

THE RELATIONSHIP BETWEEN EXAM PERFORMANCE AND EMOTION
REGULATION CAPACITY OF UNIVERSITY STUDENTS

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REGULATION CAPACITY OF UNIVERSITY STUDENTS**

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I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

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ABSTRACT

THE RELATIONSHIP BETWEEN EXAM PERFORMANCE AND EMOTION REGULATION CAPACITY OF UNIVERSITY STUDENTS

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The main objective of this thesis is to examine the effect of cognitive reappraisal and expressive suppression and on exam performance in Turkish university students. The study is based on the “appraisal-tendency framework” of Lerner and Keltner (2000) which defines “cognitive appraisal” as “cognitive meaning making that leads to emotions”, (Lerner, Li, Valdesolo, and Kassam, 2015). Expressive suppression, on the other hand, is defined as an aspect of emotional regulation where individuals mask their facial giveaways to hide their emotional states (Niedenthal, Ric, and Krauth-Gruber, 2006). Based on the cognitive reappraisal and expressive suppression abilities of the students, their affective responses (PANAS) to anxiety before and after watching a stress-inducing video were measured to find out if emotional regulation abilities influence exam performances of the students. 63 students with medium-level of exam anxiety based on the Test Anxiety Questionnaire (Nist and Diehl, 1990) participated. Responses based on PANAS scores indicate neither there was any significant difference of emotional regulation abilities on exam performance nor were they affected significantly by participants’ perception of the stressful video. Results of the emotional regulation abilities suggest that expressive suppression has a significant effect on exam performances. The students who suppressed the expression of their emotions less could increase their exam scores as measured in two exams at the beginning and end of the term.

Keywords: Emotion, Exam Anxiety, Emotional Regulation, Cognitive Reappraisal, Expressive Suppression

ÖZ

ÜNİVERSİTE ÖĞRENCİLERİNİN DUYGU KONTROL KAPASİTELERİ İLE SINAV PERFORMANSI ARASINDAKİ İLİŞKİ

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Bu tezin amacı, bilişsel yeniden değerlendirme ve dışavurumcu bastırmanın Türk üniversite öğrencilerinin sınav performansları üzerine etkisini incelemektir. Bu çalışma; bilişsel yeniden değerlendirmeyi duygulara yol açan bilişsel anlamlandırma olarak tanımlayan (Lerner, Li, Valdesolo, and Kassam, 2015) ve Lerner ve Keltner (2000) ait olan değerlendirme eğilimi taslağı temel alınarak yapılmıştır. Öte yandan dışavurumcu bastırma, bireylerin yüzle ilgili açığa vurumları maskeleyerek duygu durumlarını saklamak için kullandıkları bir duygu kontrol metodu (Niedenthal, P. M., Ric, F., and Krauth-Gruber, S. 2006) olarak tanımlanmıştır. Öğrencilerin bu iki duygu kontrol kabiliyeti temel alınarak, stresli bir sahneye sahip bir videoyu izlemeden önce ve izledikten sonra endişeye gösterdikleri duygusal tepkileri, duygu kontrol kabiliyetleri ile sınav performansı arasında bir ilişki olup olmadığını bulmak için ölçülmüştür. Sınav Stresi Anketi (Nist and Diehl, 1990) temel alınarak, 63 tane orta seviye sınav stresine sahip öğrenci katılım göstermiştir. Duygu kontrol kabiliyetlerinin sonuçları, sınav performansında dışavurumcu bastırmanın önemli bir etkisi olduğu gözlemlenmiştir. Duygularını daha az bastıran öğrenciler, dönem başı ve sonundaki sınavları doğrultusunda puanlarını yükseltebilmektedir. PANAS skorları doğrultusunda ölçülen tepkiler ise, duygu kontrol kabiliyetleri arasında, sınav performansı üzerinden, kayda değer bir fark göstermemiştir.

Anahtar Kelimeler: Duygu, Sınav Stresi, Duygu Kontrolü, Bilişsel Yeniden Değerlendirme, Dışavurumcu Bastırma

To my family...

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CHAPTER 1

INTRODUCTION

There is a common problem among students of any kind which haunts them throughout their academic : “*Exam anxiety*”, or “*Test anxiety*”. It is described as a condition which brings out many things together such as tension, worry, fear of failure; all of which can happen during an exam or before it (Zeidner, 1998). As a physiological condition where students feel extreme cases of discomfort and nervousness, exam anxiety is known to have a negative effect on the learning process and overall performances of students (Andrews and Wilding, 2004). To give an example for the effect of exam anxiety on academic performance, there is evidences provided that the grade performances of students with high levels of exam anxiety are 12 % lower than that of their peers who have low levels of exam anxiety (Hembree, 1988; Cassady and Johnson, 2002; McDonald, 2010).

Test anxiety is a condition that has several symptoms to be focused on; two of which are cognitive and emotional. While the cognitive symptoms include lack of concentration, organizational inefficiency, and confusion; the emotional symptoms of exam anxiety show themselves in the form of decrease in self-esteem, depression, and anger (Cherry, 2017).

As a condition which is observed at least in 25 per cent of all students and peaks at 40 per cent at most (Cassidy, 2010), exam anxiety is an important problem which potentially every student must face with. To look at the problem closely from both cognitive and emotional perspectives, two methods were chosen to be used and measured in this study, which are *cognitive reappraisal* and *expressive suppression*. In the next two subsections, those mechanisms will be described further.

1.1. Cognitive Reappraisal

Being a useful way to “reset” an emotion, cognitive reappraisal is an emotion regulation method where one recognizes the negative emotion one is feeling and then changes its direction to a more effective one using cognitive feedback (Barlow, Farchione and Fairholme, 2011). But the referred “more effective one” is not just a simple way of “thinking about the positive side of a situation”. Cognitive reappraisal rather reframes a situation or an event to shape the emotional response to it (Gross, 1998a).

For example, imagine a situation where a relative of you (a family member whom you love dearly) has a terminal illness. This family member suffers immeasurable pain because of the situation. Keeping that in mind, you must be feeling very sad because of this event. When this family member dies because of the illness he or she had, the sadness increases due to his or her death. This is when the regulation method comes in. By using cognitive reappraisal, rather than finding something positive about the situation since it is hard to find something positive about the death of someone you hold dear, you can reframe the event to find something more reassuring, so to speak. You might think “My [family member] has died because of his/her illness. Why did this happen to him/her?” as the first response to the death of your relative. Then, a potential cognitive reappraisal can be considered, such as “S/he was in such pain. Now that she died, s/he won’t be able to feel that pain anymore” or “After all that pain, s/he can finally find some serenity”. In short, you find a logical explanation to the situation using your cognitive ability.

As for another example, imagine yourself yet again in a situation where you are white-collar worker who must attend a party organized by your superiors in the company that you work for. Being late to such an important event, your first response might be “Oh I am late! This will have a bad impression on my superiors! I’m so done”. Using the same emotion regulation method, the situation can be re-evaluated in such a way that you can form an appraisal such as “Now I don’t have to listen to my boss’s boring opening speech” or “I don’t think they will recognize my brief absence”.

The two examples given above have one common point. They are not simply a way to think of the positive side of a bad situation which can also be identified as *Pollyanna principle* or *positivity bias* (Bloch, 1977). They are a way for a situation to be re-evaluated or re-appraised cognitively based on facts that exist. In other words, cognitive reappraisal is the assessment of a situation, not the emotion. The examples above clearly display the re-evaluation of bad situations. The person who lost his/her relative or the person who is late to the party assess the situation they are in.

While the original response given according to the event is present in the mind, the new responses that re-appraise the situation bring new layers and different points of view to the situation. As a result, your stress level or the effect of another negative emotion can be reduced.

Just like the two previous examples, cognitive reappraisal is a proper method to regulate emotions when it comes to an exam as well. An example given by Gross (1998b, 2002) states that an approach to a bad exam score, when the attendant reacts to it as “just a test”, can be included as a behaviour that is highly correlated with cognitive reappraisal. It is an important strategy to reduce the effect of self-reported negative situations (Jamieson, Nock and Mendes, 2002). Therefore, cognitive reappraisal was chosen as an emotional regulation method in this study to observe how much it is helpful in preparation for an exam. The next subsection will be focusing on another emotion regulation method that is going to be compared with cognitive reappraisal, which is expressive suppression.

1.2. Expressive Suppression

As another aspect of emotion regulation, expressive suppression is described by Paula M. Niedenthal (2006) as a concept based on a person's knowledge about their emotions such as their reasons, the behaviour towards them and the way to regulate or change them. To clarify, expressive suppression is used to form a disguise to help people hide their emotional reactions to certain conditions.

Let's imagine a representative situation as an example for expressive suppression where one is presented by a visual stimulus that results in the feeling of disgust. Normally, the first reaction to a situation that is disgusting to the naked eye shows itself in the form of facial expressions. This was proven by Paul Ekman (2006), who discovered a biological origin for facial expressions towards disgust. With expressive suppression, one may avoid showing a potential facial expression which may appear during an encounter with something disgusting. One keeps it rather inside. This example also shows a characteristic difference when expressive suppression is compared to cognitive appraisal. In expressive suppression, the person who uses the technique targets his/her emotion directly.

The situation given above was studied by Gross and Levenson, who found out that expressive suppression while watching a disgusting film resulted in reduced heart rate when compared with people who did not suppress their emotions during the film. Although it does not eliminate the expressions, it is a helpful approach for people to diminish them (Gross and Levenson, 1993).

Gross and Levenson (1993) also suggested that any attempt to prevent feeling emotions will not have a substantial effect on a person's own emotional experience. Despite this, their approach provided a clear insight into different approaches to expressive suppression studies such as how expressive suppression can have a damaging impact on emotional reaction (Wenzlaff and Wegner, 2000).

Despite all the negative effects that expressive suppression has, studies that involve the relationship between different emotional regulation methods and their effect on negative emotions like stress, fear, and disgust; expressive suppression was used as a primary method to regulate emotions alongside cognitive reappraisal. Both major methods will be explained in the next section where the relevant literature and experiments on emotional regulation methods are presented.

1.3. Purpose of the Study

The purpose of the study was to find the predictive power of two emotion regulation methods (cognitive reappraisal and expressive suppression) on exam performances of the students with certain levels of test anxiety, and to test these predictions with a critical intervention to see which method is useful to overcome test anxiety.

1.4. Significance of the Study

The significance of this study comes from its authentic nature. While the previous studies looked at the emotion regulation methods and/or stress on a controlled environment, current study has an uncontrolled one. The reason of pursuing such approach is to make use of a natural class environment whose stress-inducing components are not artificial. While other confounding and unpredictable variables can be problematic, this approach has the potential of representing a real-life situation, unlike a controlled experiment. In a natural environment, the reactions given by the students might have the possibility to be closer to reality. In that sense, this study has a significantly different approach from other emotion regulation-related studies, while continuing from where those studies left off.

With that approach, this study aims to find that (I) cognitive reappraisal capacity of students has a higher predictive power than expressive suppression for the exam performance improvement, (II) the use of cognitive reappraisal is more beneficial than expressive suppression in the sense of affect changes when exposed to a stressful stimulus, and (III) cognitive reappraisal capacity of the students is more related to the approach to good performance/avoidance of bad performance and approach to learning /avoidance of not learning than expressive suppression.

The rest of the thesis is as follows. In Chapter 2, background information on the main emotion regulation methods that are focused on the thesis, cognitive reappraisal and expressive suppression, is presented. In Chapter 3, the methodology of the thesis along with the hypotheses, the information on participants and other components such as the questionnaires and the experimental design is presented. Chapter 3 continues with the results of the thesis based on the hypotheses given at the beginning of Chapter. Chapter 4 consists of the discussion of the findings presented in Chapter 3, along with the limitations of the thesis. Both Chapter 4 and the thesis is concluded with the conclusion section.

CHAPTER 2

LITERATURE REVIEW

There are certain strategies to regulate emotions. Those strategies are based on selecting certain situations about emotions (approach or avoid) modifying those situations to manipulate their impact, directing the person's attention towards or away from the emotional situations, appraising a situation to alter its meaning, and directly influencing response systems that humans possess (Gross, 1998a).

To reduce test anxiety in students, treatment methods like emotion-oriented or cognitive methods are used. However, based on the outcomes, there are no important differences in these two approaches. They are equally efficient potential methods to treat test anxiety among students. Examples of cognitive methods are cognitive restructuring and cognitive behaviour modification (Neudert, Jabs and Schmidtke, 2009). Additionally, emotional regulation methods that are the focus of the present research have not been used in previous studies to find out if they are useful methods to overcome test anxiety, although different regulation methods like respiratory concentration, body relaxation and mental image creation were engaged by participants of an experiment done by Shcherbatykh (2000) to find out if emotional stress can be reduced by those methods to achieve better performance at school.

Existing models for cognitive reappraisal were created with the help of neuroimaging studies. As it is well-known, neurological basis of emotional self-regulation holds light to the relationship between cognition and emotion. For the sake of this relationship, many studies regarding cognitive reappraisal were conducted. Neural correlation of emotional self-regulation experimented by Mario Beauregard (2001) and his colleagues is an example. He and his team did measurements on male participants based on their responses to visual stimuli, namely a film, which involves erotic scenes. Based on their results, the arousal came from watching the film was related to activation in limbic and paralimbic structures of the brain. These structures are right amygdala, right anterior temporal pole, and hypothalamus. On the contrary of the additional activation in right superior frontal gyrus and right anterior cingulate gyrus, limbic activation was not observed. The conclusion of the study is that emotional self-regulation is a cognitive process where the neural structure of the brain implements it. Moreover, the capability to control these dynamics in the brain exists in humans (Beauregard, Lévesque and Bourgouin 2001).

Cognitive reappraisal's capability to decrease negative emotions were also proved and reinforced on many cases. The examination of emotional responses to error based on neural features in the brain (Ichikawa, Siegle, Jones, Kamishima, Thompson, Gross and Ohira 2011) demonstrates this case very well. In the study, emotional self-

regulation and its association with error was experimented on. 17 healthy adult participants performed a continuous performance task monitored with fMRI. Cognitive reappraisal was one of the emotional self-regulation methods that were asked to the participants to do in order to down-regulate their negative emotions. The results showed that error response has a close and solid relationship with emotion that was measured and proved by the modular activity in rostral and dorsal anterior (Ichikawa et al. 2011).

On the other hand, cognitive reappraisal and expressive suppression are reported strategies to alleviate stress related problems in exam performance. This thesis focuses on students with test anxiety and how these students may overcome this challenging issue with the help of cognitive reappraisal and expressive suppression.

While cognitive reappraisal is a method to regulate emotion where the experiments were focused on it alone, the same situation does not apply for expressive suppression. In studies aiming to measure the effect of emotional regulation on stress, expressive suppression was always paired with cognitive reappraisal. Therefore, the following two sections of the literature review will focus on experiments where cognitive reappraisal was used as the only measurement method (2.1) and the ones where both methods were considered (2.2).

2.1. Cognitive Reappraisal and Stress

Academic research based on cognitive reappraisal was proven to be a success in displaying its positive effects on reducing stress levels of human beings. In 2010, a study conducted by Troy, Shallcross, and Mauss presented a correlation between cognitive reappraisal and its ability to moderate the relationship between stress and depression. While at low levels of stress, no association between participants' cognitive reappraisal ability (CRA) and depression was found. On the other hand, participants with higher CRA had lower degrees of depression at high levels of stress. This research showed the importance of regulating negative emotions for creating a model for depression. As long as the stress levels are high, cognitive reappraisal is a solid method to decrease the possibility for depression to emerge. As a result, CRA marked a breakthrough in the conceptualization of the relationship between stress and depression (Troy, Wilhelm, Shallcross and Mauss, 2010).

Cognitive reappraisal as an emotion regulation method has an adaptive nature. But despite this, it cannot help every single person in every situation because their levels of stress may vary across situations. Based on the research of Troy, Shallcross, and Mauss (2013), cognitive reappraisal and its adaptive nature is dependent on situations whose context can show itself in various ways. In their research, 170 participants were tested on their ability to use cognitive reappraisal, their capacity to regulate their stress, and their depression levels. According to them, cognitive reappraisal enabled participants to adapt to situations in which they cannot control their stress levels. However, in situations where the stress is controllable, cognitive reappraisal becomes counterproductive. Also, if someone's level of stress is unstable and their CRA is high at the same time, this combination is related with low levels of depression while the

combination of controllable stress and high CRA is correlated with higher levels of depression (Troy, Shallcross and Mauss, 2013). Troy et al. explain their finding from a functionalist point of view in the sense that negative emotions were able to give a purpose and motivation to people to solve their problems. If, however, the negative emotions are neutralized by high CRA, the motivation disappears thus revealing the counterproductive nature of cognitive reappraisal appears (2013:7).

Besides the adaptive nature of cognitive reappraisal, the presence of gender difference in emotional regulation is another issue. There is, in fact, a wide-spread belief about women being more prone to feel their emotions compared to men (Shields, 2003). Indeed there is supporting evidence that women tend to feel emotional experiences more intensely than their male counterparts (Bradley, Codispoti, Sabatinelli and Lang, 2001). Along with this evidence, cognitive reappraisal seems to be a factor where different levels of emotional regulation between genders are measurable. Unfortunately, most of the studies focus only on women and their ability to use cognitive reappraisal, except the ones where the individual difference method was used. In the study conducted by McRae, Ochsner, Mauss, Gabrieli, and James J. Gross (2008), gender differences in cognitive reappraisal was measured based on behavioural as well as fMRI data. While the behavioral data showed no significant difference, this was not the case for the neural data. The fMRI data of their experiment indicated that the prefrontal regions, which are related with cognitive reappraisal (Goldin, McRae, Ramell and Gross, 2008) were differently activated in both gender, men showed a lesser amount of increase than women (McRae, Oschner, Mauss, Gabrieli and Gross, 2008). This result suggests that men and woman do indeed differ in their emotional regulation capacities and that neural data may be more sensitive indicators of emotional processes underlying emotional regulation as compared to behavioral data.

In addition, the ability to use cognitive reappraisal may modulate some extreme forms of stress as well. One of them is psychosocial stress induced from people detecting a social threat in their lives as a result of reframing the negative situation they are in (Scott, 2018). Despite being a byproduct of cognitive reappraisal, psychosocial stress can also be maintained on a safe level by CRA in both behavioral and neural terms (Shermohammed, Mehta, Zhang, Brandes, Chang and Somerville, 2017).

2.2. Cognitive Reappraisal and Expressive Suppression

In contrast to cognitive reappraisal, expressive suppression is not a regulation method that was researched on primarily on its effect on negative affect like stress. However, there are studies about this method where it was measured alongside cognitive reappraisal to see how they are related to symptoms of stress and depression. In addition, the individual differences between the two methods on people were measured as well.

When it comes to emotional responses, cognitive reappraisal and expressive suppression are said to have consequences that differs from one another. To prove this, a study was conducted to investigate “the role of attentional deployment in emotional regulation success” (Bebko, Franconeri, Oschner and Chiao, 2011). Using eye-

tracking method, they tested their hypothesis that there is a contribution of neuronal processing of human vision system that has different effects on emotional regulation strategies, namely cognitive reappraisal and expressive suppression. By measuring eye-movements, pupil size and negative emotional experiences that were reported by participants, researchers found out that participants who did cognitive reappraisal, compared to those who used the strategy of expressive suppression, felt less negative emotions when they used their regulation strategy. Eye-tracking results indicated that the visual focus of both groups was located outside of emotional areas, although this effect was more visible in participants who did expressive suppression. This shows that there is a variation between these two regulation strategies such that the output of cognitive reappraisal and expressive suppression is not similar.

Another aspect that is important for emotional regulation is that the emotional regulation strategies can have different timing in producing a certain emotional outcome on people. Gross (1998b) stated that while cognitive reappraisal is an antecedent-focused regulation strategy, expressive suppression is a response-focused strategy. Based on the focuses these regulation methods have, cognitive reappraisal is said to have a protective effect against certain cognitive consequences related with expressive suppression of emotions (Gross, 2002). A study where the relations between these two strategies and stress related symptoms was done by Moore and her colleagues (2008). The results of this study indicated that while cognitive reappraisal was related with higher stress-related symptoms, the symptoms that were related with expressive suppression were lower. The reason for this was explained by the researchers that people use this method more than the other one as they approach and interacting with the world by avoiding negative emotions (as cited in Moore, Zoellner and Mollenholt, 2008).

Escaping and/or avoiding negative emotions are the prime factors in the comparison between cognitive reappraisal and expressive suppression. Fucito, Juliano and Toll (2010) looked at these emotional regulation strategies and their effect on cigarette smokers. They carried out their study by collecting data from 121 participants in a laboratory to examine the utilization of cognitive reappraisal and/or expressive suppression and its relationship with smoking characteristics and behavioral reactions to a mood induction procedure. Based on its frequency, the smokers who use cognitive reappraisal were able to produce positive affect on higher levels. In addition to this, both regulation strategies were correlated with certain characteristics of smokers. While reappraising smokers were reported to experience less boredom, smokers who suppressed had a longer relationship with smoking and showed a higher attentional bias towards smoking cues. The summary of their results is that the “frequent reappraisal was associated with weaker expectancies that smoking alleviates unpleasant feelings, greater positive mood, and fewer depressive symptoms. In contrast, frequent suppression was related to longer smoking history and greater attentional bias to smoking cues on an Emotional Stroop Task. Among the depressed subsample, reappraisal moderated the effect of mood condition on smoking duration, number of cigarette puffs, and carbon monoxide boost.” (Fucito et.al., 2010).

Another research based on cognitive reappraisal was done at the Psychology Department of Stanford University. The study focused on the neural mechanisms of cognitive reappraisal and whether it influenced social anxiety disorder based on

negative self-beliefs. 27 participants with social anxiety disorder (SAD) and 23 healthy participants were instructed to do cognitive reappraisal while their negative emotion reactions were measured via functional magnetic resonance imaging. The results showed that cognitive reappraisal is a functional way behaviourally to down-regulate negative emotions whether they are healthy or not. Neural imaging showed that negative self-beliefs caused an early reaction in amygdala for both groups. In addition, reappraising those beliefs resulted with greater early cognitive control, language, and visual processing for the healthy participants while the same condition resulted with greater late cognitive control, visceral, and visual processing for social anxiety disorder patients. The conclusion of their “findings regarding cognitive reappraisal suggest neural timing, connectivity, and brain-behavioural associations specific to patients with SAD and elucidate neural mechanisms that might serve as biomarkers of interventions for SAD.” (Goldin, Manber-Ball, Werner, Heimberg and Gross, 2009).

It is very well established that cognitive reappraisal and expressive suppression are distinctive methods to regulate emotions that are different than each other. One of the studies that measure the cognitive reappraisal and expressive suppression at the same time and emphasizes this difference were conducted, again, by Gross. With his colleagues, he tried to find the neural basis of these two emotion regulation methods based on negative emotions. He also emphasized the contrastive nature of both strategies which are cognitive and behavioural responses to emotion (2008). Two types of films (neutral and negative emotion-inducing) each of which are 15 seconds long were displayed to 17 women. The participants were conditioned to watch those films on four types: watching the neutral movie, watching the negative emotion-inducing movie, cognitive reappraising the negative emotion-inducing movie and expressive suppressing the negative emotion-inducing movie. Their facial expressions were recorded, and their neural activities were measured via fMRI during the experiment. The results of the study showed that there were early responses in prefrontal cortex when the participants did cognitive reappraisal. Other things that were recorded during cognitive reappraisal activity are decreased negative emotion experience, and decreased amygdala and insular responses. On the contrary, there were late prefrontal cortex responses produced by expressive suppression, along with decreased negative emotion behaviour, negative emotion experience, increased amygdala and insular responses. This study concluded that cognitive reappraisal and expressive suppression are two distinctive methods to regulate emotions (Goldin, McRae, Ramel and Gross, 2008).

Whether cognitive reappraisal is healthier to use to regulate emotions than expressive suppression or not is an important topic question of emotion regulation. Debora Cutuli (2014) of the Department of Psychology in the University “Sapienza” of Rome overviewed at the role of both strategies in emotion regulation. To measure this role, an experiment was established. In the experiment, participants were exposed to emotion-inducing situations and assigned randomly to use cognitive reappraisal or expressive suppression to regulate their emotions in the given circumstances. A control group was established additionally for comparison. The results of the experiment suggested that the participants who used expressive suppression experience more stress, which was measured by looking at their blood pressure. The positive effect of

cognitive reappraisal showed itself by decreasing negative emotion experience and expression with no anomaly in the participants' physiological activity (Cutuli, 2014).

2.3. Current Study and Motivation

All the literature about cognitive reappraisal and expressive suppression suggests that cognitive reappraisal is a better method to regulate emotions with respect to certain circumstances. Even though both methods and their effect on stress or anxiety have been studied in a variety of situations, there has been no study found about their effect on test anxiety, to the best of our knowledge. In this study, 90 university students who attended to a first-year compulsory lecture were investigated. Among them, 64 of them who had medium-level of test anxiety were investigated further. Those who were focused on further notice were assessed by certain characteristics such as test anxiety, emotion regulation and approach and avoidance to performance and mastery. The motivation to make these questionnaires was to create a baseline for the experiment. Test anxiety levels were measured to be compared and/or be focused on one by one. Emotion regulation abilities were also measured to find out who is better at one of the two emotion regulation methods. Based on which one is better, participants were regulated to their own experiment groups, which were the essential components of the experiment. Moreover, approach-avoidance and performance-mastery were measured for an additional study to find a correlation between emotion regulation and achievement-goal framework.

The reason why cognitive reappraisal and expressive suppression was used instead of different emotion regulation methods that are also cognitive in nature (cognitive restructuring and cognitive behaviour modification) is that those methods are two approaches to a therapy called cognitive behavioural therapy (CBT), which focuses on challenging and changing unhelpful cognitive distortions (e.g. thoughts, beliefs, and attitudes) and behaviors, improving emotional regulation (Beck, J.S., 2011 & Benjamin, C. L., Puleo, C. M., Settiani, C. A., Brodman, D. M., Edmunds, J. M., Cummings, C. M., & Kendall, P. C., 2011), and the development of personal coping strategies that target solving current problems. As parts of a therapy session, these methods were not compatible with the experiment design. Therefore, a more common practice, cognitive reappraisal, was used alongside with expressive suppression.

The participants were studied in an uncontrolled environment (in a lecture given by a lecturer) because a stressful environment and certain consequences of having an exam was impossible to achieve in a controlled environment. The study was done during the autumn term of 2017-2018. During the term, the students were studied in a way that they were applied to a critical intervention (a form of visual stimulus that induces stress) after their characteristics were measured via certain questionnaires like Test Anxiety Questionnaire (TAQ), Emotional Regulation Questionnaire (ERQ), and Achievement Goal Framework (AGF). ERQ is the basis for the experiment's structure, because the three experiment groups were created based on the ERQ scores. The short-term and the long-term effects were aimed to be observed in this study in the form of PANAS and exam score differences, respectively. The long-term effects of emotion regulation strategies were not studied on in the previous lecture and this was one of

the main objectives of this study. To observe the long-term effects, the experiment of this study was done between two mid-terms of the lecture. The time of the experiment was chosen this way to observe the potential causal effect of the experiment. It is assumed that, even though the environment is uncontrolled, the only controlled factor would be this intervention in the form of the experiment (stress-inducing) visual stimulus. Therefore, the causal effect was planned to be measured via the experiment. The details about how the experiment was done and what type of measurements was used will be explained in more detail in the next chapter.

CHAPTER 3

METHOD

This section of the thesis consists of the two hypotheses on which this research is based, information on participants (including their academic background), the procedure of the experiment phases before and after a critical intervention, and the measurements that were used to predict certain indicators about participants.

3.1. Hypotheses

The hypotheses concerning the relation between exam performance and emotion regulation are as follows:

Hypothesis 1:

A) The students who have higher cognitive reappraisal capacity show a higher rate of performance increase from test 1 to test 2 than their counterparts who have higher expressive suppression capacity.

B) Same observation holds by conducting a critical intervention based on cognitive reappraisal or expressive suppression.

Hypotheses 2: Participants who used cognitive reappraisal (in the experiment) have a positive affect increase and negative affect decrease compared to the others.

Hypotheses 3: Emotional regulation methods have a high correlation with performance and mastery.

3.2. Participants

The choice of the participants is crucial in studies on the effect of emotion regulation on test performance. It was the most challenging part of the present study. The participants were to be chosen from the population of university students since test anxiety is a common problem and therefore a highly relevant issue in the academic field (Neudert et al. 2009). Also, every single participant had to take the same exam to avoid correlation errors due to the natural variability among different exams. An authentic and uncontrolled environment was intended for this research since it is nearly

impossible to control all factors potentially affecting participants at the same time and place. Therefore, a real course with a grade system given by a university lecturer had to be found to preserve the intended genuine environment and satisfy the ecological validity of the study.

To find a class, contact was made with a member of the Psychology Department of Middle East Technical University. After explaining and discussing the planned research with her, Prof. Dr. Özlem Bozo, a professor whose research interest is health psychology, agreed to conduct the study in one of the courses she was giving in the autumn semester 2017-2018. The name of the course was “Introduction to Psychology”. It had a capacity of 99 students with an approximate attendance rate above 50%. Among the students that took the course, 90 of them were present during the questionnaire phase of the study. 17 of them were males and 73 of them were females. The age of the students’ range between 18 and 20, given the fact that the lecture is a first-year compulsory lecture. All the participants who attended to the experiment were rewarded with bonus credits from the lecturer of the course.

The permission to conduct this study was obtained from Middle East Technical University’s Ethics Committee. Moreover, the consent of the participants was obtained from both the lecturer and the participants in written form.

3.3. Procedure

During the autumn semester of the school, a day was planned with the lecturer to start the first phase of the experiment. This part of the experiment is called *the questionnaire phase*. During this phase, three questionnaires were given to the participants (the students who attended the lecture). These questionnaires will be described briefly in this section and explained in detail in the next section.

The questionnaire phase is the phase where the initial characteristics of the students based on their test anxiety levels, emotion regulation capabilities and achievement-goal frameworks were measured. It consists of students participating in an activity where they fill out three of the four main questionnaires of this research. The contents of the questionnaires are about the participants’ stress level regarding test anxiety, their ability to use cognitive reappraisal and expressive suppression as an emotional regulation method, and their tendency to approach, or avoid, achievements in their academic life. All three questionnaires were filled out by the participants in one lecture hour. Since the participants who filled the questionnaires were Turkish, the original English questionnaires had been translated into Turkish and approved by the thesis advisor and Turkish colleagues who are specialized in English language. With this phase, it was aimed to collect a baseline data from the participants to be able to find out about their initial characteristics of anxiety levels, emotion regulation abilities and their frameworks of achievement and goal.

After the questionnaire phase was over, another day was planned with the lecturer for the second phase of the experiment, which is the *experiment phase*. This phase of the study is where the initial characteristics of the students were tested with a controlled

intervention. The day was two weeks after the questionnaire phase. In this phase, the participants were watching a video that induced stress. The video was taken from a scene of the Oscar-nominated movie “The Whiplash”, a movie about an ambitious Jazz musician, played by Miles Teller, and his relationship with a rather tough music instructor, played by J.K Simmons. The scene was found on YouTube under the title “Not Quite My Tempo” (<https://www.youtube.com/watch?v=GBvBu5ErSSo>), which is one of the most important and stress-inducing scenes of the movie. The choice of the movie scene to be used in the experiment was discussed with and approved by the thesis advisor. There were many options for a stress-inducing video, one of which was strictly related to exams in general. After further detailed discussion time spent with the advisor, “Not Quite My Tempo” scene was decided to be more useful from both stress and school/exam related perspective, since that scene also took place in a music school and consists of an audition to take part in an orchestra. All students participated in the experiment watched the movie via a projector at the lecture theatre. The sitting formation of the students was initially planned to be divided based on the experiment group. But after further discussion, a mixed sitting formation, just like a regular classroom, was chosen to provide additional authenticity.

Using a visual stimulus in this experiment was based on previous researches on cognitive reappraisal and expressive suppression that were cited above (Troy et al. 2010, Troy, Shallcross and Mauss 2013, McRae et. al 2008). Like the procedure in these studies, the participants were divided into three groups before the intervention. These groups were “reappraisal”, “suppression”, and “control” groups. While the first two groups watched the video according to the instructions given to them, the control group was given a directive to *only* observe what happens in the video. These groups were created based on the participants’ ERQ scores. As they watch the stressful scene, their response was planned to be on the same course with what the experiment group they are in requires them to do. The logic behind the experiment is to test the initial characteristics of the participants based on their emotion regulation abilities. The directives given to the participants will be explained in the next section.

A key difference between the method of this research and the previous ones is that only one visual stimulus that displays a negative emotion was used in this experiment. Normally, at least two videos were used where one displays a negative emotion while the other is a neutral one. In addition to this, none of the previous studies looked at these regulation methods from the perspective of stress and anxiety, but rather they focused on sadness and fear. Therefore, the current research provides a novel and unique but also constrained perspective on the subject matter. The reason why only one video was used is that there were time constraints related to the schedule of the lecture. The amount of time provided by the lecturer for this experiment was not enough to use more than one visual stimulus. This issue will be picked up again in a more detailed way in the discussion section of the thesis, under the title *limitations*.

Both before and after the video presentation, the students were given the Positive and Negative Affect Schedule (PANAS) test to measure their affect rates before and after the video. PANAS is proven both clinically and non-clinically to be reliable on measuring positive and negative affect (Watson, Clark and Tellegen 1988). The filling of the PANAS tests concluded the experiment phase. The lecturer was requested to give the researcher the exam results of the students, both before the experiment and

after the experiment. Since the experiment was carried out between two mid-terms, both were taken into consideration to see if there was an increase or decrease in exam performances based on the experiment. The experiment phase was originally planned to be done days before the exam to measure its short-term effect on exam anxiety. However, because of time constrains in the schedule of the lecture, more importantly, ethical considerations, it was decided to administer the experiment in between the two midterms, thus allowing to assess more long-term effects of the intervention on exam performance. This issue will also be discussed in the *limitations* section.

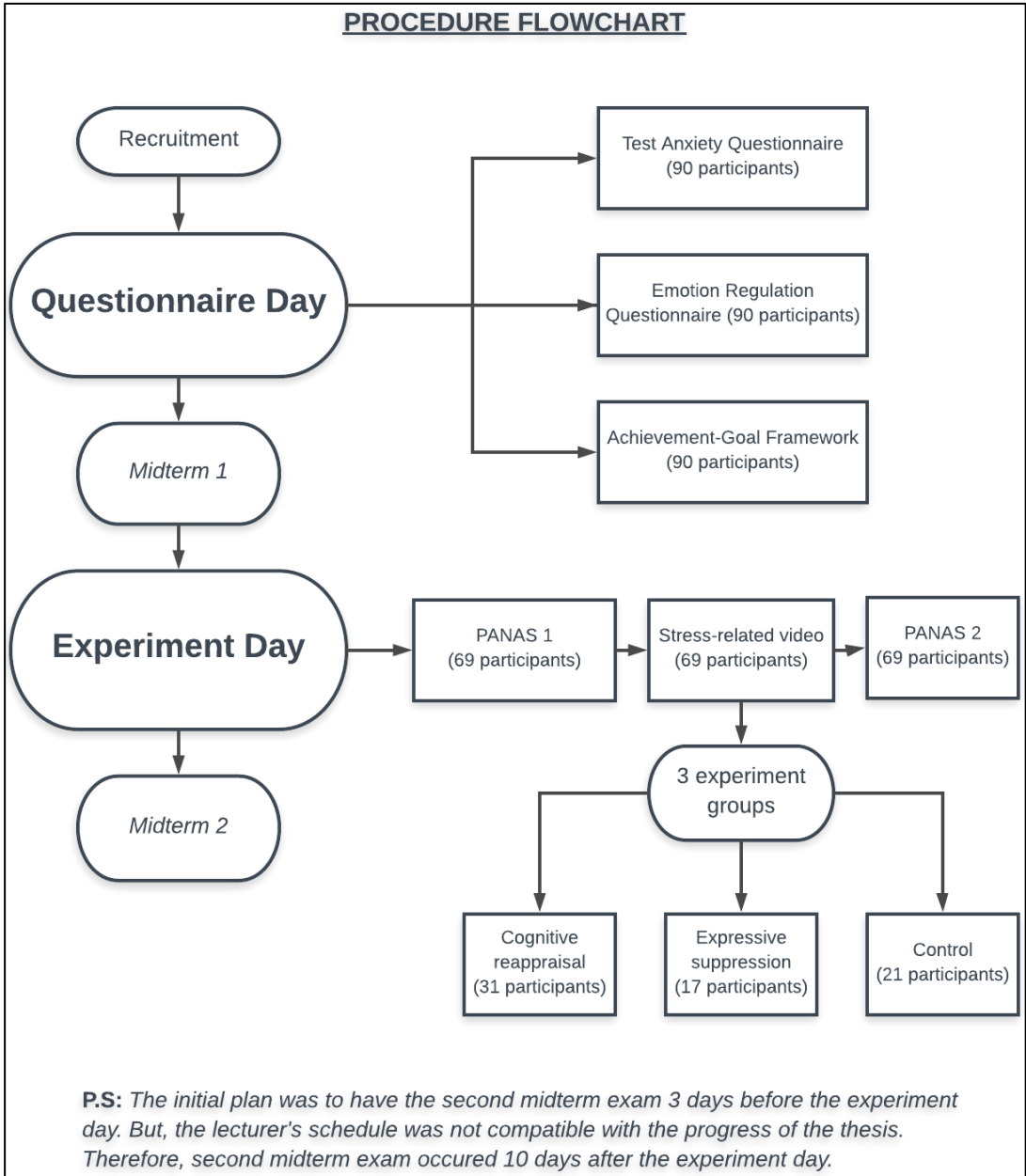


Figure 1: The procedure flowchart of the study

3.4. Measurement

Test Anxiety Questionnaire: This short questionnaire, developed by Nist and Diehl (1990), was used in the questionnaire phase of the research. It consists of 10 statements about the participant's state of mind about past testing experiences. The measurement for these statements was done with a five-level Likert scale from 1 to 5 where 1 means "Never" and 5 means "Always". The original questionnaire and its Turkish translation can be found in Appendix A.

In this research, this questionnaire was used to measure the anxiety levels of the students when it comes to tests in a lecture. The participants were given these questionnaires and were asked to fill the statements in the questionnaire based on the lecture they were in.

The point scale of the questionnaire was explained by Nist and Diehl as follows:

- Points between 10 and 19 means there is no test anxiety, or rather "low-level test anxiety"
- Points between 20 and 35 means there is test anxiety on a healthy level, or rather "medium-level test anxiety"
- Points between 35 and 50 means there is test anxiety on an unhealthy level, or rather "high-level test anxiety"

Emotion Regulation Questionnaire: This scale with 10 statements about emotion regulation methods was designed to measure the capability to regulate emotions in two ways, namely cognitive reappraisal and expressive suppression (Gross and John 2003). A Likert scale of 7 points was used in this questionnaire where 1 means "strongly disagree" and 7 means "strongly agree". The authors requested that the order of the statements must not be changed under any circumstances. Therefore, no modifications were made. The questionnaire will also be presented in the Appendix B.

Out of 10 statements, 6 of them were related with the ability to use cognitive reappraisal whereas 4 of the items were about the capability to use expressive suppression. The following items are used for scoring:

- 1st, 3rd, 5th, 7th, 8th and 10th statements are for cognitive reappraisal ability
- 2nd, 4th, 6th and 9th statements are for expressive suppression ability.

The maximum score that can be obtained from CRA (cognitive reappraisal ability) is 42 ($6 * 7$), while the one for ESA (expressive suppression ability) is 28 ($4 * 7$). To make it easier to compare both abilities, CRA and ESA scores are transformed into percentages. For example, a student whose CRA score is 30 out of 42 has a cognitive reappraisal capacity at approximately 71%. Similarly, a participant whose ESA score is 14 out of 28 has an expressive suppression capacity at 50%. Again, this method was used to measure which ability is higher in the participant.

With the help of this questionnaire, the categorization for the three experiment groups when students watched a stress-inducing visual stimulus (the movie scene) was achieved. With the help of the scores it was decided to which of the two regulation groups (based on CRA and ESA) they were allocated, or whether they were allocated to the control group. Since these capacities and abilities are not normally distributed, evening them out was impossible. To obtain comparable sample sizes of the three groups, an alternative method was pursued. Those who had 60% of any of the methods were assigned to their respective groups. If students' scores were higher than 60% for both methods, they were randomly assigned to one of the regulation groups with the intention of controlling the sample sizes to being at least close to equal. While this method was pursued for the regulation groups, a different method to choose participants for the control group was pursued. For the control group, participants with both regulation capacities lower than 60% or participants with more than 60% for each capacity but with a difference of less than 10% were chosen. To explain it clearly, let's give an example. Assume that a student who filled out this questionnaire obtained these results: His or her cognitive reappraisal and expressive suppression capacities are both below 60%. This means he or she was placed in the control group. A similar example is the following: Let's assume yet again that a participant had a cognitive reappraisal capacity of 70% and expressive suppression capacity at 78%. Since the difference between these two capacities does not exceed 10%, s/he was placed in the control group. Had the difference exceeded 10%, s/he would be placed based on which emotion regulation capacity was higher. This alternative method of placement was pursued to have comparable sample sizes in all experiment groups, which is explained in the next paragraph. Without the ERQ scores used in this alternative method, it would be difficult to put the participants into the experiment groups accordingly, since it is illogical to place a participant whose ERQ scores are higher for expressive suppression to cognitive reappraisal group and vice versa.

The aim of these methods was to equalize the sample sizes of the three groups. If those who have higher CRA were in one group and people with higher ESA were in different groups, a large portion of the participants would be in the cognitive reappraisal group whereas a significantly smaller portion would be concentrated in the expressive suppression group. As for the control group, only 2 people out of 90 participants had equal scores of CRA and ESA. Therefore, a control group made out of only two individuals would be rather useless. The sample size of the three groups according to these methods is given below:

- 35 participants for the Cognitive Reappraisal Group (31 of whom were present in the experiment)
- 25 participants for the Expressive Suppression Group (17 were present)
- 30 participants for the Control Group (21 were present)

Achievement Goal Framework: The AGF (achievement goal framework), designed by Elliot and McGregor (2001), was suggested to be used by the lecturer of the class, Prof. Dr. Özlem Bozo. She stated that considering an exam situation, measuring the tendency of students to learn and master every topic that was given to them in a lecture could be an important factor that can be used as a covariate to examine students' exam performance depending on this framework.

This framework is a 2 x 2 one with two parts, which are “definition” and “valence”. On one hand, the valence part consists of positive and negative subparts where positive refers to “approaching success” while negative means “avoiding failure”. On the other hand, the definition part is made of two subparts as well. These were about “mastery” and “performance”. Mastery in this context means how much a person pursues every single bit of knowledge that is given to them. Performance, on the other hand refers to the actual efficiency a person shows (Elliot and McGregor 2001). The questionnaire is presented in the Appendix C.

PANAS: Being the short name for “The Positive and Negative Affect Schedule”, PANAS is a type of questionnaire that is made of 2 parts, each having 10 statements that measure positive and negative affect of a person (Crawford and Henry 2004). Using a Likert scale from 1 to 5 where 1 means “not at all” and 5 means “very much”, this questionnaire was used both before and after the display of the stress-inducing video. While the first PANAS measured the affective situation of the students before they watched the video, the second PANAS measured the level of affect after the display of the video. In that way, it was possible to measure whether the students had any change in their level of affect based on their groups. The questionnaire and its directives are presented in Appendix D as well.

In addition to the questionnaires, the directives given to all three groups (reappraisal, suppression, control) before watching the video are presented in Appendix E.

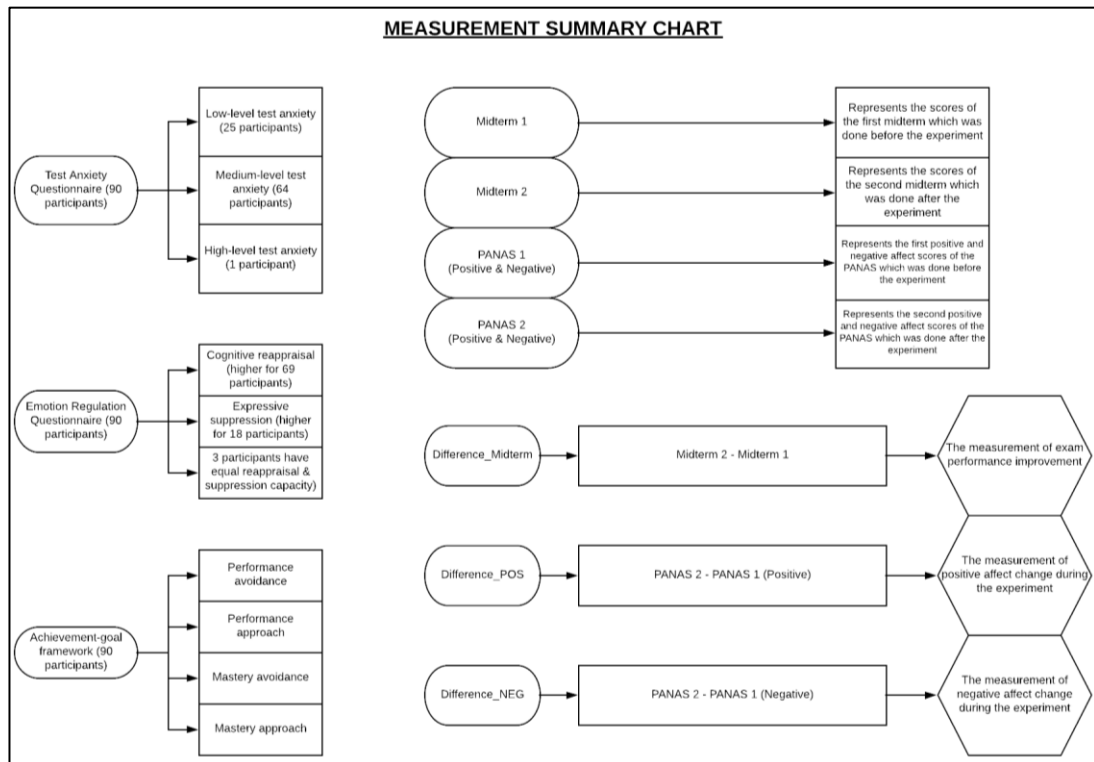


Figure 2: The measurement summary

CHAPTER 4

RESULTS

4.1. Examination of Dependent and Independent Variables

To first look at the results to explore whether the findings are consistent with the two hypotheses that were presented above, the distribution of the variables should be displayed since their form is one of the reasons why the results were approach from a certain perspective. Therefore, we must first look at important variables that were used for the experiment and explore them.

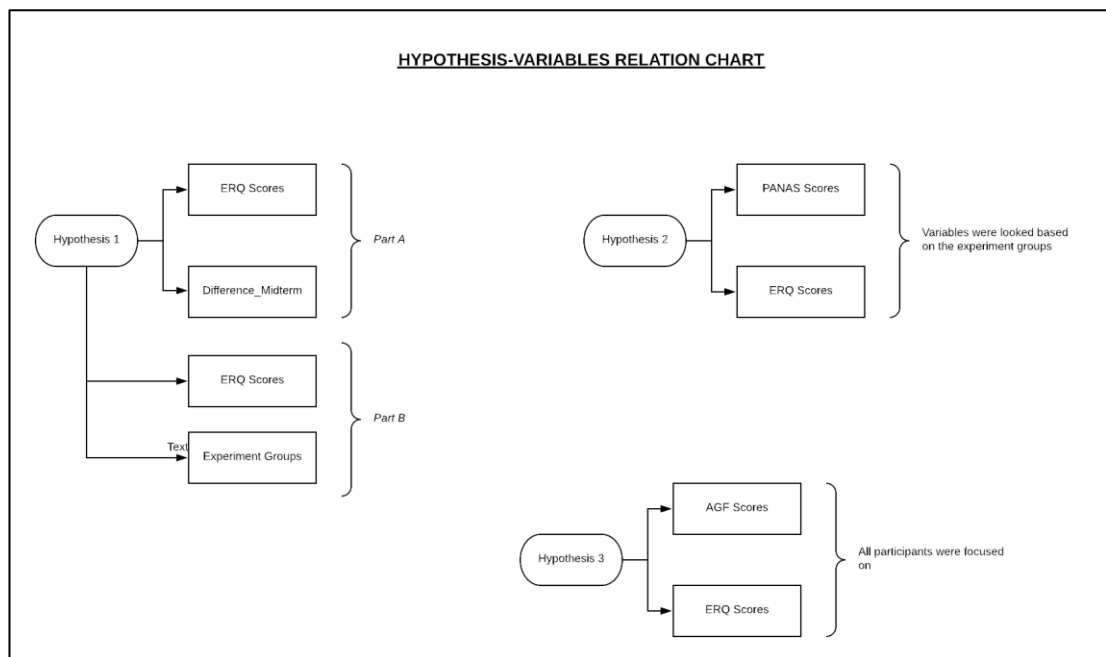


Figure 3: The hypothesis-variables relation chart

At first, there are the scores of the midterms done before and after the experiment. Table 1 showed that the mean of the second midterm results were lower than the first, showing a decrease in performance.

Table 1: Descriptives for Midterm Scores

		Statistic	Std. Error	
Midterm 1	Mean	86,74	,775	
	95% Confidence Interval for Mean	Lower Bound	85,20	
		Upper Bound	88,28	
	5% Trimmed Mean	87,13		
	Median	88,00		
	Variance	53,489		
	Std. Deviation	7,314		
	Minimum	62		
	Maximum	100		
	Range	38		
	Interquartile Range	8		
	Skewness	-,908	,255	
	Kurtosis	1,084	,506	
	Midterm 2	Mean	82,56	,998
95% Confidence Interval for Mean		Lower Bound	80,58	
		Upper Bound	84,55	
5% Trimmed Mean		82,84		
Median		84,00		
Variance		88,635		
Std. Deviation		9,415		
Minimum		56		
Maximum		100		
Range		44		
Interquartile Range		12		
Skewness		-,592	,255	
Kurtosis		-,037	,506	

Normality test of midterm scores (Table 2) indicated that these measurements are not normal for both midterms. ((For Midterm Before Experiment: Kolmogorov-Smirnov Test (D(89)= .118, $p < .001$); Shapiro-Wilks Test (W(89)=.944, $p < .001$ and For Midterm After Experiment: Kolmogorov-Smirnov Test (D(89)= .137, $p < .001$); Shapiro-Wilks Test (W(89)=.959, $p < .001$)).

Table 2: Tests of Normality for Midterm Scores

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Midterm 1	,118	89	,004	,944	89	,001
Midterm 2	,137	89	,000	,959	89	,007

a. Lilliefors Significance Correction

Since our sample was non-normally distributed, a non-parametric test for midterm scores was done to see if there was a significant difference between the exam scores. The results showed that the exam scores differed significantly (see Figure 4). The meaning is that, there is a significant difference based on the grades obtained from these two midterms, creating an important parameter to compare both emotion

regulation abilities based on midterm score change. A Wilcoxon signed-rank test showed that there was a statistically significant change between the midterm before the experiment and the midterm after the experiment ($Z = -3.849$, $p < .001$).

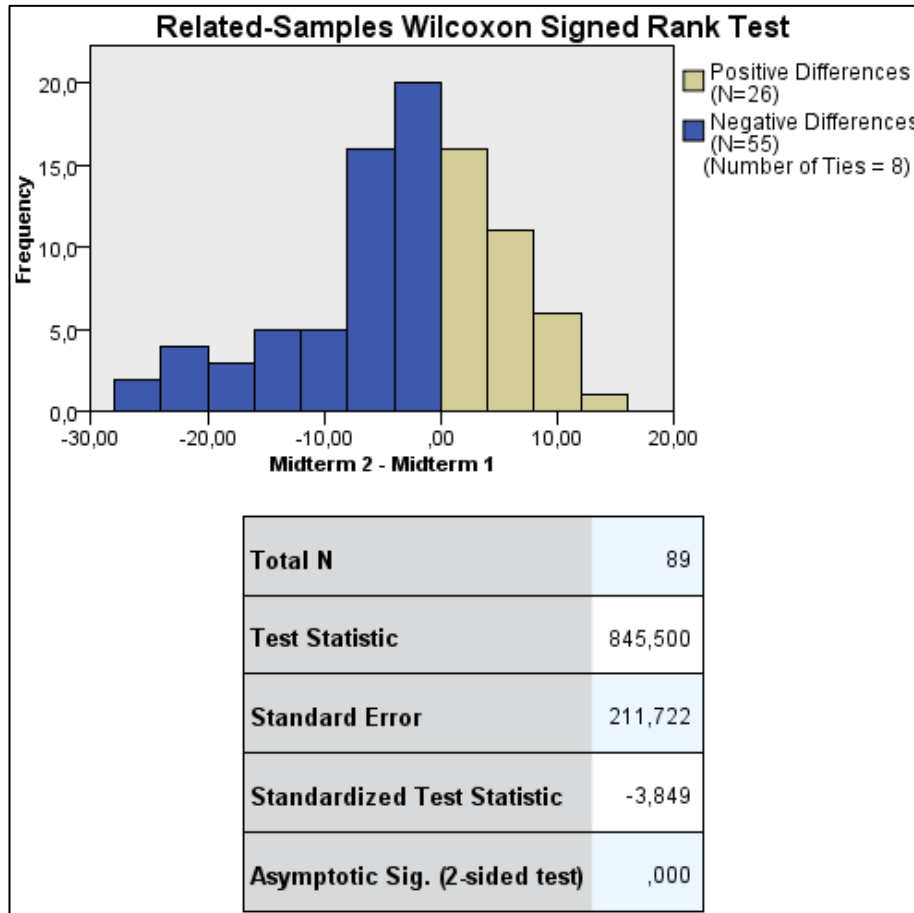


Figure 4: Non-parametric test summary of midterm 1 and midterm 2

The other variable that was used came from the achievement-goal framework categories, which are performance approach, performance avoidance, mastery approach and mastery avoidance. All normality tests were significant ($p < 0.01$) as seen on Table 3.

Table 3: Test of Normality for Achievement-Goal Framework Components

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Performance Approach	,212	90	,000	,904	90	,000
Mastery Avoidance	,173	90	,000	,899	90	,000
Mastery Approach	,170	90	,000	,893	90	,000
Performance Avoidance	,190	90	,000	,922	90	,000

a. Lilliefors Significance Correction

When the variables in the achievement-goal framework were tested for gender differences, no such effects emerged. The results fortunately displayed that the gender effect is not visible for this variable. Therefore, it is safe to assume that males and females do not differ when it comes to their approach to achieve success or master any subject matter.

The third variable, which is the most vital one, is the emotional regulation capacities in terms of percentages. Both cognitive reappraisal capacity and expressive suppression were normally distributed as it can be seen on Table 4 ($p=0.578$, $p=0.286$).

Table 4: Test of Normality for Emotional Self-Regulation Capacities

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Cognitive Reappraisal Capacity	,059	90	,200*	,988	90	,578
Expressive Suppression Capacity	,078	90	,200*	,983	90	,286

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

The fourth variable was the results of PANAS tests. As mentioned before, PANAS tests were applied to the participants both before and after the experimental manipulation (the stress-inducing video). 69 participants were present during the experiment. The descriptives showed that:

- The mean of PANAS Positive Scores before the experiment is approximately 25.
- The mean of PANAS Negative Scores before the experiment is approximately 14.
- The mean of PANAS Positive Scores after the experiment is approximately 24.
- The mean of PANAS Negative Scores after the experiment is approximately 20.

According to the Kolmogorov-Smirnov test, all variables and according to the Shapiro-Wilk test, negative affect scores, were non-normally distributed. Therefore, a paired samples t-test for positive affect scores and non-parametric tests for negative affect scores were applied. ($p = .056$, $p = .383$)

Table 5 : Tests of Normality for PANAS Positive Affect Scores

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
PANAS_1_POS	,144	69	,001	,966	69	,056
PANAS_2_POS	,107	69	,048	,981	69	,383

a. Lilliefors Significance Correction

Table 6. Tests of Normality PANAS Negative Affect Scores

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
PANAS_1_NEG	,190	69	,000	,801	69	,000
PANAS_2_NEG	,177	69	,000	,924	69	,000

a. Lilliefors Significance Correction

The paired samples t-test for positive affect scores showed that there is no significant difference between the positive affect scores before the experiment and the positive affect scores after the experiment, also displaying that the video shown to the student did not bring any significant positive affect difference. ($p = .381$)

Table 7: Paired Samples Test for Positive Affect Scores

Pair		Paired Differences							
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
1	PANAS_1_POS - PANAS_2_POS	,667	6,275	,755	-,841	2,174	,883	68	,381

On the other hands, non-parametric tests for negative affect scores showed a significant difference between negative affect scores before the experiment and negative affect scores after the experiment, displaying that the video brought a significant change on negative emotions. ($Z = 5.346$, $p < .001$)

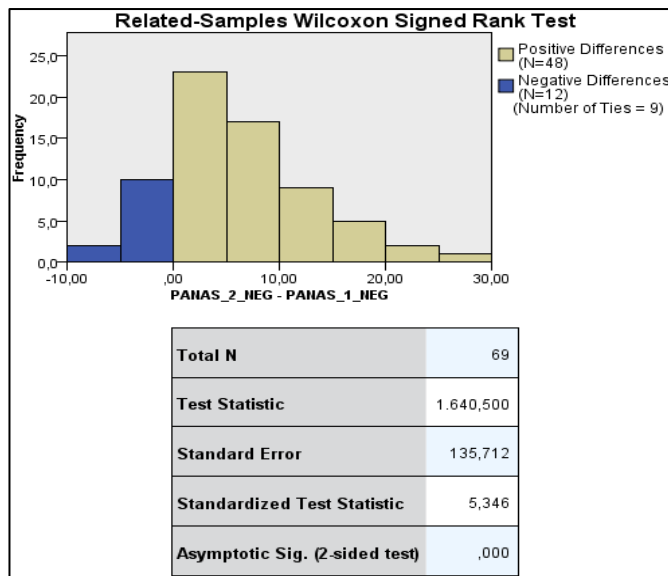


Figure 5: Non-parametric test summary of negative affect scores

4.2. Prediction of Performance Change by Survey Scores of Emotion Regulation Capacities (Test-based results)

Three multiple linear regressions were calculated to predict the grade difference between first and second midterm based on cognitive reappraisal capacity and expressive suppression capacity. Only participants who have low-level test anxiety and medium-level test anxiety, respectively. Because there was only one person with high-level test anxiety, that person's data was left out.

The fact that we measured students' grades twice opened the possibility to see whether their emotional regulation strategies – cognitive reappraisal or expressive suppression – were related to the changes between the scores from the first to the second test. Emotional regulation abilities are important to motivate oneself and improve one's grades from the first to the second test.

This measurement was based on students' habitual emotion regulation methods. In other words, the main emotion regulation method they use that was found out with Emotion Regulation Questionnaire was the key factor to see if the difference between two exam results could be predicted by those emotional regulation capacities (cognitive reappraisal and expressive suppression).

Before leaving out the data of the student with high-level test anxiety, however, the first linear regression was conducted to examine all students who entered both exams. One person's data was left out because of the absence during the second exam.

To calculate differences between the two exams (whose scoring differed), first z-scores for each of the exams were calculated and then the z-scores of the first exam were subtracted from the z-scores of the second exam (**Midterm 2 – Midterm 1**). Positive differences would then indicate that the participant's grade has improved, while negative scores would then indicate that the participant's grade has decreased.

As it was described on Figure 4 before, the midterm scores, despite being distributed non-normally, are significantly different from each other.

In addition, the midterm score changes of the experiment groups were tested to find out if there is a significant change between three experiment groups. One-way ANOVA (Table 8) shows that there is no significant difference between three experiment groups.

Table 8: One-Way ANOVA of the Z-scores of the Midterm Scores (Three Experiment Groups)

Difference_ZMidterm	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.543	2	.771	.783	.460
Within Groups	84.706	86	.985		
Total	86.249	88			

The descriptives for all students (see Table 9) show that the Z-score mean of the difference between the exam grades after and before the experiments are negative. In addition, the mean of their cognitive reappraisal capacity is at an approximate number of 65% while the mean of their expressive suppression capacity is approximately at 50%.

Table 9: Descriptives of the Regression for Midterm Z-Score Changes (All Students)

	Mean	Std. Deviation	N
Difference_ZMidterm	-,0452	,99000	89
Cognitive Reappraisal Capacity	,6466	,13869	89
Expressive Suppression Capacity	,4956	,18352	89

There was a significant regression equation (see Table 11) ($F(2, 86) = 5,522, p = .05$), with an R-square of .337 (see Table 10). Participants' predicted Z-scores of the exam grade difference (see Table 12) are equal to **1.195 - 0.591 (Cognitive Reappraisal) - 1.731 (Expressive Suppression)**, where cognitive reappraisal capacity and expressive suppression capacity are measured in percentage form of ERQ scores. Only the expressive suppression capacity is a significant predictor of the Z-scores of the difference between two exams.

Table 10: Model Summary for the -Scores of the Change of the Midterms for all Students

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,337 ^a	,114	,093	,94274

a. Predictors: (Constant), Expressive Suppression Capacity, Cognitive Reappraisal Capacity

Table 8: ANOVA of Z-Score Difference of Midterms for all Students

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	9,816	2	4,908	5,522	,006 ^b
	Residual	76,433	86	,889		
	Total	86,249	88			

a. Dependent Variable: Difference_ZMidterm

b. Predictors: (Constant), Expressive Suppression Capacity, Cognitive Reappraisal Capacity

Table 9: Coefficients of Z-Score Difference of Midterms for all Students

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1,195	,535		2,235	,028
	Cognitive Reappraisal Capacity	-,591	,727	-,083	-,813	,418

Expressive Suppression Capacity	-1,731	,549	-,321	-3,153	,002
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a. Dependent Variable: Difference_ZMidterm

Table 10 (Cont.): Coefficients of Z-Score Difference of Midterms for all Students

After examining Z-score changes based on all students, the same Z-scores were observed with linear regressions based on the test anxiety levels of them. Since there were not enough participants with low and medium-level test anxiety, those levels were left out and participants with medium-level test anxiety were focused on.

For the participants with medium-level test anxiety, another multiple linear regression was calculated to predict their Z-scores of the exam score difference based on their emotional regulation capacities. Descriptive statistics (see Table 13) show that, like the students with low-level test anxiety who participated in the experiment, the Z-score means of the exam grade difference between after and before the experiment (**Midterm 2 – Midterm 1**) is negative. While their mean of cognitive reappraisal capacity is approximately at 65%, the number for the mean of expressive suppression capacity is close to 51%.

Table 13: Descriptives of the Regression for Midterm Z-score Changes (Medium-Level Test Anxiety)

	Mean	Std. Deviation	N
Difference_ZMidterm	-,0708	1,08177	63
Cognitive Reappraisal Capacity	,6527	,12719	63
Expressive Suppression Capacity	,5062	,19196	63

A significant regression equation (see Table 15) was found ($F(2, 60) = 6.167, p < .05$), with an R-square of .171 (see Table 14). Participants' predicted Z-scores of the exam grade change (see Table 16) is equal to **1.531 – 0.703 (Cognitive Reappraisal) – 2.259 (Expressive Suppression)**, where cognitive reappraisal capacity and expressive suppression capacity are measured in percentage form of ERQ scores. Among two independent variables, only the expressive suppression capacity is the significant predictor of the Z-scores of the difference between two exams. If these calculations are correct, this result might suggest that the less one suppress their emotion, the more they improve on exams.

Table 14: Model Summary for the Z-Scores of the Change of the Midterms (Medium-Level Test Anxiety)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,413 ^a	,171	,143	1,00151

a. Predictors: (Constant), Expressive Suppression Capacity, Cognitive Reappraisal Capacity

Table 15: ANOVA of Z-Score Difference of Midterms (Medium-Level Test Anxiety)

Model	Sum of Squares	df	Mean Square	F	Sig.
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1	Regression	12,372	2	6,186	6,167	,004 ^b
	Residual	60,182	60	1,003		
	Total	72,554	62			

a. Dependent Variable: Difference_ZMidterm

b. Predictors: (Constant), Expressive Suppression Capacity, Cognitive Reappraisal Capacity

Table 15 (Cont.): ANOVA of Z-Score Difference of Midterms (Medium-Level Test Anxiety)

Table 16: Coefficients of Z-Score Difference of Midterms (medium-level test anxiety)

Model	Unstandardized Coefficients		Standardized Coefficients Beta	t	Sig.	Correlations			Collinearity Statistics	
	B	Std. Error				Zero-order	Partial	Part	Tolerance	VIF
1 (Constant)	1,531	,732		2,093	,041					
Cognitive Reappraisal Capacity	-,703	1,001	-,083	-,702	,485	-,101	-,090	- ,083	,998	1,002
Expressive Suppression Capacity	-2,259	,663	-,401	- 3,405	,001	-,405	-,402	- ,400	,998	1,002

a. Dependent Variable: Difference_ZMidterm

In summary, the exam performance improvement can be predicted by students' emotional regulation capacities and expressive suppression has an inverse relationship with the exam performance improvement. Further relationship between emotion regulation methods and the Z-scores of exam performance improvement (see Figure 6) is distributed below.

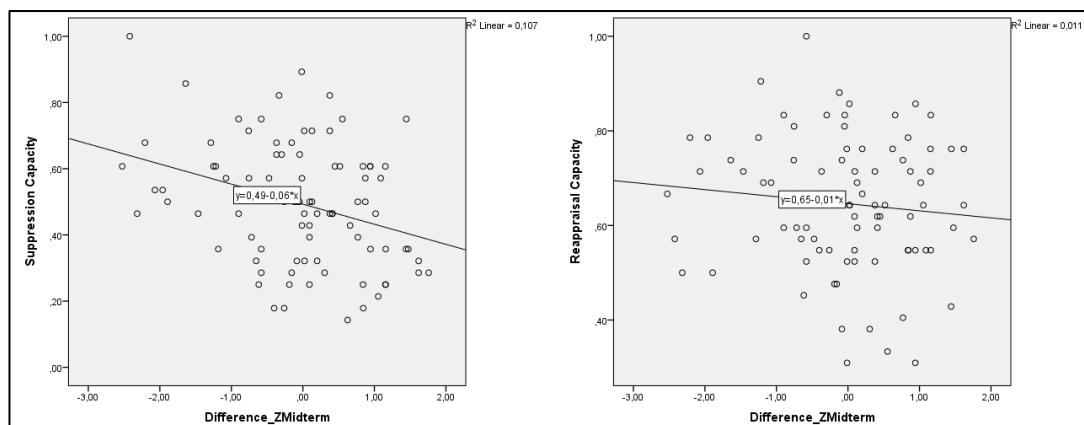


Figure 6: Scatterplots for emotion regulation methods and z-scores of midterm differences

4.3. Prediction of Performance Change Based on Experiment Groups and Their Survey Scores of Emotion Regulation Capacities

To test this hypothesis to find out whether it is significant or not, two multiple linear regressions were calculated to predict the Z-scores of exam grade changes based on cognitive reappraisal and expressive suppression capacities. Like the previous regressions, exam anxiety levels were a factor to measure the participants separately, which is the same reason why the data of the only person who had high-level test anxiety was excluded. In addition, different from the last time, the participants who were present in the experiment phase was taken into consideration to see that if the experiment they were contributing to be a factor. Specifically, the participants in this data were instructed to use their habitual emotional regulation methods. Therefore, the participants who were not present in the experiment phase were not included in this data. Also, the case was split into three groups that were created to categorize the participants who did the emotional regulation method that they were directed to do (or not to do) so.

Participants with low-level test anxiety are excluded from this test because of insufficient sample sizes for three experiment groups. Therefore, only the participants with medium-level test anxiety were included in the analysis.

The results of this analysis were significant only for the cognitive reappraisal group. Among 24 people, the cognitive reappraisal capacity mean is 74% and the expressive suppression capacity mean is 42%, and the mean of Z-scores of the difference between the exams before and after the experiment is positive, which means a performance increase (See Table 17).

Table 17: Descriptives of the Regression for Midterm Z-Score Changes (reappraisal group)

	Mean	Std. Deviation	N
Difference_Midterm	,0593	1,05110	24
Cognitive Reappraisal Capacity	,7361	,08625	24
Expressive Suppression Capacity	,4152	,12847	24

a. Experiment Group = Cognitive Reappraisal

Table 17 (cont.): Descriptives of the Regression for Midterm Z-Score Changes (Reappraisal Group)

A significant regression equation (Table 19) was found ($F(2, 21) = 6.293, p < .05$), with an R-square of .375 (Table 18). Participants' predicted Z-scores of the exam grade change (Table 20) are equal to **2.879 – 1.093 (Cognitive Reappraisal) – 4.855 (Expressive Suppression)**, where cognitive reappraisal capacity and expressive suppression capacity are measured in percentage form of ERQ scores. Only the expressive suppression capacity is the significant predictors of the Z-scores of the difference between two exams.

Table 18: Model Summary for the -Scores of the Change of the Midterms (reappraisal group)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,612 ^b	,375	,315	,86981

a. Experiment Group = Cognitive Reappraisal

b. Predictors: (Constant), Expressive Suppression Capacity, Cognitive Reappraisal Capacity

Table 19: ANOVA of Z-Score Difference of Midterms (reappraisal group)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	9,523	2	4,761	6,293	,007 ^c
	Residual	15,888	21	,757		
	Total	25,411	23			

a. Experiment Group = Cognitive Reappraisal

b. Dependent Variable: Difference_ZMidterm

c. Predictors: (Constant), Expressive Suppression Capacity, Cognitive Reappraisal Capacity

Table 20: Coefficients of Z-Score Difference of Midterms (reappraisal group)

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
	B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1 (Constant)	2,879	1,603		1,796	,087					
Cognitive Reappraisal Capacity	-1,093	2,123	-,090	-,515	,612	-,171	-,112	-	,981	1,019
Expressive Suppression Capacity	-4,855	1,425	-,593	-	,003	-,606	-,597	-	,981	1,019
				3,406					,588	

a. Experiment Group = Cognitive Reappraisal

b. Dependent Variable: Difference_ZMidterm

To sum up, for the students who were instructed to do cognitive reappraisal in the experiment, their exam score change is positive, and it is inversely related to their ESC (Emotional Suppression Capacity).

4.4. Emotional Regulation Capacities Have a High Correlation with Performance and Mastery Test Results

A Pearson correlation was done between emotional regulation capacities and the components of the achievement-goal framework to see if there is a relationship between those variables. In this correlation, students with low-level test anxiety and medium-level test anxiety were the samples that were displayed and observed.

For students with low-level test anxiety, there was a positive correlation between cognitive reappraisal capacity and performance approach ($r=0.408$, $n=25$, $p<.05$). Also, there were two additional positive correlations between cognitive reappraisal capacity and performance avoidance ($r=0.573$, $n=25$, $p<.01$) and mastery approach ($r=0.521$, $n=25$, $p<.01$) as well.

Table 21: Correlations For the Emotional Regulation Capacities and Achievement-Goal Framework for low Exam Stress Level

		Cognitive Reappraisal Capacity	Expressive Suppression Capacity	Performance Approach	Performance Avoidance	Mastery Approach	Mastery Avoidance
Cognitive Reappraisal Capacity	Pearson Correlation	1	,091	,408*	,573**	,521**	,176
	Sig. (2-tailed)		,664	,043	,003	,008	,399
	N	25	25	25	25	25	25
Expressive Suppression Capacity	Pearson Correlation	,091	1	,066	-,069	,050	-,278
	Sig. (2-tailed)	,664		,755	,743	,812	,178
	N	25	25	25	25	25	25
Performance Approach	Pearson Correlation	,408*	,066	1	,695**	,215	,391
	Sig. (2-tailed)	,043	,755		,000	,301	,053
	N	25	25	25	25	25	25
Performance Avoidance	Pearson Correlation	,573**	-,069	,695**	1	,270	,151
	Sig. (2-tailed)	,003	,743	,000		,192	,473
	N	25	25	25	25	25	25
Mastery Approach	Pearson Correlation	,521**	,050	,215	,270	1	,453*
	Sig. (2-tailed)	,008	,812	,301	,192		,023
	N	25	25	25	25	25	25
Mastery Avoidance	Pearson Correlation	,176	-,278	,391	,151	,453*	1
	Sig. (2-tailed)	,399	,178	,053	,473	,023	
	N	25	25	25	25	25	25

*. Correlation is significant at the 0.05 level (2-tailed).

** . Correlation is significant at the 0.01 level (2-tailed).

a. Exam Stress Level = Low

For students with medium-level test anxiety, there was only a marginal negative correlation between expressive suppression capacity and performance avoidance ($r=-0.236$, $n=64$, $p=.062$)

Table 22: Correlations for the Emotional Regulation Capacities and Achievement-Goal Framework for Medium Exam Stress Level

		Cognitive Reappraisal Capacity	Expressive Suppression Capacity	Performance Approach	Performance Avoidance	Mastery Approach	Mastery Avoidance
Cognitive Reappraisal Capacity	Pearson Correlation	1	,045	-,005	-,112	,194	-,014
	Sig. (2-tailed)		,722	,970	,379	,125	,910
	N	64	64	64	64	64	64
Expressive Suppression Capacity	Pearson Correlation	,045	1	-,089	-,234	-,107	-,139
	Sig. (2-tailed)	,722		,483	,062	,402	,274
	N	64	64	64	64	64	64
Performance Approach	Pearson Correlation	-,005	-,089	1	,754**	,200	,200
	Sig. (2-tailed)	,970	,483		,000	,114	,114
	N	64	64	64	64	64	64
Performance Avoidance	Pearson Correlation	-,112	-,234	,754**	1	,256*	,184
	Sig. (2-tailed)	,379	,062	,000		,041	,147
	N	64	64	64	64	64	64
Mastery Approach	Pearson Correlation	,194	-,107	,200	,256*	1	,728**
	Sig. (2-tailed)	,125	,402	,114	,041		,000
	N	64	64	64	64	64	64
Mastery Avoidance	Pearson Correlation	-,014	-,139	,200	,184	,728**	1
	Sig. (2-tailed)	,910	,274	,114	,147	,000	
	N	64	64	64	64	64	64

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

a. Exam Stress Level = Medium

In short, there was a positive correlation between cognitive reappraisal capacity and performance approach/avoidance and mastery approach. This correlation occurred for the participants with low-level test anxiety. For students with medium-level test anxiety, however, no such correlation was present.

CHAPTER 5

DISCUSSION

The two main emotional regulation methods – cognitive reappraisal and expressive suppression – were studied in this study under certain circumstances to examine their effect on emotions like sadness and fear in previous ones. The main objective was to observe which one of the regulation methods is effective during a stressful situation (an exam in this occasion). Although the results were contrary of what the hypotheses claimed, there are still some interesting findings that are needed to be discussed. The results discussed here are based on students with medium-level test anxiety since the lack of enough sample size prevents an appropriate testing for the ones with low-level test anxiety.

5.1. Exam Score Change Can Be Predicted By Expressive Suppression Capacities Of The Students

The main finding of this thesis was that students' individual emotional regulation capabilities were systematically related with the difference in their test performance (Midterm 2 - Midterm 1) based on their initial characteristics of anxiety levels (medium-level test anxiety) and emotion regulation abilities (cognitive reappraisal and expressive suppression). The regression made to predict midterm score changes based on students' cognitive reappraisal and expressive suppression capacities is proven to be a success since the model showed that emotional regulation methods are significant predictors for the difference between the Z-scores of the exams, both before and after the experiment. The interesting part, however, is that the capacity to use expressive suppression was the only significant coefficient displayed in the model. This is contrary to the hypothesis that cognitive reappraisal would be more of an important factor to predict exam score changes. The results indicate that the decrease of exam grades (calculated by subtracting before-exam scores from after-exam scores) can be explained with how students use expressive suppression capacity. In that sense, it can be concluded that when students have lower expressive suppression capacity, their grade scores decrease less. Also based on the regression and this new observation, it is safe to assume that in a stressful situation such as an exam, suppressing one's emotions less is a more dominant factor when compared to reappraising a situation cognitively. The reason can be explained in such a way that a stressful situation requires a more response-focused strategy like getting motivated through one's emotions rather than an antecedent-focused strategy like cognitive reappraisal. In details, an assessment for the physical, mental, or knowledge-based skills of a person

has cognitive and behavioural factors for the anxiety (Cherry, 2012). To deal with that kind of anxiety, modulating one's response (i.e. expressive suppression) could be a better way to improve a situation. Cognitive reappraisal is known to be a self-regulation method on an emotional level that is classified as "cognitive change" (Gross, 1998a). As mentioned before, this regulation method is based on the appraisal of a situation. The results found in this regression support the assumption that appraising a situation is not efficient during a stress-inducing condition like an exam. On the other hand, expressive suppression is different from cognitive reappraisal in that perspective. Expressive suppression is a type of response modulation where a person inhibits his/her own emotions. While the previous studies yielded mixed results for its effect to regulate negative emotions (Dan-Glauser and Gross, 2011), the results here suggest a clear path for this self-regulation method to be predictive for the change in exam performances. Consistent with the findings, it is also known that suppressing unwanted thoughts, such as negative emotions like stress, is a process of heavy effort and resource-depleting (Muraven and Baumeister, 2000; Wenzlaff and Wegner, 2000). Therefore, by not suppressing the emotions, one does not get consumed with a tiring effort to relieve themselves of the negative emotions and thoughts. In summary, the most important factor to predict the change between two exams in which students take in turn, based on this regression, is not how well a student appraises a stressful situation by its cognitive re-evaluation but how much they influence their behavioural systems directly by not suppressing their emotions. Most importantly, it is the toning down of expressive suppression, in other words, the permission of emotional expression that might boost emotional and motivational resources to tackle the upcoming second exam.

While the findings in terms of Hypothesis 1, Part B (between-group ANOVA) were insignificant; for the improvement from the first exam to the second, the participants of the experiment who were allocated to the cognitive reappraisal group in the experimental intervention (the stressful video presentation) improved their exam scores when compared to their counterparts who belonged in the expressive suppression group. But this improvement within the cognitive reappraisal group was predicted (inversely) by their expressive suppression abilities, since the exam score change between the experimental groups was insignificant. It is important to notice that people who used cognitive reappraisal in the experiment went on to increase their exam performance significantly. Still, this result alone is not enough to determine which method is better for the increase in exam performances. The coefficients table for the regression which tests the exam performance improvement of the cognitive reappraisal group, based on the second hypothesis, indicates that the only predictive factor among the two regulation capacities is the (inverse) capacity to suppress one's emotion. This finding holds a different perspective about which regulation method is useful to overcome test anxiety. The ability to overcome is indicated by how much a student improves between two exams. It is natural to assume in a similar situation that a factor for the performance for a group of people using cognitive reappraisal should be the way they appraise a negative emotion. In other words, people who use cognitive reappraisal should be able to overcome a stressful situation with success based on their capacity to use cognitive reappraisal based on the hypothesis. However, the findings show otherwise. In fact, the exam performance improvement for *appraisers* (people who use cognitive cognitive reappraisal as the dominant emotion regulation method)

is not predicted by how much they appraise or evaluate a situation where anxiety is present, but how less they suppress their emotions.

We learned from the test conducted to observe that if exam improvement can be predicted by the emotional regulation capacities of the experiment groups that the cognitive reappraisal group increasing their exam grades more than the suppression group. Also, the significant predictor here was the expressive suppression capacity of participants. The Emotion Regulation Questionnaire (ERQ) given to the students to find out which regulation ability they use dominantly showcases both cognitive reappraisal and expressive suppression. With this test created by Gross (2003), it can be seen how well people can use emotional self-regulation. The fact which presents itself in the results that expressive suppression capacity is an inverse predictor for the exam performance improvement displays how important it is not to suppress one's negative emotions in a situation where test anxiety is at the centre of attention. On the other hand, this significant finding does not show itself when it was tried to predict the second exam scores of the experiment groups based on their emotional regulation abilities. In short, the less one suppresses one's emotions the more one improves one's exam scores, which is the opposite of what was found based on the second hypothesis. To make it simple, when exposed to a stress-inducing environment, appraisers can improve their exam performance more than *suppressers* (people who use expressive suppression as the dominant emotion regulation method) but based on how less they suppress their emotions. However, changes in exam grades of expressive suppressers, as a group, cannot be predicted by their capacity to use their habitual emotional regulation mechanism, i.e., expressive suppression.

5.2. The prediction of exam performance change in students was possible by their expressive suppression capacities

The ERQ does not simply show that a person uses only one regulation method. On the contrary, it represents the fact that a person can use both cognitive reappraisal and expressive suppression to certain degrees. The visibility of the dominance of one method is based on the answers. That was the fundamental factor to create the experiment groups. Students with higher cognitive reappraisal ability would be an appraiser while the others with higher expressive suppression ability would be a suppresser. That does not mean that an appraiser cannot suppress their emotions, or a suppresser is unable to appraise certain circumstances. In that sense, even when students are instructed to use cognitive reappraisal, their lesser capability to suppress emotions can still represent itself in a stressful situation. In addition to this categorization, suppressing their emotions less can predict how much habitual appraisers can improve their grades.

This characteristic of ERQ might be the reason why the expressive suppression capacities of cognitive reappraisal group were the significant factor for their exam performance improvement. Even when they are directed to use cognitive reappraisal while watching a stress-inducing visual stimulus, their innate ability to express their suppression might be activated during the experiment, thus affecting their performance. Even though the reappraisal group, along with the other two, were

categorized based on which of their capacity to use emotion regulation method is higher. While the cognitive reappraisal capacities, the percentage forms of the cognitive reappraisal ability scores, are higher than 30%, their existing capacity to use expressive suppression was the factor that predicted exam performance improvement for them.

In addition to this characteristic, it is known that expressive suppression is a response modulator, not a cognitive change strategy like cognitive reappraisal. Already described at the *introduction*, expressive suppression focuses on responses to certain emotional situations. That is a fundamental difference from cognitive reappraisal. Test anxiety, or anxiety in general, might require an active approach for its regulation. In that sense, expressive suppression is the perfect candidate to modulate the response to anxiety, unlike cognitive reappraisal. It can be concluded that expressive suppression is a more dominant emotion regulation method than cognitive reappraisal, due to the fundamental differences in their components, in situations where anxiety is present.

5.3. Correlation between emotional regulation capacities and achievement-goal framework is more visible when test anxiety level is lower

The correlation between two main regulation capacities and the components of the achievement-goal framework, while not originally a primary focus of this study, showed important findings that are consistent with previous studies regarding mastery and performance. The main findings indicate clear results for students with lower test anxiety that their capacity to use cognitive reappraisal are related with their approach and avoidance of performance, and their approach to mastery in a positive way. A possible explanation can be said about these findings that a student's performance on a lecture, or any other subject for that matter, is a certain case that can be appraised by the same person. The higher they can appraise or evaluate a negative situation to transform it to a more positive one, the more they try to perform better and avoid having a performance that is below average. In other words, students who are identified as appraisers tend to improve themselves and refrain from appearing incompetent when they do not feel anxious about a test/exam they must take within a course. One must bear in mind that while looking at the achievement goal framework that its components are not opposites to each other. Approach and avoidance are not inversely proportioned. The same situation for appraisers is also applied to their effort to learn everything they can from a course.

The most important part about these correlations came from the students with medium-level of anxiety. Even though their emotional regulation capacities and achievement-goal scores are like their low-level counterparts, their cognitive reappraisal capacity, along with the capacity to suppress as well, has no relevance through their frameworks of achievement, while the correlation between them decreased compared with the ones that belong to the students with low-level test anxiety. This can be explained as such that when the level of anxiety increases, cognitive reappraisal ability loses its effect upon a student's goals about their own performance, with the addition of their goal to approach (or avoid) mastery. This is consistent with a previous study done by Pekrun, Elliot and Maier (2009), where they proposed a model where performance avoidance

is affected by anxiety, which also influences academic performance. They also find that anxiety is negatively correlated with performance-avoidance goals. The addition of the current study to the previous one is that while the previous study indicates that anxiety is a factor for performance-avoidance, the present study shows a clear effect of anxiety increase on performance-approach goals for higher cognitive reappraisal capacities.

With the findings displaying that expressive suppression capacity has no relevance within the achievement-goal framework, a prospective definition can be said that the achievement of higher performance or complete mastery over a subject is not influenced by suppressing one's emotions. As goal orientation theory examines goal orientation as a motivating factor for the appraisal of performance (DeGeest and Brown, 2011), its irrelevance with the capability of a person to suppress their emotions should not be a surprise, while its close connection with the ability to appraise a situation seems only natural since the term "appraisal" is at both of concepts' core.

5.4. Limitations

Along with the significant results this study was able to find, it is important to point out certain limitations of the approach to study test anxiety and emotion regulation mechanisms. By pointing them out, new potential studies in the future and new models to examine the same concept can be suggested.

At first, the limitations presented below is applied mostly for the experiment-based results of the study. While the test-based results showed important findings, the integrity of the other results were impaired by certain limitations.

One of the main limitations that hindered the pace of the experiment, and the study in general, was the choice of experiment being a social one. In other words, one of the main limitations of the study that it was carried out in a real social situation. The test anxiety examined in this study was focused on a standardised test whose administration and grades are based on standard values of the lecture. Test anxiety is therefore predetermined by how the course is operated and scored by the lecturer (Popham, 1999). Standardized tests are widely known to be used in education to assess the knowledge students learned throughout the lecture's course. Naturally, the places where these tests are conducted are classrooms filled with human beings with different ideal, knowledge-levels, and potential. With all these differences come together in one place, it creates an environment with its own social climate and emotional aspects, with many physical elements as well, like the sitting plan of students. Bierman (2011) states that the "classroom climate" is the social environment which teachers should use to lead students to their highest potential like an "invisible hand". The idea that a social climate cannot be observed individually in an authentic way was the core design of the whole study. Because it is a well-known fact that there are many standardised test types like written exams, multiple choice exams, essays and so on. Observing students individually, while it can make up for the lack of proper sample size, has the potential of increasing the factors that are essential for the test anxiety. Different dynamics of every standardised test type would also have the potential of bringing

different levels of test anxiety. Also, the assessment of the same knowledge for every student makes it eminently easier to observe the students on common grounds. This common ground could have only been created in an environment in which all participants belonged, which they do already when students are considered. The downside of this choice was the timing of the experiments was based on the lecturer's program for the lecture, which made it harder to find a proper classroom filled with students. Additionally, the infeasibility to approach the students individually led to finding a lecture given to students in a classroom with students but for the sample size to be efficient enough, it had to be a big class. This might be stated as a flaw in the experimental design in a way that it is not safe to use an approach that focuses on the differences of the collectives. Future studies should focus on a way to approach the students individually without being dependent on different dynamics that can be generated by a social climate.

Parallel to one of the reasons why the first limitation emerged, the sample size was a moderate problem to begin with. While it enabled participants to be examined and categorized properly into their experiment groups, it was also a disabling factor for being insufficient to investigate participants based on some of their attributes, or not being able to investigate those attributes at all. The main one, in that sense, is the test anxiety levels. The students who attended the lecture consisted of people who have medium-level of test anxiety. Approximately 25% of the class had low-level test anxiety, while only one student had high-level test anxiety. For this reason, the study couldn't focus on levels of test anxiety other than medium properly. While low-level test anxiety could be examined in general, the sample size in the questionnaire phase was not adequate to examine participants based on their behaviour in the experiment phase of the study. The restriction applies even more severely to the high-level test anxiety, as one person is not enough to look at.

Moreover, the lack of comparable sample sizes for the exam anxiety levels and the experiment groups severely impaired the focus of the thesis. With enough sample sizes for both, it could have been possible to compare different anxiety levels and different experiment groups based on their exam performance and emotion regulation capacities clearly.

The inability to make a debriefing due to time constraints was another limitation. Due to its nonexistence, the demeanour towards the stress-inducing movie is unknown. Questions like "How much of the movie were they able to watch?", "How much were they affected by the movie?", "How well were they able to use the directives that were given to them?" were left unanswered. The pressure from the lecturer about the timing schedule of their own lecture made it impossible to make a debriefing during the given time. Therefore, only the PANAS questionnaires were given to the students.

There was another limitation that might affect the reliability of the method used in this study. Namely, Emotion Regulation Questionnaire used in the questionnaire phase was originally English. It was translated to Turkish by myself and its validation was done by a couple of my friends in the METU Department of Foreign Language. The reason why such a way was chosen is that there is no official translation of the Emotion Regulation Questionnaire and there were time constraints, yet again. This might put the validity and reliability of the questionnaire at risk. But at the same time, this

translation can also be used as the first official translation of the questionnaire, if it is revised further.

Presented as a footnote in Figure 1, the initial plan was to put the experiment in a place before the second midterm where the effect of the experiment could be observed in a short term. As previous studies had a shorter time between an experiment and its test to observe whether the experiment has an effect in general. But in this experiment, the second midterm was postponed, leaving no option but to test if there is a long-term effect. This can be interpreted as a design flaw or sheer amount of misfortune, though a flaw is more likely. Normally, an ideal experiment in this study could have take place right before the second midterm. In that way, it would be easier to test the initial characteristics that paved the way to the experiment to test those characteristics in a real situation. But that would be unethical since it might have a bad effect on the academic performances of the participants.

The restriction of these relatively small samples of students with low and high-level test anxiety was an important factor that limited the study's focus and scope. While the study intended to point out the possible differences between levels of test anxiety, this hindrance obstructed the chance to analyse all three levels of test anxiety. It is a well-known fact that the lack of adequate sample size yields many possible outcomes that can affect a study in a negative way. A sample size smaller than needed is known to increase the odds of false assumptions when used (Faber and Fonseca, 2014). In that sense, an individual approach to test anxiety and emotion self-regulation should be preferred in the upcoming studies.

5.5. Future Work

This study also holds light to potential works that can be pursued in future. At first, it is useful to follow the result that there is a predictive power of expressive suppression for the experiment group that used cognitive reappraisal as an emotion regulation method as instructed. As contradictive as it is, there is a possibility that one method, expressive suppression, can be related to the positive and negative affect change more dominantly than the other, cognitive reappraisal. This dominance can be tested in a controlled environment where the individual differences, rather than the collective ones that was observed in this study, are meant to be observed.

As the study showed us that observing the differences of the collectives in an uncontrolled environment has certain limitations, a completely different design which can be influenced by the previous studies should be pursued. Participants, after their inherent characteristics like test anxiety levels, ERQ and PANAS scores are measured, can be initiated a certain performance task designed to measure their performance in a common task, i.e. mathematical calculations. In that way, the future researchers can control the environment in addition to be able to find enough subjects to conduct their experiments after the initial calculation of the participants' characteristics are over. Ichikawa et. al (2011) had also used a continuous performance task on the participants of their experiment individually. As the basis is there to use, future studies can easily focus on individual differences for test anxiety and emotion regulation. Especially, the

individual difference approach will make it easier to find enough participants to compare different test anxiety levels, which was something this study was unable to do so.

The example given at the previous paragraph also gives us an insight for the mechanism of the experiment. The mechanism behind emotion regulation was present in a situation where people were exposed to a stimulus that induced a certain emotion, as the previous studies are the solid proof of this. Also, the investigation of emotion regulation effects based on a performance task (2011) was another mechanism to test out and compare both methods. An exam, given in a real lecture by a real lecturer, is a form of performance task itself. So that, the mechanism of the experiment was right to assume that the experiment could have test the predictive effect of cognitive reappraisal and expressive suppression based on their exam scores, despite of the limitations that hindered the design of the experiment of this study. Future studies should use this present mechanism, but only in a controlled environment with an approach to individual differences.

An additional comparison to focus on in the future works can also be the comparison between cognitive reappraisal and the two forms of emotion regulation method used in CBT, cognitive restructuring and cognitive behaviour modification. As all three methods are used by people to regulate emotions by their cognitive aspects, it is safe to conduct an experiment where the design of it is shaped by this comparison.

Based on the correlations between cognitive reappraisal and AGF framework components (See 5.3 at Results section), there is a presence of this emotion regulation method for low-anxiety students. Future works should focus on students with low-level test anxiety to find the underlying factors of this finding.

CHAPTER 6

CONCLUSION

Emotion and cognition are viewed as interdependent for the last two decades. There were many scientists who integrated the study of emotion into their field of study such as the developer of the appraisal theory of emotion Madga B. Arnord (2006), Herbert A. Simon who integrated emotions into the field of artificial intelligence and decision making (1967), Richard Lazarus who specialized in emotion and stress in relation to cognition (1982) and the pioneer of affective neuroscience Jaak Panksepp (2017). One of the most important studies that displayed and measured this relationship were made by Oschner and Gross (2008). Their study on cognitive emotion regulation is essential to see the interdependency of emotion and cognition. This study, which was based on their findings, focused on the characteristics of emotion regulation methods (cognitive reappraisal and expressive suppression), and the testing of those characteristics.

In our study, the initial characteristics of the students showed that while unable to predict the performance of an upcoming exam, emotion regulation capabilities can predict exam score improvement. Expressive suppression was the important coefficient for the model of the study. Results displayed that students can improve their exam performances when they suppress their emotions less. This finding is the foundation of this study and might be one for the future studies. While the questionnaire phase of the study demonstrated this important finding, the experiment phase did not. Certain limitations like the approach to the study (method), sample size, time constraints and the type of the experiment (social experiment) hindered the potential to test the initial characteristics properly. Still, it can be concluded that these initial characteristics can and must be tested with an individualistic approach.

All in all, the study successfully shows that emotional interactions significantly modulate exam performance. Emotional self-regulation methods, based on the results, can be very useful to improve exam performance. The key point here is that the significant method that is related to the exam performance is expressive suppression. Expressive suppression is reported as a maladaptive emotion regulation method in psychological disorders (Aldao, Nolen-Hoeksema and Schweizer 2010). Therefore, it is understandable that, when this strategy is used less, it has a positive effect on exam performance. If a person does not suppress their emotions (or at least, suppress it less than usual), it would have a positive result based on the improvement in exam performance. This further proves that exam performance is modulated at the emotional level. Finally, we can say that although cognitive abilities are considered to be related to exam performance, when regulation for exam anxiety is considered, emotional abilities might weigh in more. Further investigations are needed to explain the underlying reasons for this finding.

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APPENDICES

APPENDIX A: TEST ANXIETY QUESTIONNAIRE

Ad:

Soyad:

SINAV STRESİ ANKETİ

Aşağıdaki cümleleri 1'den 5'e kadar numaralandırarak cümlelerin sizi ne kadar yansıttığını belirtiniz.

(1) *Asla*

(2) *Nadiren*

(3) *Bazen*

(4) *Genellikle*

(5) *Her zaman*

1. ____ Sınavdan hemen önce avuç içi terlemesi, el titremesi gibi görsel endişe belirtileri yaşıyorum.
2. ____ Sınavdan önce midemde "kelebekler" hissediyorum.
3. ____ Sınavdan önce midem bulanıyor gibi hissediyorum.
4. ____ Sınav sorularını okuyor ve hiçbir sorunun cevabını bilmiyormuş gibi hissediyorum.
5. ____ Sınav öncesinde ve sınav sırasında panikliyorum.
6. ____ Sınav sırasında beynim duruyor, bildiklerimi unutuyorum.
7. ____ Sınavdan sonra, sınav sırasında hatırlayamadığım bilgileri hatırlıyorum.
8. ____ Sınavdan bir önceki gün uyku problemi yaşıyorum.
9. ____ Kolay sorularda hata yapıyorum ve cevapları yanlış işaretliyorum.
10. ____ Sınav sırasında cevapları seçmekte sorun yaşıyorum.

APPENDIX B: EMOTION REGULATION QUESTIONNAIRE

Ad:

Soyad:

DUYGU KONTROL ANKETİ

Bu ankette size duygusal hayatınızla ve duygularınızı nasıl kontrol ettiğiniz (düzeltmek ve yönetmek) ile ilgili bazı sorular sorulacaktır. Aşağıda verilen cümleler, duygusal hayatınızın iki yönünü ele alıyor: Duygusal deneyiminiz(içinizdeki hissiyat) ve duygusal ifadeniz (konuşma, duruş ve davranış tarzına göre duygularınızı nasıl gösterdiğiniz). Bazı cümleler birbirine benzer görünse de, aslında birbirlerinden farklıdır. Cümleleri aşağıdaki ölçeğe göre numaralandırınız.

1	2	3	4	5	6	7
KESİNLİKLE			TARAFSIZ			KESİNLİKLE
KATILMIYORUM						KATILYORUM

- 1.____ Daha pozitif duygular hissetmek istediğimde (sevinç ve mutluluk gibi), hakkında düşündüğüm şeyi değiştiririm.
- 2.____ Duygularımı kendime saklarım.
- 3.____ Daha az negatif duygular düşünmek istediğimde (hüzün ve öfke gibi), hakkında düşündüğüm şeyi değiştiririm.
- 4.____ Pozitif duygular hissettiğimde, onları ifade etmemeye dikkat ederim.
- 5.____ Stresli bir durumla karşılaştığımda, sakin kalacak şekilde kendimi o durum hakkında düşünmeye zorlarım.
- 6.____ Duygularımı, onları ifade etmeyerek kontrol ederim.
- 7.____ Daha pozitif duygular hissetmek istediğimde, içinde bulunduğum durum hakkındaki düşüncemi değiştiririm.
- 8.____ Duygularımı, içinde bulunduğum durum hakkındaki düşüncemi değiştirerek kontrol ederim.
- 9.____ Negatif duygular hissettiğimde, onları ifade etmemeye dikkat ederim.
- 10.____ Daha az negatif duygular hissetmek istediğimde, içinde bulunduğum durum hakkındaki düşüncemi değiştiririm.

APPENDIX C: ACHIEVEMENT GOAL QUESTIONNAIRE

Ad:

Soyad:

BAŞARI YÖNELİMLERİ ANKETİ

Aşağıda verilen cümleleri 1'den 5'e kadar derecelendirin.

(1) Kesinlikle katılmıyorum

(2) Katılmıyorum

(3) Kararsızım

(4) Katılıyorum

(5) Kesinlikle katılıyorum

1. ____ Sınıfımdaki öğrencilere göre daha iyi performans göstermeyi amaçlarım.
2. ____ Diğer öğrencilere göre daha başarılı olmak için gayret ederim.
3. ____ Diğer öğrencilerden daha iyi performans göstermeyi hedeflerim.
4. ____ Öğrenebileceğimden daha az şey öğrenmekten kaçınırım.
5. ____ Derste anlatılan konuları eksik öğrenmekten kaçınırım.
6. ____ Bir konuyu olabildiğinden daha az öğrenmekten kaçınırım.
7. ____ Derste anlatılan konuları tamamen öğrenmeyi amaçlarım.
8. ____ Dersin içeriğini anlamak için gayret sarf ederim.
9. ____ Ders süresi içerisinde mümkün olduğunca fazla şey öğrenmeyi amaçlarım.
10. ____ Diğer öğrencilerden daha kötü performans göstermemeye gayret ederim.
11. ____ Diğer öğrencilerden daha kötü performans göstermemeyi amaçlarım.
12. ____ Diğer öğrencilere göre başarısız görünmekten kaçınmaya çalışırım.

APPENDIX D: PANAS (SINAV ÖNCESİ)

Bu ölçek farklı duyguları tanımlayan bir takım sözcükler içermektedir. Gösterilen filmden önce nasıl hissettiğinizi düşünüp her maddeyi okuyun. Uygun cevabı her maddenin yanında ayrılan yere (puanları X ekleyerek) işaretleyin.

		Çok az (hiç)	Biraz	Ortalama	Oldukça	Çok fazla
1	İlgili					
2	Sıkıntılı					
3	Heyecanlı					
4	Mutsuz					
5	Güçlü					
6	Suçlu					
7	Ürkmüş					
8	Düşmanca					
9	Hevesli					
10	Gururlu					
11	Asabi					
12	Uyanık					
13	Utanmış					
14	İlhamlı					
15	Sinirli					
16	Kararlı					
17	Dikkatli					
18	Tedirgin					
19	Aktif					
20	Korkmuş					

PANAS (SINAV SONRASI)

Bu ölçek farklı duyguları tanımlayan bir takım sözcükler içermektedir. Gösterilen filmden sonra nasıl hissettiğinizi düşünüp her maddeyi okuyun. Uygun cevabı her maddenin yanında ayrılan yere (puanları X ekleyerek) işaretleyin.

		Çok az (hiç)	Biraz	Ortalama	Oldukça	Çok fazla
1	İlgili					
2	Sıkıntılı					
3	Heyecanlı					
4	Mutsuz					
5	Güçlü					
6	Suçlu					
7	Ürkmüş					
8	Düşmanca					
9	Hevesli					
10	Gururlu					
11	Asabi					
12	Uyanık					
13	Ütanmış					
14	İlhamlı					
15	Sinirli					
16	Kararlı					
17	Dikkatli					
18	Tedirgin					
19	Aktif					
20	Korkmuş					

APPENDIX E: EXPERIMENT DIRECTIVES

REAPPRAISAL

Lütfen sıradaki film sahnesini dikkatlice izleyin. Filmi izlerken, durumu daha pozitif bir bakış açısıyla izlemeye çalışın. Bunu pek çok farklı yolla yapabilirsiniz. Örneğin, filmdeki karakterlere kendilerini daha iyi hissetmelerini sağlayacak öneriler düşünebilirsiniz. Bunlar, karakterlerin filmdeki durumlarının pozitif taraflarını görmelerine yardımcı olacak öneriler olabilir. Ya da, karakterlerin bu durumdan öğrenebilecekleri iyi şeyleri düşünebilirsiniz. Şunu unutmayın ki bir durum o an için acı verici olsa da, uzun vadede bir kişinin hayatını daha iyi hale getirebilir ya da beklenmedik iyi sonuçlar doğurabilir.

SUPPRESSION

Lütfen sıradaki film sahnesini dikkatlice izleyin. Filmi izlerken, herhangi bir duygu hissettiğiniz anda o duyguları bastırmaya çalışın. Duyguları bastırma eylemini; duygularınız kendinize saklayarak, bir duygu hissettiğiniz sırada bunu dışa vurmayarak veya duygularınız o an ifade etmeyerek gerçekleştirebilirsiniz. Film gösterimi sırasında duygularınızı bu belirtilen yöntemler ile bastırmaya özen gösteriniz.

CONTROL

Lütfen sıradaki film sahnesini dikkatlice izleyiniz. Filmi izlediğiniz sırada sizden sadece videoya konsantre olmanız bekleniyor. Filmdeki karakterlerin bulunduğu duruma, sahnenin hissettirebileceği herhangi bir duyguya odaklanmadan, sadece film sahnesinde olanları gözlemleyiniz.

APPENDIX F: ETHICS COMMITTEE APPROVAL

UYGULAMALI ETİK ARAŞTIRMA MERKEZİ
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09 AĞUSTOS 2017

Konu: Değerlendirme Sonucu

Gönderen: ODTÜ İnsan Araştırmaları Etik Kurulu (İAEK)

İlgi: İnsan Araştırmaları Etik Kurulu Başvurusu

Sayın Doç. Dr. Annette HOHENBERGER ;

Danışmanlığını yaptığınız Borabay KADİRDAĞ "*Türk Öğrencilerde Bilişsel Yeniden Değerlendirme ve Sınav Stresi Arasındaki İlişki*" başlıklı araştırması İnsan Araştırmaları Etik Kurulu tarafından uygun görülerek gerekli onay 2017-FEN-038 protokol numarası ile 09.08.2017 – 20.02.2018 tarihleri arasında geçerli olmak üzere verilmiştir.

Bilgilerinize saygılarımla sunarım.

Prof. Dr. Ş. Halil TURAN