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Gaurav Suri[a], Gal Sheppes[b], Gerald Young[a], Damon Abraham[c], Kateri McRae[c] and James J. Gross[d]

[a]Department of Psychology, San Francisco State University, San Francisco, CA, USA; [b]Department of Psychology, Tel Aviv University, Tel Aviv, Israel; [c]Department of Psychology, University of Denver, Denver, CO, USA; [d]Department of Psychology, Stanford University, Stanford, CA, USA

ABSTRACT

Which emotion regulation strategy one uses in a given context can have profound affective, cognitive, and social consequences. It is therefore important to understand the determinants of emotion regulation choice. Many prior studies have examined person-specific, internal determinants of emotion regulation choice. Recently, it has become clear that external variables that are properties of the stimulus can also influence emotion regulation choice. In the present research, we consider whether reappraisal affordances, defined as the opportunities for re-interpretation of a stimulus that are inherent in that stimulus, can shape individuals' emotion regulation choices. We show that reappraisal affordances have stability across people and across time (Study 1), and are confounded with emotional intensity for a standardised set of picture stimuli (Study 2). Since emotional intensity has been shown to drive emotion regulation choice, we construct a context in which emotional intensity is separable from reappraisal affordances (Study 3) and use this context to show that reappraisal affordances powerfully influence emotion regulation choice even when emotional intensity and discrete emotions are taken into account (Study 4).

Emotions have been said to represent the "wisdom of the ages" (Lazarus, 1991, p. 820), providing time-tested solutions to adaptive problems. However, emotions are not always helpful—sometimes they can work against us. This happens when an emotion is of the wrong type, or if it occurs at the wrong time, or with an intensity that is out of place. In such situations, we may be motivated to regulate our emotions.

Many strategies are used to regulate unwanted emotion. Three commonly used strategies are distraction, cognitive reappraisal, and expressive suppression (Gross, 1998). Distraction involves a shift in attention either away from the emotional aspects of the situation or away from the situation altogether. Cognitive reappraisal (henceforth reappraisal) involves changing the situation's meaning in such a way that there is a change in the person's emotional response to that situation. Expressive suppression (henceforth suppression) involves inhibiting emotion-expressive facial behaviour.

In the past two decades, it has become clear that different forms of emotion regulation have different consequences for how a person thinks, feels, and acts, both immediately and over the longer term (Gross, 1998, 2001, 2014; Koole, 2009; Parkinson & Totterdell, 1999; Tamir, 2009, 2011; Webb, Miles, & Sheeran, 2012). For example, cognitively, compared to suppression, using reappraisal leads to a better memory of potentially relevant emotional stimuli (Richards & Gross, 2000). Affectively, compared to suppression, reappraisal leads to a decreased subjective experience of negative emotion (Gross & Thompson, 2007). Behaviourally, compared to suppression, reappraisal has shown to facilitate more positive social interaction, relationships, and increased social support (Butler et al., 2003). Similarly, compared to distraction, reappraisal may require greater expenditure of self-control resources and show a smaller decrease in impairments related to the memory encoding of the

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CONTACT Gaurav Suri ✉ suri@sfsu.edu

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emotional stimulus (Sheppes & Meiran, 2007). These differences suggest that decisions about which emotion regulation strategies to use in a particular situation can be profoundly consequential, and it is therefore important to understand the drivers of these decisions in different emotional contexts.

Emotion regulation choice

Prior research on emotion regulation choice has largely focused on internal, person-specific determinants of emotion regulation choice. These include ethnicity, sex, personality, and age. For example, in the United States, ethnic minorities are less likely to use reappraisal compared to European Americans, men are more likely to use suppression than women, and individuals who are high (versus low) on the personality traits of extraversion and openness are more likely to use reappraisal and less likely to use suppression (Gross & John, 2003). Reappraisal usage also appears to increase with age whereas suppression usage decreases (John & Gross, 2004).

More recent work on emotion regulation choice has begun to focus on external (i.e. largely stimulus driven) variables, such as the emotional intensity of a stimulus. To examine the effects of emotional intensity on emotion regulation choice, prior studies used normative ratings to create two different levels (high and low) of negative emotional intensity and examined individuals' regulatory choices for each level (Sheppes, Scheibe, Suri, & Gross, 2011). Most of these studies used emotional images (IAPS, Lang, Bradley, & Cuthbert, 1999) of varying normative intensity, and measured preferences for two commonly used forms of emotion regulation, namely distraction and reappraisal. These studies have demonstrated that people prefer reappraisal to distraction when emotion intensity is low but prefer distraction to reappraisal when emotion intensity is high (Levy-Gigi et al., 2016; Scheibe, Sheppes, & Staudinger, 2015; Sheppes et al., 2011; Sheppes et al., 2014).

Spurred by the demonstration that the emotional intensity of a stimulus—a variable that moves beyond internally focused processes—crucially influences emotion regulation choice, we sought to determine whether there were other such (partially) external variables that also affect emotion regulation choice. In this study series, we hypothesised that environmental affordances represent an important, but previously understudied, variable that can

powerfully influence individuals' choice of emotion regulation strategy. We next motivate and define environmental affordances.

Affordances and emotion regulation choice

The concept of an affordance was established in cognitive psychology to refer to all action possibilities latent in the environment (Gibson, 1977; Norman, 1999). For example, the handle on a suitcase provides an affordance for lifting it, and a car's brake pedal offers an affordance for braking. Gibson (1977) provides several other examples of affordances: forms of layout may offer affordances for shelter or concealment; fires afford affordances for warmth and burning; speech and pictures may provide affordances for certain human behaviours. Over the past several decades, psychologists have come to view affordances as a concept of broad applicability in cognitive psychology, environmental psychology, human computer interaction, and artificial intelligence.

Building on the established concept of an environmental affordance, we define a *reappraisal affordance* as the opportunities for semantic re-interpretation that are inherent in a stimulus. An image of someone undergoing an unpleasant medical procedure in a hospital offers several possibilities for reappraisal (e.g. she will soon be cured), whereas an image of dead or mutilated children offers few such possibilities. In this sense, the former might be said to have higher reappraisal affordances than the latter.

We sought to test whether a person is less likely to choose to reappraise a stimulus with lower affordances for reappraisal than a stimulus with higher affordances for reappraisal. To address this important issue, we operationalised reappraisal affordances by measuring how easy it was for a particular stimulus to be reappraised. It is important to emphasise that reappraisal difficulty may be caused by person-specific factors (e.g. age or gender) or by stimulus-specific factors (e.g. the inherent possibilities for reinterpretations that reduce negative affect). We reasoned that for reappraisal difficulty to be a valid measure of reappraisal affordances, ratings of reappraisal difficulty would have to be consistent across people and within people at different times.

We recognise that there are many ways to operationalise reappraisal affordances. One potential option is to assess the speed with which a reappraisal comes to mind upon being exposed to an emotional stimulus. However, speed of generating a reappraisal

may not be a reliable proxy for the difficulty of generating an effective reappraisal since many generic reappraisals (e.g. "it's all for the good") may come to mind quickly, but not be effective in reducing negative emotion. Another potential option is to count the number of reappraisals that are generated in response to an emotional stimulus. However, a single effective reappraisal may be much more impactful than several less effective ones. For these reasons, we operationalised affordances via participants' ratings of how easy it was to find a reappraisal that was effective in reducing negative emotion. In selecting this approach, we sought to quantify the difficulty not just of generating any reappraisal, but of generating a reappraisal that could effectively reduce negative emotion.

The present research

To examine the validity of using reappraisal difficulty as a measure of reappraisal affordances, in Study 1 we tested whether measures of reappraisal difficulty for the same stimuli were consistent across participants and whether these ratings were consistent within participants at different time points. Finding stability across participants and within participants over time, we concluded that reappraisal difficulty ratings were unlikely to be driven by internal, person-specific variables. This stability also suggested that individuals were tapping into similar semantic reinterpretation opportunities in the stimuli, suggesting that reappraisal difficulty is an acceptable measure of affordances.

Secondary analyses of the data from Study 1 indicated that reappraisal affordances were inversely correlated with stimulus intensity in our data sample consisting of affective images. In Study 2, we confirmed that images with high negative intensity were generally rated to have low reappraisal affordances and images with low negative intensity were generally rated to have high reappraisal affordances. Since the purpose of the present work was to analyze the effect of reappraisal affordances (not intensity) on emotion regulation choice, we sought to find a context in which intensity ratings were separable from affordance ratings. *Previously researched high-intensity stimuli often had low affordances and previously researched low-intensity stimuli often had high affordances. In Study 3, we used vignettes to create stimuli in which the intensity of a particular stimulus did not predict its affordance level. Thus, we created low—and high-intensity vignettes that could have either low or high affordances.* Finally, in Study 4 we used these vignettes to test whether emotion regulatory preferences in this context were influenced by reappraisal affordances.

Study 1: reappraisal difficulty ratings are consistent within and between participants

We sought to determine whether ratings of reappraisal difficulty for the same stimuli were consistent across participants and whether these ratings were consistent within participants at different time points. Such consistency would provide evidence that reappraisal difficulty is an acceptable operationalisation of reappraisal affordance.

Method

We used IAPS images (Lang et al., 1999) eliciting varying levels of negative affect and identical to those used in prior work to demonstrate intensity-based preferences in emotion regulation choice (Sheppes et al., 2011; Sheppes et al., 2014). There were 15 high-intensity images and 15 low-intensity images (see the Supplemental Material available online for a complete list of these stimuli). These images included scenes of injury, accidents, assaults, and grief (e.g. funerals). We recruited 120 US based Internet master-workers (aged 23–55 years, mean 34 years; 64 males) (Buhrmester, Kwang, & Gosling, 2011), who had distinguished themselves with high-quality responses in prior studies to view and rate these images. They were administered Task 1, described below, and Task 2 one week later.

In Task 1, participants were shown examples of what it means to reappraise—i.e. think about pictures in different ways to lessen their negative impact. They were then shown the 30 IAPS images sequentially in pseudo-random order and were asked to rate how easy it was to think of the picture in a different way to decrease any negative emotion (1 = very easy, 9 = very difficult). The purpose of Task 1 was to determine the similarity in ratings of difficulty across participants.

In Task 2, the same 120 participants were contacted 1 week later, and given the same stimuli to rate again. One additional question was asked (for each picture), namely whether reappraisal difficulty ratings in the second rating were provided via a fresh consideration of the image or from a memory of ratings in the first session. Responses were received from 102 participants. The purpose of administering Task 2 was to determine response stability across the one-week interval.

Results and discussion

The two-way random Intraclass Correlation Coefficient (ICC) measuring the reliability of each rater for each image (we assumed a random sample of raters measuring a random sample of images—ICC(2)) for Task 1 was 0.76 (95% CI [0.67–0.85]), indicating a high degree of agreement across participants.

The within-participant ratings were also stable over time. The average correlation for within participant ratings between Task 1 and Task 2 (administered 1 week later) was 0.68 (95% CI [0.64–0.71]).

The stability of reappraisal difficulty ratings between participants and within-participants (over time) suggests that reappraisal difficulty ratings are a viable measure of reappraisal affordances.

Secondary analyses of data in Study 1 suggested that images with lower normative negative intensity scores generally had lower reappraisal difficulty ratings (i.e. higher reappraisal affordances), whereas images with higher normative negative intensity scores generally had higher reappraisal difficulty ratings (i.e. lower reappraisal affordances). In particular, low intensity images had a mean reappraisal difficulty rating of 3.52 (95% CI[3.23, 3.82]) compared to the high intensity images that had a mean reappraisal difficulty rating of 6.06 (95% CI[5.79, 6.33]), $t(124) = 44.23$, $p < .001$, $d = 1.60$. In Study 2, we sought to formally examine the association between intensity and reappraisal difficulty, for if intensity and reappraisal affordances were confounded for a set of stimuli, it would be difficult to distinguish the separate effects of reappraisal affordances and emotional intensity on emotion regulation choice.

Study 2: reappraisal affordance and emotional intensity often travel together

We sought to determine whether high-intensity stimuli used in Study 1 and in prior empirical work (Study 2 of Sheppes et al., 2011) to study emotion regulation choice offer lower reappraisal affordances than low-intensity stimuli.

Method

We used the IAPS image set described in Study 1. We recruited 30 US based Internet master-workers (aged 27–44 years, mean 33 years; 18 males) (Buhrmester et al., 2011), who had distinguished themselves with high quality responses in prior studies, to view and rate these images. The sample size was determined based on prior studies (Sheppes et al., 2011).

Participants were instructed on what it means to think about pictures in different ways to lessen their negative impact (i.e. reappraise). They were then shown the 30 IAPS images sequentially in pseudo-random order and were asked to provide (1) their first impression of the picture (initial appraisal) as a free response, (2) the intensity of their initial emotional response (on a 1–9 scale, 1 = not intense, 9 = very intense), and (3) how easy it was to think of the picture in a different way to decrease any negative emotion that might have felt (1 = very easy, 9 = very difficult). We also asked (4) how effective the new way of thinking was in reducing any negative emotion they were experiencing (1 = very effective, 9 = very ineffective).

Results and discussion

In a manipulation check, all participants provided initial appraisals that two raters separately judged to be reasonable interpretations of each of 30 images. Confirming the intensity grouping for images used in previous studies, the 15-image high-intensity group had an average intensity rating of 6.62 (95% CI [6.19–7.05]) and the 15-image low-intensity group had an average intensity rating of 3.81 (95% CI [3.55–4.07]). The difference between intensity groups is significant $t(28) = 10.88$, $p < .001$, $d = 4.0$).

Participants found high intensity images more difficult to reinterpret (high scores = low affordance) than low-intensity images: the 15-image high-intensity images had an reappraisal difficulty rating of 6.35 (95% CI [5.75–6.95]) and the 15-image low-intensity images had an reappraisal difficulty rating of 3.36 (95% CI [3.14–3.58]). The difference is significant ($t(28) = 9.10$, $p < .001$, $d = 3.33$).

Finally, participants found their reappraisals to be less effective for high-intensity images relative to low-intensity images: the 15-image high-intensity images had an average reappraisal effectiveness rating of 6.13 (95% CI [5.56–6.70]) and the 15-image low-intensity images had an average effectiveness reappraisal rating of 3.43 (95% CI [3.23–3.63]). The difference is significant ($t(28) = 8.63$, $p < .001$, $d = 3.16$).

Collectively, these results demonstrated that affordance ratings and intensity ratings for stimuli used in prior empirical work covaried. Thus, stimulus sets used in several prior emotion regulation choice studies (Mehta, Young, Wicker, Barber, & Suri, 2017; Sheppes

et al., 2011) were not appropriate for testing the effect of reappraisal affordances on emotion regulation choice.

Study 3: reappraisal affordance and emotional intensity are separable

We sought to create an emotional context in which participants' ratings of emotional intensity and reappraisal affordance were separable. As discussed in Study 2, many high-intensity stimuli used in prior work have low reappraisal affordances and many low-intensity stimuli have high reappraisal affordances. In Study 3, we sought to create instances of high-intensity stimuli which had low reappraisal affordances, and low-intensity stimuli which had high reappraisal affordances (as well as high-intensity high-affordance and low-intensity low-affordance stimuli).

To create such stimuli, we took advantage of the observation that inter-personal and complex contexts often offer multiple points of entry for reappraisal—and therefore tend to have high levels of reappraisal affordances. On the other hand, sensory and simple appraisals often offer fewer opportunities for reappraisal—and therefore tend to have low levels of reappraisal affordances (Lazarus, 1991). Since it is difficult to induce complex interpersonal contexts with via IAPS images (Mikels et al., 2005), we chose to test our hypothesis using vignettes that described an emotion-eliciting situation.

Method

We created two pairs of vignettes designed to create sensory/simple contexts with reduced opportunities for agentic control (Predicted Low Affordance - PLA), and two pairs of vignettes designed to create interpersonal/complex contexts with several opportunities for agentic control (Predicted High Affordance - PHA). Each pair had a vignette designed to elicit high-intensity emotion (HI) and another to elicit low-intensity emotion (LI). Since most adults are familiar with work-place situations, we chose the work-place as a backdrop for the vignettes and instructed participants to imagine themselves in each depicted situation. The first item of each pair was designated with the numeral "1", and the second item of each pair was designated with the numeral "2".

The first set of predicted low-affordance vignettes described a faulty sewage pipe that either broke and poured sewage directly on a co-worker (PLA-HI-1) or

leaked on the conference room table (PLA-LI-1) (see the Online Supplemental Material for the full text used in each vignette). The second set of PLA vignettes involved taking a sip out of a glass used as an ashtray (PLA-HI-2) or almost taking the sip, but stopping just in time (PLA-LI-2). The first set of predicted high-affordance vignettes involved a co-worker falsely claiming credit for your work (PHA-HI-1) or making you look bad due to his carelessness (PHA-LI-1). The second set of PHA vignettes involved a referee making a call against you at a company tournament deliberately (PHA-HI-2) or doing so unintentionally (PHA-LI-2).

To increase generalizability of findings, we recruited 125 professionals from a company located in the San Francisco Bay Area (aged 22–47, mean 32 years; 69 males) and randomly assigned each participant to one of two different groups. Group 1 received the vignettes PLA-HI-1, PLA-LI-2, PHA-LI-1, PHA-HI-2 and Group 2 received the remaining vignettes PLA-LI-1, PLA-HI-2, PHA-HI-1, PHA-LI-2 (where PHA = Predicted High Affordance; PLA = Predicted Low Affordance; HI = High Intensity; LI = Low Intensity). This grouping was instituted to reduce the probability that any observed effects were attributable to a particular set of vignettes. For each vignette, participants were asked to vividly imagine themselves in the situation described in the vignette and provide (using 1–9 rating scales; 1 = very low/easy, 9 = very high/difficult) (1) the intensity of negative emotion they experienced and (2) how difficult it was to think of the vignette in a different way to decrease any negative emotion (reappraisal affordance).

Results and discussion

We sought to test whether (1) Predicted high affordance vignettes (PHA-HI-1, PHA-LI-1, PHA-HI-2, PHA-LI-2) elicited a higher level of affordances than each of the predicted low affordance vignettes (PLA-HI-1, PLA-LI-1, PLA-HI-2, PLA-LI-2) (2) the (predicted) high-intensity vignettes (PLA-HI-1, PLA-HI-2, PHA-HI-1, PHA-HI-2) elicited greater intensity than each of the (predicted) low-intensity vignettes (PLA-LI-1, PLA-LI-2, PHA-LI-1, PHA-LI-2). If both of these expectations proved correct, then affordances would be separable from intensity here since we would have demonstrated vignettes with high affordance and low intensity, and low affordance and high intensity.

As shown in Table 1 below, both expectations were indeed met. Each predicted high affordance vignette

elicited a higher affordance rating than the predicted low affordance vignettes (the 95% CIs did not intersect for any high-low affordance combination). Further, each predicted high-intensity vignette elicited higher intensity ratings than each predicted low-intensity vignette (the 95% CIs did not intersect for any high/low intensity combination).

Specifically, the affordance rating for the lowest-rated high affordance vignette (PHA-HI-1; mean = 4.11, SD = 2.45) and the highest rated low affordance vignette (PLA-HI-1; mean = 6.99, SD = 3.25) was statistically significant ($t(248) = 7.91$, $p < .01$). Similarly, the intensity rating for the lowest-rated high intensity vignette (PLA-HI-1; mean = 8.09, SD = 2.05) and the highest rated low intensity vignette (PHA-LI-1; mean = 7.18, SD = 2.22) was statistically significant ($t(248) = 3.37$, $p < .01$).

As expected, there was no interaction of stimulus category (2×2, predicted affordance (high, low), predicted intensity (high, low)) in intensity ratings ($F(1, 996) = 1.29$, $p = 0.25$) or affordance ratings ($F(1, 996) = 0.96$, $p = 0.33$), strengthening the conclusion that the vignettes had successfully un-yoked ratings of intensity and reappraisal affordance.

In Study 4, we investigated whether in our newly created stimulus context regulation choice was driven by emotional intensity (or other factors) or by reappraisal affordance.

Study 4: reappraisal affordance influences emotion regulation choice

We sought to measure emotion regulation choice (distraction vs. reappraisal) for the context described in Study 3. Since the emotional intensity of these vignettes was separable from their reappraisal affordances, measuring emotion regulation choice would allow us to test whether reappraisal affordances played a role in emotion regulation choice even when emotional intensity was not confounded with reappraisal affordance.

The context described in Study 3 successfully separated reappraisal affordances from stimulus intensity. However, it introduced a potential confound: All of the high affordance vignettes asked the reader to imagine that she/he felt angry (via the sentence "You feel angry," at the end of the vignette); correspondingly, all of the low affordance vignettes asked the reader to imagine that she/he felt disgusted (via the sentence "You feel disgusted," at the end of the vignette). This design feature makes it impossible to separate the

effects of reappraisal affordances from the emotion type that participants were feeling.

To address this issue, we took the following two measures: First, we replaced the sentences "You feel angry" and "You feel disgusted" in the vignettes used in Study 3, with the sentence "You feel negative emotion." Second, we asked participants to report on the type of negative emotion they felt. These measures allowed us to separately examine the effects of reappraisal affordances, emotion, and stimulus intensity on emotion regulation choice.

Method

To ensure a similar community sample to Study 3, we recruited 240 professionals from a company located in the San Francisco Bay Area (aged 22–41 years, mean 35.3 years; 147 males). After instructing them on reappraisal and distraction, we randomly divided the participants into eight equal groups. Each group received exactly one of the eight vignettes similar to those used in Study 3. As described above, the only change in the Study 4 vignettes was that the words "angry" and "disgusted" were replaced by the phrase "negative emotion" so that were not prescriptive regarding the type of emotion experienced by the participant (see the Online Supplemental Material for the sample text used in Study 4 vignettes).

After reading their assigned vignette participants were required to choose an emotion regulation strategy (distraction or reappraisal) and to implement it after vividly imagining themselves to be the person in that vignette. After making their choice decisions, participants were asked to rate the affordance, intensity for the vignette they received (on a 1 to 9 scale identical to the one described Study 3). They were also asked to choose the primary emotion they experienced upon reading the vignette by selecting one option from "anger", "disgust", "fear", "sadness" or "other". In the latter case, they were asked to write-in the emotion they experienced. The list was counterbalanced.

Results and discussion

The intensity and affordance ratings followed a very similar pattern to the ratings reported in Study 3. As in Study 3, vignettes with higher predicted affordances were consistently found to have higher affordance ratings than vignettes with lower predicted affordances; also similar to Study 3, vignettes with higher predicted intensity were consistently found to

Table 1. Affordance and intensity by Vignette (Study 3).

Vignette			Affordance		Intensity	
Predicted affordance	Predicted intensity	Scenario	Affordance (lower rating = higher aff.)	95% CI +/−	Intensity	95% CI +/−
High	High	PHA-HI-1	4.11	0.43	8.37	0.34
High	Low	PHA-LI-1	2.97	0.51	7.18	0.39
High	High	PHA-HI-2	3.99	0.38	8.11	0.29
High	Low	PHA-LI-2	3.81	0.44	6.82	0.44
Low	High	PLA-HI-1	6.99	0.57	8.09	0.36
Low	Low	PLA-LI-1	7.37	0.40	6.23	0.51
Low	High	PLA-HI-2	7.41	0.36	8.17	0.48
Low	Low	PLA-LI-2	7.16	0.43	7.09	0.42

have higher intensity ratings than vignettes with lower predicted intensity. As we expected, the predominant emotion for high affordance vignettes was anger, and the predominant emotion for low affordance vignettes was disgust; however, at the individual level affordance ratings were not yoked to emotion ratings. This enabled us to separately analyze the effects of affordances and emotion (and intensity) on emotion regulation choice. Table 2 below reports the affordance, intensity, emotion ratings, and percentage choice for Study 4. 93% of participants selected either anger or disgust as the predominant emotion they experienced.

We used a logistic regression to model emotion regulation choice (1 = reappraisal, 0 = distraction) using three independent variables: reappraisal affordance rating, emotion intensity rating, and emotion type (categorical, with 0 as disgust, 1 as anger).

As shown in Table 3, reappraisal affordance, but not emotion intensity and emotion type, was predictive of emotion regulation choice. These results supported the interpretation that emotion regulation choice in the current empirical context was driven by affordances, not intensity or emotion type.

Additionally, there were no effects of other negative emotion types (i.e. sadness and fear, although such responses occurred in ~7% of all responses).

General discussion

It is now clear that the way people go about regulating their emotions matters. What is not yet clear, however, is what factors govern how people choose to regulate their emotions in different contexts. In this work, we hypothesised that reappraisal affordances represent an important, but under-studied, class of decision determinants.

Following Gibson (1977), we defined an affordance as all action possibilities latent in the environment. In the present context, we operationalised reappraisal affordances by measuring reappraisal difficulty. We demonstrated that reappraisal affordances were consistent across people and across time (Study 1), but were sometimes confounded with emotional intensity for image stimuli (Study 2). Since emotional intensity has been shown to drive emotion regulation choice, we constructed a context in which intensity was separable from reappraisal affordances (Study 3). This showed that reappraisal affordances and emotional intensity are separable variables that need not be linked to each other. We next used a context similar to the one developed in Study 3 to show that reappraisal affordances influence regulatory choice (Study 4), separately from the influence of emotion intensity and type.

Table 2. Ratings and emotion type by Vignette (Study 4).

Predicted affordance	Predicted intensity	Scenario	Affordance (lower rating = higher aff.)	Intensity	Frequency of predominant emotion type (%)	Reappraisal (%)
High	High	PHA-HI-1	4.51	6.20	Anger (63%)	63%
High	Low	PHA-LI-1	3.56	5.66	Anger (60%)	53%
High	High	PHA-HI-2	3.80	6.60	Anger (57%)	57%
High	Low	PHA-LI-2	4.33	5.07	Anger (57%)	60%
Low	High	PLA-HI-1	5.03	6.13	Disgust (53%)	33%
Low	Low	PLA-LI-1	5.06	5.26	Disgust (50%)	47%
Low	High	PLA-HI-2	5.70	5.76	Disgust (53%)	50%
Low	Low	PLA-LI-2	5.73	5.33	Disgust (56%)	27%

Table 3. Predicting emotion regulation choice (% Reappraisal) (Study 4).

	Beta	Std. Error	Z Value	Pr(>|z|)
Intercept	1.23	0.63	1.94	0.05
Reappraisal affordance	−0.15	0.07	−2.34	<0.02*
Emotion intensity	−0.08	0.07	−1.15	0.25
Emotion type (1 v 0)	0.27	0.26	1.03	0.3

*Indicates significance at the 0.05 level.

In the context of this study series, reappraisal affordances proved influential in shaping regulatory preferences. Importantly, we do not claim that reappraisal affordances are the sole determinant of emotion regulation choice. While intensity and discrete emotion did not influence emotion regulation choice in the context studied in the present work, such variables may well be influential in other emotional contexts. In general, we expect there to be multiple influences on emotion regulation choice; these likely span emotional, motivational, and cognitive domains (Sheppes et al., 2014). The contribution of the present work is to establish reappraisal affordances as one such influence.

Emotion regulation choice is a special case of decision-making. Affordances are known to influence many decisions (Lipshitz, Klein, Orasanu, & Salas, 2001), and it stands to reason that environmental affordances influence decisions involving emotion regulation choice as well. More generally, we believe that future studies of emotion regulation choice will benefit from examining other well-known choice-determinants from the decision-making literature. For example, it is possible that just as default effects broadly shape choice (Dinner, Johnson, Goldstein, & Liu, 2011), they also influence emotion regulation choice (i.e. people choose regulation strategies that they most often use) (c.f. Suri, Whittaker, & Gross, 2015). It is also likely that cognitive costs (other than reappraisal affordances) also influence regulatory choice.

Deviation from affordance-driven regulatory choice may be associated with several negative outcomes including psychopathology (Sheppes, Suri, & Gross, 2015). For example, a failure to distract low reappraisal affordance negative emotions (and a resultant continued engagement analyzing the causes and consequences of these negative emotions) may lead to rumination, which predicts the onset of depression (Nolen-Hoeksema, 1991). A failure to reappraise high affordance negative emotions (and a preference to use an avoidance regulatory response) may be related to several anxiety disorders (Campbell-Sills & Barlow, 2007; see also Sheppes et al., 2015).

The present studies break new ground by considering a new class of determinants of emotion regulation choice, namely environmental affordances. However, several important limitations of this study series bear noting. One limitation of two of the key studies we have presented (Studies 3 and 4) is that they relied upon hypothetical situations to elicit emotion and assess emotion regulation choice. There is a long history of using vignettes in affective science (Hughes & Huby, 2002; Poulou, 2001), and our participants were instructed to vividly imagine the depicted scenarios. However, future studies must seek to test affordances in non-hypothetical contexts. A second limitation is that the present study series did not measure affordances related to distraction. Theoretical accounts suggest that since distraction involves attending to information unrelated to a stimulus, distraction affordances should not vary by stimulus type (c.f. Gross, 2014). However, this hypothesis must be empirically confirmed. A third limitation of the present study series is that it was conducted in North America. We think that it is likely that reappraisal affordances vary by culture. For example, reincarnation may be a reappraisal of mortality that is afforded in some cultures, but not in others. Future studies are required to specify the impact of culture on reappraisal affordances. *A fourth limitation of this study series is that it did not systematically investigate the influence of variables other than affordances on emotion regulation choice. These variables include—but are not limited to—the duration of the emotional situation, its causal drivers (for example whether the situation was preventable or controllable), and the specific outcomes associated with the situation (for example whether the effects of the situation are widely shared or focused to a single individual). It is certainly possible that these (or other) variables might influence emotion regulation choice, either via emotional intensity or affordances, or independently. Future studies are required to further investigate these possibilities.* Finally, our studies analyzed choices in healthy participants—future studies are required to study the role of affordances in clinical populations.

Disclosure statement

No potential conflict of interest was reported by the authors.

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