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The link between emotional experiences and risky decision-making

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Abstract

Several studies have investigated the topic of emotional experiences and information processing in relation to decision-making (LeDoux, 1994; Panno, Lauriola & Figner, 2012). With a between-subjects experimental design, we investigated whether emotional regulation (ER) techniques reduced high levels of arousal, simulated by a fearful video, and then influenced risky decision-making. We also examined whether information processing and levels of arousal had a mediating effect on risky decision-making. Findings suggest that the stimuli reduced levels of positive mood but did not decrease levels of negative mood. Arousal was seen to correlate with negative mood before and after the stimuli as well as positive mood after watching the video. Analytical and intuitive processing correlated with positive mood before and after the stimuli. Analytical processing was not seen to be more evident than intuitive processing when making a risky decision, suggesting for a dual process. The mediators did not have any significant effect on the relationship between the ER techniques and risky decision-making. There was no difference between the ER techniques in relation to the mediators (arousal and analytical processing) and risky decision-making. Suggesting that the techniques could be equally effective or simply not effective at all. Gender was found to have an effect on the relationship between the ER techniques and risky decision-making, suggesting a further association with the appraisal tendency framework. Theoretical and practical implications are discussed along with limitations.

Introduction

A great amount of research has investigated the topic of emotional experiences and information processing in relation to decision-making (LeDoux, 1994; Panno, Lauriola & Figner, 2012). It is interesting as decision-making can affect risky decision-making and further be related to how individuals handle crisis related events. Risk-seeking individuals accept greater volatility and uncertainty in exchange for anticipated higher returns (Kahneman, 2011). In order to assess risk-seeking behaviour, virtual reality (VR) has been used in the field of military training and disaster preparedness (Mossel, Peer, Goellner & Kaufmann, 2017) and in studies investigating the impact of negative emotions on decision-making (Susindar et al., 2019). In terms of usability testing, crisis-related research is expensive due to the resource requirements. On that note, crisis scenarios can be reconstructed using a video simulation, which has shown to be of great effect in eliciting emotions such as fear, disgust, sadness, amusement and anger (Hewig et al., 2005). Emotional affective states, valence and arousal, have been investigated in relation to decision-making. Several studies have found individuals to make more impulsive decisions when experiencing emotions of high arousal (Peters, Vastfjall, Garling & Slovic, 2006; Sohn et al., 2015), which can be associated with risky behaviour. In this context, it is noteworthy to examine emotions that are related to high arousal and negative valence, such as fear. This is because such emotions often take place when individuals are exposed to stressful events, due to the activation of the amygdala (LeDoux, 1994). Amygdala is a brain function associated with emotions, which can be assessed with multiple measurements (e.g. physiology and experience; Goldin et al., 2008). As emotions of high arousal and low valence are thought to influence decision-making, emotion regulation (ER) techniques are used to investigate human ability to self-regulate their emotions. Such techniques are cognitive reappraisal and expressive suppression. These techniques further predict current and future risk-seeking behaviours (Panno, Lauriola & Figner, 2012). Moreover, analytical and intuitive processing are different modes of processing information, assisting individuals to deal with daily judgement and decision-making (e.g. Dane & Pratt, 2007). Information processing is interesting to investigate as it may be beneficial when exposed to a stressful situation. The aim of the study is to examine the link between emotional experiences and information processing in relation to risky

decision-making. Specifically, we will investigate whether ER techniques will reduce levels of arousal, simulated by a fearful video, and then influence risky decision-making. Similarly, we will also investigate whether information processing and arousal has a mediating effect on risky decision-making.

The relationship between uncertainty and stress

Uncertainty theory is derived from mathematics and built on normality and self-duality among others (Liu, 2007). Uncertainty occurs to the degree that situations are unpredictable and cannot be sufficiently understood (Baxter & Montgomery, 1996). According to Baxter and Braithwaite (2015) uncertainty is understood as the interplay of different, often competing discourses. When people experience uncertainty, they will most likely find themselves in a stressful situation and thereby be affected by stress. Once the person becomes stressed, fear may also surface. The amygdala is the primary function that becomes activated when a person is experiencing fear, and when a person is scared it is also likely that the person will become distressed (LeDeoux, 1994). In relation to uncertainty or risk, stimuli involving fear are processed fast, which can result in adaptive and quick responses (Ekman, 1992; Liddell et al., 2005; Ohman, 2005). Fear can be associated with an emotional reaction to stimuli that signals danger, high risk or a threat and therefore be experienced as a feeling of uncertainty (Loewenstein, Weber, Hsee & Welch, 2001). When experiencing uncertainty, people are likely to improvise because rules do not apply in such situations and thereby affecting a proper way to handle the uncertainty. Notably, improvising as a form of risk aversion offers a method to compare how individual behaviour differs when exposed to uncertain situations. Risk aversion is explained as a type of human behaviour attempting to reduce the degree of uncertainty in a situation (Zhou, Liu, Zhang, Gu & Wang, 2017). Peters, McEwens and Friston (2017) state that the essence of stress is in fact uncertainty. It is stated that information will reduce uncertainty and people would therefore seek information to avoid uncertainty (Peters, McEwens & Friston, 2017). Since uncertainty is related to stress, it can be assumed that there is a relationship between stress and a crisis. An event is considered stressful if it causes changes and requires readjustment of a normal routine (Holmes & Masuda, 1974; Kobasa, 1979). On an organizational level, a crisis is known as a situation that threatens important organizational goals. This limits the amount of time to respond and surprises the

people responsible for the decision-making and then induces higher levels of stress (Hermann, 1972). It has been found that experiencing stress becomes a disadvantage when trying to make the right decision (Starcke, Wolf, Markowitsch & Brand, 2008) especially when it comes to emotions. Stressful events are thought to create intense emotions that might influence risky decision-making (Visser-Keizer, Westerhof-Evers, Gerritsen, Van der Naalt & Spikeman, 2016).

Valence and arousal in the context of decision-making

In relation to decision-making, research has investigated emotional affective states. The literature agrees that there are at least two qualities of emotional affective states and those are valence and arousal. Valence is known as a pleasantness value and arousal is known as a bodily activation and these are basic to affective experience (e.g. Lang, 1994; Russell, 1980; Schacter & Singer, 1962). These affective states can be seen as subjective experiences. Valence is thought to be associated with pleasantness or unpleasantness and arousal is as an activation or deactivation of emotions (Russell, 1989). In other words, valence is how positive or negative the event is, whereas arousal describes how calm or exiting the information is (Russell, 1980). Two dimensions of valence and arousal have been constructed where the emotional experiences are structured in relation to the degree individuals incorporate valence and arousal into their emotions (Feldman, 1995a). According to the circumplex model of affect, emotions that are associated with high arousal and negative valence are afraid, angry, alarmed, distressed, frustrated, annoyed and tense (Russell, 1980). Some of these emotions are assumed to take place when exposed to a stressful event and thereby elicit affective emotions with high arousal and negative valence. This paper will therefore focus on the effects of arousal, while controlling for valence. Fear is known as an emotion with high arousal and low valence (LeDoux, 1994; Russell, 1980). The ability to experience and recognize fear is thought to guide individuals in their decision-making (Visser-Keizer et al., 2016). Fear has been found to influence the type of information processing method used such as analytical or intuitive strategies (Coget, Haag & Gibson, 2011; Elsbach & Barr, 1999). Moreover, fear has also been found to facilitate ethical decision-making as opposed to anger which inhibits ethical decision-making (Kligyte, Connelly, Thiel & Devenport, 2013). Several studies have reported that males and females respond differently to emotional stimuli (Brody, Lovas & Hay, 1995; Hofer

et al., 2006). Females report higher levels of fear in frightening and anger producing situations compared to males (Brody et al., 1995). Furthermore, females respond more negatively to negative stimuli, whereas males respond more positively to positive stimuli (Stevens & Hamann, 2012). Maffei, Vancato and Angrilli (2015) also suggest that females report higher levels of unpleasantness and arousal to unpleasant stimuli signaling compassion, sadness and fear compared to neutral stimuli. Specifically, stimuli signaling sadness and fear is greatly linked with high levels of distress and jittery. Females were found to be more frequent in reporting high levels of arousal compared to males, as males reported a larger variance indicating that some males did find the stimuli to evoke high levels of arousal and others did not (Maffei et al., 2015). Affective states are thought to influence decision-making, it is therefore essential to examine human's ability to utilize self-regulation methods.

Fields of investigation and hypotheses

Appraisal tendency framework. Based on the circumplex model (Russel, 1980) of affect, the appraisal tendency framework was created. Emotions are assumed to be linked to certain appraisals (Roseman, 1984; Scherer, 1999). These appraisals reflect the meaning of a situation that will cause an emotional response, which is thought to influence specific emotions on social judgement. According to Smith and Ellsworth's (1985) theory, emotions that have the same levels of valence differ in relation to the outcome. For example, the negative emotions of fear and anger will differ in relation to certainty and control. Fear is defined by the levels of situational control and uncertainty, whereas anger is defined by individual control and certainty. Therefore, it is suggested that different emotions activate a tendency to appraise future situations associated with the appraisal dimensions that sets of the emotion (Lerner & Keltner, 2000). This process is referred to as the appraisal tendency framework (Lerner & Keltner, 2000, 2001).

Emotion regulation (ER). It is well known that emotions play a key role in social and economic decision-making (Heilman, Crişan, Houser, Miclea & Miu, 2010). Consequently, there is a possibility that decisions linked to acute emotions may be mediated by ER strategies. Notably, ER is one of the fastest growing fields in

psychology, however, there is uncertainty as to what the concept actually is (Gross, 2015). The literature on ER emphasizes that humans typically make efforts to control their emotional experiences (Heilman et al., 2010). Further, the concept has been described as both a conscious and unconscious process that can easily influence a person in terms of which emotions they experience, when they experience them and how they express them (Gross, 1998). However, recent research suggests ER to be an active process directed to shift current emotions toward desired emotions (Vishkin, Hasson, Millgram & Tamir, 2020). Moreover, it is an automatic and controlled cognitive, behavioural and physiological process where people regulate their experience and the expression of their emotions (Kinner, Het & Wolf, 2014; Ochsner & Gross, 2005). Kinner et al. (2014) found that the participants with induced stress were less effective in distracting themselves from emotional pictures than the control group. This might suggest that the less stressed participants managed to distract themselves with the use of ER techniques and thereby stayed calm and less stressed. Moreover, research suggest that ER reduces loss aversion and lower amygdala responses to losses (Sokol-Hessner, Camerer & Helphs, 2012). Martin and Delgado (2011) also implies that cognitive ER techniques influence future decision-making.

ER techniques. There has been a great amount of research investigating ER techniques and two techniques have been examined extensively, namely cognitive reappraisal and expressive suppression (Ochsner & Gross, 2005, 2008). The cognitive reappraisal technique changes the streams of emotional responses in terms of reformulating the meaning of the situation. This means that, when exposed to a stressful situation, one can decrease the emotional impact by reappraising the original perceptions of the scenario (Gross & John, 2003). This technique is also known as an antecedent-focused technique, which operates before the emotions become activated (Gross & Thompson, 2007). Individuals can target specific appraisals by using different strategies as the term is an umbrella for several types of cognitive reappraisals (McRae, Ciesielski & Gross, 2012). A common type is *distancing*, which involves mentally altering an individual's perception of an emotional situation by increasing or decreasing his or her psychological distance from it (Ochsner, Silvers & Buhle, 2012; Trope & Liberman, 2010). Moreover, it includes simulating a new perspective to change the psychological distance and the

emotional impact of the stimulus. Distancing is focused on transforming the viewpoint from which the stimulus is considered (Powers & LaBars, 2019). For example, one may adopt the mindset of an objective, impartial observer (Gross 1998; Kross, Davidson, Weber & Ochsner, 2009). Distancing has been applied to decrease unpleasant or unwanted emotional responses by increasing the distance between the subject and the induced stimuli (Powers & LaBar, 2019). It has been presumed that distancing is better suited for some situations than others. Some studies propose that distancing may be better suited for low-to-moderate intensity emotional responses, and not as effective for regulating high-intensity emotional responses (e.g. Wisco, Marx, Sloan, Gorman, Kulish & Pineles, 2015). However, this technique has been found effective in regulating negative self-conscious emotions such as anger and sadness (Kross, Ayduk, & Mischel, 2005) and more recently in regulating guilt and shame (Katzir & Eyal, 2013). This study will therefore focus on distancing, a sub-technique of cognitive reappraisal.

Expressive suppression is another technique that is thought to inhibit behaviours that are linked with emotional responses such as facial and verbal expressions (Gross & Thompson, 2007). This technique is also known as a response-focused technique, which operates after the emotions arise (Gross & Thompson, 2007). As a result, expressive suppression demands an active effort to manage the inhibition of dominant emotional responses (Gross, 2002; Muraven, Tice, & Baumeister, 1998), whereas cognitive reappraisal reduces emotions at an early stage without requiring constant effort over time. Since expressive suppression requires a higher cognitive load, it might contribute to ego depletion where individuals deplete their available mental recourses, which makes it hard to have self-control. This is in contrast to the cognitive reappraisal technique (Baumeister, 2003; Richards & Gross, 1999).

Research suggests that cognitive reappraisal and expressive suppression predict risk-seeking behaviours when decisions entails mainly cognitive deliberative processes (Panno, Lauriola & Figner, 2012). Moreover, Panno et al. (2012) suggest that reappraisers would make rather riskier choices as they are more likely to concentrate on positive emotions triggered by positive potential outcomes. Quickly implementing cognitive reappraisal has shown to effectively reduce psychological arousal related to loss aversion (Sokol-Hessner et al., 2009) and anticipation of

reward (Delgado, Gillis & Phelps, 2008). Which means that the high levels of arousal are related to the value of a potential loss and the anticipation of reward that will be reduced when applying the cognitive reappraisal technique. The role of expressive suppression has received less attention in decision-making (Panno et al., 2012). One study showed that when using expressive suppression to inhibit negative emotions of high arousal, such as anger and embarrassment, individuals tend to exhibit impulsive decision-making (Leith & Baumeister, 1996). This shows that expressive suppression may have an effect on decision-making, which is why further investigation is needed.

Both of the techniques are argued to effectively reduce the feelings of positive emotions (Gross & John, 2003), but only cognitive reappraisal has shown to be as effective in decreasing the feelings of negative emotions (Gross, 1998a; Gross & Levenson, 1997). Notably, other ER techniques, such as cognitive change, is suggested to be effective in down-regulating responses when exposed to unpleasant stimuli (Strauss et al., 2013). However, more research has examined cognitive reappraisal. Recent research found that participants exposed to cognitive reappraisal show a decrease in learned disgust (Olatunji, Berg, Cox, & Billingsley, 2017). More specifically, it has been reported that distancing reduces disgust ratings to video clips relative to natural response, whereas expressive suppression does not (Gross, 1998). These findings suggest that this technique may be beneficial for reducing learned disgust. Moreover, according to Katzir and Eyal (2013), self-distancing decreases feelings of sadness and anger. Based on their findings, they also suggest that distancing will reduce feelings of fear. This is in line with the notion that the most commonly studied application of distancing is to reduce unpleasant or unwanted emotional responses by increasing the psychological distance between the subject and the stimulus (Powers & LaBars, 2019).

The ability to regulate emotions has thought to be beneficial in order to handle stressful events to a greater extent. Self-reported and neural effects of the general cognitive reappraisal technique is thought to be robust when exposed to moderate levels of stress (Shermohammed et al., 2017). Cognitive reappraisal has seen to be in favor of other ER techniques such as expressive suppression (Cheung & Mikels, 2011). This may be because cognitive reappraisal has shown to be beneficial in down-regulating behavioral and subjective expressions of affect (Gross, 1998),

where there is an activity in the amygdala (Goldin, McRae, Ramel & Gross, 2008). Expressive suppression is not as successful in down-regulating affect (Cheung & Mikels, 2011). However, expressive suppression has been found to decrease risk-taking (Panno et al., 2012), which contradicts previous findings (Leith & Baumeister, 1996). Cognitive reappraisal has been found to be robust in conjunction with stressful events (Shermohammed et al., 2017) and aids with adjusting to stressful events (Garnefski, Kraaij, & Spinhoven, 2001). Furthermore, research has shown mixed results regarding expressive suppression and it is therefore interesting to test this technique further (Cheung & Mikels, 2011; Leith & Baumeister, 1996; Gross & John, 2003; Muraven et al., 1998).

We have decided to include both distancing and expressive suppression, where expressive suppression will act as a control group to distancing. An explanation for this is that previous findings show mixed results of expressive suppression in down-regulating emotions (Cheung & Mikels, 2011; Leith & Baumeister, 1996; Gross & John, 2003; Muraven et al., 1998), whereas distancing is found to be more effective (Gross, 1998a; Gross & Levenson, 1997; Shermohammed et al., 2017; Strauss et al., 2013). It can be argued that expressive suppression and distancing will provide different results and that expressive suppression therefore will be effective as a control group to distancing.

Risky decision-making. Prospect theory suggests that the reference point of the decision-maker at the time of choice is a crucial determinant of risk taking (Kahneman & Tversky, 2013). Individuals often base their decisions on potential gains and losses rather than the final outcome possibilities (Hærem, Kuvaas, Bakken & Karlsen, 2011). Kahneman and Amos examined decision-makers' tendency to gamble by introducing a framing that is known as the Asian disease problem (ADP; Tversky & Kahneman, 1981; Kahneman, 2011). The original framework was positively framed, involving one choice of a sure gain and one choice with the gamble of either receiving a higher loss or higher gain. It was found that most people (72%) choose the choice of a sure gain. A second version was created where both choices were negatively framed, and it was found that the majority chose the gamble instead of the sure gain. This is in relation to the prospect theory, where the choices between gambles and sure gains are resolved differently depending on whether the results are good or bad. When the outcomes are good,

people have a tendency to choose the sure gain instead of the gamble as they are risk averse. If both outcomes are bad, people are more likely to reject the sure gain and accept the gamble as they, in this situation, become more risk-seeking. These results are well established for money related choices (Kahneman, 2011). Moreover, the ADP shows that the same rule applies when it comes to lives saved or lost. The framing also shows that risk-averse and risky behaviour are not reality-bound. The preferences of the same outcomes change with different framing (Kahneman, 2011). As previously mentioned, when framed with two negative choices, individuals are more likely to gamble with losses compared to sure gains. Hence, it can be linked to the tendency of loss aversion. Loss aversion implies that people tend to prefer avoiding losses rather than receiving similar gains (Kahneman, Knetsch & Thaler, 1991). We believe that this tendency will occur when investigating ADP in relation to emotions based on research suggesting that individuals become loss averse when experiencing fear (Lerner & Keltner, 2001; Habib, Cassotti, Moutier, Houdé & Borst, 2015; She, Eimontaite, Zhang & Sun, 2017). Interestingly, research has found that females are generally more loss averse than males (Brooks & Hanks, 2005), which constitutes for a gender difference.

In relation to ER techniques, Heilman et al. (2010) found that when individuals experience fear and are exposed to cognitive reappraisal, risky behaviour will increase as well as performance. Moreover, Lerner, Small & Loewenstein (2004) found that fear leads to judgement of negative load possibly due to uncertainty of future risk aversion because humans aim at identifying the possible threat and how to minimize it. Negative emotions are suggested to increase individual's risk aversion, but when exposed to cognitive reappraisal this effect was not present. Which can be explained by the reduced levels of fear (Heilman et al., 2010).

We therefore hypothesize that:

1. *Distancing of fear will increase risky decision-making*
2. *The effect of distancing of fear on risky decision-making will be mediated by reduced arousal*

Self-regulation. When people are exposed to a problem that needs to be solved quickly, they need to make a quick decision. To do so, the ability to apply reasoning,

judgement and decision-making are essential (Funahashi & Andreau, 2013). These functions are complex cognitive operations and to apply these functions, multiple neural systems need to operate simultaneously as well as in a coordinated manner. A system in the brain integrates and coordinates such operations and this system is known as *executive functions* (Roberts, 1998; Shah & Miyake, 1999). Executive functions coordinate various neural systems and is highly important to achieve a certain goal in a flexible and appropriate manner (Funahashi & Andreau, 2013). Several researchers have investigated the executive functions. According to Burgess (1997), executive functions such as problem-solving, planning, initiation of activity, cognitive estimation, and prospective memory can be applied when exposed to certain situations. Moreover, executive functions can also be associated with working memory capacity (Hester & Garavan, 2005). Working memory has shown to support the ability to regulate emotions (Gross, 1998; Hofmann, Gschwendner, Friese, Wiers & Schmitt, 2008). Executive functions can then have a significant role in self-regulating behaviour such as emotional responding (Hofmann, Schmeichel & Baddeley, 2012). Furthermore, Pineda et al. (1998) suggest that executive functions include the ability to self-regulate, have cognitive control, organize responses to immediate stimuli, plan behaviour, and to control attention. Executive functions can thereby be seen as an ability to self-regulate (Hofmann et al., 2012). Rabbitt (1997) describe executive functions as the ability to manage novel tasks, to interpret the past and to control the future and to begin new sequences of behavior. Executive functions also facilitate the ability to rapidly switch from one task to another, monitor performance to obtain correct errors and lastly to be able to pay long-term attention (Rabbitt, 1997). Moreover, it includes attentional control (switch attention from one stimulus to the other or only focus on one stimulus), control of behaviour, planning complex tasks and access information in long-term memory (Funahashi & Andreau, 2013).

A great amount of research has investigated stress and found that multiple brain areas concerning cognitive functions are highly affected when exposed to stressful events. These functions are concerned with modulating distinct cognitive systems such as memory, problem solving and attention (Arnsten, 2015; Byron Khazanchi & Nazarian, 2010; Hermans, Henckens, Joels & Fernandez, 2014; Schwabe, 2017; Shields, Sazma & Yonelinas, 2016). Psychological stress has shown to impair the

ability to switch attention (Elling et al., 2012). It has also shown to damage top-down attentional control (Shackman et al., 2011), attention and inhibition, task management, planning and coding (Starcke, Wiesen, Trotzke & Brand, 2016).

Information processing. Scholars have proposed two fundamental modes regarding information processing, which are intuitive (emotion) and analytical (rational) processing (Jung, 1968; De Neys, 2006). The intuitive mode is categorized to be quick, effortless, unconscious and more error-prone, while the analytical mode is thought to be conscious, effortful, slow and rule-based (Ayal, Rusou, Zakay & Hochman, 2015). These systems are thought to assist people in coping with daily judgment and decision-making (Lu, 2015). Moreover, research has shown that individuals tend to favor intuitive decision-making in non-professional roles where they are making personal decisions. It also suggests that such decisions are related with a thought of having better influence over the outcome than in analytical, non-personalized decisions. However, in more risky decision-making, it is suggested that people do not favor intuitive decision-making, nor analytical decisions (Sjøberg, 2003). Notably, some scholars advocate a dual process where the assumption is that the two systems work together in relation to decision-making (Dane & Pratt, 2007). According to Simon (1987) individuals do not have the option to choose between intuitive and analytical processing as both systems are needed in effective decision-making.

However, individual differences play a key role in information processing, judgement and decision-making (Ayal, Rusou, Zakay & Hochman, 2015). It also has a clear impact on the decision quality (Ayal, Zakay & Hochman, 2012). Peters et al. (2006) suggest that some individuals are more effective and accurate on judgement and decision-making. Such individuals are also less likely to be vulnerable to framing effects. These findings suggest that individual traits can predict different biases and fallacies. Ayal et al. (2012) suggest that individuals with low analytical processing are more disposed to behavioural biases. Similarly, individuals with intuitive processing style are more prone to induce error in the conjunction fallacy, known as the bias of believing that two events that happens in conjunction are more probable than one of those alone, than people using the analytical processing style (Lu, 2015). Intuitive processing has shown to increase performance on an intuitive task, but hinder performance in an analytical task (Ayal

et al., 2015). Individual differences in information processing are thought to be flexible and modified by situational factors. A situational manipulation that encouraged analytical processing increase decision quality. These findings suggest that the quality of the decision is highly dependent on the compatibility between the information processing, the nature of the task and individual differences (Ayal et al., 2015).

Emotions has also shown to have an effect on the information processing modes. Some studies have shown that individuals in a good mood have a greater tendency to apply intuitive information processing in decision-making (Bolte, Goschke, & Kuhl, 2003; Isen, 2000; Weiss & Cropanzano, 1996), whereas individuals in a bad mood tend to utilize a more rational analytical information processing in decision-making (Elsbach & Barr, 1999; Staw & Barsade, 1993). Emotions that are linked with uncertainty, such as fear, tend to be greatly associated with applying the analytical information processing strategy in terms of decision-making (Tiedens & Linton, 2001). On the contrary, a study found that fear could help individuals predicting electric shocks (Katkin, Wiens, & Ohman, 2001). This means that fear can intuitively alert individuals to danger and assist them with a gut feeling that might guide them on making a decision. Thus, even though studies have reported that positive mood engage individuals in intuitive decision-making and negative mood facilitate analytical decision-making, discrete negative emotions might hold different patterns (Coget et al., 2011). Coget et al. (2011) found that individuals with an intensity of moderate level of fear facilitated analytical decision-making, whereas high intensity of fear facilitated intuitive decision-making.

We therefore hypothesized that:

3. *The impact of distancing on risky decision-making will be mediated by increased analytical processing*

Methodology

Sample

In total, 259 people participated in this study. There was no incentive given to participate in this study. The participants were recruited online using a Qualtrics survey. Five participants had missing values as they did not specify their gender and age, two participants were below 18 years of age, 13 participants spent more than two hours to complete the survey and according to the awareness check, four participants did not watch the video as required. These participants were removed from the sample, resulting in a final sample of 235 participants (*N*=235). There were 158 females and 77 males. The age range was 18-80, where the mean age was 37.36 and the standard deviation was 14.75. Participants were randomly assigned to one of the conditions resulting in 113 (42 males, 71 females) participants in the expressive suppression group and 122 participants in the distancing group (35 males, 87 females). Prior to collecting the data, the study was presented to the Norwegian Centre for Research Data (NSD).

Data collection

Experimental design and equipment

This study was originally going to be conducted in a laboratory with the use of VR glasses and physiological measurement tools. However, due to the pandemic Covid-19, this study was carried out online. This study was an experiment with a between-participants design. The independent variable was the ER techniques expressive suppression (Ochsner & Gross, 2005, 2008) and distancing (Ochsner et al., 2012). The techniques were presented to the participants on Qualtrics. The expressive suppression technique had the following instructions: "*While you are watching the video, try your best to hide any emotions that you may feel. Try to behave so that someone watching you would not know that you are feeling anything at all*". The distancing technique was presented with the following instructions: "*While you are watching the video, try to adopt a self-distanced perspective by focusing on the "big picture". For example, imagine that you are observing the content from the perspective of a neutral, objective observer*". A validated video (Gross & Levenson, 1995) was presented to induce high arousal and the negative emotion fear. The video had a length of 2.09 minutes (see appendix A3). The

dependent variable is risky decision-making. In order to create a decision-making context to measure risk, the gain frame scenario ADP was used (Tversky & Kahneman, 1981; see appendix A4). This scenario was seen suitable for this study because it has been reported that participants are likely to engage in either analytical or intuitive processing when making such a decision (Huangfu & Zhu, 2014). Analytical processing and levels of arousal are mediating variables thought to influence the relationship between the ER techniques and risky decision-making. Gender and age are controlled for in all analyses.

Procedure

The data was collected online where all materials were presented through Qualtrics. Participants were first instructed to read the information sheet that introduced them to the procedure and what was expected of them (see appendix A1). After reading the information sheet, participants signed a consent form. After signing the consent form, participants received the positive and negative affect schedule (PANAS; Watson, Clark & Tellegen, 1988), where they were asked to state how they had been feeling over the last week. Participants were then introduced to one out of two conditions. Participants in one condition received the distancing technique while the other condition was introduced to the expressive suppression technique. After introducing the ER technique, the fearful video was presented. After watching the video, participants were introduced to the ADP. Then they completed the same PANAS questionnaire asking them to state how they felt while watching the video. Participants responded to the Self-Assessment Manikin (SAM; Bradley & Lang, 1994) and then they answered the Cognitive Processing Questionnaire (CPQ; Bakken, Hærem, Hodgkinson & Sinclair, 2016). After responding to the CPQ, participants received the awareness check (see appendix A7). Lastly, they stated their gender and age. The study took approximately 15-20 minutes to complete.

Measures

Independent variable and the manipulation check

Positive mood

The expressive suppression group recorded a mean score of positive mood of 3.09 (SD = .69) prior to watching the video, while the distancing group recorded a mean score of positive mood of 2.69 (SD = .67). An independent t-test showed that the

difference was not significant, $t(233) = .51$, $p = .61$. This means that there was no difference between the recorded positive mood prior to watching the video of those participants in the expressive suppression and the distancing group.

After watching the video, the expressive suppression group recorded a mean score of 2.08 (SD = .72), while the distancing group had a mean score of 2.04 (SD = .65). An independent t-test showed a non-significant result, $t(233) = .39$, $p = .69$. This means that there was no difference between the expressive suppression and the distancing group in terms of positive mood after watching the video.

Negative mood

Prior to watching the video, the expressive suppression group reported a mean score of negative mood of 2.20 (SD = .64), while the distancing group showed a mean score of negative mood of 2.24 (SD = .68). An independent t-test revealed a non-significant result, $t(233) = -.49$, $p = .63$. This means that there was no difference between the recorded negative mood of those participants in the expressive suppression and the distancing group before watching the video.

After watching the video, the expressive suppression group reported a mean score of negative mood of 2.21 (SD = .77), while the distancing group showed a mean score of negative mood of 2.27 (SD = .79). An independent t-test revealed a non-significant result, $t(233) = -.60$, $p = .55$. This means that there was no difference between the recorded negative mood of those participants in the expressive suppression and the distancing group after watching the video (see table 1).

Table 1: Conditions, observed means (standards deviations) and *p-values* of positive mood before and after the video and negative mood before and after the video

Condition	**Positive mood before the video**	**Positive mood after the video**	**Negative mood before the video**	**Negative mood after the video**
Suppression	3.09 (.69) *.61*	2.08 (.72) *.69*	2.20 (.64) *.63*	2.21 (.77) *.55*
Distance	2.69 (.67) *.61*	2.04 (.65) *.69*	2.24 (.68) *.63*	2.27 (.79) *.55*

In sum, when comparing the mood between participants in the expressive suppression and distancing group, results show that there was no significant difference.

Video validation

To validate the video, we analyzed how the video affected the mood of all participants, independent of the use of ER techniques. Before watching the video, all participants (N = 235) showed a mean score of negative mood of 2.22 (SD = .65), whereas after the video, the mean score of negative mood was 2.24 (SD = .78). A One-way ANOVA revealed a non-significant difference between negative mood before and after the video, F (1,468) = .117, MSE = .52, p = .73. This suggests that the negative mood did not change after watching the video.

In relation to positive mood, all participants showed a mean score of 2.98 (SD = .68), whereas after the video, the positive mood showed a mean score of 2.06 (SD = .68). A One-way ANOVA revealed a significant difference between the positive mood before and after the video, F (1,468) = .217, MSE = .46, p < 001. This suggests that the positive mood became less positive after the video indicating that the video had a negative effect on the participant's positive mood.

Levels of arousal

After watching the video, participants in the expressive suppression group showed a mean score of arousal, 4.70 (SD = 2.18), whereas the participants in the distancing group showed a mean score of arousal of 4.66 (SD = 2.17). An independent t-test revealed a non-significant difference between the groups, $t(233) = .12$, $p = .90$. This means that there was no difference between the recorded levels of arousal of those participants in the expressive suppression and the distancing group after watching the video (see table 2).

Table 2: Conditions, observed means (standard deviations) and *p-values* of levels of arousal

Condition	Levels of Arousal
Expressive suppression	4.70 (2.18) *.90*
Distancing	4.66 (2.17) *.90*

Dependent variable

In order to measure whether the video made the participants more afraid, we used PANAS (Watson et al., 1988). The questionnaire consisted of 20 items such as "interested" and "upset", where they were asked to "Indicate the extent you have felt this" on a scale ranging from "Very slightly or not at all" to "Extremely" (see appendix A2). To assess whether the participants made a risky or safe decision after watching the fearful video and actively used the ER technique introduced, the results from the ADP were used. Participants were asked to choose alternative A or B where A was considered a safe choice and B was seen as a risky choice (Kahneman, 2011), however there were no right or wrong answers.

Mediation variables

The levels of valence and arousal was measured with the use of SAM, where they were presented with pictures created to measure emotional response (Bradley & Lang, 1994). The measure of valence was included because the measurement tool is constructed in the same way as the measure of arousal. The questionnaire included single-item scales measuring valence or the pleasantness of the response on a scale from unhappy (1) to happy (9), whereas PANAS included specific emotions. SAM also measured perceived arousal on a scale from calm (1) to aroused (9) (Bynion & Feldner, 2017; see appendix A5). We also used the CPQ to assess participants' decision-making process (Bakken et al., 2016). This questionnaire contained 22 items based on five dimensions: rational (five items), control (six items), urgency (four items), affective (three items) and knowing (four items). CPQ included items such as "Even if the information was uncertain, I tried to make a quick decision" and "I based the decision on my inner feelings and

reactions". All items were rated on a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree; see appendix A6).

Control variables

Several studies have examined the difference between males and females in terms of responding to emotional stimuli (Brody et al., 1995; Hofer et al., 2006; Stevens & Hamann, 2012). Gender is therefore a variable that has been controlled for, as well as age, when the analysis has been conducted.

Results

Descriptive statistics

Correlation

The assumptions will follow a logistic regression. A correlation analysis was conducted to check whether the observations were independent of each other (see table 4). The analysis revealed that the positive mood prior to the video and after the video was significantly correlated $r = .32$, $p = .01$. The negative mood before and after the video was significantly correlated $r = 49$, $p = .01$. Arousal was significantly correlated with positive mood after the video $r = .27$, $p = 0.5$. Furthermore, arousal was also significantly correlated with negative mood after the video $r =. 70$, $p = .01$. Intuitive processing was significantly correlated with positive mood after the video $r = .17$, $p = .01$. (see table 3). Analytical processing was significantly correlated with positive mood after the video $r = .13$, $p = .05$.

Table 3: Correlation matrix with means and standard deviations

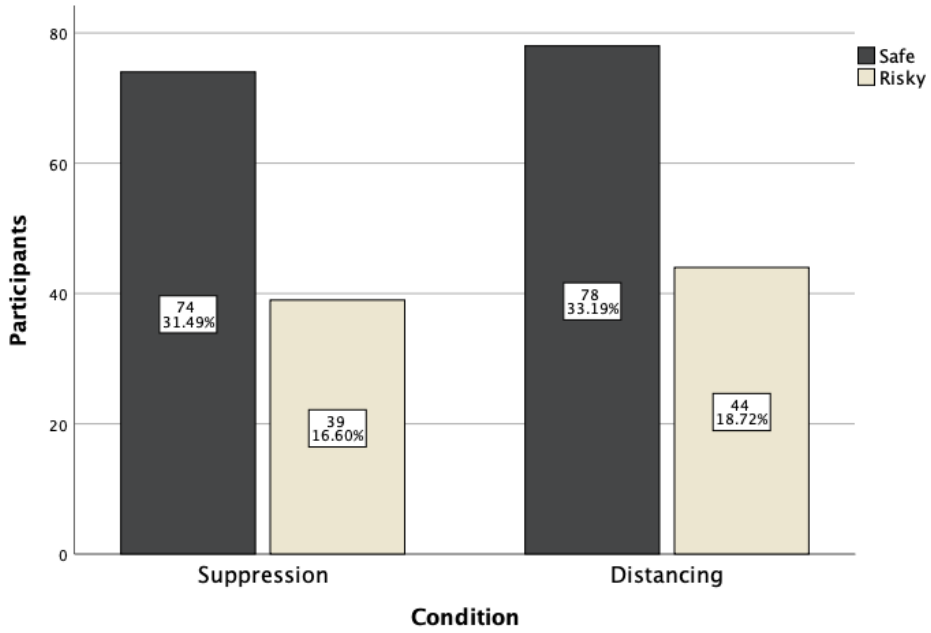
Variable	Mean	SD	1	2	3	4	5	6	7	8	9	10
1.Condition	.52	.50	-									
2.Risky decision	.35	.48	.02	-								
3.Arousal	4.68	2.17	-.01	.01	-							
4.Valence	3.91	1.56	-.05	-.08	-.52**	-						
5.Analytical processing	3.53	.55	.03	.09	.08	.03	-					
6.Intuitive processing	3.00	.56	-.00	-.03	-.01	.01	-.03	-				
7.Positive mood prior to video	2.99	.68	-.03	.05	.07	-.01	.13*	.14*	-			
8.Positive mood after the video	2.06	.68	-.03	.00	.27*	-.05	.13*	.17**	.32**	-		
9. Negative mood prior to video	2.22	.65	.03	-.04	.30**	-.28**	-.04	-.05	-.19**	.24**	-	
10.Negative mood after the video	2.24	.78	.04	.04	.70**	-.56**	-.04	.04	.04	.40**	.49**	-

Note. * $p < 0.05$. **$p < 0.01$. *** $p < 0.001$

Risky decision-making

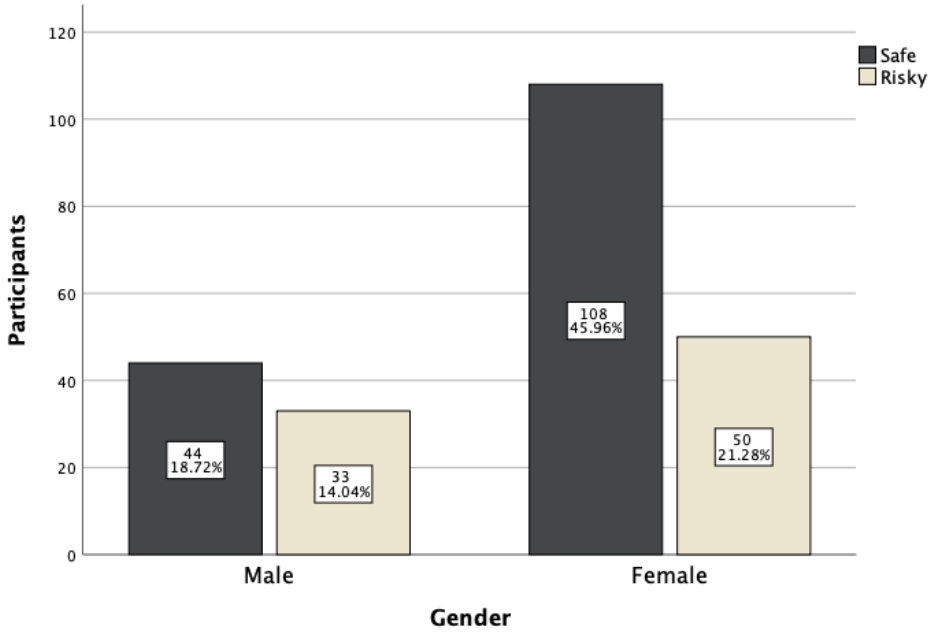
There were 113 participants in the expressive suppression group, and 74 participants chose the safe alternative when introduced to the ADP whereas 39 participants chose the risky alternative. There were 122 participants in the distancing group and 78 participants chose the safe alternative, whereas 44 participants chose the risky alternative. This shows that the ER techniques does not influence the decisions in terms of the risky or safe alternative (see table 4).

Table 4: Histogram showing numbers of safe and risky decisions in each condition



In the sample, there were 77 males and 158 females. A total of 44 males chose the safe alternative when introduced to the ADP whereas 33 males chose the risky alternative. A total of 108 females chose the safe alternative, whereas 50 females chose the risky alternative. Even though there were more females in our sample, the result indicate that females seem to choose the safe choice more frequently than males. This is because it seems to be a greater gap between the choice of risky and safe for females (see table 5).

Table 5: Histogram showing numbers of safe and risky decisions for gender



Multicollinearity

To see if the data met the assumption of collinearity, a linear regression analysis was conducted to check for multicollinearity between the independent variables. Multicollinearity was not a concern when controlling for ER techniques (Arousal, Tolerance = .99, VIF = 1.01; Analytical processing, Tolerance = .99, VIF = 1.01). Multicollinearity was not a concern when controlling for arousal (ER techniques, Tolerance = 1.00, VIF = 1.00; Analytical processing, Tolerance = 1.00, VIF = 1.00). Multicollinearity was not a concern when controlling for analytical processing (Arousal, Tolerance = 1.00, VIF = 1.00; ER techniques, Tolerance = .1.00, VIF = 1.00). This shows that the independent variables did not correlate with each other.

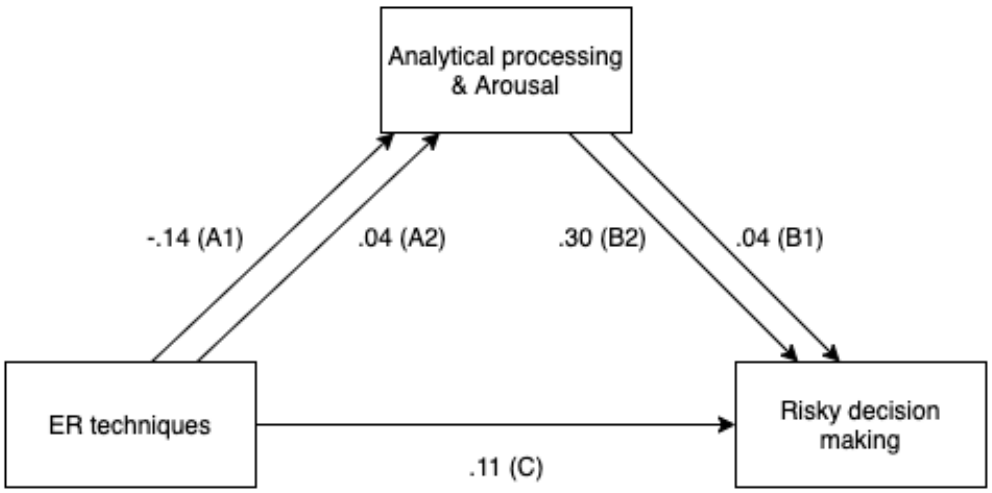
Mediation analysis

Andrew F. Hayes PROCESS mediation analysis version 3 was used to investigate all three hypotheses. It looks at whether levels of arousal and levels of analytical processing mediates the effect the ER techniques have on risky decision-making (see figure 1). The overall model of arousal, as the outcome variable, is F (3,231) = 5.95, $p < 001$, $R_2 = .07$. Results indicate that the ER techniques are not a significant predictor of levels of arousal, B = -.14, SE = .28, $p = .62$. The overall model of analytical processing, as the outcome variable, is F (3,231) = .95, $p = .42$, $R_2 = .01$. The ER techniques are not a significant predictor of levels of analytical processing, B = .04, SE = .07, $p = .58$. When risky decision making was the outcome variable, levels of arousal were not a significant predictor of risky decision-making, B = .04, SE = .07, $p = .58$ nor was the analytical processing, B = .30, SE = .26, $p = .24$. The ER techniques are not significant predictors of risky decision-making when controlling for the mediators, arousal and analytical processing, B = .10, SE = .28, $p = .72$.

The indirect effect was tested using a percentile bootstrap estimation approach, implemented with the PROCESS macro version 3 (Hayes, 2017). These results suggest that the indirect coefficient is not significant for analytical processing, B = .01, SE = .03, 95% CI [-.04, .08], showing that analytical processing does not mediate the effect on risky decision-making. The indirect coefficient is not significant for arousal, B = -.01, SE = .02, 95% CI [-.06, .04], suggesting that arousal does not mediate the effect on risky decision-making.

Since risky decision-making is a categorical variable, a binary logistic regression was calculated to predict risky decision-making scores based on the ER techniques used without the mediating variables, arousal and analytical processing. The Omnibus test shows that the model is not significant, X2 (3, N = 235) = 4.09, p = .25. The model is 65% accurate, PAC = 64.70. Furthermore, the techniques account for only 2 % of the variance in risky decision-making in this sample. The regression coefficients for the ER techniques are B = .11, p = .70, 95 % CI [.65,1.92]. This suggests that the relationship between the ER techniques and risky decision-making is not significant.

Figure 1: Mediation model showing the mediated effect of analytical processing and arousal on the relationship between the ER techniques and risky decision-making



In sum, the participants applying distancing does not show reduced levels of arousal, which indicates that they do not make riskier decisions than the participants in the expressive suppression group (path C). Therefore, hypothesis one is not supported. As shown by the Hayes mediation PROCESS analysis, the results show that arousal did not mediate the effect of ER techniques on risky decision-making (path B1). Hypothesis two is therefore not supported. Furthermore, it revealed that analytical processing did not mediate the effect of ER techniques on risky decision-making (path B2). Hypothesis three is therefore not supported. It is important to note that when examining the relationship between the techniques and levels of arousal (path A1), gender is significant, B = 1.26, SE = .30, p < 001, which is an interesting finding.

Post-hoc analysis

When controlling for gender and age, gender is significant when examining the relationship between the ER techniques and levels of arousal. Due to this finding, a post-hoc analysis was conducted to further investigate this relationship. Since gender is a dichotomous variable, we were unable to examine gender as a mediator on risky decision-making. Andrew F. Hayes PROCESS moderation analysis (model 1) was conducted, with gender as a moderator, to investigate the strength of the relationship between ER techniques and levels of arousal. The overall model is F (3,231) = 5.92, $p < 001$, $R_2 = .07$. Gender have a moderating effect on the relationship between the ER techniques and arousal, B = 1.26, $t(231) = 3.08$, $p <$ 01. Suggesting that gender has a moderating effect on the relationship between ER techniques and arousal.

Discussion

The aim of the study was to investigate whether ER techniques reduced high levels of arousal, induced by a fearful video, and then influenced risky decision-making. Similarly, we also investigated whether information processing and levels of arousal had a mediating effect on risky decision-making. First, we hypothesized that distancing, a sub-technique of cognitive reappraisal, will increase risky decision-making. The second hypothesis examined whether the effect of distancing in the context of fear on risky decision-making will be mediated by reduced arousal. The third hypothesis investigated whether increased analytical processing will mediate the impact distancing has on risky decision-making. None of the hypotheses were supported.

We hypothesized that distancing will increase risky decision-making. We found that the technique is not a significant predictor of risky decision-making. This result contradicts the evidence that when individuals experience fear and are exposed to cognitive reappraisal, riskier behaviour will occur (Heilman et al., 2010). However, it seems that Heilman et al. (2010) used cognitive reappraisal and not the specified distancing technique used in this study, which can explain why we did not find similar results in the context of fear. However, we used distancing as previous research promotes this technique to be effective as research has shown that distancing makes individuals riskier when making decisions in the context of

scenarios inducing anger, sadness (Kross et al, 2005), guilt and shame (Katzir and Eyal, 2013). It is thought to be effective in regulating negative self-conscious emotions and thereby make individuals riskier (Kross et al., 2005; Katzir and Eyal, 2013). Nevertheless, these studies have not examined distancing in the context of fear, which may explain why the results of our study are not similar to these studies. Another explanation for our results could be in line with the appraisal tendency framework (Lerner & Keltner, 2000, 2001; Smith & Ellsworth, 1985). It suggests that negative stimuli elicit different reactions, which constitute for different results. Since we examined fear and not other emotions previously examined, fear could have elicited other reactions. The use of expressive suppression as a control group may be another explanation. Expressive suppression might have been as effective as distancing and thereby not able to create a baseline for the assumed effect or none of the techniques where simply not effective in down-regulating emotions.

The second hypothesis aimed at examining whether reduced arousal will have an effect on the relationship between distancing and risky decision-making. Thus, since hypothesis one is not supported, the hypothesis that lower levels of arousal would have an effect on risky decision-making is not supported. This does not align with the findings of Heilman et al. (2010). They found that cognitive reappraisal increased risky decision-making and suggested that this effect was a cause of reduced levels of arousal. Similarly, it has been evident that cognitive reappraisal has reduced levels of arousal in the context of loss aversion (Sokol-Hessner et al., 2009) and anticipation of reward (Delgado et al., 2008). An explanation for our result may be related to the normal response rate of ADP. According to Tversky and Kahneman (1981), 72 % of participants choose the safe alternative without manipulation, which suggests for a tendency to choose the safe option in a gain frame scenario (ADP).

Moreover, when participants express fear in the context of ADP participants also become loss averse (Lerner & Keltner, 2001; Habib, et al., 2015; She, et al., 2017). Consequently, we argue that the studies above can be seen as historical control groups to our study. Our results show that 74-78 % of the participants chose the safe alternative. Participants may have experienced fear and became loss averse as a result of not using the ER techniques to down-regulate fear or because the ER techniques were simply not effective. A second explanation for why hypotheses

two was not supported could be that the participants were not affected by the fearful video and did not become afraid and responded normally to the ADP despite the use of the ER techniques. A third explanation could be that the video did induce fear, but participants used the ER techniques that reduced fear and made them risk averse. Since the result show that the there is no difference between the groups in terms of arousal, the techniques could have been equally effective.

In relation to risky decision-making and gender, we found a difference between males and females. There were 44 males and 108 females who chose the safe alternative. Even though there were more females in the sample, the result indicate that females seem to choose the safe choice more frequently compared to males. Previous research suggest that females report higher levels of arousal and unpleasant emotions compared to males (Maffei et al., 2015). Thus, the ER techniques could have been more effective for females or they could simply have followed the instructions more carefully as opposed to males. Research has also found that females are generally more loss averse than males (Brooks & Hanks, 2005), which can support our findings.

When examining ER techniques and valence, the fearful video had a negative effect on the participants positive mood. However, it is difficult to pinpoint if this outcome is a result of the ER techniques only being effective for negative emotions. This is because the result showed that the levels of negative mood did not increase after the video, suggesting for an active use of ER. Firstly, with regards to expressive suppression, this is in contrast with research suggesting that expressive suppression is only effective in down-regulating positive emotions (Gross & John, 2003). Secondly, in terms of cognitive reappraisal, our findings are in line with previous research suggesting that cognitive reappraisal is successful in reducing negative emotions (Gross, 1998a; Gross & Levenson, 1997). Another proposed effect could be that the video only influenced participants in a positive mood and not participants already in a negative mood.

The third hypothesis examined whether distancing will influence risky decision-making when mediated by higher levels of analytical processing. We did not find that analytical processing mediated this effect, which contradicts previous research, which suggest that participants in a bad mood tend to implement a more rational

analytical process in decision-making (Elsbach & Barr, 1999; Staw & Barsade, 1993). Moreover, contexts related to uncertainty and fear is suggested to be associated with analytical processing (Tiedens & Linton, 2001). However, not all studies support these findings since intuitive, as opposed to analytical, processing is found to assist individuals with a gut feeling that helps with the decision-making when exposed to danger (Katkin et al., 2001). This has also been found by Coget et al. (2011), where high intensity of fear facilitated intuitive decision-making as opposed to analytical. On another note, it has also been found that individuals do not favor intuitive or analytical processing when making a risky decision, but rather choosing a dual process (Dane & Pratt, 2007; Simon, 1987; Sjøberg, 2003). This can explain why we did not find any mediated effect of analytical processing alone. It can be argued that participants use a dual process consisting of both intuitive and analytical processing (Dane & Pratt, 2007; Simon, 1987; Sjøberg, 2003), only that the CPQ (Bakke et al., 2016) was not able to capture this. Another explanation could be that the measurement of this variable was a self-reported questionnaire. Thus, the type of process used by the participants might not have been captured as the participants might not have been consciously aware that they used a certain information process and therefore not being able to report it. Moreover, since the use of cognitive processing was measured with a self-reported questionnaire after the stimulation, the participants had to reflect the extent they applied the process in retrospect, which might have been difficult.

Limitations

Since this study was carried out online, it made it possible to collect a large number of participants, which can be considered as a methodological strength. However, this study has several limitations. First, we conducted this study online and not in a laboratory, which might have provided better results since it creates an artificial context for studying human behaviour and especially emotions (Mauss & Robinson, 2009). Hence, it was not possible to control whether the ER techniques were thoroughly read and applied by the participants when they watched the fearful video. Participants might not have understood that it was relevant and that they actively had to use the technique presented while watching the video. A reason for this could be that the ER techniques might not have been clearly explained, making it difficult for participants to implement them. Moreover, we did not include a

measure of arousal before the stimulus, making it difficult to validate whether the arousal increased or decreased. Thus, this made it problematic to control for the effectiveness of the ER techniques. This study included an awareness check which partly validated that participants recognized the content of the video introduced. However, since the study was conducted online, there is no guarantee that the participants followed the instructions presented to them before watching the video. Participants were asked to use headphones, view the video in full-screen mode and watch the video until the end. They were also asked to make sure to be free from any interruptions. Not following the instructions may be an explanation for the non-significant results. Furthermore, the questionnaires used in this study were self-reported, which has its limitations in terms of participants not being honest or reflective in terms of how they made the decision. Moreover, in relation to PANAS, participants might not be honest or aware of how they felt during the week, so they might have reported less correct results.

Theoretical and practical implications

Our findings have important implications for practice. In general, when controlling for gender and age, gender was found to be significant when examining the link between levels of arousal, ER techniques and risky decision-making. A post-hoc analysis also revealed that gender has a moderating effect on the relationship between the ER techniques and arousal. This finding can be useful in the recruitment process for organizations operating in uncertain environments such as police and fire departments. As mentioned, previous research state that females report higher levels of fear when exposed to a fearful situation compared to males (Brody et al., 1995). Moreover, females report more negatively to negative stimuli, whereas males report more positively to positive stimuli (Stevens & Hamann, 2012). These findings constitute a difference between males and females when exposed to emotional stimuli. This also supports the appraisal tendency framework (Lerner & Keltner, 2000, 2001; Smith & Ellsworth, 1985) suggesting that negative stimuli elicit different reactions. It can be suggested that not only the different negative emotions, such as anger and fear, elicit different reactions, but also that gender has an effect in these reactions. These findings can also be important for training aspects in terms of applying the right training for males and females in relation to handling uncertain and fearful situations.

Future directions

Future research should examine the effect gender could have on levels of arousal in relation to ER techniques and risky decision-making, since we found gender to be significant. Furthermore, research should investigate the direct effect of ER techniques on levels of arousal in a laboratory, as this study first intended to, in order to control for arousal being induced with more certainty (Mauss & Robinson, 2009). Additionally, levels of arousal and fear might also be more strongly induced with the use of VR glasses as a result of exposing the participants to an experience that is closely associated with real life sensations (Hewig et al., 2005). Future research may also examine other ER techniques, such as cognitive change (Strauss et al., 2013), when investigating the relationship between arousal and risky decision-making. Moreover, future research should go beyond the direct effect of ER techniques and investigate other mechanisms that could moderate this effect. In line with the appraisal tendency framework (Lerner & Keltner, 2000, 2001; Smith & Ellsworth, 1985), gender should be further investigated because it can be an additional explanation for the emotional responses caused by different types of negative stimuli. Future research should further investigate whether ER is only effective for negative emotions and not positive emotions. Additionally, examine whether there is a difference between expressive suppression and cognitive reappraisal in down-regulating negative emotions. It might also be beneficial to examine if the negative manipulation (the fearful video) only has an effect on positive mood.

Concluding remarks

The current study did not find supporting evidence for the three hypotheses examined. Previous research has found the appraisal tendency framework to be an important aspect when examining the study of emotions (Lerner & Keltner, 2000, 2001; Smith & Ellsworth, 1985). This framework suggests that negative stimuli elicit different reactions and since we found gender to have an effect, we suggest that gender can be an important factor when examining emotions and risky decision-making. Furthermore, since our results did not show that analytical processing mediated the relationship between the ER techniques and risky decision-making, participants may have used a dual process consisting of both intuitive and

analytical processing (Dane & Pratt, 2007; Simon, 1987; Sjøberg, 2003). To our knowledge, we are one of the first to examine the gap between the relationship between ER techniques and risky decision-making with the explanatory mediators' arousal and analytical processing. Moreover, several studies support the notion of an effect to be found (Coget et al., 2011; Heilman et al., 2010). It is therefore important to further investigate this relationship in a controlled environment to fully capture the hypothesized effect.

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Appendices

Appendix A

A1

Welcome to our experiment!

Your participation will take approximately 15-20 minutes. If you would like more information about the study and what it means to participate, you can read the extended information letter here: information letter NSD (updated).doc (if the link does not open, try reopening this survey in a different web browser).

By checking the answer option "Yes, I agree to participate in the study" you agree to participate in the study and agree that your information will be processed until the project is completed, approx. 31.08.2020. In addition, you agree that you have received and understood the information about the project and that you have been given the opportunity to ask questions if you have questions regarding the study.

○ Yes, I agree to participate in the study (1)

This study is divided into two parts. First, you will be asked to answer a short questionnaire and then watch a short video that will only take two minutes. Next, you will be asked to answer some questions. Please note that it is very important that you carefully **read the instructions**. This is important because your responses cannot be used in our study if instructions are not properly followed.

Please note! The video contains potentially disturbing scenes that can cause discomfort.

A2

Positive and Negative Affect Schedule (PANAS-SF; Watson, Clark & Tellegen, 1988)

Indicate the extent you have felt this way over the past week

	Very slightly or not at all (1)	A little (2)	Moderately (3)	Quite a bit (4)	Extremely (5)
Interested	○	○	○	○	○
Distressed (very concerned/worried)	○	○	○	○	○
Excited	○	○	○	○	○
Upset	○	○	○	○	○
Strong	○	○	○	○	○
Guilty	○	○	○	○	○
Scared	○	○	○	○	○
Hostile (feeling angry/not friendly)	○	○	○	○	○
Enthusiastic	○	○	○	○	○
Proud	○	○	○	○	○
Irritable (easily annoyed)	○	○	○	○	○
Alert (attentive/aware)	○	○	○	○	○

Ashamed	○	○	○	○	○
Inspired	○	○	○	○	○
Nervous	○	○	○	○	○
Determined (feeling sure about decisions)	○	○	○	○	○
Attentive	○	○	○	○	○
Jittery (moving or shaking slightly uncontrollably)	○	○	○	○	○
Active	○	○	○	○	○
Afraid	○	○	○	○	○

A3

The link to the video presented

https://www.youtube.com/watch?time_continue=1&v=cxyvx-BVuKY&feature=emb_title&fbclid=IwAR2Z4Hs3Y_M2JWlxkGfavzsn52F3W8bpqabWkHZELB975TfZBUuab4f_680

A4

The Asian Disease Problem (ADP; Tversky & Kahneman, 1981)

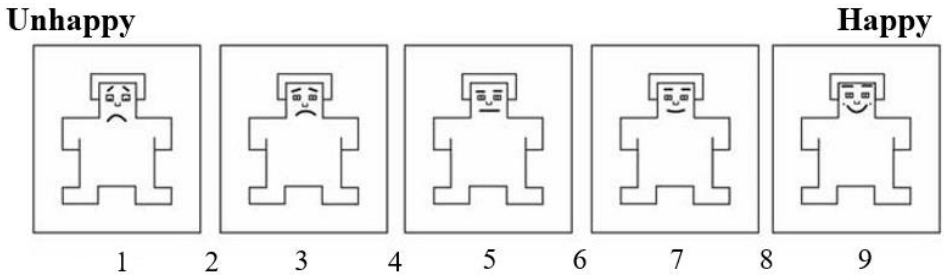
Norway is currently preparing for the outbreak of the corona virus. Imagine that the authorities expect the virus to kill 600 people, and that two alternative programs have been proposed to fight the disease. Assume that the exact scientific estimates of the consequences of the programs are as follows. Which program do you choose?

○ If program A is adopted, 200 people will be saved. (0)

○ If program B is adopted, there is a one-third probability that 600 people will be saved and a two-thirds probability that no people will be saved. (1)

A5

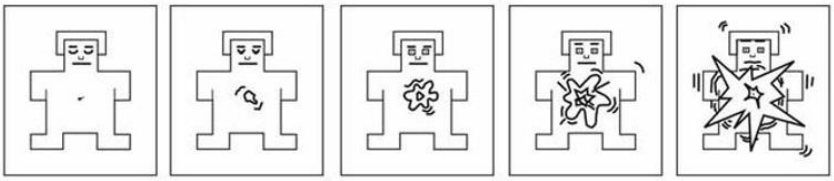
Manipulation check, as measured with the Self-Assessment Manikin (SAM) of physiological arousal level (Bradley & Lang, 1994)



Look at the illustration above and please indicate, using the scale represented below, how you FELT when watching the video.

	1	2	3	4	5	6	7	8	9
How did you feel?	○	○	○	○	○	○	○	○	○

Calm **Aroused (activated)**



Look at the illustration above and please indicate, using the scale represented below, how you FELT when watching the video.

	1	2	3	4	5	6	7	8	9
How did you feel?	○	○	○	○	○	○	○	○	○

A6

Cognitive Processing Questionnaire (CPQ; Bakken, Hærem, Hodgkinson & Sinclair, 2016)

Think back to the task you performed where you were asked to choose a program to combat the corona virus in Norway and please answer the following questions. For each statement below,
indicate on the scale whether you agree or disagree with the statement (1 = strongly disagree to 5= strongly agree)

	Strongly disagree (1)	Disagree (2)	Neither agree or disagree (3)	Agree (4)	Strongly agree (5)
I considered carefully all alternatives	○	○	○	○	○
When making a decision, I considered all options	○	○	○	○	○
I evaluated systematically all key uncertainties	○	○	○	○	○
I analyzed all available information in detail	○	○	○	○	○
I considered all consequences of my decision	○	○	○	○	○
It was easy to get a clear picture of what needed to be done	○	○	○	○	○

I had enough knowledge to make the best decision almost immediately	○	○	○	○	○
When I had made a decision there was no doubt that this was the right action to take	○	○	○	○	○
My knowledge of similar situations led me to quickly recognise a solution	○	○	○	○	○
It was more important to make a quick decision than to wait for additional information	○	○	○	○	○

It was more important to make a quick decision than to think about all possible consequences	○	○	○	○	○
Even if the information was uncertain I tried to make a quick decision	○	○	○	○	○
It was better to make a quick and perhaps faulty decision than making the decision to late	○	○	○	○	○

If the information was conflicting I tried to look for additional information that could disconfirm my assumptions	○	○	○	○	○
If I was uncertain about what to do I tried to look for information that would narrow the choices	○	○	○	○	○
Even if a decision seemed obvious I took time to think through if I might have overlooked something	○	○	○	○	○

I did not make any decision until I had thought about all possible outcomes, even if some were highly unlikely	○	○	○	○	○
Before I made my decision I tried to think if there was any information that could challenge my assumptions	○	○	○	○	○
I double-checked the description of the situation before making the decision	○	○	○	○	○
I made the decision because it felt right to me	○	○	○	○	○

I based the decision on my inner feelings and reactions	○	○	○	○	○

A7

Awareness Check

Which of the following best describes what you saw in the video?

- ○ An employee getting fired
- ○ A frightened woman at a mental hospital
- ○ A group of students complaining about exam