

Research Articles

Explicit Emotion Regulation: Comparing Emotion Inducing StimuliSuman Dhaka^a, Naveen Kashyap^{*a}**[a]** Department of Humanities and Social Sciences, Indian Institute of Technology Guwahati, Assam, India.**Abstract**

Emotions are a major part of our subjective experiences of the world. At times, our emotions are not appropriate and require active management. Emotion regulation refers to the various ways of managing or controlling emotional responses. External stimuli play specific role in eliciting emotions. Pictures and movies elicit emotions and emotional effects of films are believed to exceed that of pictures. The aim of the present study is to compare the effectiveness of emotion regulation strategies across emotion induction method (picture and films). Forty participants rated their emotion on Self-Assessment Manikin (SAM) ratings for each pictorial and video stimuli while following the emotion regulation instructions. Repeated-measures ANOVAs revealed that the pictures were more effective in modulating emotions. Cognitive reappraisal and distraction strategies downregulated emotions.

Keywords: emotion regulation, SAM, pictures, movies

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Emotions are a major part of our subjective experiences of the world. Laboratory experimentation on emotions have a number of limitations, a major one being elicitation of emotional experience. Image sets are one of the most commonly used stimuli that elicit emotions in experimental settings. Some other stimuli used to elicit emotional responses in the laboratory are sounds, words or texts, films and sound patterns (Carlson & Hatfield, 1992; Lench, Flores, & Bench, 2011; Salas, Radovic, & Turnbull, 2012; Westermann, Spies, Stahl, & Hesse, 1996). Emotion induced in laboratory settings play a pivotal role in influencing the effectiveness of emotion regulation (Webb, Miles, & Sheeran, 2012). The aim of the present study was to examine whether varying emotional induction stimuli (pictures and movie clips) causes changes in the effectiveness of emotional regulation. In order to achieve this goal, we instructed participants to modulate their emotional responses while watching the emotional pictures and movie clips using a pre-defined emotion regulation strategy. Dependent measures employed to measure the effectiveness of emotion regulation were ratings on the Self-Assessment Manikin (SAM).

Emotion Regulation (ER)

The process that modulates our emotional state and related behaviour is termed emotion regulation (ER) (Gross, 1998b; Gross & Feldman Barrett, 2011). ER is a tangible approach to managing emotions. Two popular approaches explain the emotion regulation process. The process model of emotion (Gross, 1998a) describes ER in terms of the time course of regulatory processes in regulation. Koole (2009) describes the ER process in terms of its motivational functionality. In the present study, we have used the process model of emotion regulation that has its grounding on the appraisal theory of emotion (Gross & Feldman Barrett, 2011). In the present paper, we have used the explicit emotion regulation approaches, as the subjects were aware of the emotional cues, resulting emotions and the regulation strategy required to downregulated emotional state.

Emotion Induction and Emotion Regulation

Emotion regulation studies so far have mostly focused on the type of strategy and its effect of emotional reactivity. To the best of author's knowledge, no study has attempted to establish link between stimuli inducing emotion (picture/video) and effectiveness of ER. The study of this link is important as emotion induction leads to generation of varied emotional states. These same emotional states when aversive are controlled through emotional regulation. Emotion regulation studies have used images taken from the International Affective Picture System (IAPS) as well as film clips (Bartolini, 2011; Gross & Levenson, 1995; Schaefer, Nils, Sanchez, & Philippot, 2010) as a standard for emotion induction. A film as emotion inducing stimuli is more advantageous than pictures as the dynamic nature of films make them more similar to reality. The only studies we have come across that compared pictures and films studied emotional reactions to sexual stimulations (Julien & Over, 1988). Both the studies reported superior performance on films stimuli. We designed the present study to address the question how the nature of the stimulus per se, influences the effectiveness of emotion regulation.

In the present study, we propose to examine whether emotion regulation strategies differ on processing emotions generated through pictures/videos. The effective use of emotion regulation strategy is characterized by decreased intensity of negative emotion that is quantified using a seven-point Self-Assessment Manikin scale (SAM; Lang, Bradley, & Cuthbert, 2005). It was hypothesized that mode of presentation (film) will be processed similar or better in explicit emotion regulation than pictures.

Methods

Participants

Forty undergraduate students (mean age - 21.4, all males) from Indian Institute of Technology Guwahati volunteered in exchange for partial credit toward a course requirement. Subjects had a normal or corrected-to-normal vision, and did not report any psychiatric disorders. Participants completed the following set of questionnaires: a personal data form including questions about age, gender eyesight etc. along with informed consent form, a mood questionnaire and positive and negative affect schedule (PANAS-X; Watson & Clark, 1999).

Design

Data was analysed using within subject 2 stimuli (picture, movie) x 5 affect (emotion view, situation selection, distraction, cognitive reappraisal, and suppression) repeated measure analysis of variance (ANOVA) where stimuli and affect were within subject factor and SAM rating (valence and arousal) of picture/video was dependent variable. The order of stimuli presentation was counter-balanced.

Material

The emotional regulation task consisted of two hundred (100 negative and 100 neutral) valence pictures extracted from International Affective Pictures System (negative: mean valence = 2.62 ± 1.04 ; mean arousal = 5.81 ± 2.06) (Lang et al., 2005). The pictures were further divided into five blocks (view, selection, distraction, appraisal, suppression) with equal number of negative and neutral picture. Thus, the number of picture in each block was 40 (20 negative, 20 neutral) and the total number of pictures was 200 (40 x 5). Each picture stayed on screen for eight seconds preceded by a fixation cross (500 ms) at the centre of the screen and followed by a black screen. The order of picture presentation was randomized (Figure 1). During movie presentation participant viewed two minutes movie clips [(two negatives, two neutral) x five blocks = 20] in randomized order. Movie clips were reproduced with permission (Rottenberg et al., 2007). LED monitor with display resolution 1920 x 1080 pixels presented the stimulus using E-prime (ver. 2.0.1) stimulus presentation software. Viewing distance was held constant at approximately 20 inches. The entire experiment took place in a sound-attenuated room.

Emotion Regulation task: Two hundred (negative and neutral) IAPS pictures served as test stimuli. The task consisted of two sessions. In the first session (practise), the subjects were trained on emotion regulation strategies. They were also made familiar with the task operations in this block. Session 2, consisted of the main task. The view block always appeared at the beginning and subjects were required to passively attend the displayed stimuli and later provide SAM ratings (arousal and valence) of their emotional state. The view block preceded the onset of regulation blocks (selection, distraction, appraisal and suppression) in random order. A five-minute gap separated block presentations. Subjects under regulation block attended the onscreen stimuli, regulated their emotional state (instruction for emotion regulation was block specific and preceded stimuli presentation) and provided ratings of their post regulation emotion state on the SAM (arousal and valence) scale. A minimum of seven days interval separated the picture and movie clip task. Movie clip trials followed the exact same task flow as the picture trial. The order of presentation of the movie and picture trial was counter-balanced across participants. (See Figure 1).

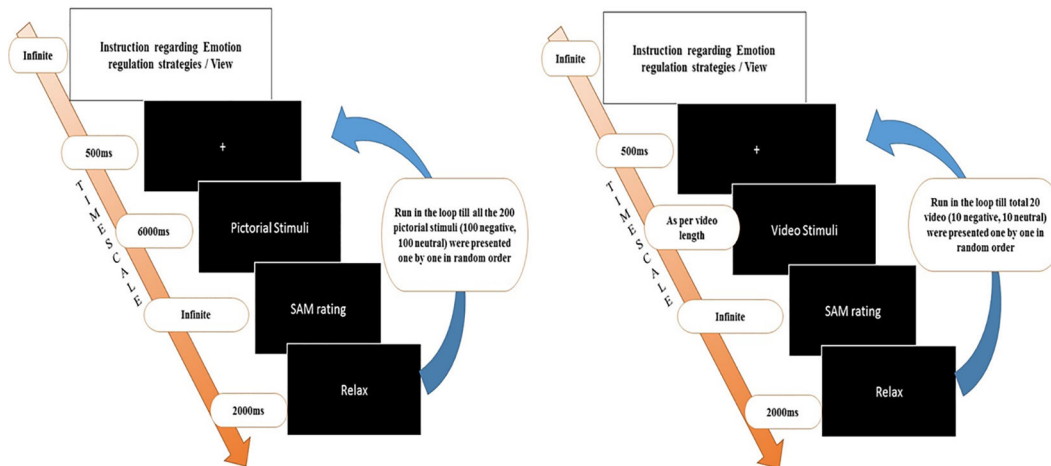


Figure 1. Design of the emotional behavioral task: (left) process flow for picture presentation; (right) process flow for the video presentation.

Procedure

Subjects provided informed consent and demographic data at the start of the experiment. The experimenter briefed the subjects about the notion of emotion regulation and detailed procedure that they should follow for initiating emotion regulation using each strategy. Subjects performed practice session where they attended practice stimuli (pictures and movies), passively viewed or regulated emotion state and provided arousal and valence ratings on SAM scale. Practice stimuli were not included in the main task. During the main task subjects performed on blocks of stimuli in a manner similar to the practice session. Additionally, in the main session the experimenter carefully probed the subjects to report verbally the precise manner in which they implemented the regulation strategy after each instance of stimuli presentation. At the end of the main, experiment the subjects, debriefed and thanked for task participation

Data Analysis

Data were analyzed using SPSS version 20. The threshold for statistical significance was set to $p = 0.05$.

Results

PANAS and Mood Scores

Positive and Negative Affective Schedule and Mood questionnaire were administered to rule out the existence of extreme positivity/negativity among the participants. Scores obtained from the participants on the positive/negative scales were within normal range for all subjects (Positive scale = 3.1; Negative scale = 1.4) Similarly, mood questionnaires were included to monitor extreme mood shifts while participating in the experiment. The mean score for Mood questionnaire is 17.62 ± 2.28 which is greater than 15, which indicates no mood discrepancy for all the participants

Emotion Regulation and Stimuli

Subjective ratings on valence and arousal dimension of SAM scale for each regulation strategy (selection, distraction, appraisal, and suppression) was paired with the ratings on the view strategy across both the picture and movie clip stimuli. Scores of each pair was subjected to within subject analysis of variance to analyse the effectiveness of emotion regulation strategy. ANOVA with stimuli [picture, movie clip] x strategy (view, selection, distraction, appraisal, suppression) as within subject factor and SAM rating for arousal and valence as dependent variable was performed for each pair of stimuli.

Arousal

Situation Selection

Main effect of stimuli was not significant ($F(1, 39) = 0.18, p > 0.05$) which suggests that both the picture and movie clip generated similar arousal. Further, main effects of strategy was also not significant [$F(1, 39) = 0.5, p > 0.05$]. The mean difference for pictorial stimuli in emotion group is 5.82 ± 0.74 and in emotion regulation group is 4.78 ± 1.03 similarly mean difference for movie stimuli in emotion group is $6.02 \pm .59$ and in emotion regulation group is 5.89 ± 0.74 (Figure 2A). Stimuli x strategy interaction was not significant [$F(1, 39) = 0.06, p > 0.05$].

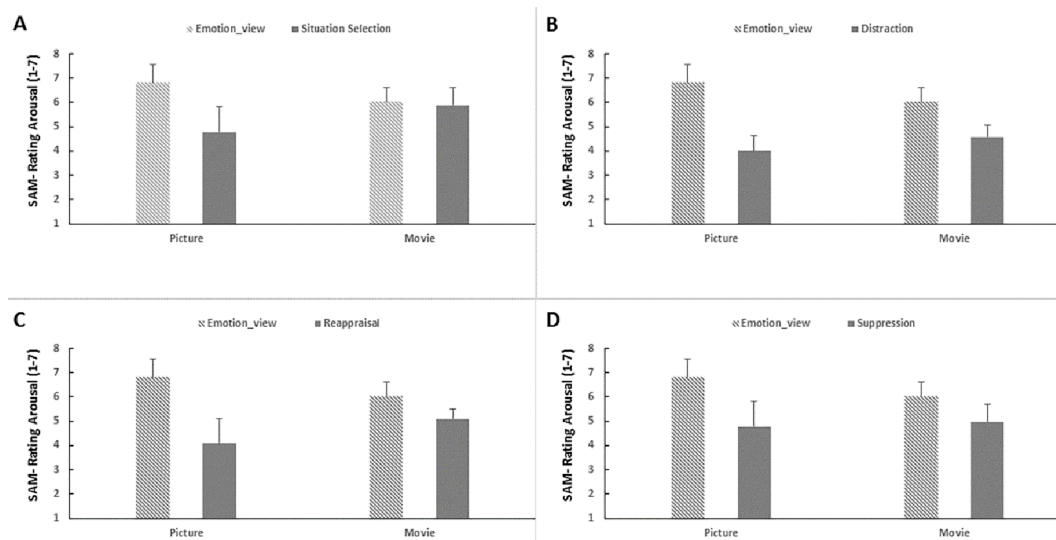


Figure 2. Arousal rating of negative affect across stimuli (mean \pm SD): A) emotion view versus situation selection strategy; B) emotion view versus distraction strategy; C) emotion view versus cognitive appraisal strategy; D) emotion view versus suppression strategy.

Distraction

Main effect of stimuli was not significant [$F(1, 39) = 0.18, p > 0.05$] which suggests that both the picture and movie clip generated similar arousal. Further, main effect of strategy was significant [$F(1, 39) = 5.99, p < 0.05$] which shows that distraction significantly lowered the arousal generated by viewing the stimuli. The mean difference for pictorial stimuli in emotion group is 6.98 ± 0.24 and in emotion regulation group is 4.01 ± 0.63 . Similarly, mean difference for movie stimuli in emotion group is $6.52 \pm .59$ and in emotion regulation group is 4.58 ± 0.47 (Figure 2B). Stimuli x strategy interaction was not significant [$F(1, 39) = 0.09, p > 0.05$].

Cognitive Reappraisal

There was no significant main effect of stimuli [$F(1, 39) = 0.07, p > 0.05$] suggesting the elicitation of similar arousal by both picture and movie clip. Main effect of strategy was however significant [$F(1, 39) = 31.5, p < 0.01$] which shows that cognitive appraisal significantly lowered the arousal generated by viewing the stimuli. The mean difference for pictorial stimuli in emotion group is 6.28 ± 0.24 and in emotion regulation group is 4.08 ± 1.04 similarly mean difference for movie stimuli in emotion group is $6.09 \pm .59$ and in emotion regulation group is 5.09 ± 0.4 (Figure 2C). Stimuli x strategy interaction was not significant [$F(1, 39) = 2.47, p > 0.05$].

Suppression

There was no significant main effect of stimuli [$F(1, 39) = 0.04, p > 0.05$] which suggests nearly similar arousal states following the viewing of pictures and movie clips. Main effects of affect [$F(1, 39) = 0.5, p > 0.05$] interprets to insignificant differences between view and suppression in terms of regulating arousal generating by the stimuli. The mean difference for pictorial stimuli in emotion group is 5.92 ± 0.24 and in emotion regulation group is 4.78 ± 1.03 similarly mean difference for movie stimuli in emotion group is $5.82 \pm .19$ and in emotion regulation group is 4.98 ± 0.74 (Figure 2D). Stimuli x strategy interaction was not significant [$F(1, 39) = 0.008, p > 0.05$].

Valence Rating

Situation Selection

There was no significant main effect of stimuli [$F(1, 39) = 0.18, p > 0.05$] which suggests pictures and movie clips were perceived as having the same type and degree of emotion. Main effects of strategy [$F(1, 39) = 0.99, p > 0.05$] were not significant suggesting the no emotion and regulation conditions were perceived as having similar type and degree of emotion. The mean difference for pictorial stimuli in emotion group is 2.98 ± 0.24 and in emotion regulation group is 2.01 ± 0.63 similarly mean difference for movie stimuli in emotion group is $3.02 \pm .59$ and in emotion regulation group is 2.58 ± 0.47 (Figure 3A). Stimuli x strategy interaction was not significant [$F(1, 39) = 0.62, p > 0.05$].

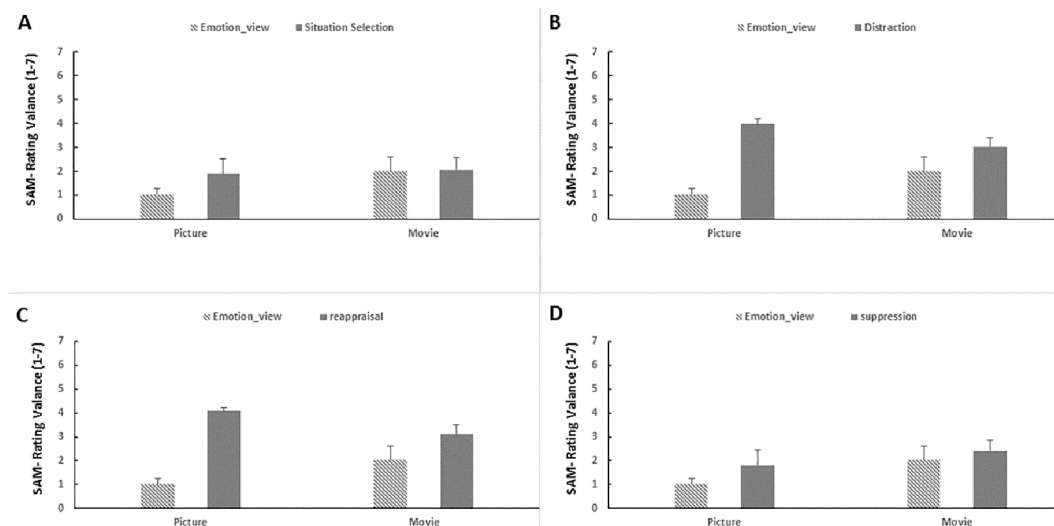


Figure 3. Valence rating of negative affect across stimuli (mean \pm SD): A) emotion view versus situation selection strategy; B) emotion view versus distraction strategy; C) emotion view versus cognitive appraisal strategy; D) emotion view versus suppression strategy.

Distraction

There was a significant main effect of stimuli [$F(1, 39) = 21.07, p < 0.05$] suggesting the pictures and movie clips were perceived by subjects as having varied emotion. Main effects of strategy [$F(1, 39) = 25.9, p < 0.01$] was significant meaning that distraction was successful in downregulating the emotional states. The mean difference for pictorial stimuli in emotion group is 1.02 ± 0.24 and in emotion regulation group is 3.78 ± 0.24 similarly mean difference for movie stimuli in emotion group is $2.09 \pm .09$ and in emotion regulation group is 3.01 ± 0.4 (Figure 3B). Stimuli x strategy interaction was not significant [$F(1, 39) = 1.59, p > 0.05$].

Cognitive Reappraisal

There was a significant main effect of stimuli [$F(1, 39) = 17.17, p < 0.02$] suggesting the pictures and movie clips were perceived by subjects as having varied emotion. Main effects of strategy [$F(1, 39) = 31.5, p < 0.01$] was significant meaning that distraction was successful in downregulating the emotional states. The mean difference for pictorial stimuli in emotion group is 1.01 ± 0.12 and in emotion regulation group is 3.97 ± 0.14 similarly mean difference for movie stimuli in emotion group is $2.0 \pm .15$ and in emotion regulation group is 3.29 ± 0.40 (Figure 3C). Stimuli x strategy interaction was not significant [$F(1, 39) = 2.90, p > 0.05$].

Suppression

There was no significant main effect of stimuli [$F(1, 39) = 0.29, p > 0.05$] which suggests pictures and movie clips were perceived as having the same type and degree of emotion. Main effects of strategy [$F(1, 39) = 0.19, p > 0.05$] were not significant suggesting the no emotion and regulation conditions were perceived as having similar type and degree of emotion. The mean difference for pictorial stimuli in emotion group is 1.98 ± 0.24 and in emotion regulation group is 2.01 ± 0.63 similarly mean difference for movie stimuli in emotion group is $2.02 \pm .59$ and in emotion regulation group is 2.58 ± 0.47 (Figure 3D). Stimuli x strategy interaction was not significant [$F(1, 39) = 0.16, p > 0.05$].

Discussion

The study examined the effect of stimuli manipulation (picture/film) on the effectiveness of emotion regulation strategies. Participants in the present study rated their emotion states generated by viewing picture or movie stimuli. Further, in some cases participants regulated the stimuli induced emotional state (using regulation strategy) and then provided emotional state ratings. The results of our investigation indicate: a) explicitly instructed emotion regulation effectively work on valence and arousal dimension of emotion. b) Participants were able to control/modulate their emotions following standard instructions. No differences in emotional state ratings were observed across picture and movie stimuli however, mean difference suggests that pictures generated emotional states were more effectively regulated. c) Reappraisal is one of the most effective ways to down-regulate self-reported negative affect followed by distraction and suppression respectively.

Effect of Stimuli Type on Emotion Regulation

Emotion regulation essential for everyday functioning and it is important to study the effectiveness of emotion regulation strategy. An important variable that influences emotion regulation is the nature of stimuli eliciting the emotions. The first evidence comes from appraisal theories that predict that the method of emotion induction partly determines the intensity of the resulting emotion and thus may influence the effectiveness of the

regulation (Zanna & Fazio, 1982). A number of studies used a variety of stimuli pictures (Lang, Bradley, & Cuthbert, 2005), film (Gross & Levenson, 1995), music (Västfjäll, 2001), verbal or written stimuli (Kenealy, 1986), reflections of experience (Lerner & Keltner, 2001), failure feedback (Kirschbaum, Pirke, & Hellhammer, 1993) and showed that effectiveness of emotion regulation is influenced by nature of stimuli. Our results suggest that the film clips were clearly less effective than picture in effective modulation of negative emotions by extrinsic emotion regulation strategies. This corresponds to the finding, that negative film clips led to lower emotional effectiveness than negative picture on both valence and arousal dimension. These findings are consistent with previous studies that report that participants were better at regulating their emotional responses to pictures than films or other types of emotion induction method (Webb, Miles, & Sheeran, 2012).

One possible reason for ineffectiveness of the films in the present can be attributed to the length of the movie used. Films stories evolve over time with the climax usually towards the end (Bartolini, 2011; Gross & Levenson, 1995; Hewig et al., 2005). Single shots of short duration of film clips can also generate emotional states however, the emotional power of such states is always questionable. Recent findings suggest length of film clips effect positively and negatively valence emotion ratings (Bartolini, 2011; Gross & Levenson, 1995: average length 151 s; Hewig et al., 2005: average length 113 s; Bartolini, 2011: average length 206 s). Another possible reason for the superior regulation by picture can be the novelty of the stimuli. Most clips used in this research and others are part of Hollywood films. There are always chances that the subject might have already seen the film and thus clips on terms of familiarity do not evoke desired emotional states. Pictures on the other hand can be both familiar and unfamiliar and thus on account of novelty stands better chances of emotion elicitation. In a meta-analysis review by Webb et al. (2012) it was reported that all emotion elicitation methods have a key dimension of personal relevance on which these methods differ. Pictures are more self-relevant than videos/movie stimuli. These results when applied to the results of the present study would mean that, as pictures were more real than films as films were thought of as depicting fictitious stories. A recent study by Uhrig et al. (2016), found that film clips were less effective than pictorial stimuli in producing the corresponding emotional state and were less arousing.

Despite all these findings, it is still unclear how the effectiveness of emotion regulation is mediated by other factors such as nature of the focal emotion, specificity of the emotion induction and underlying neural process need to be explored in future research. More work from various aspects and different technological approaches are needed to understand the role of emotion induction method as a moderating factor on effectiveness of emotion regulation.

Type of Emotion Regulation Strategies

The result of the present study reports no difference among regulation strategies on the arousal dimension, however for the valence dimension cognitive reappraisal and distraction strategies marked difference in subjective ratings in comparison no regulation (view) strategy. This would mean that none of the regulation strategies effectively downregulation arousal states when compared to no regulation (view). The same strategy comparisons on the valence dimension report effective downregulation of emotion states by cognitive reappraisal and distraction. The results of our study are in line with previous findings, which showed antecedent focused emotion regulation strategies to be superior strategy (Gross, 2002). Avoidance of an emotional situation reduces behavioural expression of emotions without causing significant changes in the subjective expression (Gross & Levenson, 1993). Gross and Levenson (1993) reported that suppressing the physiological

reactions caused by emotional states will be often harmful to the health. Reframing the meaning of emotional situations, involve handling the emotional states as professional with minimal involvement (Gross, 1998a, 2002). As compared to suppression, reappraisal reduces self-reported negative feelings and alleviates physiological responses to emotion causing events (Jamieson, Nock, & Mendes, 2012; Ochsner, Bunge, Gross, & Gabrieli, 2002). Reappraisal lead to more positive emotional experiences (Gross & John, 2003) and very few psychopathological cases (Aldao, Nolen-Hoeksema, & Schweizer, 2010). Prior work comparing the effectiveness of emotional regulation strategies for negative events report mixed results. Our results showed that cognitive reappraisal strategy is most effective to reduce risk aversive behaviour in comparison to distraction and other strategies. Some study reported that both strategies effectively down-regulating emotions (Sheppes & Meiran, 2007; Strauss, Ossenfort, & Whearty, 2016). Totterdell and Parkinson (1999) found that reappraisal as compared to distraction was a more effective emotion regulation strategy a finding that in line with our results which report cognitive appraisal to be a more effective regulating strategy (Kross & Ayduk, 2008). Overall, our findings are in line with previous work in this area that suggest reappraisal as a more effective in downregulating self-reported negative affect and minimize risk-taking behaviour. The present findings support the findings of Sheppes et al. (2011) that reports low intensity-negative situations promoting the use of reappraisal over distraction (Sheppes, Scheibe, Suri, & Gross, 2011).

The present study had several limitations. One major limitations of the study was using older set of films (developed by Rottenberg et al., 2007 and Gross & Levenson, 1995). As a remedy to this problem, future study can use an updated, validated set of film clips that reliably elicit discrete and intense emotional states. A second potential limitation of this study concerns the exclusivity of explicit measures used. We believe that the stimuli used in the present study elicited autonomic and cortical responses in addition to the rating response (Bradley, Codispoti, Sabatinelli, & Lang, 2001; Walla, Brenner, & Koller, 2011). The scope of the present concerns only behavioural response, we therefore suggest that future studies should make use of the autonomic and cortical data to evaluate the effectiveness of emotion regulation strategies.

Future studies can test the findings of our study on varied populations. Inclusion of various demographic variables (age group, socioeconomic status, education level) will enhance the scope of the present research and improve its generalizability.

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Competing Interests

The authors have declared that no competing interests exist.

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