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BRIEF REPORT

One versus many: Capturing the use of multiple emotion regulation strategies in response to an emotion-eliciting stimulus

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The past decade and a half has witnessed a renewed interest in the study of affective processes. James Gross’ process model of emotion regulation has provided a theoretical framework for this approach. This model stipulates that individuals have a repertoire of emotion regulation strategies they use in order to modify their affect and/or the situations eliciting such affect. However, empirical investigations of the use of emotion regulation strategies have largely oversimplified this model by assuming that individuals use only one regulation strategy to manage the affect elicited by a given emotion-eliciting stimulus or situation. This is problematic because it has resulted in a limited understanding of the complex process by which individuals select and implement regulation strategies. In this brief report, we present findings suggesting that people spontaneously use multiple emotion regulation strategies in response to a brief disgust-eliciting film clip. We discuss implications for future empirical work on emotion regulation strategies.

Keywords: Emotion regulation; Strategies; Spontaneous implementation.

BACKGROUND

Over the past 15 years, the empirical study of affective processes has become the focus of considerable attention in psychology. This is best illustrated by the growing interest in the construct of emotion regulation, conceptualised as a person’s ability to influence the quality, intensity, timing, and dynamic features of his/her emotions (Thompson, 1994). The predominant framework is Gross’ process model of emotion regulation (Gross, 1998a, 1998b). According to this model, individuals have a repertoire of emotion regulation strategies that they use to modify their affect and/or the situations eliciting that affect. Gross (1998a, 1998b) has differentiated between two types of strategies based on the point in time in which they are enacted relative to...
the onset of the emotion to be regulated. The antecedent-focused strategies are implemented before the emotion has been fully enacted; they include situation selection, situation modification, attentional deployment, and cognitive change (e.g., reappraisal). The response-focused strategies are deployed after the emotion has taken full form and, as such, involve response modulation of ongoing affective processes; the quintessential example is expressive suppression. Presumably because antecedent-focused strategies influence affect before it has taken full form, they tend to be more effective in regulating such affect than the response-focused strategies (e.g., Butler et al., 2003; Goldin, McRae, Ramel, & Gross, 2007).

Despite the assumption in Gross’ model that people may use multiple emotion regulation strategies over the course of dealing with a situation, empirical investigations have rarely examined this implication (see Aldao, in press, for a review). This is problematic because it has resulted in an inadequate appreciation of the complex process by which individuals select and implement regulation strategies from their repertoire. Specifically, most current paradigms have consisted of presenting participants with emotion-eliciting stimuli (e.g., pictures, film clips) and instructing them to implement a given strategy to regulate their affect. A central assumption of these paradigms has been that participants will use one strategy for the entire duration of the stimulus (usually 2–5 minutes for picture blocks and film clips). Manipulation checks have usually entailed asking participants to rate the extent to which they used that and other strategies. A higher rating for the instructed strategy has been taken as evidence that participants followed the instructions. However, little attention has been devoted to the ratings that participants give to other strategies. This has resulted in a limited understanding of the spontaneous use of additional, non-instructed strategies in the repertoire (cf. Egloff, Schmukle, Burns, & Schwerdtfeger, 2006; Ehring, Tuschen-Caffier, Schnulle, Fischer, & Gross, 2010).

In contrast, a couple of recent investigations have examined the use of multiple emotion regulation strategies in response to a given stimulus. Demaree and colleagues (Demaree, Robinson, Pu, & Allen, 2006) asked participants to watch an emotion-eliciting film clip and instructed them to either exaggerate or suppress their facial expressions. At the end of the film clip, the investigators asked participants to identify all the strategies they had used to modulate their facial expression and to estimate how much time they had spent on each strategy. The authors found that participants asked to suppress not only used “muscular” strategies, but also engaged in cognitive change. In another study, Wolgast, Lundh, and Viborg (2011) presented participants with emotion-eliciting film clips and assigned them to one of three conditions: acceptance, reappraisal, or a watch only condition. The researchers found that participants instructed to reappraise showed positive associations between avoidance and negative affect. They interpreted such findings as suggesting that participants who were less successful at downregulating their negative affect by using reappraisal might have resorted to avoidance. In other words, these participants might have switched strategies during the course of one film clip. It would appear, then, that the process of implementing emotion regulation strategies might be characterised by more testing and trying of strategies than is currently represented in the empirical literature.

In this brief report, we present findings from a recent investigation in which we sought to examine the extent to which individuals engage in spontaneous regulation and whether this type of regulation takes the form of one versus multiple emotion regulation strategies. Specifically, we presented participants with a brief film clip intended to elicit disgust and at the end of the film clip we retrospectively assessed their spontaneous attempts at regulation.

**METHOD**

**Participants**

**Recruitment.** This study was part of a larger investigation that consisted of the administration
of an online survey (Qualtrics) to assess the spontaneous use of emotion regulation strategies in community participants (see Aldao & Nolen-Hoeksema, 2012). As part of that survey, participants were instructed to watch an emotion-eliciting film clip and to rate their affect and their attempts at regulating such affect. This portion of the survey will be the focus of this brief report.

Participants were recruited using Amazon’s Mechanical Turk (mTurk.com), an internet-based platform that allows one to request jobs, such as survey completions, from participants seeking monetary compensation. MTurk.com facilitates high quality data collection from a large pool of diverse participants by allowing job requesters to reject participants’ work if they do not follow instructions. Participants have been shown to be highly motivated to complete the tasks, even when they were offered only a few cents for several minutes of work (e.g., Buhrmester, Kwang, and Gosling, 2011) and a recent study has shown that mTurk participants performed similarly to participants recruited offline in tasks examining heuristics and biases (e.g., Paolacci, Chandler, & Ipeirotis, 2010). For the purposes of this investigation, we limited the sample to individuals over the age of 18 located in the United States. We carefully examined the data and excluded eight participants who had made mistakes and/or reported not having understood the instructions. The study was approved by our Human Subjects Committee; participants were required to provide electronic consent, were fully debriefed, and received $7 for their participation.

**Demographics.** Participants were 111 adults between the ages of 18 and 68 (M<sub>age</sub> = 36.10 years, SD = 13.29); 71% were female. They were allowed to identify more than one ethnic group. A majority of the sample identified as Caucasian (n = 86), and the rest identified as Asian American (n = 13), African American (n = 9), Hispanic/Latino (n = 4), Native American (n = 4) or other (n = 2).

**Materials**

**Film clip.** The film clip depicted an amputation scene without sound that lasted 62 seconds (Rottenberg, Ray, & Gross, 2007). In order to obtain on-line ratings of affect, we broke down the film clip into four segments of equal length (20.5 seconds each). We spliced the film clip with QuickTime Player (version 7.0) and then uploaded each segment to a private YouTube account so that they could be embedded into the Qualtrics survey via HTML code. We modified the HTML code to prevent participants from fast-forwarding the segments.

**Affective ratings.** Before the first segment and after each of the four segments, participants were asked to provide affective ratings using a slider ranging from 1–10. They were required to rate five different emotions: disgust (target), anxiety, anger, sadness, and happiness (non-target).

**Emotion regulation strategies ratings.** At the end of the last segment, participants were asked to rate the extent to which they used a series of emotion regulation strategies to manage their affect in response to the entire film clip. Specifically, they were asked to provide ratings on: acceptance (“allow or accept your feelings”); self-criticism (“criticise yourself for your feelings”); distraction (“do something to take your mind off things”); problem solving (“come up with ideas to change the situation or fix the problem”); cognitive reappraisal (“think of the situation differently in order to change how you felt”); and suppression (“push down your feelings or put them out of your mind”). Participants provided ratings on a 4-point scale ranging from “Not at all” to “A lot”.

**Number of strategies used.** We dichotomised the strategy ratings such that, if participants endorsed using a strategy “A little”, “Somewhat”, or “A lot”, we considered that the strategy had been used. Conversely, if participants had endorsed “Not at all”, we assumed that the strategy was not implemented at all. We chose this scheme for dichotomisation because it acknowledged any use of a strategy as some use, and our main goal was to
determine if participants used one strategy or multiple strategies in response to the film. We summed this dichotomous variable for all six strategies to create a continuous score reflecting the number of strategies participants used during the film clip. This score could range from 0 to 6. We recoded the variable to reflect three categories of interest: (1) participants who did not use any strategy; (2) participants who implemented only one strategy; and (3) participants who used more than one strategy.

Extent of implementation. We also calculated a score to reflect the average extent to which participants reported implementing the strategies that they used. This score is independent from the number of strategies used; two participants could have a same average extent of use yet have used different number of strategies. We calculated this average use score by summing the extent to which participants reported using each strategy and dividing this number by the number of strategies they used.

RESULTS

Manipulation check

We verified that the film clip produced the intended target emotion of disgust to a greater extent than other emotions. We ran a repeated measures multivariate analysis of variance (MANOVA) predicting change from before the first segment to the end of the last segment for each of the five emotions. Results revealed significant main effects of Emotion, $F(1, 108) = 136.35, p < .001, \eta^2_p = .56$, and Time, $F(1, 108) = 75.85, p < .001, \eta^2_p = .41$, that were qualified by their interaction, $F(1, 108) = 325.59, p < .001, \eta^2_p = .75$. We broke down this interaction by examining the change from baseline to end of last segment for each emotion using a Bonferroni correction. All changes were statistically significant ($p$’s < .05), with increases in negative emotions and decreases in positive emotion. In line with predictions, the largest change was an increase in the reported levels of disgust ($M_{\text{difference}} = 6.50, p < .001$). It was followed by a decrease in happiness ($M_{\text{difference}} = -3.92, p < .001$) and an increase in anxiety ($M_{\text{difference}} = 3.19, p < .001$), anger ($M_{\text{difference}} = 1.95, p < .001$), and sadness ($M_{\text{difference}} = 0.76, p < .05$).

Number of strategies implemented during the film clip

The majority of participants (87%) reported engaging in an active regulatory effort (i.e., using one or more strategies). Of these participants, approximately one third (35%) reported using one strategy and the remaining two thirds (65%) endorsed using multiple strategies during the film clip. See Table 1 for descriptives on each strategy. It is possible that participants who did not report using any strategies might be a heterogeneous groups consisting of individuals who did not have a strong emotional reactivity and subsequently had no need to regulate, as well as those who had such an intense emotional experience that they were overwhelmed and had difficulties enacting any sort of regulatory effort. We sought to examine this issue by comparing the variability in self-reported disgust across participants who reported using no strategy, one strategy, and more than one strategy. We found that participants who did not report using any strategies did not have higher variability in their affective experiences than those in the other groups, thus suggesting that they constituted a homogeneous group.

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Mean and standard deviation</th>
<th>Percentage of participants who endorsed this strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acceptance</td>
<td>2.39 (1.17)</td>
<td>68.5</td>
</tr>
<tr>
<td>Self-criticism</td>
<td>1.14 (0.50)</td>
<td>9</td>
</tr>
<tr>
<td>Distraction</td>
<td>1.65 (1.05)</td>
<td>32.4</td>
</tr>
<tr>
<td>Problem solving</td>
<td>1.41 (0.87)</td>
<td>22.5</td>
</tr>
<tr>
<td>Reappraisal</td>
<td>1.77 (1.13)</td>
<td>36.9</td>
</tr>
<tr>
<td>Suppression</td>
<td>1.72 (1.06)</td>
<td>37.8</td>
</tr>
</tbody>
</table>
more strategies revealed a significant effect, \( t(95) = 2.26, p < .05 \), such that participants who reported using only one strategy implemented it to a greater extent (\( M = 2.29; SE = 0.14 \)) than those who endorsed using multiple strategies (\( M = 1.92; SE = 0.08 \)). That is, participants who did not switch strategies used a given strategy to a greater extent; they stuck to it. We elaborate on this notion in the discussion section.

**Predicting state affect with number of strategies implemented during the film clip**

We predicted the Target Emotion (disgust) at five points in Time (before the film clips and after each of the four segments) with the Number of Strategies used (no strategies, one strategy, multiple strategies). We found a main effect of Number of Strategies, \( F(2, 106) = 7.52, p < .01, \eta^2_p = .12 \), which we followed up with Bonferroni-adjusted post hoc comparisons. Participants reporting using multiple strategies reported higher levels of disgust than those reporting using only one (\( M_{\text{difference}} = 2.20; p < .01 \)). Participants not endorsing any strategies did not differ from those using multiple (\( M_{\text{difference}} = 1.81; ns \)) or only one strategy (\( M_{\text{difference}} = 0.39; ns \)). In addition, there was a significant interaction between Number of Strategies and Time, \( F(2, 106) = 7.56, p < .01, \eta^2_p = .13 \), revealing that the significant differences between participants endorsing using multiple versus one strategy occurred after each of the four segments, but not before the film clip (all \( ps < .05 \)).

**DISCUSSION**

Despite the assumption in Gross’ process model (1998a, 1998b) that people use multiple emotion regulation strategies as an emotion-eliciting situation unfolds, laboratory investigations have rarely been designed to capture this process (cf. Demaree et al., 2006; Wollgast et al., 2011). Specifically, current paradigms have been based on the assumption that participants use one strategy over the course of several minutes (see Aldao, in press, for a longer discussion of this issue). In this brief report, we sought to test whether people implement more than one strategy in response to the affect elicited by a short film clip. Indeed, that is what we found. Below, we discuss our findings and their implications in more detail.

Sixty-five percent of the participants engaging in a regulation effort endorsed having used two or more regulation strategies over the course of the film clip (of note, this clip is relatively shorter than most other film clips utilised in the literature; see Rottenberg et al., 2007). These findings suggest that people might have a tendency to implement various strategies when presented with an emotion-eliciting stimulus. Thus, it will be important to more systematically examine the use of additional strategies in the context of laboratory paradigms that instruct participants to use a given strategy. Specifically, it will be useful for future investigations to develop more sophisticated methods to properly test the complex process by which individuals experience an emotion, seek to regulate it by implementing a strategy, might not be satisfied with the results, and might subsequently seek to deploy a second strategy.

Our findings also suggest that in response to the film clip, most participants (87%) spontaneously engaged in some form of regulatory effort, as evidenced by their endorsing using at least one regulation strategy. This is consistent with previous investigations examining the spontaneous use of emotion regulation strategies (e.g., Egloff et al., 2006; Ehring et al., 2010). These findings indicate that under un instructed conditions, the experience of affect triggers a regulation process; in other words, it generates an urge to regulate. It will be interesting for future work to examine this urge in situations in which participants are instructed to not regulate their emotions (i.e., control conditions). How difficult is it to resist this urge? Does the attempt at resisting it increase cognitive load and potentially interfere with the very regulation process (e.g., Wegner, Erber, & Zanakos, 1993)? Does such effort deplete self-regulation (e.g., Muraven & Baumeister, 2000)? It will be important to carefully examine the process by which individuals experience, seek to resist, and actually resist urges to regulate. This, of course,
also applies to situations in which participants are instructed to use a specific strategy and they experience the urge to implement another one (perhaps one that they are more comfortable using). A related question pertains to whether there are individual differences in the experience of such urges to regulate and/or in the ease with which individuals can resist them. It will be clinically meaningful to examine the relationship between such individual variability in urges to regulate and symptoms of psychopathology. Of particular interest, the acceptance-based third wave cognitive behavioural therapies, e.g., Acceptance and Commitment Therapy (ACT; Hayes, Strosahl, & Wilson, 1999), emphasise the importance of learning to accept (rather than seeking to change) emotional states as key to psychological health. In other words, resisting the urge to actively regulate (when contextually appropriate) is considered to be adaptive.

We also found that participants endorsing using multiple strategies reported implementing them, on average, to a lesser extent than participants who reported using only one. In other words, participants implementing multiple strategies appeared to be spreading their regulatory effort across strategies. This poses an interesting question: is the “stronger” use of one strategy more advantageous than the “weaker” use of multiple strategies? The literature on regulation flexibility (e.g., Bonanno, Papa, O’Neill, Westphal, & Coifman, 2004) would suggest that using more strategies might reflect adaptive responding to the environment. However, the studies on regulation flexibility have examined participants’ ability to switch between two strategies (enhancing and suppressing facial expressions) in response to various stimuli. That is, they have not examined the use of multiple strategies in response to one stimulus. Thus, it remains plausible that using multiple strategies in response to one stimulus might be indicative of haphazard and misguided attempts at regulation. In addition, a few more questions stem from our findings on regulatory strength: is it always the case that implementing various strategies results in a diminished regulatory effort? In other words, is there some sort of a law of diminishing returns at play? Or does it depend on whether strategies are implemented sequentially or simultaneously? (presumably, implementing them sequentially could leave more regulatory effort available for the next strategy). Seeking to address these questions will be extremely important in furthering our understanding of the temporal aspect of implementing emotion regulation strategies.

Lastly, the use of multiple-regulation strategies was associated with higher levels of self-reported affect in response to the film clip. Because participants reported on their affect on-line and their use of regulation strategies after the film clip, this association does not allow us to draw any conclusions regarding causal relationships between affect and its regulation. On the one hand, it is possible that participants implementing multiple strategies did so because they were more emotionally reactive to the film clip (i.e., higher reactivity led to more regulation). On the other hand, it is plausible that participants using multiple strategies were doing so haphazardly and therefore were less effective at downregulating negative affect (i.e., poor regulation led to sustained reactivity). Disentangling the complex relationship between emotion reactivity and regulation (e.g., Lewis, Zinbarg, & Durbin, 2010) is well beyond the scope of this brief report. One way of beginning to address this question will be to assess changes over time in affect and its regulation concurrently in line with the suggestions presented in the previous paragraph.

This investigation had several limitations. First, participants provided on-line ratings of emotion and retrospective reports of use of emotion regulation strategies, which precluded the examination of the co-variation between processes over time. In addition, by asking participants to retrospectively report on their regulation efforts, we could not assess the sequence in which they sought to implement the strategies. Although this study provides evidence that participants use multiple strategies in response to a given stimulus, we have yet to investigate whether individuals can implement two strategies at the exact same time or rather
whether they do so sequentially. Relatedly, it would be important to examine the implicit use of emotion regulation strategies (see Koole & Rothermund, 2011) in tandem with explicit regulation. A second limitation pertains to whether the forced-choice format used to assess the use of emotion regulation strategies might have indicated to participants that the use of multiple strategies was expected. However, our main aim in this study was not to provide an estimate of the number of strategies used, but rather to test the assumption implicit in the design of most laboratory studies on emotion regulation that participants use one, instead of multiple, emotion regulation strategies in response to a stressor. It will be important for future research to develop instruments for assessing the number, degree, and kind of emotion regulation strategies individuals use in response to stressors. In particular, it will be critical to tailor the phrasing of the items to more accurately reflect the contextual factors surrounding a given paradigm. A third limitation of this investigation pertains to the utilisation of only one film clip that elicited high levels of disgust, which precludes generalisations to additional emotional contexts (e.g., other emotions, different levels of intensity).

Concluding remarks

A central assumption of Gross’ process model of emotion regulation is that people have a toolbox of emotion regulation strategies they use in order to modify their affect and/or the situations eliciting such affect. However, empirical investigations of the use of emotion regulation strategies have not adequately modelled the complexity of this repertoire, as they have tended to assume that individuals use only one strategy in response to a given stimulus. In this brief report, we provide preliminary evidence suggesting that individuals might, indeed, utilise multiple emotion regulation strategies to manage the affect elicited by one short stimulus. We hope that our findings will inspire the development of more sophisticated paradigms that can better capture the complexity of the process by which individuals experience emotions and seek to regulate them.

REFERENCES


