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MEASURING MOMENTARY EXPERIENTIAL AVOIDANCE IN DAILY LIFE: A PRELIMINARY INVESTIGATION FOR A NEW CONTINGENCY-BASED MEASUREMENT FRAMEWORK

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Abstract

This preliminary investigation aims to develop a new measure for momentary experiential avoidance in daily life using ecological momentary assessment (EMA) and a small sample. To measure momentary experiential avoidance, this study devised a new method that involves capturing reductions in unwanted experiences after a behavior has occurred based on negative reinforcement characteristics. A daily life investigation on students ($N = 25$) indicated that although "a momentary experiential avoidance index" did not correlate with acceptance and commitment therapy or symptom-related questionnaires, it could partially predict a decrease in "irritation" and an increase in "satisfaction" after a behavior that is measured separately from an unpleasant private experience preceding the behavior. Moreover, the momentary experiential avoidance index predicted a number of positive mood states only in a group with high global experiential avoidance defined by a self-report questionnaire. Although the momentary experiential avoidance index may measure one aspect of experiential avoidance, consistent results were not obtained. Thus, this preliminary investigation only suggests the potential of expanding the measurement framework and reveals issues that require further examination.

Keywords: daily life measurement; ecological momentary assessment; experiential avoidance; contingency

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Introduction

Experiential avoidance is a major developing or maintenance factor for a wide range of psychobehavioral problems (Chawla & Ostafin, 2007; Hayes, Luoma, Bond, Masuda, & Lillis, 2006; Hayes et al., 2004; Hayes, Wilson, Gifford, Follette, & Strosahl, 1996). It is defined as an individual's attempts to avoid unwanted private experiences, such as thoughts, emotions, memories, or bodily sensations even when such avoidance creates long-term negative consequences (Hayes et al., 1996). The theoretical background of experiential avoidance includes a rebound effect of thought suppression (Wegner, Schneider, Carter, & White, 1987), which explains that while we can temporarily suppress any thought, the frequency of such thoughts' intrusion can increase after the suppression attempt. Experiential avoidance entails trying to avoid unwanted private events in most settings and is maintained by temporarily achieving the purpose. Therefore, it is a behavioral class maintained through negative reinforcement (Gifford, 1994; Ruiz, 2010). Although such avoidance may be effective in the short-term, it narrows one's behavioral repertoire and reduces the quality of life over the long-term (Hayes et al., 2004).

One of the most widely adopted global experiential avoidance assessment tools is questionnaires, such as the Acceptance and Action Questionnaire-II (AAQ-II; Bond et al., 2011). However, although several studies that used these global self-report questionnaires have estimated the overall relation between concepts, it has been considered that utilizing global assessment lacks details regarding practical usefulness (Levin, Krafft, Pierce, & Potts, 2018). Moreover, when one evaluates therapy effects, it is necessary that one capture daily life behavioral changes rather than simply referring to questionnaire score changes (Ramnerö & Törneke, 2008) because a measure of experiential avoidance and behavioral changes in daily life can provide a better picture of therapy efficacy.

In recent years, the ecological momentary assessment (EMA; Stone & Shiffman, 1994), also known as the experiential sampling method (Hektner, Schmidt, & Csikszentmihalyi, 2007; Myin-Germeys et al., 2009), has been used to measure daily life experiential avoidance. As EMA records daily life in natural settings, researchers can collect data with high ecological validity (Myin-Germeys et al., 2018; Shiffman, Stone, & Hufford, 2008; Stone & Shiffman, 1994). Previous studies have indicated that momentary experiential avoidance predicts a high negative or a low positive condition (Hershenberg, Mavandadi, Wright, & Thase, 2017; Kashdan et al., 2013; Kashdan et al., 2014; Machell, Goodman, & Kashdan, 2015; Levin et al., 2018; Udachina et al., 2009; Udachina, Varese, Myin-Germeys, & Bentall, 2014; Wenze, Gaugler, Sheets, & DeCicco, 2018). Furthermore, global characteristics or trait experiential avoidance measured by self-report questionnaires have been reported to moderate the relation between momentary experiential avoidance and its consequences (Kashdan et al., 2014; Levin et al., 2018). As mentioned earlier, EMA can help investigate daily life behavior in detail.

EMA allows for the evaluation of daily life behavior changes that cannot be captured through questionnaires (Wenze et al., 2018). Questionnaires can only capture global behavioral tendencies and its scores may be distorted caused by recalling events, current mental state (Ben-Zeev & Young, 2010; Erskine, Morley, & Pearce, 1990), social desirability (Phillips & Clancy, 1972), or pliance (Hayes, Zettle, & Rosenfarb, 1989). The aforementioned problems using a questionnaire can somewhat be avoided because of certain EMA features such as collecting contextual information for each response and momentary measurement.

EMA implies that daily life momentary experiential avoidance can be measured dynamically. However, the measurement methods used in previous studies can still be improved, as some problems with respondent evaluations on question items remain. For example, in studies employing EMA measurement methods, respondents were required to interpret and evaluate the applicability of certain experiential avoidance items to them at that time, which means some social desirability or compliance issues might have reduced accuracy. Further, although the EMA purports to capture behavioral patterns, the respondent may not actually notice these behaviors (Myin-Germeys et al., 2018). This led Myin-Germeys et al. (2018) to recommend avoiding direct questions (e.g., Do you like what you are eating right now?) and include question items that inquire about momentary states (e.g., [1] How do you feel right now? and [2] What are you eating right now?). Therefore, to obtain a more accurate picture of a respondent's state of behavior at a particular moment and to avoid interpretive bias, the respondents' interpretation needs to be limited as much as possible.

Based on these problems, this study conducts a preliminary investigation to develop the framework of a new momentary experiential avoidance measurement method as the first step. The framework employed in this study focusing on the feature of negative reinforcement that maintains experiential avoidance (Gifford, 1994; Ruiz, 2010). Specifically, momentary experiential avoidance is measured using the following method: (1) capturing the unpleasant private event context, a prerequisite for experiential avoidance, and (2) measuring momentary experiential avoidance as objectively as possible by adopting indirect questions and limiting respondent interpretation when behavior is assessed. To meet these two conditions, this study focuses on measuring how an unpleasant private experience is reduced through behavior. However, to capture experiential avoidance adequately, it is needed to involve mid- or long-term consequences taking personal values into account (Hayes, Strosahl, & Wilson, 2012) other than the perspective of negative reinforcement. Because this study did not measure mid- or long-term consequences relevant to personal values, it is regarded as a preliminary investigation, which will be a necessary step for developing a more complete measure of momentary experiential avoidance.

Validation is required to develop the framework for a measurement method. Therefore, the study examined whether the new momentary experiential avoidance index can measure experiential avoidance. The following were assessed:

(1) whether the momentary experiential avoidance index predicts multifaceted mood changes as short-term consequences of experiential avoidance by measuring some mood-state items expected to be influenced by experiential avoidance;
(2) whether the way momentary experiential avoidance predicts these mood states is differentiated by global experiential avoidance, which is similar to Levin et al. (2018); and
(3) whether momentary experiential avoidance has correlations with Acceptance and Commitment Therapy (ACT; Hayes et al., 2012), which is psychotherapy with a particular focus on experiential avoidance or symptom-related questionnaires.

It is hypothesized that the momentary experiential avoidance index predicts a decrease in negative (i.e., regret, fatigue, and irritation) and an increase in positive (i.e., excitation, fulfillment, pleasantness, satisfaction, and concentration) mood or states because unlike previous research (Levin et al., 2018), the present study focuses on short-term consequences. Regarding the moderating effect, it is assumed that higher global experiential avoidance (AAQ-II) leads to a stronger association between momentary experiential avoidance and its consequences. In addition, as the experiential avoidance rate indicates a personal tendency toward avoidance, it is hypothesized to have a positive correlation with ACT or symptom-related questionnaires. However, for the discrepancy regarding the ecological validity of these measurement methods, these relations are expected to be weak.

Methods

Participants

The study recruited 25 Japanese undergraduate students (females = 19, males = 6; mean age: 18.96 ± 0.84 years) without prior knowledge of experiential avoidance. Participation was on a voluntarily basis with 1,500 JPY as compensation. The study was approved by the University Academic Research Ethical Review Committee. Participants were informed about (1) the purpose of the research study, expected duration, and procedures; (2) their right to decline to participate and to withdraw from the research study once participation has begun; (3) the foreseeable consequences of declining or withdrawing; (4) reasonably foreseeable factors that may be expected to influence their willingness to participate, such as potential risks, discomfort, or adverse effects; (5) any prospective research benefits; (6) limits of confidentiality; (7) incentives for participation; and (8) whom to contact for questions about the research study and research participants' rights. The prospective participants were provided with the opportunity to ask questions and receive answers, and all participants signed informed consent.

Materials

Questionnaires

All questionnaires were used to confirm the validity of the momentary experiential avoidance index.

a) ***Acceptance and Action Questionnaire-II (AAQ-II).*** AAQ-II is a seven-item measure of experiential avoidance (Bond et al., 2011) in which higher total scores indicate greater experiential avoidance (or psychological inflexibility). The Japanese version of the AAQ-II (Shima, Yanagihara, Kawai, & Kumano, 2013), which has high reliability and validity was used. A Cronbach's alpha was .87 (95% CI [.79 to .95]) in this study. This tool was also used to confirm that this study replicates previous research (Levin et al., 2018) by examining whether the global experiential avoidance measured by the AAQ-II moderates the effect of momentary experiential avoidance.

b) Beck Depression Inventory-II (BDI-II). BDI-II is a 21-item measure of depression, with higher total scores indicating more severe depression (Beck, Steer, & Brown, 1996). The Japanese version (Kojima et al., 2002), which also has high reliability and validity was used; its Cronbach's alpha was .73 (95% CI [.57 to .89]).

c) Cognitive Fusion Questionnaire (CFQ). CFQ is a 7-item measure of cognitive fusion, conceptualizes the tendency for people's behavior to be overly regulated and influenced by their cognition (Gillanders et al., 2014) in the ACT. Higher total scores correspond to a greater fusion with their thoughts. The Japanese version of the CFQ (Shima, Kawai, Yanagihara, & Kumano, 2016), which is highly reliable and valid was used. A Cronbach's alpha was .87 (95% CI [.79 to .95]) in this study. As in the AAQ-II, this measurement was used to investigate whether global cognitive fusion moderates the effect of momentary experiential avoidance.

d) State-Trait Anxiety Inventory (STAI). STAI is a 40-item measure of anxiety (20 items for each state and trait anxiety), with higher total scores indicating greater anxiety (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983). The Japanese version of the STAI-Trait (Hidano, Fukuhara, Iwawaki, Soga, & Spielberger, 2000), which has high reliability and validity was used. The Cronbach's alpha was .87 (95% CI [.79 to .94]).

Ecological Momentary Assessment (EMA)

Items for the momentary experiential avoidance index

To measure contingency-based momentary experiential avoidance, the existence of an unpleasant private experience during the behavior and the reduction of its intensity after the behavior need to be captured. Therefore, the following information was collected (Table 1 and Figure 1 illustrate all items used in the EMA and its overview): (1) the existence or nonexistence of unpleasant experiences during the behavior (Q4), (2) the contents of the private event during the behavior (Q5), and (3) any changes in these contents before and after the behavior (Q6 and Q7).

Table 1. Items used in ecological momentary assessment

Items	Record
Q1. Current states 1. Regret 2. Excitation 3. Fatigue 4. Fulfillment 5. Irritation 6. Pleasantness	1 = not at all; 10 = very much
Q2. Behavior influencing the current state	Free description
Q3. Time elapsed after the behavior	a. continuing; b. 5 min; c. 10 min; d. 15 min; b. e. 30 min; f. 60 min; g. >60 min
Q4. Was there an unwanted feeling, thought, or sensation at the time of the behavior?	Yes or no
Q5. Mood or condition at the time of the behavior	Free description
Q6. Intensity of mood or condition at the time of the behavior	1 = not at all; 10 = very strong
Q7. Intensity of the current mood or condition	1 = not at all; 10 = very strong
Q8. Degree of current satisfaction	1 = not at all satisfied; 10 = very satisfied
Q9. Degree of concentration at the time of the behavior	1 = not at all concentrated; 10 = very concentrated

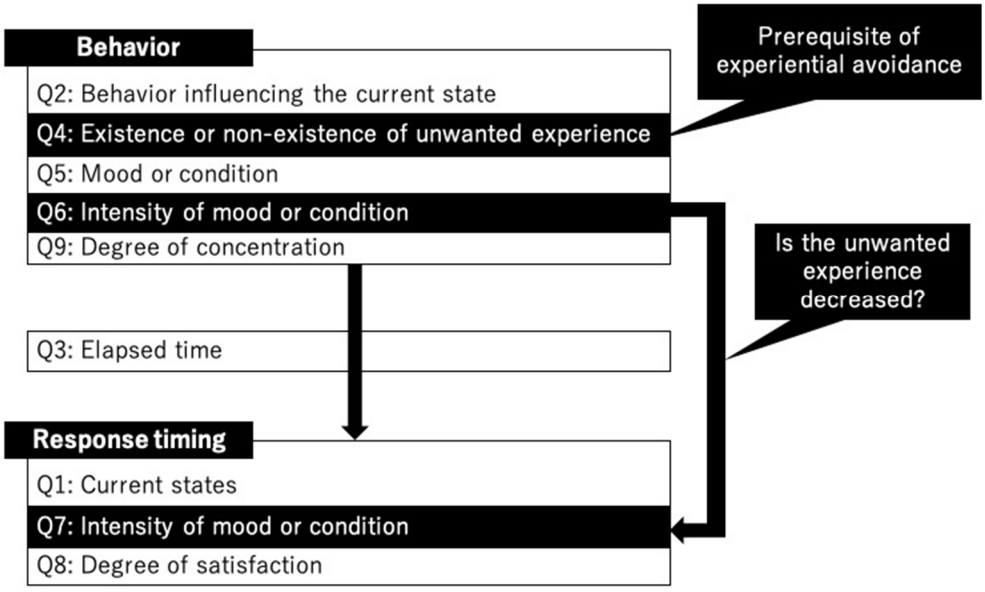

Figure 1. Overview of measurement items

Items for validating the momentary experiential avoidance index

Because this study investigates a new experiential avoidance index preliminarily, it is needed to examine its validity. Therefore, items pertaining to mood or states after the behavior (Q1: regret, excitation, fatigue, fulfillment, irritation, and pleasantness; Q8: satisfaction) or during the behavior (Q9: concentration) that are expected to change according to experiential avoidance were also employed. These items were selected in terms of the participant's expected reaction after experiential avoidance or acceptance and by agreement among the first, second, and last authors, who regularly practiced ACT in a clinical setting.

Items for increasing record accuracy

The participants were required to complete items regarding behavior that affected their current state (Q2) as prompts to recall their states during the behavior. Furthermore, the time that elapsed from behavior to record (Q3) was recorded to avoid recall bias and increase ecological validity by eliminating records with more than a certain amount of time lapse.

Procedure

The study consisted of three phases, namely, (a) Phase 1, which included an explanation of this study, response to the questionnaires, and an introduction to the EMA; (b) Phase 2, daily life investigation of over 10 days using the EMA; and (c) Phase 3, which included feedback on the EMA from participants.

Phase 1

After signing informed consent, the participants completed the questionnaires (AAQ-II, CFQ, BDI-II, and STAI-T). They were provided psychoeducation on ways to react to unpleasant private events to realize processes that would be captured in the EMA. Experiential avoidance and acceptance were explained using real-world examples, and participants shared the kinds of reactions that they used in daily life. However, the terms "experiential avoidance" and "acceptance" were not used to avoid influencing the participants' impressions. After confirming that there were no questions, the daily life measurement procedure was explained. Participants were required to complete all daily life measurement items and confirming their questions.

Phase 2: Daily life investigation using EMA

In this study, the participants used their smartphones to record their EMA responses. Two record-timing patterns—when participants received a response reminder email (signal-contingent) and when they recognized they had an unpleasant private event (event-contingent)—were employed to document as many situations as possible (combination design; Shiffman et al., 2008). Participants could access

the record form from the URL provided in the response reminder email. The record took approximately two minutes (adjusted to be completed within 3 minutes at the longest), which met the criteria proposed by Myin-Germeys et al. (2018).

Response reminder emails that prompted the records were sent four times a day—Block 1: 9:00–12:00, Block 2: 12:00–15:00, Block 3: 15:00–18:00, and Block 4: 18:00–21:00. The exact timing of the response reminder emails was randomly determined for each participant. The participants were required to record their responses within 15 min of receipt. If they received more than two response reminder emails, they were required to record their responses at an interval of approximately 30 min. Figure 2 illustrates a hypothetical recording. The example shows one event-contingent response, where a participant recognized an unpleasant private event in Block 1. Afterward, the participant received a response reminder email but was unable to provide an immediate response. In Block 2, the response reminder email was re-sent, to which the participant answered. Therefore, the participant provided two records with an interval of more than 30 min. In Block 3, a respond was immediately sent after the receipt of the response reminder email. Finally, Block 4 consisted of one event-contingent response and one signal-contingent response after receipt of the email.

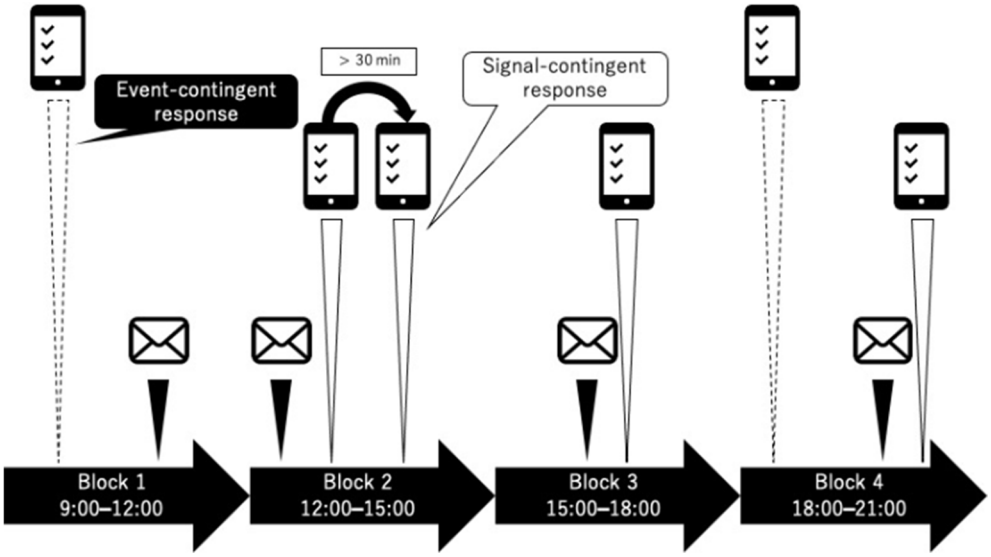

Figure 2. Hypothetical EMA recording

The study refrained from differentiating between signal- and event-contingent records to encourage as many responses as possible. The reason underlying this option is that given the clinical application, capturing the function of the behavior when a client recognizes an unpleasant private event but not when receiving the response reminder email is an important point. In other words,

recording immediately after the occurrence of a specific behavior is essential, not when the email is received. Therefore, the EMA items were designed to verify the elapsed time from the behavior to response for both signal-/event-contingent responses. In addition, Figure 1 demonstrates that the function of the behavior can be evaluated using both designs by specifying experiential avoidance through the change in unpleasant private events before and after a specific behavior (i.e., contingency). In general, conducting an investigation using only an event-contingent design is appropriate. However, collecting sufficient responses is expected to be difficult due to the nature of the study (preliminary). Therefore, one item was used to verify the elapsed time to secure a sufficient number of responses.

Phase 3

The participants were asked whether they had any questions regarding the procedure or felt that the EMA was deficient in any way.

Analytical Plan

The record states were summarized and the momentary experiential avoidance records were selected.

Momentary experiential avoidance record

This was defined in terms of whether the unpleasant private experience during the behavior was reduced. The three-step selection procedure is described below.

a) Excluding records that lapsed 15 minutes from the behavior to the response. Records that were collected more than 15 minutes after the behavior were excluded, as employed by another study (Udachina et al., 2009). Therefore, only those records evaluated by the participant within 15 minutes of the behavior (event) were used.

b) Selecting records during unpleasant private events. As experiential avoidance mainly occurs during unpleasant (or unwanted) private events, records of such events were selected. However, if the response to Q4 (presence or absence of unwanted experience) was "No" or omitted, Q5 (contents of the private event) was examined. If the description of the experience contents was judged to be a generally unpleasant situation by two independent evaluators, such records were not excluded.

c) Selecting experiential avoidance records. Records of the reduced intensity of unpleasant experiences before and after the behavior were selected from the remaining data and classified under experiential avoidance. Also, the momentary experiential avoidance rates in the records during unpleasant private events were calculated for each participant; those who had 0% or 100% were excluded from the analysis using this index.

The study takes a hypothetical participant who recorded 100 times as an example. (a) Out of 100 records, five were excluded because a time lapse of 15 min was observed after the behavior. (b) Then, records of unpleasant private events (e.g.,

40 records) from the remaining 95 records were selected. Lastly, (c) records of the reduced intensity of unpleasant events (denoted as momentary experiential avoidance) before and after the behavior (e.g., 25 records) were noted (remaining 15 records may be seen as "acceptance" by definition.). The experiential avoidance rate was calculated using the following formula: (momentary experiential avoidance/records of unpleasant events) $*$ 100. Therefore, the experiential avoidance rate for the hypothetical participant was (25/40) $*$ 100 = 62.50%.

The hierarchical linear model (HLM) and correlational analyses were conducted after calculating the descriptive statistics for the record states. The effect of momentary experiential avoidance on mood states immediately after the behavior was conducted using the momentary experiential avoidance index (1: experiential avoidance, 0: other behavior) as the fixed effect, the participants as the random effect, and each current mood state as the dependent variables. As a subanalysis, the participants were divided into two groups with high and low AAQ-II or CFQ scores and performed similar analyses in each group. For the analyses, all the answers at the time of the unpleasant event were used. All HLMs included data from all participants who responded at least three times, following Levin et al. (2018).

The correlation analysis investigated the relations between the momentary experiential avoidance rate and each questionnaire's scores.

Results

Record States

Over the 10-day survey, 863 records were obtained; incomplete records and one participant's records with an incomplete rate of 67.5% were excluded (a total of 75 records), and a further 109 records that were not evaluated within 15 minutes of the behavior were also removed (788 records remain). Therefore, the analysis included 679 records (86.17%), of which 315 were records at the time of unpleasant experiences (39.97%); of these, 133 met the experiential avoidance criteria (16.88%). Table 2 presents descriptive statistics. The respondents reported no questions or deficiencies regarding the recording procedure.

Table 2. Descriptive Statistics for EMA Records (n = 24)

	Mean	*SD*	*Min.*	*Max.*
All records	34.29	8.59	9	44
Records within 15 min	28.29	9.76	3	42
Records at the time of unpleasant experience	13.13	6.64	2	28
Records of experiential avoidance	5.54	4.27	0	18

Effect of the Momentary Experiential Avoidance on Mood States Immediately After the Behavior

An HLM analysis was conducted using the momentary experiential avoidance index. Here, the data of one participant whose available records were fewer than three were excluded and used those of 23 participants. Analysis indicated that the momentary experiential avoidance index predicted an increase in satisfaction (positive mood) and a decrease in irritation (negative mood) (*ps* < .01). However, the index did not predict other moods or states (i.e., regret, excitation, fatigue, fulfillment, pleasantness, and concentration). Subanalysis indicated that AAQ-II generated different results among the groups. Although, increment in excitation, fulfillment, pleasantness, and satisfaction and decrement in irritation were predicted for the high-AAQ-II group (*ps* < .05), the only decrement in irritation was predicted for the low-AAQ-II group (*p* < .01). No significant relationships were observed between the momentary experiential avoidance index and regret, fatigue, and concentration in the high-AAQ-II group, and between the momentary experiential avoidance index and regret, excitation, fatigue, fulfillment, pleasantness, satisfaction, and concentration in the low-AAQ-II group. Moreover, the CFQ indicated no differences in the prediction pattern of the groups. The momentary experiential avoidance index predicted the increment in satisfaction and decrement in irritation (*ps* < .01), whereas no significant relationships existed between other mood or states for the high- and low-CFQ groups. Table 3 provides the results.

Table 3. Results of Hierarchical Linear Model Analysis

	All data (n = 23, obs. = 313)			AAQ-II						CFQ					
				High group (n = 10, obs. = 140)			Low group (n = 13, obs. = 173)			High group (n = 13, obs. = 198)			Low group (n = 10, obs. = 115)		
	Est.	95%CI	*p*	Est.	95%CI	*p*	Est.	95%CI	*p*	Est.	95%CI	*p*	Est.	95%CI	*p*
Regret	−0.00	−0.45 to 0.45	.99	−0.26	−0.97 to 0.44	.46	0.26	−0.32 to 0.83	.38	−0.05	−0.66 to 0.55	.86	0.20	−0.44 to 0.83	.55
Excitation	0.36	−0.10 to 0.82	.13	1.04	0.38 to 1.70	.00	−0.18	−0.81 to 0.44	.56	0.25	−0.28 to 0.79	.36	0.49	−0.37 to 1.35	.26
Fatigue	0.00	−0.44 to 0.45	.99	−0.31	−0.86 to 0.24	.27	0.14	−0.52 to 0.80	.67	−0.02	−0.56 to 0.51	.93	0.16	−0.64 to 0.96	.70
Fulfillment	0.19	−0.22 to 0.60	.37	0.68	0.03 o 1.33	.04	−0.17	−0.68 to 0.34	.51	0.35	−0.18 to 0.88	.19	0.03	−0.58 to 0.64	.93
Irritation	−1.04	−1.58 to −0.51	.00	−1.51	−2.39 to −0.62	.00	−0.68	−1.35 to −0.01	.05	−0.99	−1.69 to −0.30	.01	−1.14	−2.00 to −0.28	.01
Pleasantness	0.41	−0.01 to 0.82	.05	0.95	0.33 to 1.58	.00	0.03	−0.51 to 0.58	.90	0.42	−0.09 to 0.94	.11	0.53	−0.16 to 1.22	.14
Satisfaction	0.77	0.42 to 1.11	.00	1.25	0.77 to 1.73	.00	0.41	−0.07 to 0.89	.10	0.82	0.41 to 1.22	.00	0.80	0.17 to 1.43	.01
Concentration	0.33	−0.08 to 0.74	.12	0.32	−0.25 to 0.88	.27	0.35	−0.24 to 0.94	.25	0.28	−0.23 to 0.78	.29	0.46	−0.26 to 1.18	.21

Note. Obs.: Observation, Est.: Estimate, AAQ-II: Acceptance and Action Questionnaire-II, CFQ: Cognitive Fusion Questionnaire. All parameter estimates are unstandardized regression coefficients. Shaded cells indicate that momentary experiential avoidance significantly predicts these conditions.

Correlation Analysis

Result of the calculation of the momentary experiential avoidance rates at the time of unpleasant records for each participant, two of them had 0%—which were excluded. Therefore, the data of 21 participants was used in the following analysis. The mean momentary experiential avoidance rate for these participants was 41.30 ± 12.65% (min. = 7.69%, max. = 64.29%). Spearman's correlation coefficient between momentary experiential avoidance rates and questionnaire scores were calculated. The analysis results and the descriptive statistics for each questionnaire are presented in Table 4, indicating no significant relations between the momentary experiential avoidance index and each questionnaire.

Table 4. Correlations between
Momentary Experiential Avoidance Index and Each Questionnaire (n = 21)

	Mean	*SD*	*Min.*	*Max.*	ρ	95% CI	p
AAQ-II	23.29	7.67	9	38	−.22	−.59 to .24	.35
BDI-II	8.95	4.60	1	17	.06	–.38 to .48	.79
CFQ	25.95	7.55	7	38	.02	–.41 to .45	.93
STAI-T	45.71	9.55	29	61	–.12	–.52 to .33	.61

Note: AAQ-II: Acceptance and Action Questionnaire-II; BDI-II: Beck Depression Inventory-II; CFQ: Cognitive Fusion Questionnaire; STAI-T: State-Trait Anxiety Inventory Trait.

Discussion

This study sought to conduct a preliminary examination of the framework of an EMA measurement method of momentary experiential avoidance based on contingency, and also conducted a preliminary analysis of whether the global questionnaire differentiates the associations between momentary experiential avoidance and its immediate consequences. Additionally, relations between momentary experiential avoidance rates and the ACT or symptom-related questionnaire were investigated. The study deemed that discussing future directions for the development of the framework based on the results is beneficial because the study is a preliminary investigation.

The results of a series of analyses indicated that the new momentary experiential avoidance index predicts an increase in immediate positive mood (satisfaction) and a decrease in immediate negative ones (irritation). These suggest that this new index may measure daily experiential avoidance as hypothesized. Moreover, consistent with a previous study (Levin et al., 2018), the momentary experiential avoidance index predicted more mood states in the group with high

global experiential avoidance than that with low avoidance as defined by the self-reported questionnaire. However, the correlation analysis indicated that momentary experiential avoidance rates had no association with questionnaires including the AAQ-II.

In this study, 863 records were extracted from a 10-day survey, with an average of 34.29 records per participant (more than three records per day on average), of which 46.39% were records at the time of the unpleasant experiences, and 86.17% were recorded less than 15 minutes after the behavior's occurrence; therefore, most records met the criteria employed by Udachina et al. (2009). Although there were more than three records per day on average by prompted four times per day, the number of responses was insufficient considering the record was requested when at the time of the unpleasant experiences. Therefore, while the measurement framework employed in this study can collect records at the time of the unpleasant experiences and met criteria regarding record timing, it is needed to be modified or considered to promote participants' responses.

The results of the HLM analysis indicated that momentary experiential avoidance predicted decreased irritation and increased satisfaction. Moreover, besides the above results, momentary experiential avoidance predicted increased excitation, fulfillment, and pleasantness in the group with high global experiential avoidance. One feature of experiential avoidance is that it is maintained through negative reinforcement (Gifford, 1994; Ruiz, 2010), such that the prediction of decreased negative mood or states with increased positive ones in the short-term was consistent with the theory. Since the momentary experiential avoidance index established in this study determines whether a record was typical of experiential avoidance by confirming a reduction in negative experiences in the short-term, it seems appropriate that a reduction in the related negative event (irritation) with an increase in the positive event (satisfaction) was predicted. Moreover, the result that momentary experiential avoidance predicts more mood or states with an increased tendency when global experiential avoidance is high instead of low was consistent with that of Levin et al. (2018). By contrast, the prediction process of momentary experiential avoidance index to its immediate consequence did not differ between the high- and low-CFQ groups. Thus, individuals with high global experiential avoidance, but not high global fusion, may be more influenced by the immediate consequences of behaviors during unpleasant experiences. This result suggests that the proposed measurement framework can capture certain aspects of experiential avoidance.

However, these results were not consistent with those of previous studies (Machell et al., 2015; Wenze et al., 2018), which had found that experiential avoidance can be correlated with or predict an increase in negative events or a reduction in positive events as overall trends. The differences in the employed measurement method and the prediction target in previous and current studies may have caused such a discrepancy. For example, Wenze et al. (2018) investigated how

experiential avoidance at time X predicted the states of time X + 1 (at least 90 minutes after time X). Levin et al. (2018) investigated the relationship between the degree of experiential avoidance from time X − 1 response to time X response and current states. In other words, this study investigated the short-term results (15 minutes at the most) of experiential avoidance relevant to the negative reinforcement, whereas previous studies examined mid- to long-term results, corresponding to the long-term negative consequences defined by Hayes et al. (1996). Besides, both results could be consistently understood in terms of the theoretical background of experiential avoidance. This means that this study's results might be equivalent to the early stage of the rebound effect (Wegner et al., 1987), in which a person suppresses his/her thoughts temporarily (decreased negative states with increased positive ones), and those obtained in previous studies may correspond to a later stage of that effect (increased negative states and decreased positive ones). However, this hypothesis is an empirical issue that requires further investigation by measuring time-series changes in terms of influenced states. Thus, validating the framework by investigating not only short-term but also long-term consequences is essential.

Contrarily, the momentary experiential avoidance index had no association with any of the questionnaires, including the AAQ-II. Three reasons for this result were considered. First, while questionnaires have significant recall bias, EMA can measure more correct responses, which may produce inconsistent results. Second, the scope of the measured subject is different. The momentary experiential avoidance index focused on behavior at that moment while the questionnaire captured mid- to long-term behavioral trends (e.g., the BDI-II measures states over two weeks, and the AAQ-II requires an approximate frequency as to how true each statement is for respondents). Therefore, the questionnaire targeted a wider range of experiences in terms of time. Third, the measured dimensions are different between the two measurement methods. The momentary experiential avoidance index was designed to capture only the presence of experiential avoidance, whereas various dimensions—frequency, intensity, and difficulty—were captured in the questionnaire (additionally, in the AAQ-II, the measurement range was expanded to include an assessment of both experiential avoidance and psychological flexibility/inflexibility [Bond et al., 2011]). Therefore, questionnaires such as the AAQ-II and the momentary experiential avoidance index do not necessarily describe the same experiential avoidance dimensions. In terms of correlation involving the momentary experiential avoidance index and the AAQ-II, similar results were reported by Kikuchi et al. (2006) upon investigating the relation between headache intensity measured by a recalled self-report and by the EMA. Although no correlation was found in this study, Kikuchi et al. (2006) demonstrated that the headache intensity measured by these two methods had low correlation (ICC [A, 1] = .46, 95% CI [−.08 to .75], N = 40). In Kikuchi et al. (2006), both the recalled self-report and the EMA measured the same phenomenon using direct questions in

contrast with the present study, which used the indirect method. Because an indirect question is more difficult to interpret than a direct one, it may be possible that no correlation was found in the present study, unlike in the previous study.

This study has several limitations that are summarized with the suggestive future directions. First, newly developed items for experiential avoidance and "current states" were used to measure momentary experiential avoidance and to validate the index. Further investigations with revised items of experiential avoidance would be needed to prevent responders from misunderstanding the meaning of the items. Moreover, employing highly validated measurements (e.g., Positive and Negative Affect Schedule: PANAS; Watson, Clark, & Tellegen, 1988) simultaneously to verify a momentary experiential avoidance index would be also needed. Second, the average response rate to the 40 response reminder emails was 85%, even with the inclusion of event-contingent responses. Rintala, Wampers, Myin-Germeys, and Viechtbauer (2019) analyzed data from over 1,700 participants in 10 EMA studies, which conducted 10 random assessments per day and reported an average response rate of 78%. In addition, the investigation by Levin et al. (2018) obtained a 90% response on average for prompt. Although the study obtained a response rate comparable with previous studies, it was insufficient, because event-contingent responses were set and included in this overall response rate. Improving item contents, reducing the number of items, or clarifying response timing and condition (i.e., at the time of pre-defined avoidance behavior or expected difficult situation [e.g., exposing social, fearful, or unwanted situations]) during event-contingent responses is required to set the condition for easy response. Third, because this was a pilot study, the investigation was conducted on a small sample of healthy students. Therefore, to assess whether the proposed framework is suitable for application to a population with psychopathological conditions, further research with large or clinical samples is required. Fourth, because the contents regarding mid- or long-term consequences relevant to personal values were not measured, the measurement at this stage is incomplete since this method focuses on one element of experiential avoidance. In a future study, a momentary experiential avoidance index can be improved by incorporating the items asking mid- or long-term consequences relevant to personal values.

The study employed a combination design and did not distinguish between event- and signal-contingent records. To adequately capture experiential avoidance, employing event-contingent design is desirable, because experiential avoidance is not a trait but a behavior. However, the study aimed to conduct a preliminary investigation to develop a new measurement framework. To this end, it employed the combination design and collected as many responses as possible. In the current measurement framework, items that intended to verify the time elapsed between behavior and recording were employed in both signal- and event-contingent designs. Moreover, both designs were set to evaluate the function of the behavior in the same manner by identifying experiential avoidance by assessing changes in moods or

states before and after specific behavior (contingency). Therefore, although the signal- and event-contingent designs may display relatively qualitative differences, the study implemented measures to minimize such differences and to demonstrate that the measurement framework deserves further consideration at the least.

Thus, conducting future studies that consider the abovementioned aspects may be worthwhile. First, since the signal-contingent design presents an easier setting for responses than the event-contingent design, it may be appropriate to continue the investigation using only the signal-contingent design to establish and validate the evaluation method. Simultaneously, measurement items should be improved on the basis of the current results. For example, although the study separately evaluated unpleasant moods and states with the occurrence of the behavior and those recorded, modifying the method of measurement may reduce the recording burden by capturing the degree of change in unpleasantness using a single item. Moreover, further examination is required to validate the measurement framework using a validated index (i.e., PANAS). Thereafter, research on measurement using the event-contingent design is required because it is essential to evaluate experiential avoidance exactly at the moment it occurs for it to be clinically useful. However, the event-contingent design poses certain disadvantages if employed in clinical settings, such as difficulties in (a) defining the target behavior, (b) establishing compliance with respondents, and (c) capturing other related aspects if the defined behavior or situation is appropriately measured (Myin-Germeys et al., 2018). In other words, difficulties associated with the event-contingent design are problems not specific to this study; however, these difficulties should be addressed in focused studies on EMA. If studies aim to capture experiential avoidance, then the abovementioned problems should be solved essentially. Therefore, research that specify factors or conditions that promote responses should be conducted separately from studies that aim to establish the measurement framework. For example, experiential avoidance often occurs in conditions with unpleasant experiences. Thus, investigating whether prior training about the discrimination of unpleasant experiences promotes EMA recording is beneficial for future studies. Moreover, determining whether feedback on record improves compliance or which type of feedback (e.g., response rate or message from a researcher or therapist) can promote response may be useful for the research on EMA. Especially, contributing not only assessment but also intervention methods (i.e., ecological momentary intervention: Myin-Germeys et al., 2018 and just-in-time adaptive interventions; Nahum-Shani et al., 2018, respectively) is desirable because the measurement framework is intended for clinical application. Thus, reinforcing response promotion and therapeutic effects through continuous feedback on the summary of cumulative records in clinical settings is a promising avenue for future studies or applications. To clarify such conditions, conducting a survey on a population that can comparatively and easily specify or collect related events, such as a non-clinical high-risk sample, is required.

Although the momentary experiential avoidance measurement method that was examined preliminarily in this study has several limitations, it partially predicted mood states immediately after the behavior and indicated the results consistent with its background theory. This measurement framework has a distinctive feature in terms of focusing on the contingency. Despite the potential of the measurement framework for expansion, the current study remains a preliminary research and did not obtain consistent results. Thus, further investigation based on the results and problems presented in the study is necessary. To establish the framework, the problems listed above should be improved, and incorporating the items regarding mid- or long-term consequences relevant to personal values will be needed in the future study. Moreover, it should also be needed to validate the measurement framework by investigating whether the momentary experiential avoidance index will change by ACT intervention.

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Ethical Approval

This research is approved by Waseda University Research Ethics Committee (Approval Number 2015-195(1))

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