

# **A Comparison of Signal Contingencies and Response Formats in Ambulatory Assessment**

by

Philip Howard Himmelstein

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This thesis was presented

by

**Philip Howard Himmelstein**

It was defended on

April 9<sup>th</sup> 2018

and approved by

Michael Pogue-Geile, Professor, Department of Psychology, Department of Psychiatry

Carissa Low, Assistant Professor of Medicine and Psychology, Division of

Hematology/Oncology, Department of Psychology

William Woods, Graduate Student, Department of Psychology

External Examiner: Gabriella Harari, Assistant Professor, Department of

Communication, Stanford University

Thesis Director: Aidan Wright, Assistant Professor, Department of Psychology

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# **A Comparison of Signal Contingencies and Response Formats in Ambulatory**

## **Assessment**

Philip Howard Himmelstein, BPhil

University of Pittsburgh, 2018

Ambulatory assessment is a form of intensive repeated measurement that allows researchers to examine how constructs unfold over time within an individual's natural environment. While its advantages over retrospective reports are well documented, it is less understood how methodological choices between signal contingencies and response formats influence the data that is collected. The present study aims to use big-five and interpersonal traits as well as social behavior and affect measured in the moment to determine whether signal and event contingent recording procedures or Visual Interpersonal Adjectives Scale (adjective slider) and behavioral checklist response formats provide equivalent data. Undergraduate psychology students ( $N = 197$ ) completed baseline questionnaires, received training on smartphone use, and completed one week of ambulatory assessment. Signal and event contingencies were evaluated by comparing means and variances across groups, by comparing correlations between interpersonal behavior and affect within-person across groups, and by fitting multiple linear regressions with an interaction term between sampling condition and big-five trait, interpersonal trait, or positive or negative affect. Results indicate that signal and event contingent recording techniques provide equivalent results. Adjective slider and behavioral checklist response formats were evaluated by comparing the correlations between an interpersonal trait, big-five trait, or positive or negative affect and a dimension of interpersonal behavior measured using either the slider or the checklist format. In addition, correlations between positive or negative affect and dimensions of interpersonal behavior were compared within person across slider and checklist formats. Results suggest that when

measuring interpersonal agency, slider and checklist response formats provide equivalent results. Results suggest that when measuring interpersonal affiliation, the slider may be a slightly superior method of measurement.

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## **PREFACE**

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## 1.0 INTRODUCTION

Over the past two decades, researchers have sought to understand human behavior as a set of interconnected, temporally dynamic processes. At the forefront of this shift lies a technique known as ambulatory assessment (AA; Hamaker & Wichers, 2017). Using AA, researchers collect samples of behavior using diverse modalities (e.g., self-report or physiological assessments) in an attempt to understand how emotions, behaviors, and thoughts interrelate across hours, days, and weeks. By assessing individuals in their natural environment, ambulatory assessment provides high ecological validity and allows for the examination of how a variety of constructs manifest in an individual's natural setting (Shiffman, Stone, & Hufford, 2008).

AA can take several forms: Assessment techniques have ranged from once-per-day assessment (daily diaries; Carney, Tennen, Affleck, Del Boca, & Kranzler, 1998) to the continuous measurement of physiological variables such as heart rate (Wilhelm, Perrez, & Pawlik, 2012). While AA questionnaires can be administered by paper and pencil, the proliferation of smartphones has led to an increase in the use of technology in the assessment of daily life. For a full review on methodological and analytical techniques in AA, see Bolger, Laurenceau, and Ebrary (2013), and Csikszentmihalyi (2011).

EMA is designed to study processes that occur within individuals over time, and is therefore useful for studying constructs in psychopathology like mood (Ebner-Priemer & Trull, 2009; Ebner-Priemer & Trull, 2009; Hamaker, 2012; Trull, Lane, Koval, & Ebner-Priemer, 2015).

Reviews of the use of EMA in psychopathology include examinations of post-traumatic stress disorder (Chun, 2016), major depression (Ebner-Priemer & Trull, 2009; Pemberton & Fuller Tyszkiewicz, 2016), bipolar disorder (Ebner-Priemer & Trull, 2009; Sperry & Kwapil, 2017), anxiety (Walz, Nauta, & Aan Het Rot, 2014), eating disorders (anorexia and bulimia nervosa, binge-eating; Engel et al., 2016), borderline personality disorder (Ebner-Priemer & Trull, 2009), psychosis (Oorschot, Kwapil, Delespaul, & Myin-Germeys, 2009), and substance abuse (Serre, Fatseas, Swendsen, & Auriacombe, 2015; Shiffman, 2009).

Within a psychopathology diagnosis, researchers can use EMA to examine different constructs and the temporal relationships between them (Piasecki, Hufford, Solhan, & Trull, 2007). For example, BPD is a multifaceted disorder involving affective instability, interpersonal distress, self-harm, and impulsivity that would be insufficiently characterized by examining any one of these symptoms alone (Carpenter & Trull, 2013; Ebner-Priemer & Trull, 2009; Lane, Carpenter, Sher, & Trull, 2016; Terzi et al., 2017). EMA can not only examine these multiple constructs simultaneously, but it can determine the temporal structure between different constructs to determine which behaviors and symptoms precede and follow other behaviors. An excellent example of this research comes from Fischer (2015), who used EMA to distinguish three latent factors of generalized anxiety disorder from the original 12 DSM-IV criteria. This information was then used to preferentially order treatment modules depending on which latent factor drove the other 12 symptoms, demonstrating the unique clinical utility of EMA (Fernandez, Fisher, & Chi, 2017).

AA has several advantages over traditional retrospective self-reports or laboratory assessments. Compared with traditional retrospective designs, AA is less subject to biases in autobiographical memory. This is an important advantage, as research in this domain has shown

that individuals experience biases in the encoding, recall, and aggregation of memory (Bradburn, Rips, & Shevell, 1987; Fahrenberg, Myrtek, Pawlik, & Perrez, 2007; Gorin & Stone, 2001; Schwarz, 2007; Stone & Broderick, 2007; Tourangeau, 2000). Research has also found that an individual's memory of a past experience is influenced by the respondent's current state (Clark & Teasdale, 1982; Salovey, Sieber, Jobe, & Willis, 1994). In retrospective reports, these biases lead individuals to over or underestimate the frequency and intensity of behaviors or emotions, altering data in systematic ways (Ebner-Priemer & Trull, 2009). These phenomena are illustrated in the work of Carney, Tennen, Affleck, Del Boca, and Kranzler (1998), who compared rates of alcohol consumption measured using timeline follow-back (TLFB) assessment and AA. Those who completed TLFB assessment were asked to reconstruct their daily drinking patterns at the end of thirty days, whereas those who completed AA procedures reported each day throughout the study. Findings indicated that TLFB assessment was unable to capture the patterning of daily fluctuations in alcohol consumption. In addition, estimated daily rates of alcohol consumption were significantly lower in those who reported retrospectively using TLFB compared with those who reported using AA.

AA data also has advantages over data gathered through laboratory assessment. AA data is thought to possess higher external validity compared with data gathered in the laboratory for three reasons (Robbins & Kubiak, 2014). First, AA is able to gather data concerning the impact of the situation in the natural environment, which has been shown to have a substantial impact on the behavior of an individual (Fleeson & Law, 2015; Moskowitz, Russell, Sadikaj, & Sutton, 2009a). This is important because many situations that occur in daily life cannot be recreated or would be unethical to recreate in the laboratory. For example, the stress of an impending deadline at work or a fight with a significant other over whose turn it is to do dishes can cause changes in mood that

gradually unfold over days (Driver & Gottman, 2004). These changes in mood would be difficult if not impossible to reconstruct in the laboratory. Furthermore, AA allows for the study of behaviors that would be unethical to recreate in the laboratory like self-harm, substance abuse, and relationship violence. Second, laboratory assessments are able to capture an individual's variability in response to their natural environment, which has been shown to be distinct from state measurements and an important correlate of both positive and negative psychological outcomes (Moskowitz & Zuroff, 2004). Finally, the experience of being in the laboratory has been shown to impact the retrieval of autobiographical memory. In the laboratory, individuals are often asked to recall salient or meaningful events in an environment that differs from the environment in which the event would usually be remembered or recalled (Stone & Shiffman, 2002). In theory, this could not only alter what is recalled, but the emotions and associated memories that are recalled with it.

Although it is understood that AA is superior to laboratory and retrospective self-reports in its ability to capture naturalistic experience and minimize biases associated with memory recall, it is less well understood how AA methodology itself can be enhanced to maximize validity and reliability. To this end, it is helpful to understand two attributes of AA methodology: how surveys are administered (known as the sampling contingency) and how surveys are constructed (referred to here as response format). The following paragraphs explain the role of sampling contingency and response format in AA and outline the theoretical considerations for why a researcher may choose one sampling contingency or response format over another. Ultimately, this overview leads to the conclusion that while differences between sampling contingencies and response formats have been examined theoretically, current research has yet to systematically compare data from competing methodologies.

The present research aims to quantitatively compare two methods of collecting data (signal contingent and event contingent recording) to one another as well as two methods of formatting surveys (adjective scale and behavioral checklist) to one another to determine whether different methods provide equivalent data. Agreement between the two modes of sampling design will be examined by examining the means of social behavior and affect measured in the moment, the correlations between social behavior measured in the moment and baseline personality questionnaires, and the within-person relationships between social behavior and affect measured in the moment.

I chose to use baseline personality measurements, social behavior, and affect to determine whether competing designs provide equivalent data because the relationships within and between these three constructs have been measured extensively. Extant research (e.g., McCrae & Costa, 1987; Moskowitz, 2005; Pincus, 2005) provides a solid framework for the present study, such that I can make predictions about which patterns I anticipate and suggest that if means and patterns of associations differ between signal contingency or response formats, this difference is a result of the design aspects of AA and not a result of error in the questionnaires themselves. Thus, if different methods do not provide equivalent data, researchers should not use methods interchangeably based on ease of data collection but should instead consider how the method of measurement may impact data when choosing a methodology.

## **1.1 SAMPLING CONTINGENCIES IN EMA**

In AA, three types of sampling methods can be used. These include interval contingent, signal contingent, and event contingent sampling designs. In an interval contingent design, participants

record an experience at a time predetermined by the interviewer (Bolger, Laurenceau, & Ebrary, 2013). For example, a participant may be prompted to complete a survey at 8AM every morning and 9PM every night. The present study does not examine data collected from interval-contingent designs. In a signal contingent design, participants are prompted randomly. In this sampling format, a day is typically divided into blocks and a prompt is sent out within these blocks (Csikszentmihalyi, 2011). For example, a 12-hour day may be divided into six, two hour blocks. A prompt could then be sent out randomly once per block for a total of six surveys throughout the day. In a study of bipolar disorder, Sperry and Kwapil (2017) randomly signaled participants eight times a day within 90 minute intervals to complete surveys concerning their thoughts, feelings, and behaviors. In an event contingent design, participants are asked to complete a prompt whenever they experience an event of interest. For example, Santangelo (2016) asked participants to complete a survey following each interpersonal interaction. Event contingent designs are distinct from interval and signal designs because event designs are not time based and instead rely on the participant's ability to detect and notice a stimulus.

The existence of multiple sampling strategies prompts the question: Which sampling strategies should be used when, and for what reasons? Current consensus suggests that two reasons underlie why a researcher may choose one sampling strategy over another. These reasons include the nature of the event itself and the frequency of the event in the naturalistic environment.

### **1.1.1 The Nature of the Event**

Events can be classified as discrete or continuous (Shiffman et al., 2008). Discrete events are those that can be directly observed by a participant. For example, social interactions are typically defined as discrete because they have relatively unambiguous beginning and end demarcations. In contrast,



continuous events are those that undergo continual change. Mood is generally considered a continuous event because emotions ebb and flow without clear, perceivable boundaries.

Theoretically, discrete events are well suited for event contingent measurement. This is because discrete events may be easier for a participant to detect and report given their clearly definable beginning and endpoints (Moskowitz et al., 2009a). Importantly, the clearly defined endpoint of a discrete event allows researchers to examine constructs immediately following the event in an event contingent paradigm. Provided that the participant reports immediately following the event, the researcher can know the exact moment the event occurred and can examine constructs immediately following the event (Csikszentmihalyi, 2011). For example, Arney, Crowther, and Miller (2011) examined changes in affect as a result of self-injurious behavior.

In contrast, events that are continuous in nature are presumably better suited for signal contingent measurement. A continuous event is a stimulus that is expected to vary in intensity and character continuously over time, but that might be difficult for a participant to detect discrete start and end points (Moskowitz, Russell, Sadikaj, & Sutton, 2009a). In an event contingent paradigm, reporting on continuous events may pose problems for reporting because the construct of interest lacks a clear, perceivable starting point. With a signal contingent paradigm, this problem is avoided. In addition, signal contingent measurement is beneficial in testing antecedents and predictors of events because researchers can examine a construct prior to an event. For example, a research question examining whether anger is a predictor for self-harm behavior could benefit from this design. Because the self-harm behavior is not tied to reporting, metrics of anger could be gathered from reports prior to the report of self-harm behavior and “lagged associations” between the two constructs could be examined, leading to a better understanding of the temporal

association between the two constructs (Pemberton & Fuller Tyszkiewicz, 2016; Terzi et al., 2017).

### **1.1.2 The Frequency of the Event**

When choosing a sampling design, it is also important to take into account the expected frequency of the event. Signal contingent designs are thought to be best suited for events that are frequent. This is because for frequent events, event contingent designs may place a burden on participants and can lead to attrition and missing data (Ebner-Priemer & Trull, 2009). For example, an event contingent design would have been inappropriate in the study of rumination in depressed individuals by Timm et al. (2017) because it would be unrealistic for a depressed individual to report every time they experience a ruminative thought. In this instance, a signal contingent design was likely the right approach.

In contrast, event contingent designs are presumably best suited for events that are infrequent. If an event of interest is infrequent and occurs only once or twice per week, the intensive nature of a signal contingent design would be unnecessary (Moskowitz et al., 2009a). For instance, Nock, Prinstein, and Sterba (2009) used an event contingent design to observe that participants with a history of self-harm experienced an average of five thoughts of harming themselves per week. Asking a participant to complete eight assessments per day for seven days would be unnecessary to identify an infrequent event like self-injurious thought in this study. For this research question, an event contingent design was likely the correct protocol.

### **1.1.3 Signal and Event Contingent Combination Designs**

In some instances, researchers may use signal and event contingent sampling methods simultaneously. This can occur in one of two ways. First, researchers may fit a sampling method to different constructs within the same study. For example, Smyth et al. (2009) explored the relationship between affect (a continuous event) and binge-eating (a discrete event); these constructs were measured with signal and event contingent recording, respectively. Second, researchers may use both signal and event contingent recording to measure the same construct. For example, Greeno, Wing, and Shiffman (2000) collected event contingent measurements of mood before eating as well as signal contingent measurements of mood not tied to eating in those with and without binge eating disorder. This combination design allowed researchers to determine that those with binge eating disorder experience mood disturbances in comparison to healthy controls but also experience distinct changes in mood associated with a binge eating episode compared to normal eating (Greeno, Wing, & Shiffman, 2000).

### **1.1.4 Prior Sampling Contingency Research**

To date, choices in sampling procedure have largely been made based on the conceptual criteria detailed above. To my knowledge, only one study has compared event and signal contingent methodologies directly. In a study assessing food intake in daily life, Wouters et al. (2016) used a counterbalanced design to assess snacking behavior. Forty-six participants completed both mobile, signal contingent recording and paper and pencil event recording at separate times. No significant differences were found between the two designs (Wouters, Thewissen, Duif, Lechner, & Jacobs, 2016). However, because study groups differed in both the sampling contingency and the device

used, it is uncertain whether measuring contingency alone would lead to the same conclusion. Further, certain constructs outside of snacking behavior (interpersonal interactions, mood, self-harm behavior) may interact with the chosen sampling contingency to provide differing results. Ultimately, it remains uncertain whether researchers can choose the sampling design based on theoretical considerations and ease of data collection, or whether a chosen sampling strategy changes the nature of gathered data in systematic ways that need to be taken into account when designing a study.

## **1.2 RESPONSE FORMAT IN AA**

Ensuring that questionnaires are reliable and valid are chief concerns in assessment. The reliability and validity of a questionnaire depends, in part, on how the question is asked. For lack of an overarching terminology within the psychometric literature, the present study refers to this as response format.

Questions can be asked in different ways. Two of these include adjective questionnaires that ask a participant to rate themselves on a particular adjective (e.g., how friendly were you today?), and behavioral checklists that ask whether a participant engaged in a particular behavior (e.g., did you smile today?). In the latter method, behaviors are then summed to create a measure of a particular construct, like friendliness. Importantly, behavioral checklists are dichotomous whereas adjective measures are rated on a continuous scale based upon the intensity or frequency of the construct of interest.

For example, both the revised interpersonal adjectives scale (IAS-R; Wiggins, Trapnell, & Phillips, 1988) and the social behavior inventory (SBI; Moskowitz, 1994) assess social behavior

using the underlying structural model of the interpersonal circumplex. The interpersonal circumplex organizes social behavior along the orthogonal dimensions of agency (i.e., dominant-submissive) and affiliation (i.e., cold-warm). To assess agency, the IAS-R asks participants to rate themselves on adjectives including self-assured, self-confident, assertive, persistent, firm, dominant, forceful, and domineering on an eight point Likert scale (Gurtman & Pincus, 2000). In contrast, the SBI assesses agency using categorical behavioral questions such as “I set goals for the others or for us”, “I gave information”, “I expressed an opinion”, and “I spoke in a clear voice” (Moskowitz, 1994).

Adjective assessments have received attention as a useful tool in assessing personality. Several reviews have been published on their strengths and weaknesses (Craig, 2005; Gough, 1960; Masterson, 1975). Behavioral checklist assessments have received less attention. Waller (1989) investigated whether checklist items with specific behavioral content may be inapplicable to subgroups of individuals and found that checklists that contain a small to moderate number of inapplicable items can significantly alter results (Waller, 1989). This finding speaks to the difficulty in creating behavioral checklist items that are universally applicable to a wide range of individuals or situations while keeping a checklist relatively short.

One question concerning adjective checklists is whether participants will interpret an adjective in the same way. For example, what may be friendly behavior to one person may not be friendly behavior to another. Hence adjective assessments may experience difficulty in maintaining internal consistency because the experimenter cannot control how a participant interprets the adjective “friendly.”

However, the interpretative component of adjective assessments may also be beneficial in that an adjective may capture a construct more succinctly than a behavioral checklist item. For

example, a behavioral checklist may need to contain ten different “friendly” behaviors to ensure the questionnaire captures differences in behavior between individuals. In contrast, the adjective assessment may only require two or three “friendly” items because a participant could interpret the “friendly” adjective to mean “what behaviors do *I* normally exhibit when I am acting friendly?”

The “ideal” type of response type may also depend on the nature of the construct itself. For example, interpersonal behavior is more overt than affect and may be best measured using the behavioral checklist method, whereas affect is more covert and may be well suited to the adjective question format.

Due to the reasons outlined above, it is plausible that adjective scale and behavioral checklists of an identical construct could provide data that differs in systematic ways. The present study intends to examine this to answer the question of whether researchers can use adjective scales and behavioral checklists interchangeably. Due to a lack of previous research, this portion of the study is exploratory.

### **1.3 THE PRESENT STUDY**

In the present study, participants underwent an initial training session where they were trained on using their smartphone for data recording purposes and completed baseline questionnaires. After this, participants completed one week of ambulatory assessment during which they completed questionnaires concerning their social behavior and affect. Overall, the present study aims to measure interpersonal behavior and affect in the moment alongside trait measures to examine whether data gathered through signal contingent recording differs from data gathered through event contingent recording, and whether data gathered through a behavioral checklist differs from

data gathered through an adjective scale response type. This difference will be operationalized in multiple ways. When comparing recording contingencies, I will: 1) Compare the means and variances of signal and event contingent methodologies; 2) Conduct multiple linear regressions between baseline personality traits and social behavior measured in the moment to determine whether associations differ between event and signal contingent conditions; 3) Examine correlations between affect and interpersonal behavior within-person across sampling contingencies. When comparing response formats, I will: 1) Compare correlations between baseline personality traits and individual differences in social behavior across adjective scale and checklist response formats, and 2) Determine whether within-person correlations between affect and interpersonal behavior differ across response formats. Importantly, affect will serve as an external validator that will not be provided in different response formats; instead, social behavior measured in the moment is the primary focus of this examination.

When comparing sampling contingencies in the first analysis, I predict that the means and variances will not significantly differ between signal and event contingent conditions, regardless of response formats.

When comparing sampling contingencies and response formats, I predict that interpersonal traits of agency and affiliation measured with the international personality item pool-interpersonal circumplex (IPIP-IPC; Markey & Markey, 2009) will correlate with agentic and affiliative behavior regardless of sampling contingency or response format. This prediction is based on evidence that interpersonal traits measured with the IPIP-IPC are predictive of interpersonal behaviors that match with their corresponding domains (Markey, Anderson, & Markey, 2013).

Based on previous retrospective research (McCrae & Costa, 1989) and AA research (Moskowitz & Zuroff, 2005a; Timmermans, Van Mechelen, & Kuppens, 2010) examining the

overlapping structure of the big-five traits and the interpersonal circumplex, I predict that trait extraversion will associate with average agentic behavior measured in the moment, whereas trait agreeableness will associate with average affiliative behavior assessed in the moment regardless of sampling contingency or response format.

Previous research relating big-five neuroticism, conscientiousness, and openness to the interpersonal circumplex has been less conclusive. Previous research has suggested that neuroticism, conscientiousness, and openness play a role in interpersonal behavior and interpersonal perceptions (Ansell & Pincus, 2004); however, previous AA research relating neuroticism, conscientiousness, and openness to interpersonal behavior has provided mixed results. In a previous study, Moskowitz et al. (2005) observed an association between neuroticism and both the agency and affiliation; however, this was not replicated by Timmermans et. al. (2010). In addition, Timmermans et. al. (2010) observed a relationship between openness and submissive behavior and conscientiousness and agreeable behavior that was not observed by Moskowitz et. al. (2005). Given the inconclusiveness of this research, this portion of the study will be largely exploratory; however, I predict that the patterns observed will be identical when comparing sampling contingencies and response formats.

With regard to the linear regressions that use positive and negative affect as predictors and the analyses that examine the within-person correlations between interpersonal behavior and affect, the majority of previous research has focused on the role of perceptions of others' agentic and affiliative behavior in eliciting a positive or negative emotional response and has not directly observed whether social behavior exhibited by the individuals relates to affect within the individual (Roche, Pincus, Rebar, Conroy, & Ram, 2014; Sadikaj, Moskowitz, Russell, Zuroff, & Paris, 2013; Timmermans et al., 2010; Wang et al., 2014). Nevertheless, this line of research suggests that the



affiliation dimension of interpersonal behavior is linked to valence (e.g. positive, negative) with quarrelsome and agreeable behavior being linked to negative and positive affect, respectively (Wright et al., 2017). To my knowledge Sadikaj et al. (2013), Timmerman's et al. (2010), and Wright et al. (2017) were the only groups to link social behavior and affect in the individual. In their study, Sadikaj et al. (2013) examined quarrelsome behavior and negative affect in individuals with BPD. In this study, perceptions of quarrelsomeness of the other elicited negative affect in the individual, which in turn led to an increase in quarrelsome behavior in the individual. In a study by Timmerman's et al. (2010), affiliative social behavior did not relate directly to valence but instead appeared to be a combination of pleasantness and low arousal. In their study, Wright et al. (2017) found that others' dominant behavior elicited quarrelsome behavior in the individual that was mediated by negative affect. From this evidence gathered through interpersonal perceptions and interpersonal behavior, I predict that positive affect will positively associate with affiliation, while negative affect will display a negative association with affiliation. I predict that this pattern will be observed regardless of sampling contingency or response format.

In summary, I expect that means and variances across signaling conditions and question formats will not be significantly different. I expect that interpersonal traits of agency and affiliation will correlate with agency and affiliation in the moment, respectively, and I expect trait extraversion to relate to the agentic behavior and trait agreeableness to relate to affiliative behavior in the moment. In addition, I expect that momentary positive affect and negative affect will positively and negatively associate with affiliation, respectively. Importantly, across all analyses I expect that the interaction term of association by groups will not be significantly different. I also expect that correlations between baseline personality and interpersonal traits and social behavior measured in the moment will not be significantly different when comparing adjective scale and

checklist response formats. Finally, I predict that association among affect and social behavior examined within-person will not significantly differ between adjective scale and checklist response formats or signal and event sampling contingencies.

## 2.0 METHOD

### 2.1 PARTICIPANTS

One-hundred and ninety-seven University of Pittsburgh undergraduate freshman were recruited from the University of Pittsburgh's introduction to psychology subject pool. Sixty-seven individuals participated in study procedures in Spring 2017, and the remaining participants underwent study procedures in the Spring of 2018. Eighty participants were female, 115 participants were male, and two participants did not identify their gender (Table 1). The mean age was  $19.2 \pm 1.85$  years old. Participants received course credit for their participation. Requirements for participation were that participants had to be at least 18 years old and have a smartphone running an iOS or Android operating system.

**Table 1: Demographics**

Contingency	Number of Reported Interactions	Mean Age	Sex	
			Males	Females
Signal	1900	$19.3 \pm (2.2)$	30.8% (50)	10.5% (36)
Event	1747	$19.2 \pm (1.4)$	28.2% (55)	22.5% (44)

## 2.2 PROCEDURE

Trained research assistants and I conducted initial training sessions for participants. During this time participants were briefed on study procedures and compensation and asked to download the MetricWire application onto their personal smartphone. MetricWire is an experience sampling collection application that allows for timed survey administration and management (Trafford, 2015). Participants in all training sessions were instructed to report on social interactions between themselves and at least one other person lasting at least five minutes for the duration of the study. After participants downloaded the application, research assistants checked that the app was functional and had downloaded properly. Participants were then asked to complete two baseline personality questionnaires.

At the initial training session, participants were randomly assigned to undergo the survey protocol and report on their social behavior and affect in either a signal contingent recording or event contingent recording fashion for one week. In the signal contingent condition participants received prompts and reported on their social interactions and affect from 10AM to 10PM. Prompts occurred randomly once per two-hour interval with the stipulation that prompts had to occur at least 90 minutes apart. In total, six surveys were administered per day. Participants received a reminder prompt after 15 minutes and were required to answer a survey within 30 minutes of notification or the survey would become unavailable. Participants were instructed to report on a social interaction that occurred since the last assessment. Participants in the event contingent condition were instructed to initiate a prompt immediately after a social interaction lasting at least 5 minutes occurred, and were instructed to initiate at least four prompts per day.

Participants in each recording contingency completed measures of social behavior in the moment in both an adjective scale and behavioral checklist format. Midway through the study, the

order that participants saw the adjective scale and behavioral checklist was flipped to avoid response format order as a potential confound.

### 2.3 MEASURES

Interpersonal traits were measured using the IPIP-IPC (Markey & Markey, 2009). A complete list of items can be found in Table A1. The IPIP-IPC is a 32-item questionnaire that assesses interpersonal traits along the the orthogonal dimensions of agency (i.e., dominant-submissive) synonymously referred to as dominance, and affiliation (i.e., quarrelsome-agreeable), synonymously referred to as communion. Items in the IPIP-IPC are phrased as short statements like “love large parties” and “think of others first.” Participants ranked each statement on a 5-point Likert scale from “very inaccurate; 1” to “very accurate; 5”. Reliabilities for the eight octants of the IPIP-IPC prior to collapsing the octants into affiliative and agentic dimensions ranged from questionable ( $\alpha = .60$ ) to good ( $\alpha = .81$ ).

Big-five personality traits of extraversion, agreeableness, neuroticism, conscientiousness, and openness were measured using the Big-Five Inventory – 2 (Soto & John, 2017). A complete list of items can be seen in Table B1. The BFI – 2 consists of 60 items rated on a 5-point scale ranging from disagree strongly to agree strongly. For example, items assessing extraversion included “is talkative” and “is full of energy” while items assessing neuroticism included “can be tense” and “worries a lot”. Reliabilities for the big-five traits ranged from acceptable ( $\alpha = .77$ ) to good ( $\alpha = .88$ ).

Affect was measured in the moment using the positive and negative affect schedule (PANAS-X), a scale consisting of five positive affect items and five negative affect items (Watson

& Clark, 1999). A complete list of items can be seen in Table D1. Participants were asked to rate the extent to which each adjective described how they felt on a visual slider scale from “not at all; 0” to “extremely; 100”. For example, items assessing positive affect included “content”, “relaxed”, and “happy” while items assessing negative affect included “sad”, “nervous”, and “angry”. Both positive affect and negative affect measures showed good reliability (PA  $\alpha = .82$ , NA  $\alpha = .87$ ).

In regard to response format, for questions in the adjective scale format participants completed the Visual Interpersonal Adjectives Scale (VIAS). In this scale, participants were asked to rate their behavioral affiliation on a bipolar axis ranging from cold/distant/hostile to warm/friendly/caring, with each pole of the axis representing circumplex quarrelsomeness and agreeableness, respectively. Behavioral affiliation was measured on a bipolar axis ranging from accommodating/submissive/timid to assertive/dominant/controlling, with each pole representing circumplex submissiveness and dominance, respectively. For both agency and affiliation, poles of the axis were marked numerically from -50 (quarrelsomeness, submissiveness) to 50 (agreeableness, dominance).

For items in the behavioral checklist format, dichotomous (yes/no) behavioral items from the social behavior inventory (SBI; Moskowitz, 1994) representing each pole of the agentic and affiliative dimensions were presented, and items representing each dimension were summed after recording. For a complete list of measures, see Table 2. Consistent with the prior literature using the SBI in AA, the total 46 items of the SBI were divided into four subsets of 12, with 3 items measuring each pole of the two dimensions included in each set of 12. One of these four subsets was then presented randomly at each momentary assessment. Example items for agency included “I spoke in a clear firm voice” and “I spoke softly.” Example items for affiliation included “I showed sympathy” and “I made a sarcastic comment.”

**Table 2: Table of Measures**

	Questionnaire	Description
Baseline	The International Personality Item Pool- Interpersonal Circumplex (IPIP-IPC)	Measures interpersonal circumplex dimensions of agency, affiliation
	Big Five Inventory (BFI)	Measures factor five personality traits including extraversion, agreeableness, neuroticism, openness, conscientiousness
AA	Social Behavior Inventory	Measures interpersonal circumplex dimensions of agency, communion
	Positive and Negative Affect Schedule – Expanded Form (PANAS-X)	Measures positive and negative affect

### 3.0 RESULTS

To understand the effects of recording procedure and response format in AA, I conducted three stages of analyses.

Prior to this, a chi-square test of independence was performed to examine the relation between recording contingency and sex. The relationship between these variables was not significant,  $X^2(1, N = 195) = 0.71, p = 0.40$ .

Prior to testing any of my focal hypotheses, I conducted a power analysis using G\*Power (Faul, Erdfelder, Lang, & Buchner, 2007) to determine the population effect sizes I would be able to detect with my collected sample size ( $N=197$ ;  $n=98$ ,  $n=99$ ) at power = 80 with an alpha of 0.05. The current sample has the power to detect: a small to medium effect size (Cohen's  $d = 0.40$ ) for a test of independent means; a small effect size (Cohen's  $d = 0.20$ ) for a test of dependent means; a numerator to denominator ratio of 1.77 in an F-test; and a small effect size ( $F^2 = 0.04$ ) for a regression path.

#### 3.1 STAGE 1

First, I compared averages and variances of social behavior and affect measured in the moment between signal and event contingent groups using independent t-tests and f-tests for the equality of two variances means and variances, respectively.



No significant differences were found when comparing means of agency (slider), agency (checklist), affiliation (slider), affiliation (checklist), positive affect, and negative affect between event and signal conditions (Table 3)

**Table 3: Comparison of Means in Event, Signal Conditions Across Response Formats**

Response Format	Mean		<i>df</i>	<i>t</i>	<i>p</i>
	Signal	Event			
Agency Slider	0.40 (1.00)	-0.88 (1.18)	195	0.83	0.410
Agency Checklist	0.27 (0.04)	0.24 (0.03)	195	0.58	0.563
Affiliation Slider	22.33 (1.24)	25.67 (1.38)	195	-1.80	0.073
Affiliation Checklist	0.47 (0.04)	0.50 (0.05)	195	-0.48	0.634
Positive Affect	51.93 (1.33)	51.95 (1.32)	195	-0.01	0.991
Negative Affect	18.06 (1.35)	16.22 (1.30)	195	0.98	0.327

*Note.* \* =  $p \leq 0.05$ , \*\* =  $p \leq .01$ , \*\*\* =  $p \leq .001$ , mean (standard error)

Prior to the use of the f-test for equality of two variances, I examined QQ plots of relevant variables to confirm normality. Variances across groups were then compared to determine whether

the signal or event contingent group contained more variability (see Table 4). The agency checklist demonstrated significantly more variability in the signal compared to the event contingent condition and the affiliation checklist demonstrated more variability in the event compared to the signal contingent condition.

**Table 4: Comparison of Variances in Event, Signal Conditions Across Response Formats**

Response Format	Ratio	Var Signal	Var Event	F (df)	p
Agency Slider	1.40	98.9	138.9	1.41 (98, 99)	0.10
Agency Checklist	1.49	0.17	0.12	1.49 (98, 99)	0.05*
Affiliation Slider	1.23	152.7	187.6	1.25 (98, 99)	0.30
Affiliation Checklist	2.00	0.12	0.24	2.00 (98, 99)	0.00***
Positive Affect	1.01	172.5	173.7	1.01 (98, 99)	0.97
Negative Affect	1.05	177.3	168.2	1.05 (98, 99)	0.79

*Note.* \* =  $p \leq 0.05$ , \*\* =  $p \leq .01$ , \*\*\* =  $p \leq .001$ , Numerator = event contingent, Denominator = signal contingent, F (df<sub>1</sub>, df<sub>2</sub>)

### 3.2 STAGE 2

The second stage of the analysis, examining between-person associations, was divided into two parts. In Stage 2A, I examined potential differences between signal and event contingent recording

conditions. In Stage 2B, I examined potential differences between adjective scale and behavioral checklist formats.

### **3.2.1 Stage 2A**

In the first part of stage 2, I fit multiple linear regression models using big-five traits and interpersonal traits measured at baseline to predict agency and affiliation measured in the moment. I also fit models with person-level averages of positive and negative affect measured in the moment predicting interpersonal behavior measured in the moment.

The following 4 outcomes, 1) agency (slider), 2) agency (checklist), 3) affiliation (slider), and 4) affiliation (checklist) were each examined separately as dependent variables. Each dependent variable was predicted by each interpersonal trait, each big-five trait, and positive or negative affect in separate models. For each predictor, I created five different models in order of increasing complexity. Model 1 entered the focal substantive independent variable (e.g., baseline extraversion) to predict person-level averages of social behavior measured in the moment, model 2 added in condition (event vs. signal contingency) to model 1 as a predictor, model 3 added sex (male or female) to model 1 as a predictor, model 4 included both condition and sex as predictors, and model 5 added an interaction term between the independent variable (big-five trait, interpersonal trait, or affect) and condition while adjusting for sex as a way to determine whether regression slopes differed between event and signal contingent conditions.

Table 5 contains the final linear models (model 5) for each big-five trait, interpersonal trait, or affective valence for the dependent variable agency (slider). Agency (slider) was predicted by extraversion, agreeableness, trait agency, and negative affect. Agreeableness, trait agency, and negative affect were significant in earlier models, but were not significant when the interaction

term was added. Given the interaction terms were not significant, the effects for agreeableness, trait agency, and negative affect are retained as significant.

Table 6 contains the complete linear models (model 5) for each big-five trait, interpersonal trait, or affective valence for the dependent variable agency (checklist). Agency (checklist) was predicted by extraversion, trait agency, negative affect, and conscientiousness. Trait agency and conscientiousness were significant in earlier models, but were not significant when the interaction term was added. Given the interaction terms were not significant, the effects for trait agency and conscientiousness are retained as significant.

Table 7 contains the complete linear models (model 5) for each big-five trait, interpersonal trait, or affective valence for the dependent variable affiliation (slider). Affiliation (slider) was predicted by agreeableness, conscientiousness, trait affiliation, positive affect, and negative affect. Conscientiousness was significant in earlier models, but was not significant when the interaction term was added. Given the interaction term was not significant, the effect for conscientiousness was retained as significant.

Table 8 contains the complete linear models (model 5) for each big-five trait, interpersonal trait, or affective valence for the dependent variable affiliation (checklist). Affiliation (checklist) was predicted by positive and negative affect. Positive affect and negative affect were significant in earlier models, but were not significant when the interaction term was added. Given the interaction terms were not significant, the effects for positive and negative affect were retained as significant.

**Table 5: Complete Models Predicting Agency (Slider) Using Big-Five, Interpersonal Traits, and Affect**

	Extraversion	Agreeableness	Neuroticism	Conscientiousness	Openness	Trait Agency	Trait Affiliation	Positive Affect	Negative Affect
Trait	<b>0.244*</b> (0.111)	-0.255 (0.169)	-0.099 (0.114)	0.029 (0.141)	-0.014 (0.148)	0.694 (0.387)	0.737 (0.655)	0.127 (0.084)	0.104 (0.084)
Sampling Contingency (event=1)	-0.912 (1.553)	-0.984 (1.548)	-1.051 (1.594)	-0.945 (1.576)	-1.023 (1.572)	-0.783 (1.561)	-1.019 (1.547)	0.655 (6.336)	-0.902 (2.566)
Gender (male=1)	2.642 (1.579)	2.172 (1.597)	2.699 (1.731)	2.817 (1.598)	2.964 (1.630)	2.571 (1.587)	2.490 (1.601)	2.892 (1.584)	2.282 (1.614)
Trait*Contingency	-0.188 (0.161)	-0.026 (0.220)	0.207 (0.162)	-0.160 (0.184)	0.090 (0.210)	-0.272 (0.590)	<b>-2.089*</b> (0.875)	-0.033 (0.118)	0.001 (0.119)

Note: \*p<0.05; \*\*p<0.01; \*\*\*p<0.001, estimate (SD)

**Table 6: Complete Models Predicting Agency (Checklist) Using Big-Five, Interpersonal Traits, and Affect**

	Extraversion	Agreeableness	Neuroticism	Conscientiousness	Openness	Trait Agency	Trait Affiliation	Positive Affect	Negative Affect
Trait	<b>0.009*</b> (0.004)	-0.006 (0.006)	-0.003 (0.004)	0.009 (0.005)	0.0004 (0.005)	0.019 (0.014)	0.013 (0.023)	-0.002 (0.003)	<b>-0.007*</b> (0.003)
Sampling Contingency (event=1)	-0.027 (0.054)	-0.033 (0.055)	-0.046 (0.056)	-0.047 (0.055)	-0.034 (0.055)	-0.025 (0.055)	-0.035 (0.055)	-0.186 (0.224)	-0.093 (0.089)
Gender (male=1)	-0.009 (0.055)	-0.014 (0.057)	-0.029 (0.061)	0.006 (0.056)	-0.003 (0.057)	-0.009 (0.056)	-0.001 (0.057)	-0.003 (0.056)	0.026 (0.056)
Trait*Contingency	-0.002 (0.006)	0.005 (0.008)	-0.0003 (0.006)	-0.005 (0.006)	-0.0003 (0.007)	0.0001 (0.021)	-0.020 (0.031)	0.003 (0.004)	0.003 (0.004)

Note: \* p<0.05; \*\* p<0.01; \*\*\* p<0.001, estimate (SD)

**Table 7: Complete Models Predicting Affiliation (Slider) Using Big-Five, Interpersonal Traits, and Affect**

Table 7	Extraversion	Agreeableness	Neuroticism	Conscientiousness	Openness	Trait Agency	Trait Affiliation	Positive Affect	Negative Affect
Trait	0.127 (0.126)	<b>0.573**</b> (0.185)	-0.196 (0.128)	0.210 (0.154)	-0.011 (0.166)	-0.031 (0.438)	<b>2.066**</b> (0.728)	<b>0.373***</b> (0.084)	<b>-0.421***</b> (0.080)
Sampling Contingency (event=1)	2.775 (1.759)	2.593 (1.699)	2.451 (1.782)	2.115 (1.715)	2.745 (1.761)	2.612 (1.767)	2.514 (1.720)	-3.185 (6.326)	<b>4.888*</b> (2.429)
Gender (male=1)	<b>-9.847***</b> (1.788)	<b>-8.605***</b> (1.754)	<b>-10.464***</b> (1.935)	<b>-9.515***</b> (1.738)	<b>-9.507***</b> (1.826)	<b>-9.762***</b> (1.796)	<b>-8.793***</b> (1.780)	<b>-9.380***</b> (1.582)	<b>-7.230***</b> (1.528)
Trait*Contingency	-0.107 (0.182)	-0.219 (0.242)	0.258 (0.181)	0.218 (0.200)	0.131 (0.235)	-0.344 (0.667)	-1.169 (0.974)	0.114 (0.118)	-0.173 (0.112)

*Note:* \* p<0.05; \*\* p<0.01; \*\*\* p<0.001, estimate (SD)

**Table 8: Complete Models Predicting Affiliation (Checklist) Using Big-Five, Interpersonal Traits, and Affect**

	Extraversion	Agreeableness	Neuroticism	Conscientiousness	Openness	Trait Agency	Trait Affiliation	Positive Affect	Negative Affect
Trait	0.005 (0.004)	-0.003 (0.007)	-0.004 (0.004)	0.003 (0.005)	-0.001 (0.006)	0.010 (0.015)	0.013 (0.026)	0.005 (0.003)	-0.005 (0.003)
Sampling Contingency (event=1)	0.018 (0.060)	0.016 (0.060)	0.010 (0.062)	0.008 (0.061)	0.016 (0.061)	0.017 (0.061)	0.014 (0.061)	-0.033 (0.243)	0.072 (0.097)
Gender (male=1)	<b>-0.192**</b> (0.061)	<b>-0.187**</b> (0.062)	<b>-0.204**</b> (0.067)	<b>-0.185**</b> (0.061)	<b>-0.182**</b> (0.063)	<b>-0.192**</b> (0.062)	<b>-0.180**</b> (0.063)	<b>-0.184**</b> (0.061)	<b>-0.152*</b> (0.061)
Trait*Contingency	-0.005 (0.006)	0.008 (0.009)	0.004 (0.006)	0.002 (0.007)	0.004 (0.008)	-0.014 (0.023)	-0.0003 (0.034)	0.001 (0.005)	-0.004 (0.004)

*Note:* \*p<0.05; \*\*p<0.01; \*\*\*p<0.001, estimate (SD)



### **3.2.2 Stage 2B**

Next, I compared slider and checklist response formats by calculating and correlations between momentary agency and a personality or interpersonal trait predictor, and testing for differences across response format. For example, a correlation was calculated for trait extraversion and each person's average momentary agency measured via slider response format, and for trait extraversion and agency measured in the moment via checklist response format. A Steiger z-test was then performed to determine whether these correlations differed significantly.

Results are tabulated in Table 9. I found that the correlation between conscientiousness and agency (checklist) was significantly greater than the correlation between conscientiousness and agency (slider). In addition, the correlation between negative affect and agency (slider) was significantly greater than the correlation between negative affect and agency (checklist). No other associations differed across response formats.

**Table 9: Comparing Correlations Between Baseline Measures or Affect with Agency in the Moment Across Response Formats**

Predictors	Momentary Measures			
	Slider Agency	Checklist Agency	<i>z</i>	<i>p</i>
Trait Agency	0.16	0.14	0.17	0.87
Trait Affiliation	-0.09	0.01	-1.03	0.30
Trait Extraversion	0.15	0.20	0.54	0.59
Trait Agreeableness	-0.20	-0.07	-1.26	0.21
Trait Neuroticism	-0.19	-0.07	-1.26	0.21
Trait Conscientiousness	-0.06	0.14	-2.12	0.04*
Trait Openness	0.00	0.01	-0.07	0.94
PA_M	0.12	-0.01	1.45	0.15
NA_M	0.15	-0.18	3.57	0.00***

*Note:* \* =  $p \leq 0.05$ , \*\* =  $p \leq .01$ , \*\*\* =  $p \leq .001$ . PA\_M, NA\_M = Per person averages for positive and negative affect. Slider Agency & Checklist Agency  $r = 0.07$ .

Results for momentary affiliation (see Table 10) also showed that the correlation between trait affiliation and affiliation (slider) was significantly greater than the correlation between trait affiliation and affiliation (checklist). In addition, the correlation between trait agreeableness and affiliation (slider) was significantly greater than the correlation between trait agreeableness and affiliation (checklist). The correlation between positive affect and affiliation (slider) was

significantly greater than the correlation between positive affect and affiliation (checklist). The correlation between negative affect and affiliation (slider) was also significantly greater than the correlation between negative affect and affiliation (checklist). No other associations differed across response formats.

**Table 10: Comparing Correlations Between Baseline Measures or Affect with Affiliation in the Moment Across Response Formats**

Predictors	Momentary Measures			
	Slider Affiliation	Checklist Affiliation	<i>z</i>	<i>p</i>
Trait Agency	-0.07	0.00	0.09	0.39
Trait Affiliation	0.26	0.09	2.12	0.03*
Trait Extraversion	0.03	0.04	-0.12	0.90
Trait Agreeableness	0.29	0.07	2.28	0.00**
Trait Neuroticism	0.07	0.04	0.35	0.73
Trait Conscientiousness	0.25	0.10	1.97	0.05
Trait Openness	0.09	0.05	0.42	0.67
PA_M	0.44	0.17	3.63	0.00***
NA_M	-0.56	-0.26	-4.35	0.00***

*Note:* \* =  $p \leq 0.05$ , \*\* =  $p \leq .01$ , \*\*\* =  $p \leq .001$ . PA\_M, NA\_M = Per person averages for positive and negative affect. Slider Affiliation & Checklist Affiliation  $r = 0.34$

### 3.3 STAGE 3

The third stage of the analysis focused on within-person correlations between momentary interpersonal behavior and affect.

First, I compared the within-person correlations between affect and momentary interpersonal behavior across signal and event contingent conditions. Results from the analyses can be found in Table 11. No significant differences were found when comparing conditions when either the slider or checklist was used to measure social behavior.

**Table 11: Comparing Signal and Event Contingencies Within-Person**

Response Format	Correlation	Mean		<i>df</i>	<i>t</i>	<i>p</i>
		Signal ( <i>r</i> )	Event ( <i>r</i> )			
Slider	PA - Agency	0.15	0.18	186.5	-0.31	0.76
	PA - Affiliation	0.52	0.53	175.2	-0.24	0.81
	NA - Agency	0.02	0.19	108.3	-0.85	0.39
	NA - Affiliation	-0.41	-0.51	107.1	0.63	0.53
Checklist	PA - Agency	-0.10	0.13	100.2	-1.14	0.26
	PA - Affiliation	0.25	0.27	179.7	0.74	0.73
	NA - Agency	-0.06	-0.12	184.5	1.34	0.18
	NA - Affiliation	-0.41	-0.51	107.1	0.63	0.53

*Note:* \* =  $p \leq 0.05$ , \*\* =  $p \leq .01$ , \*\*\* =  $p \leq .001$ , PA = Positive Affect, NA = Negative Affect

Next, correlations for each participant were calculated between agency and affiliation in each response format with positive and negative affect, collapsing signal and event contingent conditions. Correlations were standardized into z scores using a Fisher transformation and an independent t-test was conducted to compare group averages across response format types. Z scores were then transformed back into correlations.

Results from the analysis can be found in Table 12. Neither association of positive or negative affect with momentary agency differed across response format. The average correlation between positive affect and affiliation was significantly stronger in the inverse direction when affiliation was measured via the slider, compared to when affiliation was measured using the checklist. In addition, the average correlation between negative affect and affiliation was significantly stronger when affiliation was measured via the slider compared to when affiliation was measured using the checklist.

**Table 12: Comparing Slider and Checklist Response Formats Within-Person**

Correlation	Mean		<i>df</i>	<i>t</i>	<i>p</i>
	Slider ( <i>r</i> )	Checklist ( <i>r</i> )			
PA - Agency	0.17	0.01	234.9	-1.45	0.25
PA - Affiliation	0.53	0.26	358.6	-7.69	0.00***
NA - Agency	0.11	-0.09	213.0	-1.85	0.07
NA - Affiliation	-0.46	-0.15	378.8	2.34	0.01**

*Note.* PA = Positive Affect, NA = Negative Affect

## **4.0 DISCUSSION**

In the present study, I investigated the extent to which participant responses were influenced by recording contingencies (i.e., event and signal) and response formats (i.e., adjective and checklist). For recording contingency I predicted no significant difference between means and variances, and a non-significant interaction term between contingency condition and substantive predictors (i.e., interpersonal traits, big-five traits, and affect) when fitting multiple linear regression to predict agency (slider), agency (checklist), affiliation (slider), or affiliation (checklist). I also predicted no significant differences between recording contingencies when comparing within-person correlations between momentary interpersonal behavior and affect. For response format, I again predicted no significant difference between correlations using a common interpersonal trait, personality trait, or affect in association with agency (slider) and agency (checklist) or affiliation (slider) and affiliation (checklist). In addition, I tested for the impact of response format by comparing momentary agency and affiliation correlations with positive and negative affect across response formats.

### **4.1 RECORDING CONTINGENCY**

Comparisons made across recording contingencies generally failed to reject the null hypothesis; I found no significant differences in mean levels and few and inconsistent differences in variability of interpersonal behaviors when comparing the two groups. When fitting multiple regression models, only one significant interaction was found when using trait affiliation to predict agency

(slider), adjusting for gender (see Table E7). Generally, however, the overall pattern of results suggested no marked difference between the contingency groups. Furthermore, no differences were found between signal and event contingencies when comparing within-person correlations between affect and social behavior.

My findings regarding recording contingency are in line with the findings of Wouters et al. (2016), who found no significant differences when comparing energy intake between smartphone signal contingent and paper and pencil based event contingent recording. The present findings suggest that researchers may choose a sampling strategy based on ease of data collection and the properties of the event of interest.

## **4.2 RESPONSE FORMAT**

### **4.2.1 Agency**

For a summary of the relationships between linear regression analyses (Stage 2A) and correlation analyses across response formats (Stage 2B) regarding agency, see Table 13.

**Table 13: Predicting Momentary Agency**

	Regression Predictors		Slider v. Checklist	Previous Research
	Slider	Checklist		
E	✓	✓	X	Supports relationship between extraversion, agency (McCrae & Costa, 1989; Moskowitz & Zuroff, 2005b; Timmermans et al., 2010)
A	✓	X	X	Does not support a relationship between agreeableness, agency (McCrae & Costa, 1989; Moskowitz & Zuroff, 2005b; Timmermans et al., 2010).
C	X	✓	✓	Does not support a relationship between conscientiousness, agency (Timmermans et al., 2010).
Trait Agency	✓	✓	X	Supports a relationship between trait agency and momentary agency (Markey & Markey, 2009).
NA	✓	✓	✓	Research supports relationship between negative affect and agency between-persons but not within-persons (Timmermans et al., 2010; Yik, 2010).

*Note:* ✓ = Significant difference between slider, checklist format, **Bold** = Stronger predictor when comparing slider, checklist, E = Extraversion, A = Agreeableness, C = Conscientiousness, NA = Negative Affect

Following previous research (Markey & Markey, 2009; McCrae & Costa, 1989; Moskowitz & Zuroff, 2005b; Timmermans et al., 2010), I predicted that extraversion and trait agency would predict momentary agency across both slider and checklist response formats. These hypotheses were supported by my multiple linear regression analyses.

In addition, negative affect measured in the moment predicted momentary agency across both response formats when performing linear regressions, despite conflicting research concerning the relatedness of the two constructs that found that agency was related to affect when measured



between but not within-persons (Timmermans et al., 2010; Yik, 2010). In the present study, this association was stronger when agency was measured via the slider than with the checklist.

The response formats diverged to some extent, however, with agreeableness predicting momentary agency in the slider, but not in the checklist format when performing linear regressions. However, the difference between the effect across response formats was not significantly different. Previous research does not support a relationship between agreeableness and agency (Moskowitz, 2005; Timmermans et al., 2010).

Response formats diverged again with conscientiousness predicting agency measured with the checklist but not agency measured with the slider. The correlation between conscientiousness and agency (slider) was found to be significantly greater than the correlation between conscientiousness and agency (checklist). AA research suggests that conscientiousness does not relate to agency (Timmermans et al., 2010), though conscientiousness has been shown to impact interpersonal relationships and has been hypothesized to play a role in interpersonal perceptions, with individuals who are high in conscientiousness being perceived as more dominant (Ansell & Pincus, 2004). Despite these few instances of difference the overall pattern of results suggested that response format does not strongly influence momentary agency's relationships with other constructs.

Finally, no difference was found when comparing the within-person correlations between positive or negative affect and agency across agency (slider) and agency (checklist), further suggesting that when measuring agency, researchers may choose to use either the slider or checklist format with little concern that response format biases responding in systematic ways.

## 4.2.2 Affiliation

For a summary of the relationships between linear regression analyses (Stage 2A) and correlation analyses across response formats (Stage 2B) regarding affiliation, see Table 14.

**Table 14: Predicting Momentary Affiliation**

	Regression Predictors			Previous research
	Slider	Checklist	Slider v. Checklist	
A	✓	X	✓	Supports relationship between agreeableness, affiliation (McCrae & Costa, 1989; Moskowitz & Zuroff, 2005b; Timmermans et al., 2010).
Trait Affiliation	✓	X	✓	Supports a relationship between trait affiliation, momentary affiliation (P. M. Markey & Markey, 2009).
PA	<u>✓</u>	✓	✓	Supports a relationship between positive affect, affiliation (Timmermans et al., 2010).
NA	<u>✓</u>	✓	✓	Supports a relationship between negative affect, affiliation (Sadikaj et al., 2013; Wright et al., 2017).
C	✓	X	X	Supports a relationship between affiliation, conscientiousness

*Note:* ✓ = Significant difference between slider, checklist format, **Bold** = Stronger predictor when comparing slider, checklist, A = Agreeableness, PA = Positive Affect, NA = Negative Affect, C = Conscientiousness

In line with Markey and Markey (2009) and Timmermans et. al. (2010), I hypothesized that trait affiliation, positive affect, and negative affect would predict affiliation measured in slider and checklist response formats. When performing multiple linear regressions, I found that agreeableness, conscientiousness, trait affiliation, positive affect, and negative affect predicted affiliation measured via the slider, while only positive affect and negative affect predicted affiliation measured via the checklist. I also observed that females were higher in affiliation than

males, a finding that supports previous research suggesting a gender difference in affiliative but not agentic behavior (Moskowitz, Suh, & Desaulniers, 1994).

Multiple linear regressions found that agreeableness and trait affiliation significantly predicted affiliation presented as a slider but not as a checklist. Importantly, this difference was found to be significant when the correlations between each trait and agency measured in either the slider or checklist format were compared. Current literature suggests that agreeableness and trait affiliation predict momentary affiliation, suggesting the slider format may have an advantage when examining these constructs (Markey & Markey, 2009; McCrae & Costa, 1989; Moskowitz & Zuroff, 2005a; Timmermans et al., 2010).

Multiple linear regressions also found that positive affect and negative affect significantly predict affiliation in both response formats. When the correlations between positive affect and affiliation were compared across response formats, I found that positive affect was more strongly associated with affiliation in the slider format; I found a similar albeit inverse pattern between negative affect and affiliation in the slider format. Current research suggests that positive affect and affiliation are directly related, while negative affect and affiliation are inversely related (Sadikaj et al., 2013; Timmermans et al., 2010; Wright et al., 2017). In two studies that examined negative affect and affiliation between-person, Wright et. al. (2017) and Sadikaj et. al. (2013) used the SBI checklist and found the correlation between negative affect and affiliation were -0.30 and -0.15 for each study respectively, while in my study the correlation between negative affect and affiliation was -0.56 and -0.26 for the slider and checklist, respectively. Because no other studies have examined the relationship between negative affect and affiliation measured via the slider, it is uncertain whether the slider is accurately representing or inflating the relationship between negative affect and affiliation. In a study that examined positive affect and affiliation between-

person, Timmermans et. al. (2010) used the SBI checklist and found the correlation between positive affect and affiliation was 0.21, while in my study the correlation between positive affect and affiliation was 0.44 and 0.17 for the slider and checklist, respectively. Because no other studies have used the slider to examine the correlation between positive affect and affiliation, it is also uncertain whether the slider is accurately representing or inflating the relationship between positive affect and affiliation.

In addition, when within-person scores were examined negative affect and positive affect were found to associate more strongly with affiliation when affiliation was measured via the slider than via the checklist. Again, whether this is due to the slider inflating or accurately representing this relationship is uncertain. Future studies will want replicate my findings to determine whether the slider is accurately representing the relationship between these constructs. It is conceivable that because affect was also measured using a slider, the interposal slider associations reflect shared method variance.

One possible explanation for why agreeableness and trait affiliation, appear to predict affiliation measured via the slider but not affiliation measured via the checklist may be because individuals may lack the motivation to thoroughly read through the behavioral checklist items each time they complete a survey, leading to the weaker associations between affiliation and interpersonal traits, personality traits, and affect seen in the present study. However, if this were the case we could expect to see a similar pattern in regard to agency, which was not observed. Another possible explanation is that because the slider is more abstract and can be interpreted in multiple ways, it is capturing a higher number of relevant behaviors, leading to the stronger associations seen in the slider but not the checklist format.

### **4.3 FUTURE RESEARCH**

Regarding response format, following studies may want to explore different adjectives for the anchors of the adjective scale. In the present study, we asked participants to rate agency on a scale of accommodating/submissive/timid to assertive/dominant/controlling, while we asked participants to rate affiliation on a scale of cold/distant/hostile to warm/friendly/caring. While the main advantage of the adjective scale checklist is that it is generally more succinct than the behavioral checklist, a key disadvantage is that it is more subjective. That is, it is possible that different adjectives could be interpreted differently and produce different results. Theoretically, it may be possible to choose adjectives that are less subjective and less likely to be interpreted differently by different individuals, which could lead to the creation of an adjective scale format that is both succinct and objective.

### **4.4 LIMITATIONS**

One limitation in the present study is that participants were college students, which may limit the generalizability of the present study given that college students have busier, more unpredictable schedules than the average adult that could have prevented participants from answering surveys at certain times of the day, like when participants were in class. Another limitation is that no external method of validating whether a participant did or did not experience an interpersonal interaction was used; instead, the present study relied on participants to accurately self-report their social interactions.

## 4.5 CONCLUSION

Past literature has compared event and signal contingent designs in regard to snacking behavior, and has conducted a comparison of adjective slider and behavioral checklist response formats. The present study aimed to examine differences in signal and event contingent methodologies and in adjective slider and behavioral checklist response formats by examining the relationship between personality, affect, and interpersonal behavior. Results suggest that signal and event contingencies do not exert differential influences on the relationships between interpersonal behavior and other constructs. When examining agency, researchers may administer surveys in either a checklist or adjective scale response format. When examining affiliation, our findings suggest that the slider may provide an advantage over the checklist.

## APPENDIX A

### THE INTERNATIONAL PERSONALITY ITEM POOL- INTERPERSONAL CIRCUMPLEX BASELINE QUESTIONNAIRE

For the following questions, please describe yourself as you generally are now, not as you wish to be in the future. Describe yourself as you honestly see yourself, in relation to other people you know of the same gender as you are, and roughly your same age. Please read each statement carefully, and then fill in the number that corresponds to your response using the scale below.

Use the following options for your responses:

Table 15: IPIP-IPC

<b>1</b> Very Inaccurate	<b>2</b> Moderately Inaccurate	<b>3</b> Neither Inaccurate or Accurate	<b>4</b> Moderately Accurate	<b>5</b> Very Accurate
1. I am quiet around strangers.				
2. I speak softly.				
3. I tolerate a lot from others.				
4. I am interested in people.				
5. I feel comfortable around people.				
6. I demand to be the center of interest.				
7. I cut others to pieces.				
8. I believe people should fend for themselves.				
9. I am a very private person.				
10. I let others finish what they are saying.				

- 
11. I take things as they come.
  12. I reassure others.
  13. I start conversations.
  14. I do most of the talking.
  15. I contradict others.
  16. I don't fall for sob stories.
  17. I don't talk a lot.
  18. I seldom toot my own horn.
  19. I think of others first.
  20. I inquire about others' well-being.
  21. I talk to a lot of different people at parties.
  22. I speak loudly.
  23. I snap at people.
  24. I don't put a lot of thought into things.
  25. I have little to say.
  26. I dislike being the center of attention.
  27. I seldom stretch the truth.
  28. I get along well with others.
  29. I love large parties.
  30. I demand attention.
  31. I have a sharp tongue.
  32. I am not interested in other people's problems.
-



## APPENDIX B

### BIG FIVE INVENTORY BASELINE QUESTIONNAIRE

Here are a number of characteristics that may or may not apply to you. For example, do you agree that you are someone who *likes to spend time with others*? Please write a number next to each statement to indicate the extent to which you agree or disagree with that statement.

Use the following options for your responses:

Table 16: Big-Five Inventory

---

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Disagree Strongly	Disagree A Little	Neutral; No Opinion	Agree A Little	Agree Strongly

---

*I am someone who...*

---

1. Is outgoing, sociable.
2. Is compassionate, has a soft heart.
3. Tends to be disorganized.
4. Is relaxed, handles stress well.
5. Has few artistic interests.
6. Has an assertive personality.
7. Is respectful, treats others with respect.
8. Tends to be lazy.
9. Stays optimistic after experiencing a setback.
10. Is curious about many different things.
11. Rarely feels excited or eager.
12. Tends to find fault with others.
13. Is dependable, steady.
14. Is moody, has up and down mood swings.

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- 
15. Is inventive, finds clever ways to do things.
  16. Tends to be quiet.
  17. Feels little sympathy for others.
  18. Is systematic, likes to keep things in order.
  19. Can be tense.
  20. Is fascinated by art, music, or literature.
  21. Is dominate, acts as a leader.
  22. Starts arguments with others.
  23. Has difficulty getting started on tasks.
  24. Feels secure, comfortable with self.
  25. Avoids intellectual, philosophical discussions.
  26. Is less active than other people.
  27. Has a forgiving nature.
  28. Can be somewhat careless.
  29. Is emotionally stable, not easily upset.
  30. Has little creativity.
  31. Is sometimes shy, introverted.
  32. Is helpful and unselfish with others.
  33. Keeps things neat and tidy.
  34. Worries a lot.
  35. Values art and beauty.
  36. Finds it hard to influence people.
  37. Is sometimes rude to others.
  38. Is efficient, gets things done.
  39. Often feels sad.
  40. Is complex, a deep thinker.
  41. Is full of energy.
  42. Is suspicious of others' intentions.
  43. Is reliable, can always be counted on.
  44. Keeps their emotions under control.
  45. Has difficulty imagining things.
  46. Is talkative.
  47. Can be cold and uncaring.
  48. Leaves a mess, doesn't clean up.
  49. Rarely feels anxious or afraid.
  50. Thinks poetry and plays are boring.
  51. Prefers to have others take charge.
  52. Is polite, courteous to others.
  53. Is persistent, works until the task is finished.
  54. Tends to feel depressed, blue.
  55. Has little interest in abstract ideas.
  56. Shows a lot of enthusiasm.
  57. Assumes the best about people.
  58. Sometimes behaves irresponsibly.
  59. Is temperamental, gets emotional easily.
-

---

60. Is original, comes up with new ideas.

---

**APPENDIX C**

**SOCIAL BEHAVIOR INVENTORY CHECKLIST QUESTIONNAIRE**

Rated dichotomously (yes/no)

**Table 17: Social Behavior Inventory**

Dominance
I set goal(s) for the other(s) or for us
I gave information
I expressed an opinion
I criticized the other(s)
I took the lead in planning/organizing a project or activity
I asked for a volunteer
I spoke in a clear firm voice
I asked the other(s) to do something
I got immediately to the point
I tried to get the other(s) to do something
I made a suggestion
I assigned someone to a task
Submissiveness
I waited for the other person to act or talk first
I went along with the other(s)
I did not express disagreement when I thought it

---

I spoke softly

---

I let other(s) make plans or decisions

---

I gave in

---

I spoke only when I was spoken to

---

I did not say what I wanted directly

---

I did not state my own views

---

I did not say how I felt

---

I avoided taking the lead or being directly responsible

---

I did not say what was on my mind

---

Agreeableness

---

I listened attentively to the other

---

I went along with the other(s)

---

I spoke favorably of someone who was not present

---

I compromised about a decision

---

I complimented or praised the other person

---

I smiled and laughed with the other(s)

---

I showed sympathy

---

I exchanged pleasantries

---

I pointed out to the others where there was agreement

---

I expressed affection with words or gestures

---

I made a concession to avoid unpleasantness

---

I expressed reassurance

---

Quarrelsomeness

- 
- I did not respond to other(s) questions or comments
- 
- I criticized the other(s)
- 
- I raised my voice
- 
- I made a sarcastic comment
- 
- I demanded that the other(s) do what I wanted
- 
- I discredited what someone said
- 
- I confronted the other(s) about something I did not like
- 
- I gave incorrect information
- 
- I stated strongly that I did not like or that I would not do something
- 
- I ignored the other(s)' comments
- 
- I withheld useful information
- 
- I showed impatience
-

**APPENDIX D**

**POSITIVE AND NEGATIVE AFFECT WORDS**

Rated on a Visual Interpersonal Adjective Scale from 0-100

**Table 18: PANAS-X**

Positive Affect Words
Happy
Proud
Content
Excited
Relaxed
Negative Affect Words
Ashamed
Nervous
Hostile
Sad
Angry

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