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Ecological Momentary Assessment of Self-Attitudes in Response to Dietary Lapses

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Abstract

Objective—To examine whether self-attitudes and self-efficacy after dietary lapses relate to lapse frequency or predict risk for lapsing again on the same day.

Methods—Adults with overweight/obesity ($n = 91$) completed ecological momentary assessment for 14 days at the start of a lifestyle modification program. At each survey, participants reported whether they had experienced a dietary lapse, and, if so, reported their self-attitudes (i.e., self-criticism, self-forgiveness, self-regard) and self-efficacy. The relationships between participants' typical (i.e., average level for each participant across lapses) self-attitudes/self-efficacy after lapsing and lapse frequency were examined using correlations. Generalized estimating equations examined whether participants' typical (average across lapses; between-person effect) self-attitudes/self-efficacy or momentary (i.e., level of each variable at a particular lapse relative to one's typical level; within-person effect) self-attitudes/self-efficacy predicted same-day lapse occurrence.

Results—Lower typical self-efficacy and more negative typical self-regard related to greater lapse frequency. Additionally, lower momentary self-criticism predicted greater likelihood of same-day lapse occurrence. There also was a quadratic relationship between typical self-regard and risk of same-day lapse occurrence, such that individuals with either more negative or more positive typical self-regard were more likely to lapse on the same day.

Conclusions—Findings provide preliminary support for the relevance of self-attitudes and self-efficacy to lapses during early lifestyle modification. While greater typical self-efficacy and more positive typical self-regard are associated with fewer lapses, lower momentary self-criticism and very positive or negative typical self-regard may confer risk for same-day lapses.

Keywords

ecological momentary assessment; dietary lapses; lifestyle modification; self-attitudes; self-efficacy

Many individuals with overweight or obesity who participate in lifestyle modification (LM), which is a first-line treatment for obesity, experience suboptimal weight loss (Christian, Tsai, & Bessesen, 2010). Experiencing more dietary lapses (i.e., discrete instances of dietary nonadherence) has been linked to poorer weight loss and weight loss maintenance (Forman et al., 2017; Latner, McLeod, O'Brien, & Johnston, 2013). It is important to identify factors that contribute to dietary lapses so that they can be addressed during LM.

Past research has examined real-time predictors (e.g., affect, environmental cues) of dietary lapses using ecological momentary assessment (EMA), a repeated sampling method that occurs in participants' natural environments (Engel et al., 2016). EMA also has been used to characterize aspects of individuals' cognitive-affective responses to and self-attitudes following lapses. For example, past EMA studies have found that participants report greater guilt, greater feelings of failure, and lower self-encouragement at EMA surveys where dietary lapses are reported compared to EMA surveys where lapses are not reported (Carels et al. 2002; Carels, Douglass, Cacciapaglia, & O'Brien, 2004). However, research has not examined other self-attitudes—such as how critical, forgiving, or generally positively vs. negatively (“self-regard”) individuals feel toward themselves—after lapsing, and whether these self-attitudes relate to lapse behavior. Given that lapsing appears to confer risk for additional lapses in the near future (Forman et al., 2017), further examination of self-attitudes after lapses and how they relate to and predict lapse behavior is warranted.

On the one hand, some theories (e.g., Marlatt and colleagues' (1985) abstinence violation effect theory) posit that a more “negative” cognitive and affective response to a lapse may lead to discouragement and thus further lapses. Other theories (e.g., Carver and Scheier's (2011) control theory), however, posit that some degree of “negative” response to unmet goals can be helpful for signaling greater self-regulatory resources/goal salience and motivating change. Thus, a more “negative” (i.e., greater self-criticism, lower self-forgiveness, more negative self-regard) or more “positive” (i.e., lower self-criticism, greater self-forgiveness, more positive self-regard) self-attitude may similarly impact whether or not one is able to get back on track with dietary goals and prevent future lapses. Self-efficacy for weight control, which appears to decrease after a lapse (Carels et al., 2002) and is associated with lapse frequency after intentional weight loss (Latner et al., 2013), may also relate to lapse behavior during early weight loss efforts.

The current study used EMA to examine (1) whether “typical” self-attitudes (i.e., average self-criticism, self-forgiveness, self-regard for each individual across lapses) and “typical” self-efficacy (i.e., average self-efficacy for each individual across lapses) are associated with overall frequency of dietary lapses; and (2) whether “typical” or “momentary” self-attitudes and self-efficacy (i.e., level of self-attitude/self-efficacy at a particular lapse relative to one's typical self-attitude/self-efficacy) predict same-day lapse occurrence (i.e., next lapse occurring on the same day). Typical responses were examined to determine whether *individuals who* had higher or lower average levels of self-attitudes/self-efficacy relative to other participants experienced more lapses or had greater risk for same-day lapses; that is, typical responses examined the between-person effects of self-attitudes and self-efficacy. Momentary responses were examined to determine whether individuals were at greater risk for same-day lapses *when* they reported experiencing higher or lower self-attitudes/self-

efficacy than was normal for them. Thus, momentary responses examined the within-person effects of self-attitudes and self-efficacy. Because lapsing confers risk for additional lapses in the near future and self-attitudes may be particularly influential on behavior shortly after a lapse, same-day lapse occurrence was examined to determine whether self-attitudes prospectively predict episodes of dietary nonadherence that may accumulate to threaten weight loss. With the exception of self-efficacy, an exploratory (i.e., non-directional hypotheses) approach was used to examine relationships of self-attitudes with lapse frequency and same-day lapse risk. It was hypothesized that lower levels of self-efficacy would correlate with greater lapse frequency and increased risk for same-day lapses. This study complements recent investigations of factors that contribute to dietary lapses (e.g., Engel et al., 2016; Forman et al., 2017) by examining novel variables (i.e., self-attitudes) in relation to lapse behavior.

Method

Participants

Out of 190 adults with overweight/obesity participating in a larger LM trial (Forman et al., 2016), the final two cohorts ($n = 100$) participated in this study. All 100 participants consented to complete the EMA protocol upon admission to the LM trial. As discussed below, nine participants were excluded due to poor EMA compliance. Mean body mass index among the remaining participants ($n = 91$) was 37.21 kg/m^2 ($SD = 5.79$), mean age was 52.09 years ($SD = 8.88$), and most participants were female ($n = 72$, 79.1%) and White ($n = 64$, 70.33%).

Procedure

This study was approved by the Institutional Review Board of Drexel University. All participants provided written and verbal informed consent to participate, and were compensated up to \$42 for participation. Participants completed EMA for 14 days during the first three weeks of a LM program (for details of treatment, see Forman et al., 2016). Participants from both arms of the larger trial were included in the present study and data were collapsed across conditions, as treatments were virtually identical for the first three weeks. Prior to beginning EMA, participants were prescribed a reduced calorie diet (1200–1800 kcal/day, depending on weight) and were advised to reduce consumption of high-sugar and high-fat foods. Participants also were instructed in a treatment session on how to identify and report on dietary lapses, which were defined as “eating or drinking likely to cause weight gain, and/or put weight loss/maintenance at risk.”

For the EMA protocol, participants received six daily, signal-contingent surveys and also were instructed to initiate an EMA survey whenever they experienced a dietary lapse. If participants reported a lapse, they then reported on the date/time of the lapse and their self-attitudes/self-efficacy. Specifically, they reported their self-criticism (“How critical do you feel towards yourself for having a lapse?”; 1 = *Not at all critical* to 4 = *Extremely critical*); self-forgiveness (“Thinking about your lapse, which best describes how forgiving you feel toward yourself?”; 1 = *Not at all forgiving* to 4 = *Completely forgiving*); self-regard (“Right now, how would you describe your overall opinion about yourself?”; 1 = *I have a very*

negative opinion of myself to 4 = *I have a very positive opinion of myself*); and self-efficacy (“Right now, how confident do you feel in your ability to succeed in your weight control goals?”; 1 = *Not at all confident* to 4 = *Extremely confident*). The single-item format and wording was modeled off of EMA items used in prior studies of lapses (e.g., Gwaltney, Shiffman, Balabanis, & Paty, 2005).

Statistical approach

All data analyses were performed using SPSS Statistics 24. Typical responses (average level of each self-attitude/self-efficacy for each individual across lapse reports; between-person effect) were characterized by mean, standard deviation (SD), and range. Variability in momentary responses (self-attitude/self-efficacy at a specific lapse relative to one’s typical level; within-person effect) was characterized by each participant’s mean, SD, and range of mean square successive difference (MSSD; Jahng, Wood, & Trull, 2008), which is a measure of variability that accounts for the temporal order of responses. The relationships between lapse frequency (prorated to 14 day average) and typical self-attitudes/self-efficacy were examined with Pearson bivariate correlations. Separate generalized estimating equations (GEEs) based on a binary logistic distribution with a logit link function and an autoregressive (AR(1)) matrix structure were used to examine whether typical (between-person) or momentary (within-person) self-criticism, self-forgiveness, self-regard, and self-efficacy predicted whether the next lapse occurred on the same day (1 = *yes*, 0 = *no*; “day” defined as 4am on one calendar date to 4am on the next date). Linear and squared between- and within-person terms were included to test for nonlinear effects. Between-person variables were grand mean centered and within-person variables were centered within person prior to squaring.

Results

Across all 100 participants, mean compliance with responding to EMA prompts was 80.13% ($SD = 18.17$; range: 15.48 to 100.00). Based on visual examination of the data distribution and consistent with previous EMA studies (e.g., Lavender et al., 2013), participants with <50% compliance ($n = 9$) were excluded from remaining analyses (range among excluded participants: 15.48–48.81%). Participants with poor EMA compliance were excluded because low response rates (leading to problems such as long periods of time between surveys) could result in detecting inaccurate momentary relationships (e.g., triggers of same-day lapses) or inaccurately low lapse frequencies. Among the remaining 91 participants, mean compliance was 84.45% ($SD = 11.81$; range: 54.76–100.00%). A total of 635 lapses were reported across 6301 EMA recordings (10.08% of recordings). Based on clinical judgment regarding eating episodes qualifying as a lapse, multiple lapses occurring within 20 minutes were considered a single lapse and only responses for the first lapse were used in analyses (9 lapses excluded). Thus, a total of 626 lapse reports were included in analyses. Most participants (81/91; 89.01%) reported at least one lapse; mean lapse frequency (prorated to 14 day average) among these participants was 8.16 ($SD = 5.69$). Fifty-one participants had at least one day with more than one lapse, and 300 of the 626 reported lapses (47.92%) occurred on the same day as another lapse. Among lapses that occurred on the same day as another lapse, mean lapse frequency was 2.13 ($SD = 0.78$, range: 0–6).

Mean (*SD*, range) typical responses for each response variable was as follows: self-criticism: 2.03 (0.53, 1.00–4.00); self-forgiveness: 2.82 (0.73, 1.50–4.00); self-regard: 3.10 (0.69, 1.00–4.00); self-efficacy: 2.83 (0.68, 1.24–4.00). Typical self-criticism was negatively correlated with other typical response variables (r s: $-.35$ to $-.51$; p s $< .01$); all other typical response variables were positively correlated (r s: $.53$ to $.71$; p s $< .001$). Mean (*SD*, range) MSSDs across participants were as follows: self-criticism: 0.48 (0.48, 0.00–2.10); self-forgiveness: 0.57 (0.64, 0.00–4.00), self-regard: 0.34 (0.46, 0.00–2.09); self-efficacy: 0.18 (0.26, 0.00–1.21).

Typical self-efficacy ($r = -.36$, $p = .001$) and typical self-regard ($r = -.23$, $p = .04$) were significantly correlated with lapse frequency, indicating that lower self-efficacy and more negative self-regard were associated with greater lapse frequency. Typical criticism ($r = -.04$; $p = .70$) and forgiveness ($r = -.02$; $p = .86$) were not significantly associated with lapse frequency.

Results from GEEs predicting same-day lapse likelihood are displayed in Table 1. Typical (between-person) self-regard predicted same-day lapse occurrence according to a quadratic relationship, such that individuals with either more negative or more positive typical self-regard were more likely to have their next lapse occur on the same day at any given lapse survey. Momentary (within-person) self-criticism also predicted same-day lapse likelihood according to a linear relationship, with lower momentary self-criticism predicting greater likelihood of the next lapse occurring on the same day. Self-forgiveness and self-efficacy did not predict same-day lapse occurrence.

Discussion

This was the first study to utilize EMA to examine how self-attitudes and self-efficacy relate to lapse frequency and same-day lapse occurrence among individuals in a LM program. Participants, on average, endorsed levels of self-criticism slightly below the scale midpoint and levels of self-forgiveness, self-efficacy, and self-regard slightly above the midpoint, indicating generally “positive” typical self-attitudes and high typical self-efficacy. Results revealed that both more positive typical self-regard and greater typical self-efficacy were associated with fewer total lapses. While lapses occurred, on average, approximately once every other day, 50% of lapses clustered in the same day, suggesting lapses may often occur in succession. When examining relationships between self-attitudes/self-efficacy and the likelihood of the next lapse occurring on the same day, lower momentary levels of self-criticism and both more positive and more negative typical self-regard predicted same-day lapse occurrence. Thus, while individuals who have higher typical self-efficacy and more positive self-regard after lapsing may lapse less often, a more critical momentary response and having more neutral typical self-regard may be most helpful for avoiding same-day lapses. Such findings are consistent with self-regulation theories that posit negative affect may help motivate behavior change (Carver & Scheier, 2011), and support further examination of whether self-attitudes that may be thought of as “negative” may be beneficial in moderation or at specific moments.

Of note, these findings suggest that self-attitudes and self-efficacy differentially relate to overall lapse frequency and same-day lapse risk. For example, consistent with prior research (Latner et al., 2013), typical self-efficacy related to overall lapse frequency; however, self-efficacy did not prospectively predict same-day lapses. This pattern of results, along with the high rate of same-day lapses that occurred within the sample, suggests that same-day lapses are a unique phenomenon that warrant additional study. Contrary to expectations, self-forgiveness was not associated with lapse frequency or predictive of same-day lapses. One explanation for this finding is that the concept of “self-forgiveness” is rather complex and the single item used in this study did not assess important aspects of self-forgiveness. For example, genuine self-forgiveness requires accepting responsibility for wrongdoing and then choosing to forgive oneself, while “pseudo” forgiveness involves excusing behavior without taking responsibility (Wenzel, Woodyatt, & Hedrick, 2012). Different interpretations of this item may have impacted the ability to detect meaningful relationships with lapses. It is also possible that participants engaged in self-licensing (i.e., preemptively justifying temporary goal abandonment) for certain lapses, which could have impacted self-attitudes (including self-forgiveness) or self-efficacy and their impact on same-day lapses. As self-licensing for a dietary violation appears to increase future eating indulgence (Prinsen, Evers, & de Ridder, 2016), future studies should assess the impact of self-licensing on self-attitudes/self-efficacy and same-day lapses.

Strengths of the current study include the use of EMA, which allowed for assessment of self-attitudes and self-efficacy immediately after a lapse and for detailed measurement of lapse behavior (including multiple lapses in a day). Assessment with a sample participating in a LM program also was a strength, as this is a key population in which to understand and prevent lapses. Additionally, this study included assessment of novel variables (e.g., self-attitudes) that contributes to a greater understanding of factors that relate to dietary nonadherence. Given the exploratory nature of this study, there also were several limitations. Self-attitudes were measured using single-item measures that were developed specifically for this study, and lapses within 20 minutes were considered a single lapse. As such, replication of these findings utilizing psychometrically sound measurement is needed, and future research should further examine distinctions between separate and ongoing lapses occurring very near in time. Further, only some possible self-attitudes were assessed. A logical extension of this research would be to assess how other self-attitudes (e.g., self-compassion) relate to lapses, and to assess more nuanced aspects of self-attitudes (e.g., whether a lapse is viewed as a mistake and responsibility is taken before forgiving). Finally, the sample was primarily White and female. Replication with more diverse samples is needed, as is examination of the potential moderating effect of demographic variables.

In conclusion, this study represents a novel examination of self-attitudes and self-efficacy after lapsing, and provides preliminary evidence for the influence of self-attitudes and self-efficacy on lapse behavior. Results also support further study of factors that contribute to same-day lapses. Though further research is needed to replicate and clarify relationships between self-attitudes and lapses, results indicate that certain self-attitudes relate to dietary lapses and could be viable targets for intervention.

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Table 1

Predicting same-day lapse occurrence.

	B	SE	95% CI	Wald χ^2	p
Self-criticism					
<i>Between-person effect</i>					
Linear	.13	.23	[-.32, .58]	.31	.58
Squared	.03	.31	[-.57, .63]	.01	.93
<i>Within-person effect</i>					
Linear	-.49	.14	[-.77, -.22]	12.64	<.001
Squared	.01	.18	[-.34, .37]	.01	.94
Self-forgiveness					
<i>Between-person effect</i>					
Linear	-.13	.21	[-.53, .28]	.38	.54
Squared	.01	.20	[-.38, .41]	.003	.95
<i>Within-person effect</i>					
Linear	.29	.18	[-.06, .64]	2.69	.10
Squared	.01	.17	[-.32, .33]	.002	.97
Self-regard					
<i>Between-person effect</i>					
Linear	-.16	.19	[-.53, .21]	.74	.39
Squared	.40	.16	[.09, .71]	6.39	.01
<i>Within-person effect</i>					
Linear	.28	.17	[-.06, .62]	2.62	.11
Squared	.35	.23	[-.10, .79]	2.38	.12
Self-efficacy					
<i>Between-person effect</i>					
Linear	-.31	.19	[-.67, .06]	2.76	.10
Squared	.07	.18	[-.27, .42]	.18	.67
<i>Within-person effect</i>					
Linear	.19	.22	[-.24, .61]	.74	.39
Squared	-.19	.40	[-.97, .60]	.21	.64