DOES EMOTION ELICITING INFLUENCE RISK TAKING BEHAVIOR?

İpek Ergönül Hürman * , Hilal Yorulmaz, Sinem Gülser Karaman***, Nur Başakhan Uzun****, Selin Ilgız*****, Hazal Yalman******, Aybüke Küçükakdağ*******, Çağdaş Güdücü*********, Adile Öniz*********

ABSTRACT

Objective: In the related literature; the effects of emotion on behaviour have been commonly investigated. The main purpose of this research is to examine the influence of different emotions on risk-taking behaviour.

Methods: Risk-taking behaviour have been investigated in three different conditions: happiness, fear and neutral emotion. The participants were manipulated by viewing photos of inducing happiness, fear or neutral emotion in the form of slides. The Balloon Analogue Risk Task (BART) was used to measure the participants' risk-taking tendencies.

* İpek Ergönül Hürman, Dokuz Eylül University, Faculty of Letters, Department of Psychology , ergonulipek@gmail.com, 0000-0002-5429-0387

**Hilal Yorulmaz, İzmir University of Economics, Faculty of Arts and Sciences, Department of Psychology , hilalyorulmaz13@hotmail.com, 0000-0002-2654-3682

***Sinem Gülser Karaman, Hacettepe University, Faculty of Letters, Department of Psychology , sinemmkaramann@gmail.com, 0000-0002-0910-8419

****Nur Başakhan Uzun, Dokuz Eylül University, Faculty of Letters, Department of Psychology , basakhan.uzun@gmail.com, 0000-0001-7630-3428

*****Selin Ilgız, , Dokuz Eylül University, Faculty of Letters, Department of Psychology, selin.ilgiz@gmail.com, 0000-0003-1116-4062

******Hazal Yalman, İzmir University of Economics, Faculty of Arts and Sciences, Department of Psychology, hazallyalman@gmail.com, 000-0002-6533-3418

*******Aybüke Küçükakdağ, Dokuz Eylül University, Faculty of Letters, Department of Psychology, aybukekad@gmail.com, 0000-0003-0858-8323

********Çağdaş Güdücü, Dokuz Eylül University, Faculty of Medicine, Department of Biophysics, cagdas.guducu@gmail.com, 0000-0002-7735-4048

*********Adile Öniz, Near East University Faculty of Health Sciences, adile.oniz@gmail.com, 0000-0002-6619-4106

Results: In this study, a statistically significant difference found in money earned from yellow and orange balloons depending on emotion. There was no statistically significant difference in pumps, explosions, and money earned from blue and total balloons among emotions.

Conclusion: In line with the related literature, participants tend to collect more money in fear conditions. In addition, the fact that the money collected in happiness and fear conditions is more than neutral, reveals the effects of the emotions on risk-taking behavior.

Keywords: Emotion Eliciting, Risk Taking, Decision Making

DUYGU UYANDIRMA RİSK ALMA DAVRANIŞINI ETKİLER Mİ?

ÖZ

Amaç: İlgili literatürde; duygunun davranış üzerindeki etkileri yaygın olarak araştırılmıştır. Bu araştırmanın temel amacı, farklı duyguların risk alma davranışı üzerindeki etkisini incelemektir.

Yöntem: Risk alma davranışı üç farklı koşulda incelenmiştir: mutluluk, korku ve nötr duygu. Katılımcılar, mutluluk, korku veya nötr duygu uyandıran fotoğrafları slaytlar şeklinde görüntüleyerek manipüle edilmiştir. Balon Analog Risk Görevi (BART), katılımcıların risk alma eğilimlerini ölçmek için kullanılmıştır.

Bulgular: Bu çalışmada duyguya bağlı olarak sarı ve turuncu balonlardan kazanılan paralarda istatistiksel olarak anlamlı fark bulunmuştur. Aynı anlamlı fark mavi ve toplam balon patlama, pompa veya parada görülmemiştir.

Sonuç: İlgili literatür doğrultusunda katılımcılar korku koşullarında daha fazla para toplama eğilimindedir. Ayrıca mutluluk ve korku koşullarında toplanan paranın nötr durumdan çok daha fazlası olması duyguların risk alma davranışı üzerindeki etkilerini ortaya koymaktadır.

Anahtar Kelimeler: Duygu Uyandırma, Risk Alma Davranışı, Karar Verme

1. INTRODUCTION

In recent years, studies have examined risk-taking behaviour in different areas such as economy, neuroscience and psychology (Jessor, 1991; Moore & Gullone, 1996). Risks have been identified in various ways; with frequent themes including the balance of potential rewards and losses and the value of the link between short-term gain and long-term consequences(Leather, 2009). Risk-taking behaviour can be described as any deliberately or unconsciously managed behaviour with a perceived lack of control over its outcome, as well as its potential advantages or disadvantages for one's own or others' physical, financial or psychosocial well-being (Trimpop, 1994). Past studies have investigated the links between risk-taking behaviour and gender (Bergman &

Scott, 2001; Michael & Ben-Zur, 2007; Morsünbül, 2009), personality (Alohali et al., 2018; McGhee et al., 2012; Nicholson et al., 2005; Skeel et al., 2007), age (Escobedo, 1997; Trimpop et al., 1998) and psychopathology (Hunt vd., 2005; Ruchkin et al., 2006; Wade et al., 2022). Nicholson et al. (2005) studied the effect of personality factors on risk-taking behaviour and reported that high extraversion (especially sensation-seeking) and openness supply the motivational force for risk-taking (Nicholson et al., 2005). According to Moore and Gullone (1996), adults' and adolescents' perceptions of positive and negative outcomes of risky decisions and behavior are different Adolescents are more likely to see the positive side of risky behavior than adults (Moore & Gullone, 1996).

Ekman introduced the existence of basic emotions regardless of culture: surprise, fear, disgust, anger, happiness, and sadness (Ekman & Friesen, 1971). Emotions appear to evolve through their adaptive value in coping with basic life tasks (Ekman, 1992). Risk-taking behaviour has also been investigated within emotional concepts. Research has revealed that risk tendency among different emotions also differs between the two age groups (Chou et al., 2007). Happy older individuals were most likely to select the risky option, followed by those who were neutral and then by those who were sad. Individuals with positive emotions tend to be more cautious. They are more concerned about losing money, are more likely to avoid losses, and are self-protective (Arkes et al., 1988; Isen et al., 1988; Isen & Geva, 1987). In addition, loss-related thoughts were expressed more by subjects in the positive affect condition than those in the control condition (Isen & Geva, 1987). Another study revealed that the subjects in positive affect tended to bet less than those in the control condition in a high-risk bet (Isen & Patrick, 1983). Further research claimed that regarding the emphasis on potential loss; positive affect can increase both risk-averse and risk-prone behavior (Arkes et al., 1988; Nygren et al., 1996). These studies generally have associated positive effects with high-risk behavior, but if subjects are happy; they are more concerned with the potential loss and more likely to show risk-adverse behavior. On the contrary; there are studies with different arguments about the association between affective states and risk-taking behavior. It has been reported that people with good emotions do not see any danger or threat in their environment and consider themselves safe (Grable & Roszkowski, 2008). Hence, they might be willing to take some risks. However, negative states cause people to see their situation as more problematic, where they might end up making less risky decisions. It has been reported that angry people were more optimistic while making risk estimations and made riskier choices, whereas fearful people were more pessimistic about risk estimations and avoided risky choices (Lerner & Keltner, 2001). Another study examined the effect of anger and disgust on risk-taking behavior while considering gender differences. Results showed that anger increases risk-taking behavior

in men, whereas disgust decreases risk-taking behavior in women (Fessler et al., 2004). Nguyen and Noussair (2014) reported that feeling good positively correlates with high risk-taking decisions; however, when emotions (fear, anger, happiness or surprise) become stronger, risk-adverse decisions increase (Nguyen & Noussair, 2014).

In the related literature, it was reported that emotion has contradicting effects on risk-taking behavior. To gain a better understanding of how positive and negative emotions affect risk-taking behavior, we aimed to investigate the relationship between risk-taking and emotions through three different emotion states; happiness, fear and neutral in the same healthy adult participants. **We hypothesized that positive mood induction will increase the risk taking behavior while negative emotion will decrease this behavior.**

2. Method

The study has been approved by the Clinical Ethical Committee.

2.1. Participants

Forty-four healthy participants (19 males) between the ages of 18 and 29 (M = 22.11, SD = 1.54) were recruited for the study. Four participants were excluded because they failed to complete all three sessions. Therefore, there were 48 participants in the beginning, and the participation rate was %92. Before participating, the subjects were required to complete several forms, such as the Informed Consent Form, Personal Information Form, Hand Preference Test, Epworth Sleepiness Scale, STAI-TX (The State-Trait Anxiety Inventory), and SCL-90 (Symptom Checklist-90).

The Edinburgh Hand Preference Test was used to measure participants' hand preference for 10 everyday tasks. Participants evaluate the list of given tasks with adjacent ''left'' or ''right'' columns. The Epworth Sleepiness Scale is a short, easy-to-use questionnaire that subjectively measures sleepiness in everyday life situations. The users rated their sleep potential in eight situations. They rated it on a 4-point scale, with minimum scores of 4 points and maximum of 24 points. The normal score range is 0–10. The State–Trait Anxiety Inventory (STAI-TX) assesses anxiety in two domains: State and Trait. In this study, we used the state anxiety form, which determines an individual's feelings at present. The SCL-90 consists of 90 items covering a very wide range of psychiatric symptoms, including feelings, emotions, thoughts, consciousness, behavior and habits, interpersonal relationships, diet, and sleep.

People with any chronic, psychological, or neurological diseases or phobias were not included in the study.

2.2. Materials

The Balloon Analogue Risk Task: BART measures risk-taking tendency. The screen shows a simulated balloon, a button to pump the balloon up, a reset button displayed as Collect $$$, a permanent bank labeled "Total Earned" that shows how much money the participants were able to earn, and the money earned from the last balloon labeled as "Last Balloon". There are 90 balloons and participants are expected to pump to inflate. For each pump, participants received 5 cents, and they could transfer it to the permanent bank if they collected it before the balloon exploded. If the balloon explodes, they lose all the money for that balloon in the temporary bank, but the amount in the permanent bank remains the same. Balloons exploded at some point, and this point was different for each balloon (Figure 1). Particular data concerning the balloon explosion time is not given to the participants, who are educated that the balloons can explode with a pop sound from the first pump through enough pumps to fill the screen. The algorithm calculates the explosion points determined by constructing an array of N numbers. Blue, orange, and yellow balloons have 1–128, 1–8, and 1–32 integers, respectively. These colors and integrals represent low, medium or high payoff values (0.5 cents, 1.0 cents, and 5.0 cents per pump). Moreover, the money that the participants earned from the last balloon was displayed in the Last Balloon box. Therefore, the main task was collecting the money before the balloon exploded and earning as much as possible (Lejuez et al., 2002a).
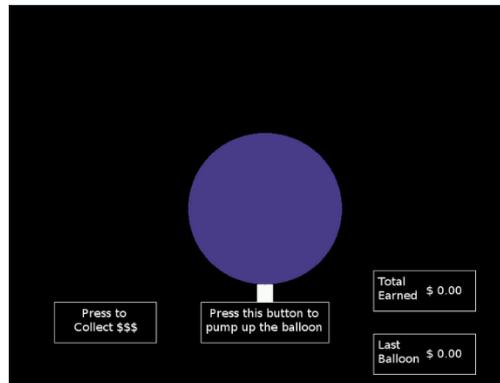

Figure. 1. BART Trial Screen (Mueller, 2010)

Emotion Eliciting Photos: A Slideshow was prepared to induce specific emotions. Photos were derived from the International Affective Picture System (IAPS) with permission (Lang et al., 2008). The IAPS stimuli have been listed in more than 374 citations in Science Direct in the past three years. Research suggests that sustained exposure to unpleasant pictures may induce short-term emotion elicitation (Smith et al., 2005). Research using physiological measurements showed a congruency between self-reports and physiological information, setting IAPS as a reliable apparatus for emotion

elicitation (Branco et al., 2023). Calvo et al. (2009) also reported that reaction times may differ between display durations of pictures. Their findings showed that 250 ms of exposure would be sufficient to process the emotional valence of a picture (Calvo & Avero, 2009). The presented stimuli sets were selected following Mikel's study, which provides a categorical structure of IAPS photos and regulated emotions (Mikels et al., 2005). In our study, each emotion-inducing slideshow included 47 photos, and the duration of the display was set at 5 s per photo. Overall, every emotion eliciting the slideshow lasted approximately four minutes.

2.3. Procedure

This study was conducted at the Dokuz Eylul University Department of Biophysics Human Factors Cognitive Sciences Laboratory. Data were collected between May and September 2019. Participants were invited through announcements on the department's website. In a well-lit recording room, the participants were seated on comfortable chairs and completed the sessions on a desktop computer. On the study days, emotion-eliciting photos were presented to the participants in a PowerPoint slide show. Following this step, BART was administered using the Psychology Experiment Building Language Program(PEBL)   (Mueller, 2010). Every participant attended all three groups. The neutral emotion group was asked to perform BART without watching any slideshows. Participants were asked to attend three different sessions on three different days. This with-in-subject design provided a control group of participants and therefore reduced the amount of error arising from natural variance between individuals. Also allows for the control of individual differences and individual response biases (Webb et al., 2012).

There was at least a 48-h interval between each session day. The emotion order was randomized to minimize the order effect.

2.4. Statistical Analysis

The Statistical Package for Social Sciences (SPSS 20) was used for analyzes The Shapiro–Wilk test was used for the normality of the data. Parametric data were analyzed with ANOVA. A one-way repeated-measures ANOVA was conducted to compare risk-taking behavior between the emotional states of participants after three conditions (happy, fearful, neutral). Mauchly's test indicated that the assumption of sphericity had been violated, $\chi^2 (2) =, p < .01$, therefore degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity. The Friedman test was used to analyze nonparametric data. For pairwise comparisons, 2-Related samples were used.

3. Results

In this study, the risk-taking behavior of 44 participants among three different emotion states (happiness, fear, and neutral) was investigated.

The means and standard deviations of the Balloon Analogue Risk Task are presented in Table 1.

	Pumps						Explosion						Money					
	Fear		Neutral		Happiness		Fear		Neutral		Happiness		Fear		Neutral		Happiness	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Yellow	149.50	40.45	145.99	42.34	150.36	39.04	14.59	5.24	26.52	60.24	14.45	5.32	128.09	186.50	78.28	144.38	105.87	163.27
Orange	91.61	15.44	91.02	17.86	91.91	15.66	19.73	4.70	19.77	5.53	19.80	4.68	58.83	75.65	30.94	59.86	45,100	71.78
Blue	1,007.89	624.32	1,138.61	675.24	963.90	606.96	6.82	4.29	7.25	5.30	6.95	4.67	427.57	721.89	1,029.24	1,436.81	865.73	1,468.78
Total	1,249.00	620.83	1,239.34	661.81	1,206.16	615.01	41.14	10.68	41.02	11.84	41.20	11.20	1,188.56	1,692.75	813.13	1,350.98	585.80	1,150.60

Table 1 Mean and standard deviation values of risk-taking behavior among balloon pumps, explosions, and money depending on emotion.

Statistically significant difference was found in the amount of money earned from yellow balloons depending on emotion, $\chi2(8,469) = 2.000$, p = .014. The mean of money points earned from yellow balloons in neutral conditions is M=78.27, however, in fear and happy conditions, the means are M=128.09 and M=105.86. On the other hand, the same significant difference has not been observed in pumps and explosions for yellow balloons among emotions. F (1.943, .225), p = .793), $\chi2(2) = .609$, p = .738, respectively (Tables 2 and 3).

There was no significant difference in pumps and explosions for orange balloons among emotions, F (1.923, .053), p =,943), F (1.970, .003), p = .997) However, there was a statistically significant difference in the amount of money earned from orange balloons, F (1.910, 3.443), p = .039). The mean of money earned from orange balloons in neutral conditions is M=30.93, however, in fear and happy conditions means are M=58.82 and M=45.99 (Tables 2 and 3).

There was no significant difference in pumps, explosions, and money earned from blue balloons among emotions, $\chi2(2) = 0.320$ p = 0.852, $\chi2(2) = 0.038$ p = 0.98, $\chi2(2) = 0.720$ p = 0.698, respectively (Tables 2 and 3).

There was no statistically significant difference in pumps, explosions, and money earned from total balloons among emotions, $\chi2(2) = .727$, p = .695, F (1.966, .005), p = .994), $\chi2(2) = 3.455$, p = .178, respectively (Tables 2 and 3).

	df	F	Sig.
Yellow Pump	1.943	0.225	0.793
Orange Pump	1.923	0.53	0.943
Orange Explosion	1.97	0.003	0.997
Orange Pump	1.91	3.443	0.039
Total Explosions	1.966	0.005	0.994

Table 2 2 Repeated measures ANOVA with a Greenhouse-Geisser correction for balloon pumps, explosions, and money depending on emotion.

	Yellow Explosion	Yellow Money	Blue Pump	Blue Explosion	Blue Money	Total Pump	Total Money
N	44	44	44	44	44	44	44
Chi-Square	0.609	8.469	0.320	0.038	0.720	,727	3455
df	2	2	2	2	2	2	2
Asymp. Sig.	0.738	0.014	0.852	0.981	0.698	,695	,178

Table 3 Friedman Test Results for balloons pumps, explosions and money depending on emotion

4. Discussion

This study investigated the relationship between risk-taking behavior and three different emotion states; happiness, fear,, and neutral. The risk-taking behavior was evaluated in terms of average pumps, number of balloon explosions, and total earned money among three different types of balloons that have different probabilities of explosion. Our results showed a statistically significant difference in money earned from yellow and orange balloons depending on emotion.

Related literature has reported that happy emotions may be associated with high risk-taking behavior. Schwarz and colleagues (1990) indicated that positive affect may be associated with high risk-taking (Schwarz, 1990). Yuen and Lee (2003) suggested that feeling happy makes people perceive choices as less risky and outcomes more favorable. The smaller amount of money earned in the happy emotion group in the total tasks can be a result of the perception of gain. Another study's findings also revealed that individuals with positive affect or feeling good felt that the impact of potential losses would be worse (Isen et al., 1988). One study revealed that subjects who are in positive effect tend to bet less than those in control condition in a high-risk bet since they are more concerned about the potential loss (Isen & Patrick, 1983). The lower number of pumps in the total process in the happy group supports this potential loss idea.

In contrast, in this study, the money earned in the yellow and orange balloons in the fear condition had a higher mean than in the neutral condition. Schwarz et al. also stated that negative states cause people to see their situation as more problematic. They are more likely to avoid further negative outcomes and put more effort into their thinking strategies. Therefore, they may end up taking less risky decisions. Likewise, in our study, participants tended to collect more money in fear conditions and try to avoid an explosion and escape from risk-taking behavior.

In the related literature, it has been reported that blue balloons are more likely to measure risk-taking behavior due to their widest range of pumps (Lejuez et al., 2002a). In the current study, there was no significant difference

between emotions in terms of the pumps for blue balloons. Although there was an excess of collected money in the neutral condition, this was not statistically significant. In this study, no risk-taking behavior was observed in the blue balloon in any emotional condition. In contrast, the mean number of pumps for blue balloons is less than the pumps for orange and yellow balloons. In addition, although there is no statistically significant difference, money collected in neutral conditions in blue balloons is more than in happy and fearful conditions.

Vigil-Colet (2007) investigated the relationship between impulsivity and decision making. Results showed that individuals who scored higher in Dickman's impulsivity inventory on dimensions such as functional impulsivity also tend to make impulsive decisions if they perceive a positive consequence behind it. The BART task was used to investigate functional impulsivity, and results showed that participants adopted an impulsive decision-making style when circumstances highlight that there will be rewards, similar to the low balloon explosion probability condition. Yellow and orange balloons tend to explode earlier than blue balloons, which enables us to observe impulsivity during pumps for balloons (Vigil-Colet, 2007). In our study, the results showed that the number of pumps for yellow and orange balloons was almost equal among emotions. In addition, the number of explosions for yellow balloons in neutral conditions was higher than those in happy and fearful conditions. Lastly, there is a significant difference in money earned from orange and yellow balloons among emotions. These results may indicate that the participants impulsively tried to collect money, which led to increased money in the bank and decreased number of exploded balloons in the happiness and fear conditions. On the other hand, there was a significant difference in the amount of money collected in the yellow and orange balloon conditions among the emotions. The money collected separately in both fear and happiness conditions was more than the money collected in neutral conditions.

Moore and Gullone (1996) reported that adults' and adolescents' perceptions of positive and negative outcomes of risky decisions and behaviors varybehavior. Adolescents are more likely to see the positive sides of risky behavior than adults, who engage in risky behavior if they think there is a reasonable chance of pleasant outcomes (Moore & Gullone, 1996). Chassin et al. (1989) reported that young people who engage in negative forms of risk-taking may also be more likely to engage in, or at least have the potential for, more positive, constructive forms of teenage unconventionality, reflecting independence and creativity. Underlying personality traits, such as impulsivity and sensation-seeking, may link adaptive and maladaptive forms of risk (Chassin et al., 1988). In our study, the participants' ages were between 18 and 29 years and they were in emerging adulthood. The impulsive behavior

that comes from the yellow and orange balloons may be related to the participants' developmental stage.

Nguyen and Noussair (2014) investigated the correlation between the strength of emotions and risk-averse decisions Participants were asked to make risky choices while their facial expressions were monitored using facial expression software. The results showed that positive affect positively correlates with high risk-taking decisions; however, when emotions (fear, anger, happiness or surprise) become stronger, risk-adverse decisions increase (Nygren et al., 1996). The current study investigated the relationship between emotion induction and risk-taking behavior. However, although there was enough emotion induction to reveal the impulsive behavior of the participants in the yellow and orange balloon money condition, this emotion induction was not strong enough to reveal risk-taking behavior in the blue balloon money.

One of the limitations of our study was the absence of "pop" sound, which is used to give a more realistic effect in similar research (Lejuez et al., 2002). Another limitation was the limited environment for this experiment. For example, in the fear condition, there was no fearful background music/sound or ambience to make participants more scared. This resulted in a lack of information about the participants' concentration on the given state of emotion, whether they were scared or happy enough for a sufficient time. In addition, for the neutral condition, there were no neutral pictures to induce emotion, and participants directly took the BART test. Gross and Levenson (1995) reported that self-reports following emotion-eliciting procedures are not an essential condition for the evaluation of emotions. However, verbal feedback from a participant was received at the end of every session to evaluate the emotion-eliciting procedure. This verbal feedback can be considered a limitation.

For further research, we suggest taking a heart rate measurement for the manipulation check to determine participants' emotions. In fearful and happy conditions, the environment could be more effective with music and light to induce emotion better in the participant. In addition, the effects of other emotions such as surprise, disgust, anger, and sadness can be examined within the same study group to have a full understanding of how emotion eliciting can affect risk-taking behavior. In addition, a "pop" sound might be used to make a greater impact on participants. Lastly, BART can be adapted and played in virtual reality to make participants feel more realistic about the game, which might affect their risk-taking behavior.

Main Points

- Risk-taking behavior can be modulated by emotion.

- Fear and happiness condition make people collect more money.

•   Regarding less exploded balloons, impulsivity can be observed especially during the happiness and fear conditions

CONFLICT OF INTEREST

ETHICS COMMITTEE APPROVAL / PARTICIPANT CONSENT

FINANCIAL SUPPORT

AUTHOR CONTRIBUTIONS

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