentive (ex. money, a personalized report at the end).
- (2) Consider the time and energy required each day.
- (3) Consider how long your study runs.

While keeping (1)-(3) in mind, you can be creative with the number of question sessions, and the number of questions within each session.

Choosing Technology

See Conner, 2015 for more detailed information.

When picking what technology to use for your study, you should consider the following factors:

- Study fit
- Scalability

Study fit: What technology best fits your study? There are many options to choose from: stopwatches and notecards, daily dairies, personal digital assistants (PDAs), phone calls, emails, physiological sensors, text messages, and smartphone app-based approaches (see Table 1). Some of these options will be better suited for some schedules, and studies, than others. Obviously, you wouldn't have someone record their heart rate every minute on paper. And email might be a good idea for assessing end-of-workday measures. However, there are many ways to "skin a cat."

In the recent past, it wasn't feasible to use technologies like smartphones when studying certain demographics, such as the young, elderly, or low socio-economic status. The best approach would have been stopwatches (or beepers) and notecards, or daily diaries. However, in the last several years, smartphone technology has become nearly ubiquitous; and there is little doubt it will further penetrate the global market in the upcoming years. As a result, smartphone technology is becoming feasible for nearly all demographics. However, there are always exceptions, and it's up to you to consider whether your study might offer one. In this case, low-tech might work best for you.

Whether going low-tech or high-tech, as much as possible, you want participant interactions to be easy, straightforward, and to fluidly fit with their lives. However, you also need to balance what is feasible for you. What

Choosing Technology

will it take to get your research off the ground, and to be able to analyze the large amounts of data you will accumulate in an ESM study? And this leads to questions about scalability.

Scalability: If you plan on doing ESM repeatedly you will want to consider scalability. Which approach will make it easiest for you to continue and grow in this research track? You want to choose a technology that will grow with you. You also want to make sure the cost of the technology fits with where you are now and where you hope to be down the road. When considering scalability, data output is also an important factor. How will the data be organized? Are you willing to enter and process hand-written entries, and at what point is this not feasible? Does the amount of data you will be generating make it necessary to have automatically generated datasets?

See Conner, 2015 for more detailed information.

Types of Technology

The major approaches to ESM involve Paper/pencil/watches, PDA, Email, Text/SMS, smartphone apps, and physiological sensors. Let's look at the pros and cons of each

Using a **paper, pencil, and watch** with a beeper is probably one of the oldest ways of doing ESM. It involves a person wearing a watch that would beep at random or regular times, signaling them to respond to some questions on paper (usually a card or notebook carried with them). This method is simple and cost effective. However, this method requires all the data to be entered into datasets by hand, which can take a considerable amount of time. Also, studies show that most participants don't actually respond in the moment - they "frontfill" all their responses when they get their diaries, or "backfill" their responses right before turning their diary back in.

Choosing Technology

Beeper Watch & Paper	PDA (Personal Digital Assistant)	Email
Pros <ul style="list-style-type: none"> • Simple • Cost effective Cons <ul style="list-style-type: none"> • Time-consuming • Backfilling possible 	Pros <ul style="list-style-type: none"> • Timestamps • No backfilling • Digital data Cons <ul style="list-style-type: none"> • Outdated technology • “Another device” to carry around 	Pros <ul style="list-style-type: none"> • Easy • Good for daily diary Cons <ul style="list-style-type: none"> • Difficult to detect momentary changes
Physiological Sensors	SMS/Text Messaging	Smartphone Apps
Pros <ul style="list-style-type: none"> • Detect physiological variables Cons <ul style="list-style-type: none"> • Can become expensive • Commitment from participant if need to charge/care for 	Pros <ul style="list-style-type: none"> • Inexpensive • Own device, texting easy • No internet required Cons <ul style="list-style-type: none"> • Limited questions • Limited schedules 	Pros <ul style="list-style-type: none"> • Flexible question types • Flexible scheduling • Scalable Cons <ul style="list-style-type: none"> • Expense

Personal digital assistants (or PDA's) have been widely used for ESM studies in the past. Before mobile and smartphones, they provided a way to prevent backfilling. They timestamp the data, and digitally store the data, which was a plus. In addition to these advantages, PDAs are relatively inexpensive option. However, they are “old-school” technology, and most participants have to be trained on how to use these. Also, it introduces a device into participants daily lives, which they don't typically carry around. Further, they can be cumbersome to program and data extraction isn't straightforward.

Email can be handy because you can just send participants a survey. This method works especially well for studies at work, and daily diary studies. However, it is difficult to detect momentary changes throughout the various situations of daily life via email. So another option might work better if that's your aim.

Choosing Technology

Physiological sensors are imperative if you want to study certain physiological variables in daily life. Although many people have these devices with sensors (ex. Fitbit), it might be wise to provide your own. This can ensure level of precision that might not otherwise be possible. These sensors come in a variety of types and price ranges, so you can choose which is best for your objectives.

With **SMS/text messaging**, participants receive SMS/text messages on their mobile phones. This method is helpful because people can use devices they already carry with them throughout the day. Also, SMS/Text messaging services can be very cost effective. However, you are often limited in the types of questions you can ask (respond with a number, or a short response), and scheduling options may not be as robust. It offers the same accessibility as a smartphone app, but not as much flexibility. Further, the data will often require reformatting before it can be analyzed.

Smartphone apps are often used like text messaging, but they provide more flexibility, more dynamic and varied ways of interacting with your participants, and data that is ready for analysis. Signal-contingent schedules can be used to deliver notifications which, like text messages, pop up on peoples' phones. At the same time, smartphone apps provide ways of collecting event-contingent reports as well. Also, these systems often allow for real-time data visualization. ESM app systems can be costlier than SMS/text messaging; but the improved flexibility, improved features, and scalability add to its value.

Ready to Get Started?

Now that you are familiar with the various aspects of starting an experience sampling study, you are ready to begin planning your own!

Here's what we've covered:

- Aims
- Participants
- Selecting Questions
- Reporting method
- How many questions to deliver
- Technology

Good luck as you get started!

Further Reading & References

Sources for Further Reading

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References

Chapter 1: Introduction

See (Schiffman, Stone, and Hufford, 2008) for explanation of experience sampling

See *Further Reading* for more information about experience sampling

Chapter 2: Objectives

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Chapter 3: Participants

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