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RESEARCH ARTICLE

The Association of Emotion Regulation Flexibility and Negative and Positive Affect in Daily Life

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Abstract

In contrast to traditional classifications of emotion regulation (ER) strategies as either uniformly maladaptive or adaptive, recent theoretical models emphasize that adaptability is determined by greater ER *flexibility* (i.e., the ability to flexibly implement and adjust ER strategies based on the context). This study is the first to empirically test the two central perspectives of ER flexibility on affect. A sample of 384 adults (M_{age}=38.58 years, *SD*=13.82) residing predominantly in North America completed daily diaries for 14 days. We found evidence that theoretical components of ER flexibility, as defined by greater context sensitivity in the selection of ER strategies, greater ER strategy repertoire, enhanced responsivity to affective feedback, and ER-environmental covariation, were associated with adaptive affective outcomes (i.e., reduced negative affect and/or increased positive affect). This study highlights the importance of examining ER flexibility and its consequences as a critical component of ER.

Keywords Emotion regulation · Affect · Emotion regulation flexibility · Negative affect · Positive affect

To adapt to one's dynamic environment, people must regularly modulate their emotions, a process known as emotion regulation (ER; Gross, 1998). Past ER research has predominantly espoused a dichotomous perspective, whereby ER strategies were considered either adaptive or maladaptive based on their consequences (e.g., decreases or increases in negative affect). Recently, however, a growing body of literature has questioned this dichotomous perspective, arguing that strategies are not uniformly adaptive or maladaptive across all contexts (Bonanno & Burton, 2013). Instead, it is posited that adaptiveness is based on the ability to flexibly implement and adjust ER strategies given contextual demands—i.e., ER flexibility (Aldao et al., 2015; Bonanno & Burton, 2013). Despite strong theories of ER flexibility, there is limited empirical support for its adaptiveness.

The two main ER-flexibility perspectives are proposed by Bonanno and Burton (2013) and Aldao et al. (2015). Bonanno and Burton (2013) highlighted three components of ER flexibility. First, *context sensitivity* is the ability to match an appropriate ER strategy to particular contexts. Second, *repertoire* is the ability to implement a range of strategies and is measured in terms of both categorical variability (the number of strategies used at one point in time) and temporal variability (ER strategy use over time; Bonanno & Burton, 2013; Eldesouky & English, 2018). Third, *feedback* is the ability to monitor the effectiveness of a chosen ER strategy and to adjust strategies as needed. Building on Bonanno and Burton (2013), Aldao et al. (2015) proposed a fourth characteristic: *synchronized variation* (i.e., *covariation*) of ER variability with environmental variability (e.g., changes in daily events), which is composed of within-strategy variability (variability in the use of a particular strategy over time) and between-strategy variability (variability in the degree to which a range of strategies are implemented each day).

There are four fundamental gaps within the ER flexibility literature. First, several studies have established the importance of ER flexibility using cross-sectional and experimental designs (Bonanno et al., 2004; Eldesouky & English, 2021; Goodman et al., 2021; Southward et al., 2018). Yet, few studies have examined day-to-day ER flexibility (e.g., Blanke et al., 2020; Goodman et al., 2021) using intensive longitudinal designs (e.g., daily diaries). Second, limited research has tested the benefits of ER flexibility using multiple ER strategies. Third, research has largely neglected the association of ER flexibility with positive affect. Finally, no study has

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simultaneously tested the theories of Bonanno and Burton (2013) and Aldao et al. (2015) to evaluate ER flexibility holistically across these two complementary approaches. Overall, considering that ER is needed in everyday life to manage the complexity of the ever-changing environment, it is crucial to investigate the effective use of ER. This daily diary study empirically examined the adaptiveness of *flexibly* implementing multiple ER strategies day-to-day and its association with affect. Consistent with perspectives of ER flexibility offered by Bonanno and Burton (2013) and Aldao et al. (2015), participants completed daily diaries before bedtime for 14 days during the start of the coronavirus disease (COVID-19) pandemic. Diaries assessed affect, whether an event occurred that day, and, if so, the pleasantness, controllability, and stressfulness of the event. Participants also reported on the ER strategies that they used either in response to the event (i.e., event-contingent ER) or in general, if no event occurred that day (e.g., Müller et al., 2012).

The present pre-registered study had four objectives, corresponding to the four characteristics of ER flexibility proposed by Bonanno and Burton (2013) and Aldao et al. (2015). Objective 1: Akin to past research examining context sensitivity (Haines et al., 2016; Troy et al., 2016), we investigated whether the controllability of a negative event moderated the association of ER strategy use and affect. Our hypotheses were based on the coping literature (Haines et al., 2016; Lazarus, 1993 ; Troy et al., 2016), which suggests that, in an uncontrollable context, it is adaptive to change one's *emotional* response because the context cannot be directly altered (i.e., to engage in emotion-focused coping), whereas, in a controllable context, it is maladaptive to change one's emotional response because the context can be directly managed (Lazarus, 1993; Troy et al., 2016). Cognitive reappraisal and distraction are considered emotion-focused coping strategies because they modify thoughts to regulate emotions (Lazarus & Folkman, 1984; Troy et al., 2016). Thus, consistent with past research (Haines et al., 2016; Troy et al., 2016), we hypothesized that greater cognitive reappraisal and distraction would be associated with lower negative affect and higher positive affect in the context of events with less perceived controllability, but higher negative affect and lower positive affect in the context of events with greater perceived controllability. In contrast, problem-solving is a strategy that constitutes modifying a situation (i.e., problem-focused coping; Lazarus, 1993). Therefore, we predicted that greater problem-solving would be associated with higher negative affect and lower positive affect in the context of events with less perceived controllability, but lower negative affect and higher positive affect in the context of events with greater perceived controllability (Lazarus, 1993). Additionally, considering that rumination is associated with adverse outcomes (Aldao et al., 2010), we predicted that greater rumination would be associated with higher negative affect and lower positive affect regardless of controllability context. However, given that both rumination and uncontrollable events tend to be associated with greater negative affect and less positive affect (Nolen-Hoeksema et al., 2008; van der Stouwe et al., 2019), we predicted that greater rumination would be more strongly associated with higher negative affect and lower positive affect in the context of events with less perceived controllability, compared to those with greater perceived controllability. We had no a priori hypothesis for suppression.

Objective 2: As suggested by Bonanno and Burton (2013), we tested repertoire by examining the influence of categorical and temporal ER variability on affect. Consistent with Bonanno and Burton (2013), empirical research suggests that repertoire is associated with adaptive outcomes (e.g., less negative affect, enhanced well-being, lower internalizing symptoms; Blanke et al., 2020; Grommisch et al., 2020; Lougheed & Hollenstein, 2012). Thus, we predicted that greater categorical and temporal ER variability would be associated with lower negative affect and higher positive affect.

Objective 3: Consistent with Bonanno and Burton's (2013) conceptualization of feedback, we examined whether the association between change in ER strategy use and affect was moderated by affect the previous day. Research suggests that higher feedback predicts beneficial outcomes (e.g., greater wellbeing; Birk & Bonanno, 2016; Chen & Bonanno, 2021). Thus, we hypothesized that greater change in ER strategy use from one day to the next would be associated with lower negative affect at higher levels of negative affect the day prior and with higher positive affect at lower levels of positive affect the day prior. We did not expect day-to-day changes in ER strategy use to be associated with affect at lower levels of negative affect the day prior or at higher levels of positive affect the day prior.

Objective 4: We examined the covariation of ER variability and environmental variability, as recommended by Aldao et al. (2015). Given that ER-environmental covariation is postulated to predict adaptive outcomes (Aldao et al., 2015), we expected that greater covariation of ER variability and environmental variability would predict lower negative affect and higher positive affect (see Supplement Table S1).

Method

Participants

This sample was composed of 384 adults (M_{age} = 38.58 years, SD = 13.82) who resided predominantly in North America. Demographic characteristics of the sample are shown in Table 1. Participants were included in the study if they were fluent in English and 18 years of age or older. The sample size was determined based on the success of recruitment, the sample size required for accurate statistical estimates given our data analytic approach (i.e., regression, multilevel modelling; Austin & Steyerberg, 2015; Maas & Hox, 2005), and past 14-day daily diary research (e.g., Seo & Patall, 2021). Although

Table 1 Demographic characteristics of the sample

Variable	
Sex, *n*	
Male	90
Female	294
Gender, *n*	
Man	87
Woman	283
Gender-fluid	2
Genderqueer	2
Non-binary	5
Non-binary male-leaning	1
Non-binary female-leaning	1
Transgender	1
Not sure	2
Age, *M* (*SD*)[a]	38.58 (13.82)
Residing country, *n*	
USA	133
Canada	248
Germany	1
India	1
Peru	1
Ethnic origin (*n*)[b]	
Black	2
Chinese	8
Filipino	6
Japanese	6
Korean	1
Indigenous	5
Latinx	11
Middle Eastern	4
East Indian	2
Native Hawaiian/Pacific Islander	0
South Asian	1
Southeast Asian	3
West Asian	1
White	358
Not listed above[c]	14
Highest education (*n*)[d]	
Less than high school	8
High school diploma	74
College diploma/certificate	71
Bachelor's degree	136
Master's degree	68
Doctorate degree	10
Juris Doctor degree	6
Doctor of Medicine degree	1
Not listed above[e]	9

Note. Participants reported their sex, gender, age, residing country at the time of the study, ethnic origin, and highest level of education

[a] Six participants did not report their age

[b] Participants were able to choose multiple options when reporting their ethnic origin. One participant did not report their ethnic origin

[c] Other ethnic origins were identified as follows: Ashkenazi Jew, Canadian, Eastern European, European, Filipino-Spanish-German, mixed, Indo-Caribbean, Jewish, North African, Portuguese, Scandinavian-Saami/Lappi, and Trinidadian

[d] One participant did not report their highest level of education

[e] Other degrees were identified as follows: Associate's degree, Trades certification, Doctor of Behavioral Health, Doctor of Ministry, Doctor of Optometry, Doctor of Education, Naturopathic Physician, and Trade school

all participants ($n = 384$) were included in Objectives 2 and 3, a subset of the final sample was used for Objectives 1 and 4. Only participants who reported negative events ($n = 236$) could be included in the analyses for Objective 1, and only participants who reported events in general (negative, neutral, or positive; $n = 334$) could be included in the analyses for Objective 4.

Materials

Daily Diary Measures

Affect The negative affect and positive affect subscales from the 20-item version of the Positive and Negative Affect Schedule (PANAS; Watson et al., 1988) were used to assess affect. The negative affect subscale items were *distressed*, *upset*, *guilty*, *scared*, *hostile*, *irritable*, *ashamed*, *nervous*, *jittery*, and *afraid*. The positive affect subscale items were *interested*, *excited*, *strong*, *enthusiastic*, *proud*, *alert*, *inspired*, *determined*, *attentive*, and *active*. Participants indicated to what degree they felt each emotion that day on a scale from 1 (*Very slightly or not at all*) to 5 (*Extremely*). The items were summed for a score of negative and positive affect, respectively. For negative affect, the between-person reliability was .98 and the within-person reliability was .82. For positive affect, the between-person reliability was .99 and the within-person reliability was .88.

Event Type Participants were asked to indicate if an event occurred that day. If more than one event occurred, they were asked to report on the most significant event, in keeping with Genet and Siemer (2012) and Garrison et al. (2014). They were asked to choose which category best described the type of event from a multiple-choice list of 11 types of events: *close friendship*, *social life*, *romantic relationship*, *family relationship*, *education*, *work*, *finances*, *health of self*, *health of family*, *health of friends*, *recreation*, *other*. Event type was used for research Objective 4 (ER-environmental covariation).

Event Pleasantness, Controllability, and Stressfulness If participants reported experiencing an event on a given day, they were asked to report how pleasant the event was on a scale from 1 (*Very unpleasant*) to 5 (*Very pleasant*). Events rated as 1 or 2 on this scale were characterized as negative, events rated as 3 were characterized as neutral, and events rated as 4 or 5 were characterized as positive. Participants were also asked to report how controllable the event was on a scale from 1 (*Very uncontrollable*) to 5 (*Very controllable*). Finally, participants were asked to indicate how stressful the event was on a scale from 1 (*Not at all stressful*) to 5 (*Extremely stressful*). These items were derived from past intensive longitudinal research (e.g., Kircanski et al., 2015). Event pleasantness was used for research Objectives 1 (context sensitivity) and 4 (ER-environmental covariation). Event controllability was used for research Objective 1 (context sensitivity), and event stressfulness was used for research Objective 4 (ER-environmental covariation).

Emotion Regulation Each day, participants rated the degree to which they used five different ER strategies: cognitive reappraisal, suppression, problem-solving, distraction, and rumination. If participants experienced an event, they reported the amount that they used each ER strategy in response to the event. If no event occurred, participants were still asked to report the amount that they used each ER strategy that day.[1] Consistent with past daily diary research (e.g., Battaglini et al., 2021; Starr, 2015), one or two items were used to assess each of the five ER strategies to reduce participant burden and enhance compliance. The cognitive reappraisal and suppression items were derived from the Emotion Regulation Questionnaire (ERQ; Gross & John, 2003) and past intensive longitudinal studies (Brockman et al., 2017; Kashdan & Steger, 2006). Participants rated their use of cognitive reappraisal by reporting on the items "Changing the way I was thinking in order to feel less negative emotion (e.g., less sad)" and "Changing the way I was thinking in order to feel more positive emotion (e.g., happier)." These items were averaged to create a composite of cognitive reappraisal. The between-person reliability was .95 and the within-person reliability was .74 for cognitive reappraisal. Participants rated their use of suppression with the item, "Keeping my emotions to myself." The problem-solving and distraction items were derived from The Responses to Stress Questionnaire (RSQ) and past intensive longitudinal research (Connor-Smith et al., 2000; Stone et al., 2019). Participants reported on their use of problem-solving by responding to the item: "Trying to think of different ways to change the situation." Distraction was assessed with, "Trying to keep my mind off the situation by thinking about or doing something else." The rumination item was based on the definition of rumination offered by Nolen-Hoeksema et al. (2008) and was derived from past intensive longitudinal research (Connolly & Alloy, 2017; Ding et al., 2019) and experimental rumination inductions that instruct participants to focus on the causes, meanings, and consequences of their feelings (Nolen-Hoeksema & Morrow, 1993). Rumination was assessed by asking participants to report how much they were "Thinking about the causes, meanings, and consequences of my situation or feelings." Each ER item was rated on a scale from 1 (*Not at all*) to 5 (*Very much*), with responses of 2 or greater indicating the strategy was used that day. State (i.e., daily diary) measures of rumination, cognitive reappraisal, and suppression were positively associated with trait measures of that construct (Ruminative Response Scale; Treynor et al., 2003; Emotion Regulation Questionnaire; Gross & John, 2003): for rumination, $b = 0.07$, $p < .001$, 95% CI [0.05, 0.08], cognitive reappraisal, $b = 0.02$, $p < .001$, 95% CI [0.01, 0.03], and suppression, $b = 0.10$, $p < .001$, 95% CI [0.08, 0.12]. We did not administer trait measures of problem solving or distraction. Event-contingent ER was used as the predictor for Objectives 1 and 4, whereas both event-contingent ER and general ER were used as predictors for Objectives 2 and 3 (Müller et al., 2012).

Procedure

This online study (i.e., The COVID-19 and Wellbeing Study) was approved by The University of British Columbia's (UBC) Behavioural Research Ethics Board (BREB) and is in line with the World Medical Association Declaration of Helsinki. Participants were recruited online through various websites (e.g., social media), targeting those living in North America (see Table 1). Consent was obtained for the baseline session, during which demographic data were collected; additional consent was obtained for the daily diary portion, which began the day after the baseline session and continued for 14 days. The daily diaries were sent to participants via email each evening at 5 pm, and participants were asked to complete it before going to bed. The baseline survey and daily diaries were available for participation from April to July 2020. Remuneration was not offered for this study.

Data Analytic Approach

R Version 4.0.4 (R Core Team, 2021) and the lme4 (Bates et al., 2015) and lmerTest (Kuznetsova et al., 2017) R-packages were used for our analyses. Multilevel models (MLMs) were conducted to test objectives with a nested data structure, in which days (Level 1) were nested within persons (Level 2). Analyses were conducted with random intercepts and slopes. All continuous variables at Level 1 were person-mean centered to assess within-person deviations from the

[1] Participants reported their ER strategy use and affect for the day. However, if participants reported experiencing an event, they reported their ER strategy use in response to the event and affect that day. Considering that affective recovery from daily events can linger for extended periods of time (e.g., day-to-day; Leger et al., 2018), we assessed ER in response to the event but assessed affect for the whole day to understand how event-contingent ER impacts broader daily affect.

participant's mean. The predictor of each model at Level 1 was re-introduced at Level 2 and grand-mean centered to evaluate and control for between-person effects (Bolger & Laurenceau, 2013). Objectives without a nested structure to the data were tested using regression analyses, which is consistent with past research (Blanke et al., 2020). In line with prior research, analyses were conducted separately for positive affect and negative affect (e.g., Blanke et al., 2020; Thompson et al., 2012). Analyses were pre-registered on the Open Science Framework (OSF) for the outcomes of negative affect (osf.io/c38ga) and positive affect (osf.io/jemz6). Elaboration regarding deviations from the pre-registration can be found in the Supplemental Material (Table S2).

Prior to conducting analyses, the data were cleaned based on our pre-registered procedures and inclusion criteria. Of the 1,687 participants who provided consent, only 711 completed both the baseline survey and the daily diaries. Participants (n = 3) were excluded if they were younger than 18 years of age or not fluent in English. Consistent with survey research practices (e.g., Silber et al., 2019), participants (n = 197; similar to Jung et al., 2020) were excluded if they did not pass all three attention checks in the baseline survey. To calculate the time the daily diaries were completed, we required that participants report their time zone; participants (n = 34) were excluded if they did not provide this information or did not complete any daily diaries within the allowable window of time (5 pm until 6 am), which is consistent with previous daily diary studies (e.g., Boynton & Richman, 2014). For duplicate entries (two entries completed on the same day), only the first entry was retained. In addition, entries submitted past the 14-day period were not included in analyses. Because 2 days of daily diaries are required to appropriately estimate random effects, participants (n = 93) were excluded if they completed only 1 diary (Mehl & Conner, 2012), which is consistent with past daily diary studies (e.g., Sheehan & Lau-Barraco, 2019). After taking into account these pre-registered data cleaning procedures and inclusion criteria, 384 participants remained in our final sample.

Results

Preliminary Analyses

Unconditional models were conducted to compute the intraclass correlation coefficients (ICC) for negative and positive affect, respectively. The ICCs were conducted for Objectives 2 and 3 separately from Objectives 1 and 4 given that Objectives 1 and 4 were analyzed with subsets of the total sample (i.e., only participants who reported negative events could be included in Objective 1, and only participants who reported an event [either negative, neutral, or positive] could be included in Objective 4). For negative affect, the ICCs ranged from .53 to .58, indicating that 53–58% of the variability in negative affect was due to between-person variance. With regard to positive affect, the ICCs approximated to .53, indicating that 53% of the variability in positive affect was due to between-person variance. Participants completed an average of M = 7.29 (SD = 3.99) diaries, across the 14-day period.

Objective 1: Context Sensitivity (Bonanno & Burton, 2013)

Analogous to past research that investigated context sensitivity (Haines et al., 2016; Troy et al., 2016), we predicted that the controllability of a negative event would moderate the association between ER strategy use and affect. As described above, only participants (n = 236) who reported the occurrence of negative events could be included in these analyses. A total of 478 negative events were reported. To assess context sensitivity, we conducted MLMs predicting affect as a function of event-contingent ER, the perceived controllability of the event, and their interaction at Level 1. All variables were person-mean centered at Level 1, and the event-contingent ER strategy was grand-mean centered at Level 2 to control for between-person effects. Separate MLMs were conducted for each event-contingent ER strategy (i.e., cognitive reappraisal, distraction, problem-solving, rumination, suppression).

As expected, perceived controllability of the negative event significantly moderated the association of distraction with negative affect at time t, b = 1.16, p = .001, 95% CI [0.44, 1.88]. The simple slopes analysis indicated that, when the event was less controllable (i.e., 1 SD below the mean), participants who used higher levels of distraction than their personal average, reported lower negative affect, b = −1.85, p = .001, 95% CI [−2.96, −0.74]. In contrast, distraction was not significantly associated with negative affect at the mean level of event controllability, b = −0.89, p = .067, 95% CI [−1.84, 0.06], or when events were more controllable (i.e., 1 SD above the mean), b = 0.07, p = .902, 95% CI [−1.04, 1.18] (see Figure 1a). No other interactions significantly predicted negative affect, $|bs| \leq 0.92$, $ps \geq .074$.

For positive affect, perceived controllability of the negative event significantly moderated the association of cognitive reappraisal with positive affect at time t, b = −1.16, p = .023, 95% CI [−2.20, −0.10]. The simple slopes analysis showed that, as expected, participants who used higher levels of cognitive reappraisal than their personal average reported lower positive affect when the event was more controllable (i.e., 1 SD above the mean), b = −2.38, p = .004, 95% CI [−3.98, −0.77], or at the mean level of event controllability, b = −1.42, p = .047, 95% CI [−2.80, −0.03]. However, cognitive reappraisal was not significantly associated with positive affect when events were less controllable (i.e., 1 SD below the mean), b = −0.46, p = .576, 95% CI [−2.08, 1.16] (see

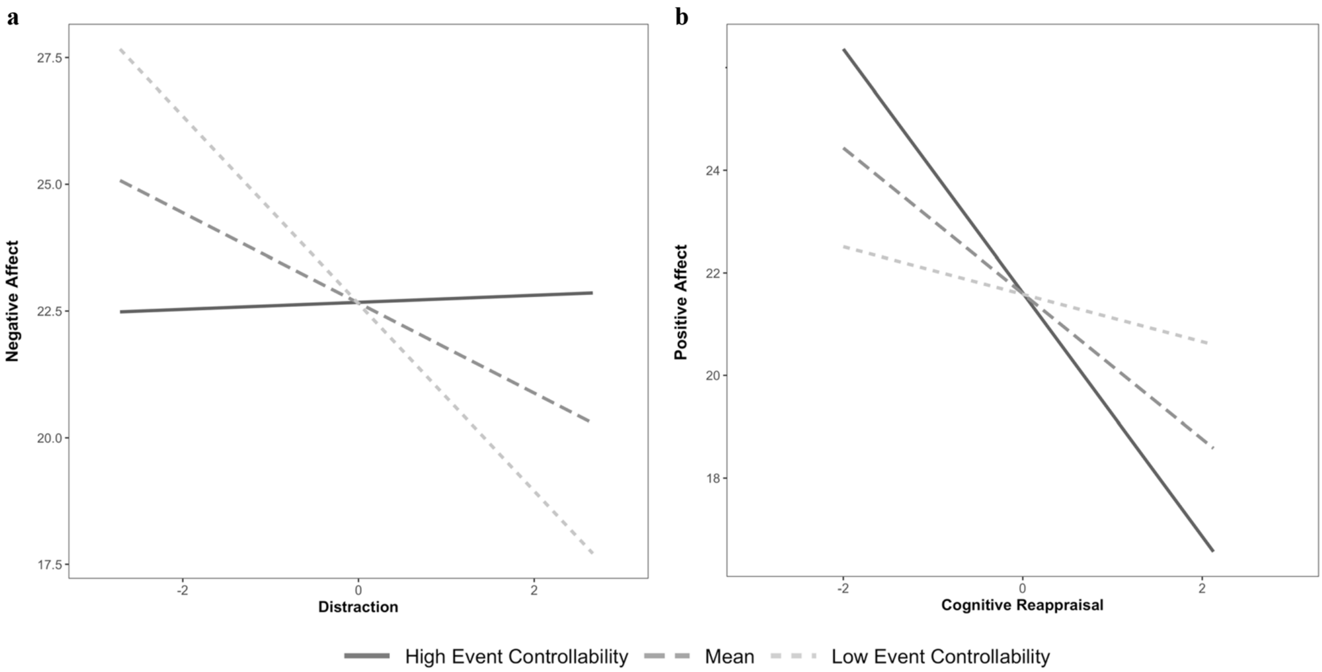

Fig. 1 Perceived controllability of the negative event moderated the association of distraction with negative affect (**a**), and the association of cognitive reappraisal with positive affect (**b**). Perceived controllability, distraction, and cognitive reappraisal were person-mean centered. For negative affect (**a**), the simple slopes analyses indicated that when the event was less controllable (i.e., 1 SD below the mean), higher distraction predicted lower negative affect. No other slopes were significant for negative affect. For positive affect (**b**), higher cognitive reappraisal predicted lower positive affect when the event was more controllable (i.e., 1 SD above the mean) or at the mean level of event controllability. Cognitive reappraisal was not significantly associated with positive affect when events were less controllable (i.e., 1 SD below the mean)

Figure 1b). No other interactions significantly predicted positive affect, $|bs| \leq 0.48$, $ps \geq .168$.

Objective 2: Repertoire (Bonanno & Burton, 2013)

In line with theoretical and empirical research (Blanke et al., 2020; Bonanno & Burton, 2013), we hypothesized that greater repertoire (indexed by greater categorical and temporal variability) would predict lower negative affect and higher positive affect. Following the analytical approach used in past research (Eldesouky & English, 2018), categorical variability was quantified based on the total number of ER strategies participants used each day. A higher number of strategies used indexed greater categorical variability. On average, participants reported using approximately 3 strategies per day ($M = 3.13$, $SD = 1.66$).

To test our hypothesis, MLMs were conducted with categorical variability predicting negative and positive affect. Categorical variability was person-mean centered at Level 1 and grand-mean centered at Level 2 to control for between-person effects. As expected, there was a significant negative association between categorical variability and negative affect, $b = -1.36$, $p < .001$, 95% CI [−1.87, −0.88]. This suggests that on days when participants employed more ER strategies than usual, they reported less negative affect. In contrast, the association between categorical variability and positive affect was not significant, $b = 0.43$, $p = .143$, 95% CI [−0.11, 1.03].

With regard to temporal variability, we analyzed both within- and between-strategy variability in accordance with past research (Blanke et al., 2020). As an index for within-strategy variability, the standard deviation of the amount each strategy was used across the 14 days was averaged across ER strategies for each participant. Higher values indicate greater within-strategy variability across the 14 days. We then regressed negative and positive affect (averaged across the 14 days) on within-strategy variability. Participants' average amount of ER strategy use across the 14 days was entered as a covariate to separate this effect from variability because they tend to be confounded (higher variability is related to higher average amount of ER strategy use; Blanke et al., 2020). Although the full sample was included in this analysis (n = 384), only participants who had complete within-strategy variability data could be analyzed (n = 379). Contrary to our predictions, within-strategy variability did not significantly predict negative affect, $b = 0.57$, $p = .485$, 95% CI [−1.12, 1.95], or positive affect, $b = 1.29$, $p = .225$, 95% CI [−0.94, 3.41].

Between-strategy variability was indexed by calculating the standard deviation of the amount each participant used ER strategies each day (Blanke et al., 2020). Higher values indicate greater between-strategy variability on that day. To test the association between between-strategy variability and affect, MLMs were conducted. At Level 1, affect was predicted as a function of between-strategy variability and the average amount of ER strategy use each day, which was included as a covariate at Level 1 to ensure the influence of between-strategy variability was assessed independently from the average amount of ER strategy use (as recommended by Blanke et al., 2020). All variables were person-mean centered at Level 1, and between-strategy variability was grand-mean centered at Level 2 to control for between-person effects. As expected, between-strategy variability was significantly negatively associated with negative affect, $b = -4.55$, $p < .001$, 95% CI [−5.97, −2.93], and positively associated with positive affect, $b = 3.63$, $p < .001$, 95% CI [1.56, 5.36]. Thus, on days when participants had greater between-strategy variability than their average, they reported lower negative affect and higher positive affect.

Objective 3: Feedback (Bonanno & Burton, 2013)

Based on the theoretical conceptualization of feedback (Bonanno & Burton, 2013), we predicted that the association between day-to-day changes in ER strategy use and affect would be moderated by affect the previous day. Day-to-day changes in ER strategy use were indexed by the average of the absolute value of the difference in the amount each ER strategy was used from one day to the next (i.e., from time t-1 to t). MLMs were conducted to test our hypothesis. At Level 1, affect at time t was predicted based on change in ER strategy use (from t-1 to t), affect at t-1, and their interaction. All variables were person-mean centered at Level 1 and change in ER strategy use was grand-mean centered at Level 2 to control for between-person effects. Even though the full sample was included in this analysis ($n = 384$), only participants with complete data for the lagged predictors could be analyzed ($n = 331$). As expected, negative affect at t-1 significantly moderated the association between change in ER strategy use (from t-1 to t) and negative affect at time t, $b = -0.27$, $p < .001$, 95% CI [−0.37, −0.17]. The simple slopes analysis indicated that, at higher levels of t-1 negative affect (i.e., 1 SD above the mean) or at mean levels of t-1 negative affect, participants who had greater change in ER strategy use (from t-1 to t) compared to their personal average reported a decrease in negative affect at time t, $b = -3.75$, $p < .001$, 95% CI [−5.32, −2.18], for 1 SD above the mean, and $b = -2.58$, $p = .001$, 95% CI [−4.10, −1.05], at the mean. In contrast, at lower levels of t-1 negative affect (i.e., 1 SD below the mean), the association between change in ER strategy use (from t-1 to t) with negative affect was not significant, $b = -1.40$, $p = .087$, 95% CI [−3.00, 0.20] (see Figure 2a).

Positive affect at t-1 also significantly moderated the association between change in ER strategy use (from t-1 to t) and positive affect at time t, $b = -0.24$, $p < .001$, 95% CI [−0.34, −0.14]. However, the simple slopes analysis was not significant, $|bs| \leq 0.92$, $ps \geq .084$. Given this, to further clarify the interaction, the Johnson-Neyman test for the regions of significance was conducted (Hayes & Matthes, 2009; Johnson & Neyman, 1936). It indicated that when t-1 positive affect was below −10.86, participants who reported a greater change in ER strategy use (from t-1 to t) compared to their usual, reported an increase in positive affect at time t. In contrast, when t-1 positive affect was above 6.76, participants who reported a greater change in ER strategy use (from t-1 to t) reported a decrease in positive affect (see Figure 2b).

Objective 4: Covariation of Emotion Regulation Strategy Variability and Environmental Variability (Aldao et al., 2015)

We followed analytic recommendations made by Aldao et al. (2015) to test our hypothesis that greater covariation of ER strategy variability and environmental variability would predict lower negative affect and higher positive affect. The subset of participants ($n = 334$) in the sample who reported the occurrence of events were included in these analyses. A total of 1,097 events were reported across participants. ER strategy variability was assessed separately as within- and between-strategy variability. Within-strategy variability was computed as the standard deviation of each event-contingent ER strategy used across the 14 days, averaged across ER strategies for each participant (Blanke et al., 2020). Environmental variability was indexed based on the number of distinct event types reported by each participant across the 14 days. We then regressed within-strategy variability onto the number of distinct event types and extracted the residuals. As described by Aldao et al. (2015), positive residuals indicate greater covariation of ER variability and environmental variability, whereas negative residuals indicate lower covariation of ER and environmental variability. The residuals were included as an independent variable in regression models predicting negative and positive affect, respectively. Despite including $n = 334$ participants in the analysis, only participants who had within-strategy variability data could be analyzed ($n = 251$, which is sufficient for accurate estimates using regression analyses; Austin & Steyerberg, 2015). Contrary to our expectations, greater covariation of within-strategy ER variability and environmental variability significantly predicted higher negative affect, $b = 3.28$, $p < .001$, 95% CI [1.32, 5.19], and did not significantly predict positive affect, $b = -0.49$, $p = .656$, 95% CI [−2.60, 1.72].

Next, the covariation of between-strategy variability and environmental variability in predicting affect was assessed. Between-strategy variability was measured as the standard deviation of event-contingent ER strategies used each day (Blanke et al., 2020). Environmental variability was indexed as the change in event type (from t-1 to t), where dummy codes indicated 0 = no change and 1 = change in event type. An MLM was conducted with between-strategy variability regressed onto the change in event type (from t-1 to t). The change in event type was person-mean centered at Level 1 and

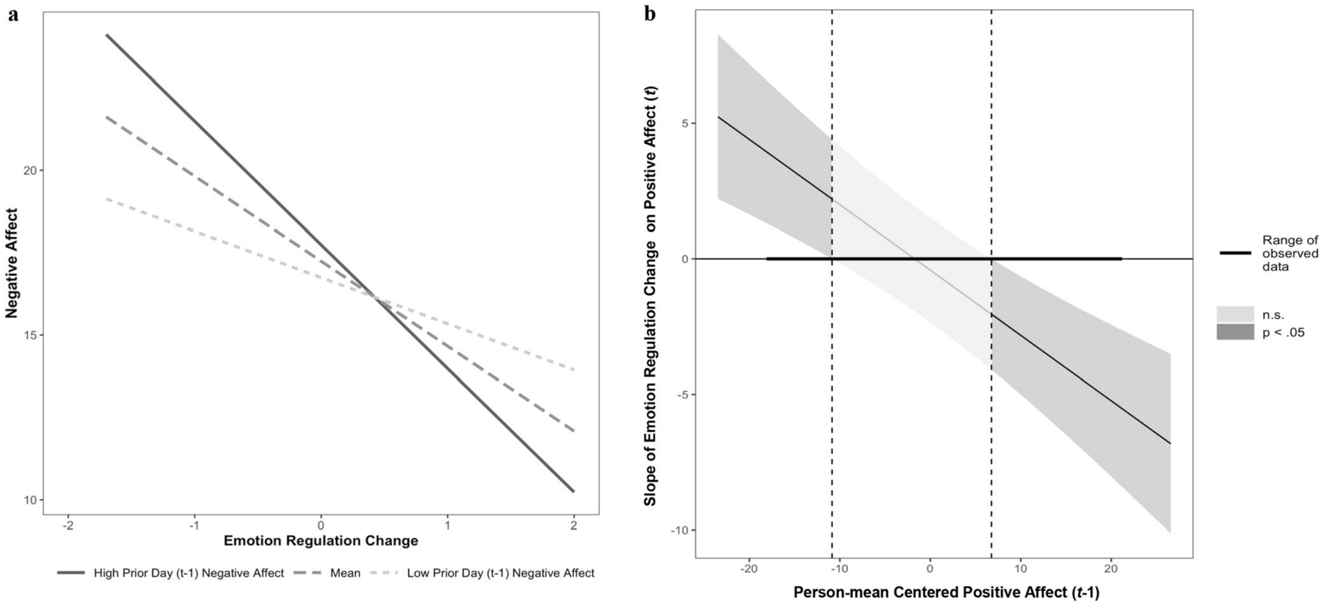

Fig. 2 Affect the day prior (t-1) moderated the association of day-to-day change in ER strategy use with negative affect at t (**a**) and with positive affect at t (**b**). Affect the day prior (t-1) and change in ER strategy use was person-mean centered. For negative affect (**a**), the simple slopes analysis showed that, at higher levels of t-1 negative affect (i.e., 1 SD above the mean) or at mean levels of t-1 negative affect, greater change in ER strategy use (from t-1 to t) predicted less negative affect at time t. At lower levels of t-1 negative affect (i.e., 1 SD below the mean), the association between change in ER strategy use (from t-1 to t) with negative affect was not significant. For positive affect (**b**), the simple slopes analysis was not significant; therefore, the Johnson-Neyman test for the regions of significance is presented to clarify the interaction. Results showed that when t-1 positive affect was below −10.86, greater change in ER strategy use (from t-1 to t) predicted higher positive affect at time t. In contrast, when t-1 positive affect was above 6.76, greater change in ER strategy use (from t-1 to t) predicted less positive affect at time t

grand-mean centered at Level 2 to control for between-person effects (this model was near singular; however, conducting fixed slope instead of random slope models showed the same results; see Supplemental Materials for more details). The residuals from this model were extracted and used in MLMs to predict negative and positive affect, respectively. The residuals were person-mean centered at Level 1 and grand-mean centered at Level 2. In contrast to our prediction, results indicated that the covariation of between-strategy ER variability and environmental variability (change in event type from t-1 to t) did not significantly predict negative affect, $b = -4.00$, $p = .066$, 95% CI [−7.90, 0.05], or positive affect, $b = -0.58$, $p = .824$, 95% CI [−5.69, 4.89].

As an exploratory analysis, we further indexed environmental variability as the difference in event stressfulness (from t-1 to t). We conducted an MLM with between-strategy variability regressed onto the difference in event stressfulness (from t-1 to t). The difference in event stressfulness was person-mean centered at Level 1 and grand-mean centered at Level 2 to control for between-person effects (this model was near singular; however, conducting fixed slope instead of random slope models showed the same results; see Supplemental Materials for more details). The residuals from this model were used as predictors for MLMs predicting negative and positive affect. The residuals were person-mean centered at Level 1 and grand-mean centered at Level 2. Although participants (n = 334) were included in the between-strategy variability analyses, only participants with complete data for the lagged predictors could be analyzed (n = 158, which is sufficient for unbiased estimates using MLM; Maas & Hox, 2005). Findings indicated that greater covariation of between-strategy ER variability and environmental variability (indexed as the difference in event stressfulness) significantly predicted less negative affect, $b = -4.63$, $p = .035$, 95% CI [−8.69, −0.33]; however, this did not significantly predict positive affect, $b = 0.07$, $p = .978$, 95% CI [−5.42, 5.14].

Follow-up Analyses That Were Not Pre-Registered

To account for multiple comparisons, we conducted our main analyses using the Benjamini-Hochberg approach to account for the false discovery rate (Benjamini & Hochberg, 1995). Using the Benjamini-Hochberg approach, all significant effects remained significant except for two findings. First, for Objective 1, the controllability of the negative event no longer significantly moderated the association of cognitive reappraisal with positive affect, $p = .120$. Second, for Objective 4, the covariation of between-strategy ER variability and environmental variability (defined as the difference in event stressfulness) no longer significantly predicted negative affect, $p = .105$.

Additionally, we assessed whether demographic characteristics were associated with the number of daily diaries completed. The majority of demographic characteristics were not related to the number of daily diaries completed, such as sex, $t(382) = -0.11$, $p = .909$, gender, $F(2, 381) = 0.07$, $p = .935$, ethnic origin, $F(3, 379) = 0.76$, $p = .518$, or level of education, $F(8, 374) = 1.25$, $p = .269$. However, age was significantly positively associated with the number of diaries completed, whereby older participants completed more diaries, $r(376) = 0.23$, $p < .001$. Although we did not pre-register that demographic covariates would be included in our models, we conducted all of our main analyses including age as a covariate in each model. When this was done, all significant effects remained except for the covariation of between-strategy ER variability and environmental variability (indexed as the difference in event stressfulness) predicting negative affect, which was no longer significant, $b = 3.70$, $p = .077$, 95% CI [−7.72, 0.39].

Moreover, we conducted three exploratory analyses. First, we examined whether components of ER flexibility related to each other. Given the nature of our study variables and analyses, only types of repertoire could be meaningfully compared. We obtained the averages of within-strategy variability, between-strategy variability, and categorical variability for each participant across the 14 days and we examined the correlations among them. Within-strategy variability was positively correlated with between-strategy variability, $r(377) = 0.31$, $p < .001$, 95% CI [0.22, 0.40], and categorical variability, $r(377) = 0.24$, $p < .001$, 95% CI [0.15, 0.34]. Similarly, between-strategy variability was positively correlated with categorical variability, $r(382) = 0.30$, $p < .001$, 95% CI [0.21, 0.39]. Second, we attempted to examine the relative contribution of all ER flexibility components on affect; however, the models contained multicollinearity, did not converge, or could not contain random effects. Finally, we investigated whether ER flexibility predicts affect above and beyond the effects of ER use. To answer this question, we conducted all of our analyses controlling for ER strategy use (i.e., rumination, distraction, cognitive reappraisal, suppression, problem-solving) in each model. All significant effects remained the same, except one. For Objective 4, the covariation of within-strategy ER variability and environmental variability (indexed as the number of distinct event types across the 14 days) predicted greater negative affect in our original analyses, but when controlling for all of the ER strategies, this was no longer significant, $b = 1.31$, $p = .127$, 95% CI [−0.38, 3.00]. Overall, the results suggest that even when controlling for ER use, ER flexibility generally predicts adaptive consequences (i.e., lower negative affect, higher positive affect) above and beyond ER use. However, for Objective 4, the covariation between the ability to commence and halt a regulation process with the number distinct event types across the 14 days did not predict maladaptive consequences (i.e., higher negative affect) when controlling for ER use.

Discussion

The emerging field of ER flexibility is rooted in two central theories (Aldao et al., 2015; Bonanno & Burton, 2013). The present study concurrently tested these theories by assessing the association between ER flexibility and affect using an intensive longitudinal design (i.e., daily diaries). ER flexibility, as defined by greater context sensitivity in the selection of ER strategies, greater ER strategy repertoire, enhanced responsivity to affective feedback, and ER-environmental covariation, were all associated with adaptive affective outcomes, often even after controlling for traditional markers of ER strategy use.

Our hypotheses regarding the association between context sensitivity and affect (Objective 1) were partially supported: distraction was more adaptive (i.e., associated with lower negative affect) when events were less controllable, whereas cognitive reappraisal was less adaptive (i.e., associated with lower positive affect) when events were more controllable. These findings are consistent with theoretical models positing that it is most effective to use emotion-focused coping strategies (e.g., cognitive reappraisal, distraction) in less controllable situations (Lazarus, 1993). Our findings are also consistent with empirical evidence that cognitive reappraisal predicts maladaptive outcomes (e.g., lower well-being and higher depression symptoms) in controllable contexts (Haines et al., 2016; Troy et al., 2016). However, this effect was no longer significant after statistical adjustment (i.e., the false discovery rate); thus, it should be interpreted with caution. Surprisingly, ER strategies other than cognitive reappraisal have not been studied within context sensitivity; thus, the finding that distraction is adaptive in particular (i.e., less controllable) contexts expands this growing body of literature. Interestingly, we did not find evidence that event controllability moderated the association of problem-solving, rumination, or suppression with affect; future research might examine whether other aspects of context moderate these associations.

We did, however, find evidence of affective benefits to implementing a larger number of ER strategies (i.e., greater categorical variability and temporal between-strategy variability). Findings are consistent with our hypotheses regarding repertoire (Objective 2) and with past research investigating temporal between-strategy variability (Blanke et al., 2020). In contrast, temporal within-strategy variability did not significantly predict affect. One possibility for this unexpected finding is that repertoire may be adaptive when using multiple strategies, rather than individual strategies. Thus, findings extend the ER flexibility literature by highlighting the importance of utilizing a breadth of strategies.

Consistent with our predictions for Objective 3, our findings support the adaptiveness of flexibly adjusting ER strategy use in relation to internal feedback (i.e., affect levels). This finding is congruent with experimental and cross-sectional research indicating that higher feedback ability is adaptive (i.e., predicts greater life satisfaction) and lower feedback ability is maladaptive (i.e., predicts elevated internalizing symptoms; Birk & Bonanno, 2016; Chen & Bonanno, 2021). Notably, our findings extend cross-sectional investigations of trait-level feedback to the naturalistic examination of feedback at state level (day-to-day).

Results for Objective 4 were more nuanced than expected. Findings showed that the covariation of within-strategy variability and environmental variability predicted higher negative affect. Additionally, between-strategy variability was associated with lower negative affect when environmental variability was indexed based on the difference in event stressfulness, but not when it was based on the change in event type. These results suggest that the ability to commence and halt a regulation process (within-strategy variability) may have maladaptive consequences (i.e., greater negative affect) compared to seeking the most effective strategy (between-strategy variability; Aldao et al., 2015), which appears to be more adaptive. In addition, these findings suggest that between-strategy variability may only have adaptive outcomes when covaried with particular environmental changes, such as daily changes in event stressfulness (although this finding should be interpreted with caution, as it was no longer significant after accounting for statistical adjustments). Considering that this was the first study to examine ER-environmental covariation in predicting affect, future research might explore additional methods for indexing environmental variability (Aldao et al., 2015).

This study has both strengths and limitations. First, we expanded the scope of research examining the impact of ER flexibility on both positive and negative affect. However, our measure of affect assessed high-arousal emotions (Russell & Barrett, 1999), making it unclear whether our findings generalize to low-arousal emotions. Second, our findings should be interpreted in light of our daily diary design and measures. Specifically, for research Objective 1 (context sensitivity), we assessed ER in response to the event and overall affect over the entire day (Kuppens et al., 2010; Park et al., 2004). Whereas affective recovery from events may linger for extended periods of time (Leger et al., 2018), the mismatch of ER and affect timescales in the present study means that this association is not temporally linked. Thus, it is possible that factors other than events or ER in response to those events may have influenced daily affect in this study, and further research is needed to disentangle this association. For research Objective 2 (repertoire), within-strategy variability could only be assessed as a predictor of average affect across 14 days, whereas categorical and between-strategy variability could be assessed as predictors of daily affect; thus, components of research Objective 2 should be interpreted based on the timescales of those variables. For instance, given that affective benefits were observed for between-strategy and categorical variability, but not within-strategy variability, repertoire may be associated with daily affect rather than overall affect across an intermediate term (i.e., 2-week period). Future research should investigate the daily adaptiveness of within-strategy variability and the intermediate-term adaptiveness of categorical and between-strategy variability to further elucidate the daily and intermediate-term adaptiveness of repertoire. For research Objective 3 (feedback), we tested feedback daily, which may represent a process whereby the private assessment of affect and modification of ER strategy use to modulate affect happens day-to-day rather than immediately in the moment. Future research is needed to better understand if moment-to-moment or day-to-day feedback represents the same construct or has differential outcomes. Finally, for research Objective 4 (ER-environmental covariation), findings of within- versus between-strategy variability should be interpreted based on the timescale of the variables whereby the covariation of within-strategy and environmental variability was assessed as predictors of average affect across the 14 days and the covariation of between-strategy and environmental variability was assessed as daily predictors of affect. Considering that the covariation of between-strategy and environmental variability, and the covariation of within-strategy variability and environmental variability predicted different levels of negative affect, our findings suggest that ER-environmental covariation may be differentially associated with affect day-to-day versus overall affect across a 2-week period. Additional research is needed to better understand the role of timescale when assessing affective benefits of ER-environmental covariation. In addition, participants reported their ER in response to the event and reported their affect over the entire day, sharing the same limitations as research Objective 1. The current study used daily diary methodology to assess ER flexibility because ER and affect arise in daily life and we assessed ER and affect across time and contexts to appropriately assess ER flexibility; however, future research might consider ecological momentary assessment designs to examine the close succession of ER flexibility and affect. Additionally, the field currently lacks research on the validity of single-item measures used in intensive longitudinal designs. The current study derived state-level items (e.g., cognitive reappraisal) from theoretical models (Gross, 2001; Gross & John, 2003), past research (Brockman et al., 2017; Kashdan & Steger, 2006), and validated trait-level measures (e.g., ERQ; Gross & John, 2003). Although the trait-level and state-level measures we assessed in the study were positively associated, future research is required to specifically investigate the validity of the state-level measures used in daily diary research.

Third, whereas this present study investigated the association between ER flexibility and short-term affective outcomes, future research is needed to compare and contrast the short-term (e.g., day-to-day affect) and long-term (e.g., well-being) outcomes associated with ER flexibility. Furthermore, these research objectives should be examined in different samples to extend the generalizability of our findings. Finally, this study took place during the context of the COVID-19 pandemic. This unique context may have impacted our study findings whereby the uncertainty of the pandemic may have enhanced daily stress, which could hinder daily coping or necessitate greater coping efforts (Wen et al., 2021; Zheng et al., 2021). Thus, the assessment of ER flexibility during this time may specifically reflect the adaptiveness of ER flexibility in contexts of uncertainty (Durodié, 2020). Future research is needed to investigate ER flexibility in the post-pandemic context.

Using intensive longitudinal methods, we documented the importance of multiple components of ER flexibility on affect. Moreover, types of repertoire were correlated with one another, suggesting a connection among aspects of ER flexibility that could inform theoretical models and/or applied work. Findings suggest that researchers and clinicians would benefit from incorporating ER flexibility in their assessment and intervention of ER.

Additional Information

Funding No funding was received for conducting this study.

Data availability This study was pre-registered on the Open Science Framework (OSF): osf.io/c38ga and osf.io/jemz6. The study materials, data, and/or other study related information can be requested via email to the first author (ashley.battaglini@psych.ubc.ca). Upon acceptance of this manuscript the study materials, data, and/ or other study related information may be publicly available on OSF.

Ethics approval This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by The University of British Columbia's (UBC) Behavioural Research Ethics Board (BREB; #H20-00888).

Conflicts of interest The authors declare no competing interests.

Consent to participate Informed consent was obtained from all individual participants included in the study.

Consent to publish Participants signed informed consent regarding publishing their data.

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s42761-022-00132-7.

Author Contribution Ashley M. Battaglini, Katerina Rnic, Taylyn Jameson, Ellen Jopling, and Joelle LeMoult contributed to the study design. Data collection was spearheaded by Taylyn Jameson. Ashley M. Battaglini performed the statistical analyses with the consultation from Arianne Y. Albert and under the supervision of Joelle LeMoult. Ashley M. Battaglini wrote the manuscript with important contributions from Katerina Rnic and revisions from all the authors. All the authors gave approval for the final version of the manuscript for submission.

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