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Ph.D. DISSERTATION

Pınar SOYDAŞ



T.C.
ANKARA YILDIRIM BEYAZIT UNIVERSITY
GRADUATE SCHOOL OF SOCIAL SCIENCES

THE EFFECTS OF MOOD, AGE AND EXECUTIVE FUNCTIONS (WORKING MEMORY AND COGNITIVE FLEXIBILITY) ON EMOTION REGULATION

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Supervisor
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APPROVAL PAGE

The thesis, prepared by Pınar SOYDAŞ and titled "The Effects of Mood, Age and Executive Functions (Working Memory and Cognitive Flexibility) on Emotion Regulation" is accepted by a unanimous vote as a doctoral thesis at Ankara Yildirim Beyazıt University, Graduate School of Social Sciences, Department of Psychology.

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DECLARATION

I hereby declare that all information in this thesis 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 materials and results that are not original to this work; otherwise, I accept all legal responsibility. Date (14.01.2026)

Signature

Pınar SOYDAŞ

DEDICATION

To my beloved husband "Bahadır"

&

To my beloved daughters "Elif Naz and Nil Asya"

&

To my beloved mother and father "Elbiyan and Gürsel"

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ABSTRACT

The Effects of Mood, Age and Executive Functions (Working Memory and Cognitive Flexibility) on Emotion Regulation

The main purpose of this study is to examine the effects of mood, age, and executive functions (cognitive flexibility and working memory) on emotion regulation. For this purpose, two different studies were conducted. Study 1 (N = 179) is a correlational study in which mood was measured with a self-reported scale named Derogatis Affect Balance Scale (DABS). The relationship between mood (positive and negative) and perceived emotion regulation strategies (reappraisal and suppression) and executive functions (working memory and cognitive flexibility) was investigated. Study 2 (N = 191) is an experimental study, and how the mood manipulation (Cyberball paradigm in positive, negative, and control) affects adolescents' emotion regulation strategies (reappraisal, suppression and temporal distance) and executive functions was investigated. Additionally, the moderating role of Executive Functions (EFs) in the relationship between mood and emotion regulation (ER) strategies was analyzed. To reveal the role of age on emotion regulation strategies, the data were collected from both younger adolescents (10-12 ages) and older adolescents (18-21 ages) in both Study 1 and Study 2.

The results shown that, firstly, the current positive mood was moderately and negatively related to the perceived suppression strategy and weakly and positively related to the perceived reappraisal strategy in the older adolescent group. Positive mood was also moderately and positively related to the peceived reappraisal strategy in the younger adolescent group (Study 1). However, mood manipulations (negative and control) do not have a significant effect on perceived ER strategies (reappraisal and suppression). Conversely, mood manipulations (negative and control) made a significant effect on temporal distance ER strategy task (TDERT) (Study 2).Secondly, positive mood was significantly weakly and positively correlated with working memory (WM) and cognitive flexibility (CF), and negative mood was negatively and weakly correlated with WM and negative mood was also negatively and moderately correlated with CF (Study 1). Mood manipulations also affected WM and CF scores (Study 2). Third, consistent with the literature, EFs and temporal distance ER strategy were improved, while perceived suppression strategy decreased with age. Perceived reappraisal strategy also stayed similar with age (both Study 1 and Study 2). Forth, CF has a significant moderating role on the

relationship between positive mood and perceived reappraisal strategy in older group and also a significant moderator role on the relationship between negative mood and perceived suppression strategy in younger group (Study 1). However, WM does not have any significant moderating role in the relationship between moods (positive or negative) and ER strategies (reappraisal or suppression) (both Study 1 and Study 2).

As a result, these two studies have showed that mood has an effect on perceived and manipulated ER strategies and EFs. Furthermore, there are significant differences between younger and older adolescents in terms of mood, EFs and ER strategies, and this difference shows positive development with age. These findings are consistent with previous literature.

Key Words: Emotion regulation strategies, temporal distance, mood, executive functions, working memory, cognitive flexibility, adolescence.

ÖZET

Duygu Durum, Yaş ve Yönetici İşlevlerin (Çalışma Belleği ve Bilişsel Esneklik) Duygu Düzenlemeye Etkisi

Bu çalışmanın amacı, duygu durum, yaş ve yönetici işlevlerin (bilişsel esneklik ve çalışma belleği) duygu düzenleme üzerindeki etkilerini incelemektir. Bu amaçla iki farklı çalışma yürütülmüştür. Çalışma 1 (N = 179), duygu durum (pozitif ve negatif) (Derogatis Duygulanım Denge Ölçeği) ile duygu düzenleme stratejileri (yeniden değerlendirme ve bastırma) ve yönetici işlevler (çalışma belleği ve bilişsel esneklik) arasındaki ilişkilerin araştırıldığı korelasyonel bir çalışmadır. Çalışma 2 (N = 191), duygu durum manipülasyonunun (pozitif, negatif ve control) (Cyberball paradigması) ergenlerin duygu düzenleme stratejilerini ve yönetici işlevlerini nasıl etkilediğinin araştırıldığı deneysel bir çalışmadır. Buna ek olarak, yönetici işlevlerin duygu durum ve duygu düzenleme stratejileri arasındaki ilişkideki düzenleyici rolü analiz edilmiştir. Yaşın duygu düzenleme stratejileri üzerindeki rolünü ortaya çıkarmak için, küçük (10-12 yaş) ve büyük ergen (18-21 yaş) gruptan toplanan veriler karşılaştırmalı olarak incelenmiştir.

Çalışma bulguları, ilk olarak, büyük ergen katılımcıların mevcut pozitif duygu durumları, algılanan bastırma stratejisiyle negatif yönde ve orta derecede ve algılanan yeniden değerlendirme stratejisiyle ise pozitif yönde ve zayıf derecede ilişkili bulunmuştur. Ayrıca, küçük ergen katılımcıların mevcut pozitif duygu durumları, algılanan yeniden değerlendirme stratejisiyle pozitif yönde ve orta derecede bir ilişkili bulunmuştur (1. Çalışma). 2. Çalışmada, duygu durum manipülasyonunun (negatif ve kontrol) (Cyberball) yeniden değerlendirme ve bastırma stratejilerini anlamlı düzeyde etkilemediği ancak zamansal mesafe duygu düzenleme stratejisini anlamlı bir şekilde etkilediği görülmüştür (2. Çalışma). İkinci olarak, pozitif duygudurum ile çalışma belleği (WM) ve bilişsel esneklik (CF) arasında anlamlı düzeyde, pozitif yönde ve zayıf bir korelasyon bulunurken, negatif duygu durum ile WM arasında anlamlı düzeyde, negatif yönde ve zayıf bir korelasyon bulunmuştur. Ayrıca, negatif duygu durum ile CF arasında orta derecede ve negatif yönde bir korelasyon bulunmuştur (1. Çalışma). Duygu durum manipülasyonunun ayrıca WM ve CF'yi pozitif yönde etkilediği görülmüştür (2. Çalışma). Üçüncü olarak, literatürle tutarlı biçimde, yönetici işlevler ve zamansal mesafe ER stratejisi yaşla birlikte iyileşirken, algılanan bastırma stratejisi yaşla birlikte azaldığı görülmüştür. Algılanan yeniden değerlendirme stratejisinin ise yaşla birlikte anlamlı şekilde farklılaşmadığı görüldü (hem

Çalışma 1, hem de Çalışma 2). Dördüncü olarak, CF'nin, büyük ergen grupta, pozitif duygu durum ile algılanan yeniden değerlendirme stratejisi arasındaki ilişkide ve ayrıca küçük ergen grupta, negatif duygu durum ile algılanan bastırma stratejisi arasındaki ilişkide anlamlı bir düzenleyici role sahip olduğu görülmüştür (Çalışma 1). Bununla birlikte, WM'nin duygu durum (pozitif veya negatif) ve algılanan ER stratejileri (yeniden değerlendirme veya bastırma) arasındaki ilişkide düzenleyici rolü anlamlı düzeyde bulunamamıştır (hem Çalışma 1 hem de Çalışma 2).

Sonuç olarak, bu iki çalışma, duygu durumun algılanan ve manipüle edilen ER stratejileri ve yönetici işlevler ile ilişkili olduğunu göstermektedir. Ayrıca, duygu durum, duygu düzenleme stratejileri ve yönetici işlevler açısından büyük ve küçük ergen grupları arasında anlamlı bir fark olduğu ve bu farkın yaşla birlikte olumlu bir gelişme gösterdiği görülmüştür. Elde edilen bulgular önceki araştırma bulgularıyla genel itibariyle örtüşmektedir.

Anahtar Kelimeler: Duygu düzenleme stratejileri, zamansal mesafe, duygu durum, yönetici işlevler, çalışma belleği, bilişsel esneklik, ergenlik.

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LIST OF ABBREVIATIONS

ACT	: The Auditory Consonant Trigram
CF	: Cognitive Flexibility
CFT	: Cognitive Flexibility Task
DABS	: Derogatis Affect Balance Scale
EFs	: Executive Functions
ER	: Emotion Regulation
ERQ-CA	: Emotion Regulation Questionnaire for Child and Adolescent
TDERT	: Temporal Distance Emotion Regulation Scale
WM	: Working Memory

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1. INTRODUCTION

Emotions have important functions in our lives. They shape our thoughts, feelings and behavior. Emotions can be beneficial or harmful to the individual or group depending on the context. Emotions help us facilitate the decision-making process (Heilman et al., 2010), increasing memory performance (Xiu et al., 2016) and providing interpersonal interactions (Lopes et al., 2005). On the other hand, emotions can be harmful and they can significantly impair the functionality of the person (Gross & Jazaieri, 2014). Emotions may cause problems when they are very intense and long-lasting in inappropriate conditions. In such cases, the person tries to influence or change their emotional reactions. In other words, people actively regulate their emotions by trying to reduce the negative features of emotions and increase their positive ones (Gross & Jazaieri, 2014). Emotion regulation (ER) is defined as the set of processes that affect what emotions individuals have, when they have those emotions, and how they experience and express those emotions (Gross, 1998). In a semi-structured interview study, Gross and his colleagues (2006) asked to the participants about the situations in which they had regulated their emotions in the last two weeks. The participants targeted 24 types of emotions in emotion regulation states, and the three most common emotions among these emotions were anger (23%), sadness (22%) and anxiety (10%). Also, positive emotions were regulated at a lower rate (9%) than negative emotions, and the most regulated emotions among positive emotions were happiness and excitement (Gross et al., 2006).

Another concept related to emotion is mood. The terms of emotion and mood are sometimes used interchangeably in society, however they are conceptually unique emotional states and differ in important ways. Emotions last a short time; they are intense, adaptive and activated with a stimulus (Ekman & Davidson, 1994). Emotions are also revealed with a specific facial expression. However, mood is of lower intensity but longer duration than emotions (last for hours or days) and mostly there is not any specific motivation or stimulus that activates it (Ekman & Davidson, 1994). Also, there is not any facial expression for mood. It is very important to distinguish between the concepts of emotion and mood in evoking and measuring emotional experiences and states (Yücel & Unal, 2020). Additionally, both emotions and moods are in need of regulation when these are intense and last for a long time.

The current thesis will initially present the basic concepts related to ER to better understand the topic of ER. Second, it will introduce the theoretical background of ER and Gross' process model of ER. Then, it will focus on ER strategies (reappraisal, suppression, and temporal distancing) and examine their relationships with various factors, including positive or negative mood, age of transition from younger adolescence to older adolescence and executive functions (especially working memory and cognitive flexibility).

2. LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1. Emotion Regulation

The concept of emotion regulation (ER) is defined by Gross (1998) "*as a set of processes that determine which emotions individuals have, when they have those emotions, and how they experience and express those emotions*." Based on this definition, ER can be considered as being able to recognize emotions and express these emotions in a healthy way. The focus of ER is the regulation of emotions by individual instead of the regulation of individual's emotional states by emotions (Gross, 1999). According to Gross (1999), both of regulation perspective are valuable, however their aims, objectives and strategies are different. That is why, these two regulation perspectives should be divided each other.

ER is a broad issue that encompasses many fundamental concepts. Although ER varies according to contextual factors, the following three fundamental concepts stand out in the literature: *goals of ER, awareness of emotion and who regulates the emotion* (Gross & Jazaieri, 2014; İlkmen, 2023). Depending on individual's aims of ER, emotions can be increased or decreased. Also, the individual may or may not be aware of regulating their emotions (implicit and explicit ER). ER can also take the form of regulating one's own emotions (instrinsic ER) or regulating the emotions of others (extrinsic ER). These characteristics of ER are important to understand the process of regulation.

2.1.1. Fundamental Concepts of ER

Goals of ER

People regulate their emotions, sometimes by increasing or decreasing their positive and negative emotions. Individuals decide to increase or decrease the intensity of these emotions based on their goals (Gross, 2015). For instance, a student who succeed an exam might try to hide his/her positive emotions in the presence of a friend who did not succeed. This situation can be an example of decreasing positive emotions. With this way, trying to reduce his/her friend's negative emotions can be also an example of decresing negative

emotions. These examples demonstrate that ER is being done in a desired or functional manner.

ER can be done in dysfunctional as well as functional ways and this situation also points to psychological disorders through increasing or decreasing emotions (Gross & Jazaieri, 2014). Millgram and colleagues (2015) found that individuals diagnosed with depression regulate their negative emotions to feel more intense sadness.

Intrinsic and Extrinsic ER

Regulation of individual's own emotions can be called instrinsic ER, while regulation of the emotions of others can be called extrinsic ER (Gross & Jazaieri, 2014). As an illustration, expressing one's emotions by writing which is expressing writing (Pennebaker, 2010) is an example of instrinsic ER. It can be also an example of extrinsic ER is when a parent says supportive words to calm their child down and makes her/him feel that they are there for her/him.

Implicit and Explicit ER

Another concept in ER processes is awareness of emotions. Emotions can be regulated implicitly or explicitly by an individual. Implicit ER is performed automatically and unconsciously, while explicit ER is performed effortfully and consciously (Gross, 1999; Gyurak et al., 2011). Gyurak and colleagues (2011) proposed a dual-process model and emphasized that both are important for mental health. Dual-process model includes explicit and implicit regulation. Explicit ER is related to a conscious desire that can be expressed explicitly to change one's emotions, whereas implicit ER is related to an unconscious desire to change emotional response. Implicit ER is a process that works without conscious control or clear objectives in order to change emotional reaction (Koole & Rothermund, 2011). Explicit and implicit ER have flexible boundaries rather than being mutually incompatible categories. In other words, the relationship between explicit and implicit processing determines adaptive emotional responses (Gyurak et al., 2011). For instance, a student who goes for a walk to reduce her/his anxiety before the exam is an example of explicit ER and then continues to move unconsciously while talking with a friend is an example of implicit ER.

Braunstein and colleagues (2017) describe a multi-level framework within the implicit and explicit ER. One of these dimensions includes the purpose of changing the emotion (implicit and explicit) and the other includes the process of changing the emotion (automatic and controlled) (Ilkmen et al., 2023). The interaction of these two dimensions creates four distinct ER categories. One of the category is emerged a controlled ER with an implicit intention. Another one is conducted an automatic ER with an implicit intention. The other category is carried out a controlled ER with explicit intention. The last category is carried out an automatic ER with explicit intention (Ilkmen et al., 2023).

Braunstein and collegues states that reappraisal strategy initially is expilicit ER category due to its purpose, however in the process, it transforms from a controlled ER to an automatic ER as a result of repeated use. This multi-level framework offers a methodical way to comprehend ER, which could be useful for enhancing both mental and physical health. As a result, this framework improves comprehension of the complex relationships among various emotion regulation strategies (Braunstein et al., 2017).

2.1.2. Theoretical Background and the Models of ER

The theoretical background of ER research has been based on ego defense mechanisms (Freud, 1946) in psychoanalytic tradition, psychological stress and the theory of coping with stress (Lazarus & Folkman, 1984), attachment theory (Bowlby, 1969), and emotion theory (Frijda, 1966) (cited by Gross, 1999). After the 1990s, ER has become a distinctive research domain in the literature (Thompson, 1994).

Gross (2015) developed the Process Model of ER by presenting a theoretical framework based on studies in the field of emotion regulation. According to the model, emotion formation is divided into four levels sequentially, which are confronting the situation, paying attention to the essential aspects of this situation, appraising the situation related to the active aims, and creating a response to the relevant situation (McRae & Gross, 2020) (see Figure 1a). As an illustration, a student has an exam in class (situation), notices the teacher's cold behavior (attention), interprets this coldness as dislike of the student (appraisal), and becomes fearful, nervous, and shaking during the exam (response). The emotion formation cycle was also shown with a feedback arrow.

In addition to the emotion formation cycle, the Process Model distinguishes ER strategies into five families. These are situation selection, situation modification, attentional deployment, cognitive change, and response modification (McRae & Gross, 2020). Situation selection is the process of deciding to stay away from an emotionally charged circumstance in order to stop an emotional reaction from being triggered (Gross, 1998). For example, an individual who thinks he/she will not be hired avoids going to a job interview. Hu and colleagues (2014) stated that one of the most commonly used methods for situation selection strategy is escape. If escape is not possible, the individual can try to minimize exposure time. This strategy is called situation modification (Gross, 1998). As an illustration, the person attends the job interview but wants to leave the environment as soon as possible because the person thinks he or she will not get the job.

The next step is to employ attention deployment to divert attention from elements of the circumstance that elicit undesirable feelings (Gross, 1998) . Distraction and rumination are attentional deployment strategy (McRea & Gross, 2020). For example, a person attending an interview might not make eye contact with the interviewer because they will notice his/her excitement. This is an example of distraction. Also, the person who constantly thinks about the interview and can not sleep the interview night is an example of rumination. Cognitive change is trying to change the perception about the situation or the meaning of the situation via reapprasing the situation (Gross, 2015). Reappraisal and acceptance are cognitive change strategy (McRea & Gross, 2020). As an illusation, a student who received a bad grade saying, "*It's my responsibility to get this low score*", is an example of acceptance strategy. The same student saying "*This grade is an opportunity for my development*" is an example of reappraisal strategy. As a cognitive change strategy, reappraisal is one of the most prominent and frequently researched strategy in the literature (Ahmed et al., 2018). Then, the last step is response modulation, which appears in the later stages of the ER process because regulation occurs after the emotion has been elicited (Gross, 1998, McRea & Gross, 2020) (see Figure 1b). Suppression and physiological intervention are responce modulation strategy (McRea & Gross, 2020). As an illustration, a student who received a bad grade, hides his/her sadness when meeting with his/her friends which is an example of suppression. The same student doing breathing exercises to suppress their emotions is an example of physiological intervention.

According to Gross' process model, ER strategies are also divided into two ways: 1) the antecedent-focused strategies emerging before the emotional reaction and 2) the

response-focused strategies being managed in the process of an ongoing emotional reaction (Gross, 2015). The first four ER families (situation selection, situation modification, attentional deployment, and cognitive change) are defined antecedent-focused strategies, while the last ER strategy (response modulation) is known as response-focused strategies (McRea & Gross, 2020). Antecedent-focused strategies attempt to influence emotion before emotional reactions are elicited, while response-focused strategies attempt to change emotional reactions after emotion is elicited (Gross & Thompson, 2007).

In the last stage of the model which is called the extended process model by Gross (2015), it was mentioned about the process that the individual goes through while implementing the strategies (see Figure 1c) (McRea & Gross, 2020). This process consists of four steps which are identification, selection, implementation, and monitoring (Gross, 2015, McRea & Gross, 2020). During the identification step, after an emotional state is perceived, and then it is decided whether the emotion should be regulated or not. During the selection step, an appropriate regulatory strategy is chosen among the alternatives. During the implementation step, selected strategies are implemented using specific methods. During the final monitoring step, the entire process is observed to see if the regulatory goals are being reached (McRae & Gross, 2020) (see Figure 1c).

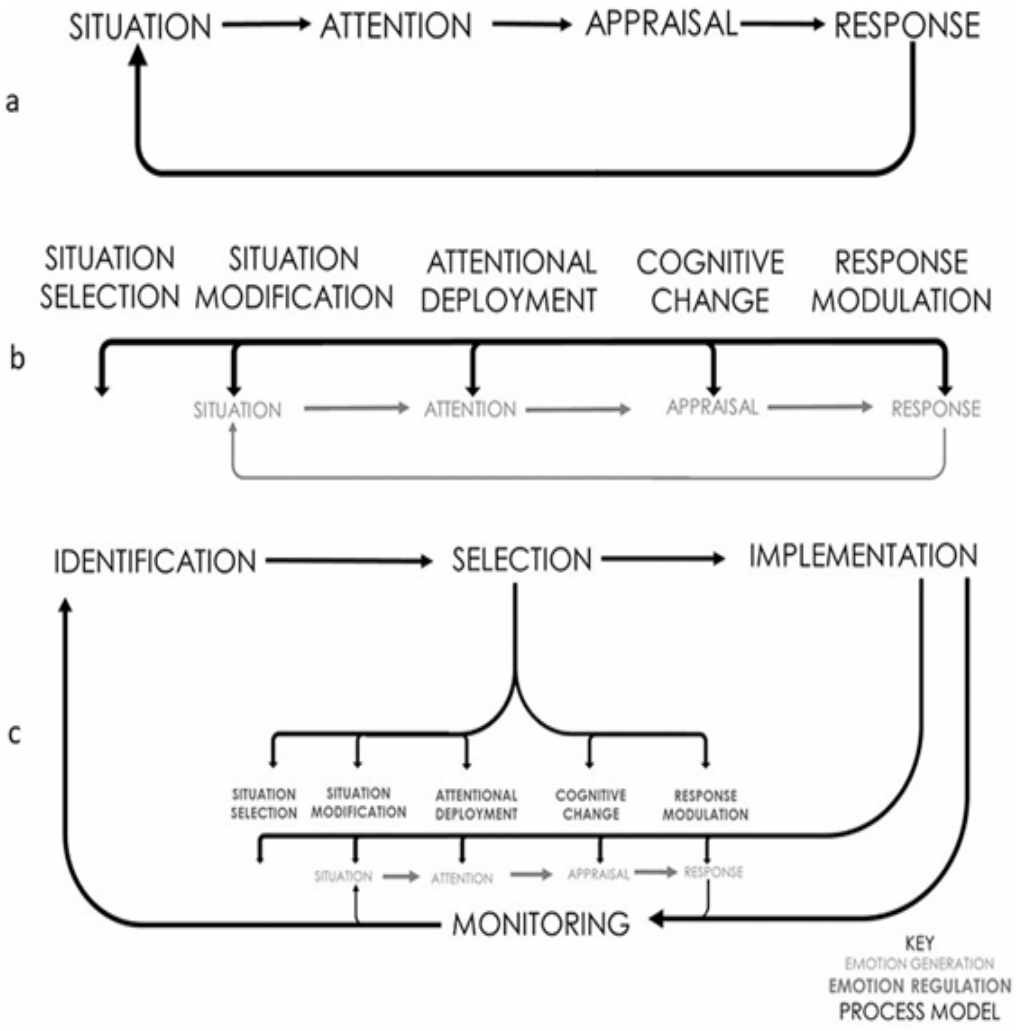


Figure 1. ER process steps; (a) The cycling of emotions formation, (b) the five-family process of ER strategies, (c) the four-stage process model of ER (McRae & Gross, 2020)

As a result, the important point about the five ER approaches in the process model is that a person often uses several ER approaches to regulate his/her emotions in daily life. Still, this process model put forwards a very useful conceptual framework to comprehend the mechanism underlying different forms of ER (McRea & Gross, 2020).

2.1.3. ER Strategies and Distancing

Researchers have looked at the emotional, cognitive, and social effects of various ER strategies in different fields. They have done this through both experimental studies and survey studies that evaluate individual differences (e.g., Shafir et al., 2016; Sheppes et al., 2015). The Process Model (Gross, 1998) and the Extended Process Model (Gross, 2015,

McRea & Gross, 2020) suggests that it is more beneficial to begin regulation at a reasonably early point in the emotion-generating process rather than putting regulatory strategies into place later. This is because attentional deployment and other early selection filtering procedures are less demanding and more successful (especially at high intensity levels) than semantic-based processing strategies like cognitive reappraisal (Sheppes et al., 2014). In a later study, Shafir and colleagues (2016) found that distraction is better than reappraisal in high emotional-intensity situations and reappraisal success may be a strategy specific to moderate emotional intensity.

The behavioral and neurological implications of employing distraction and reappraisal as an ER strategy were examined by McRae et al. (2010). McRae and collegues (2010) compared distraction and reappraisal ER strategies via a fMRI study and they found that both forms of ER were effective in lowering negative affect; however, reappraisal performed significantly better than distraction in reducing negative affect (McRea et al., 2010). In a different study, Kross and Ayduk (2008) indicated that participants who engaged in reappraisal experienced less repetitive thoughts than participants in the distraction group, suggesting that reappraisal but not distraction provided long-lasting (for seven days) benefits following experimental manipulations. This might be because reappraisal creates a positive long-term effect because it changes one's perspective on the event, whereas distraction provides a short-term benefit (Kross & Ayduk, 2008). Previous researches suggest that the use of ER strategies varies depending on the intensity of the emotion (Shafir et al., 2016, Sheppes et al., 2011, Sheppes & Gross, 2011). According to Sheppes and colleagues (2011), reappraisal mostly works in a situation with low and moderate emotional intensity, while distraction works better in situations with high emotional intensity. In the early regulatory process, distraction can reduce intense emotional reactions before they worsen (Sheppes & Gross, 2011). On the other hand, reappraisal works better in a situation with low to moderate emotional intensity because it can change how emotional situations are viewed and effectively reduce moderate emotional reactions (Shafir et al., 2016). Even when offered money, the result remained the same. When regulating high-intensity emotions, individuals prefered to use distraction and when regulating low-intensity emotions, they prefered to use reappraisal (Sheppes et al., 2014). However, Denny & Ochsner (2014) found that while distraction strategy reduced emotional intensity in a short term, it did not offer a permanent effect on the intensity of ER. On the other hand, the effects of reappraisal strategy have been observed to continue in the long term (Denny & Ochsner, 2014).

In the previous literature, it can be seen that ER studies have mostly used suppression as one of the response-focused strategies and reappraisal as one of the antecedent-focused strategies and (Zörer & Yorulmaz, 2022). One reason why these strategies are mostly used in academic studies is that they can be easily manipulated in a laboratory setting (Zörer & Yorulmaz, 2022). Experimental studies can employ various techniques, such as showing participants emotionally charged photos or movies or listen also emotionally charged sounds. The findings of these studies have mostly indicated that reappraisal decreases the intensity of negative emotions, whereas suppression increases the intensity of negative emotions (e.g. Haga et al., 2009; McRea et al., 2012). Additionally, according to the findings of Gross and John (2003)' research, participants who use reappraisal strategy report having closer relationships and also use suppression strategy impairs memory and interpersonal interactions.

While reappraisal effectively reduces negative affect at the physiological, behavioral, and neurological levels (McRae et al., 2012), recent studies have revealed that this strategy encompasses a wide range of ER strategies and have attempted to more precisely define the efficacy of specific strategies covered by this definition (Ahmed et al, 2018). One of the reappraisal strategy is distancing and distancing means reevaluating one's emotional state by psychological distance between oneself and the event. (Ayduk & Kross, 2010). Distancing can be done through several methods. According to construal-level theory (Trope & Liberman, 2010), psychological distance can be altered by modifying the perceived temporal, physical and impartial observer (Kross & Ayduk, 2008). A number of studies have demonstrated that distancing effectively downregulates negative affect in both children (Kross et al., 2011), adolescents (Silver et al., 2012), and adults (Ayduk & Kross, 2008). In a longitudinal study, participants were trained in separate groups, which were self-distance and reinterpretation, across two weeks, applying a reappraisal task via negative images (Denny & Ochsner, 2014). The findings indicated that both self–distancing and re-interpretation training led to a decrease in self-reported negative affect in response to aversive pictures across a two-week duration (Denny & Ochsner, 2014). Furthermore, self-distancing strategy was found to be more effective than the use of reinterpretation strategy in decreasing negative affect (Denny & Ochsner, 2014).

In an experimental research, Ayduk and Kross (2008) divided the participants into two groups, self-immerced and self-distanced. Individuals in each group were asked to recall an angry memory. Self-immerced members were asked to feel as if they were reliving the

event, while self-distanced members were asked to step back from the event and think and feel as if it were happening far away from them. The results have shown that individuals in the self-distanced condition had markedly reduced blood pressure reactions compared to the self-immersed condition, both throughout and after the experiment (Ayduk & Kross, 2008).

Another study was conducted by Kross and colleagues (2011) with children who are 5th grade students. Children were randomly assigned to self-immersed and self-distanced condition to examine their emotions on a anger-related interpersonal experience. Participants subsequently assessed their negative affect and gave written descriptions of thoughts they experience. The analyses results showed that children in the distancing group were less likely to blame, had lower emotional responses, and restructured their experiences in healthier ways than the self-immersed group (Kross et al., 2011).

Current evidence indicates that distancing is an effective method for ER. Still, most of the research examining certain methods within distancing, namely temporal, physical, and impartial observer strategies, has concentrated on the physical distancing strategy (Ayduk & Kross, 2008; Kross et al., 2011). The regulatory effects of various types of distancing remain uncertain (Nook et al., 2017; 2024); however, recent studies on temporal distancing show promising results (Ahmed et al., 2018). For instance, a current research indicates that considering the potential impact of a stressful life event on one's distant future, rather than the near future, diminishes difficulty (Bruehlman-Senecal & Ayduk, 2015). Furthermore, Bruehlman-Senecal and colleagues (2016) stated that the application of this strategy in daily life correlates with enhanced wellbeing.

Temporal distancing is a self-distancing strategy that requires perceiving an unpleasant experience from a future time perspective (Suksasilp et al., 2021). According to Bruehlman-Senecal & Ayduk (2015), thinking about future emotions over a daily life stressor eliminates present negative mood. Ahmed and colleagues (2018) evaluated the efficacy of temporal distancing in adolescents within a controlled experimental task called the temporal distancing emotion regulation task (TDERT). Participants were asked to score their arousal and distress level in the face of negative situations (e.g., "*You are late an important meeting"*) and they were told to think about whether each scenario would still affect them in the near future, the distant future, or with no strategy (Ahmed et al., 2018). The results revealed that adopting a distant-future perspective lowered distress and arousal levels compared to adopting a near-future or no strategy. Additionally, using a distant-future

perspective not only diminished negative emotions, but participants who projected themselves further ahead in time experienced more advantages from this approach (Ahmed et al., 2018). Suksasilp and colleagues (2021) broadly replicated this research to test the psychometric properties of TDERT. The findings indicated that TDERT had adequate test-retest reliability and the temporal distancing strategy for ER also enhances throughout adolescence. However, this ability may not correlate with the habitual use of the strategy (TDQ) and ERQ-CA (Suksasilp et al., 2021).

Recent studies have emphasized the significance of context in the issue of ER and the effectiveness of ER strategies can vary among individuals and context (Aldao, 2013; Sheppes et al., 2014; Zörer & Yorulmaz, 2022). Even the same person may use different strategies in different contexts, emotions, intensity levels, and goals. Thus, it may not be appropriate to define ER along a single axis. One of the important contextual factors is the measurement of ER strategies. Despite ER happenning in a situation, the majority of self-report instruments designed to evaluate ER strategy use lacks the capability to conduct situational assessments and cannot measure spontaneous situational use. Additionally, these self-report scales evaluate ER as a stable structure or trait (Zörer & Yorulmaz, 2022). However, these assessments are predicated on individuals' tendencies in strategy use and may not accurately reflect actual usage. This highlights the significance of considering the context-dependent nature of ER and evaluation of specific situations (state) (Aldao, 2013).

Thus, in this thesis, ER strategies (reappraisal, suppression, and temporal distance) was measured in two ways: self-report (ERQ-CA), and experimental task (TDERT). The study also focuses on three principal contextual factors believed to affect emotion regulation: mood, age (specifically adolescence) and executive functions (specifically working memory and cognitive flexibility).

2.2. Mood

Mood is a fundamental part of daily life and human identity. In order to understand the concept of mood, first, it may be helpful to explain the concepts related to it. The concept of mood has defined as a part of affect in the literature (Barsade & Gibson, 2007). Watson and Clark (1984) stated that affect is an umbrella term including moods, emotions and affective dispositions:

- Moods are long- lasting states that usually arise without a specific cause (positive or negative mood).
- Emotions are instantaneous reactions triggered by a particular target (such as anger).
- Affective dispositions are permanent features that are applicable in a variety of settings (such as pessimism) (Barsade & Gibson, 2007).

In this point, moods and emotions can be confused each other because of being subjective emotional experiences. Therefore, it is important to distinguish them in terms of how they are stimulated and measured in academic studies (Ekkekakis, 2012). Forgas (2017) mentions the fundamental differences between these two concepts. Moods are lower intensity feelings and have positive and negative dimensions, while emotions are more intensive and short-term reactions. In this context, while positive and negative mood can be valued in terms of good or bad, respectively, classifying emotions as good or bad can be misleading (Fiske & Taylor, 2017). Based on these distinctions, mood is more likely to be measured than emotions.

Several aspects or components of mood were frequently reported over the last thirty years (Watson & Tellegen, 1985). Watson and Tellegen (1985) brought together the previous studies which aim at understanding the structure of mood and formed the concept of mood to two dimensions in a universal perspective. These two dimensions are positive affect and negative affect. Positive affect includes positive states like cheerful, satisfied, active and negative affect includes negative states like nervous, regretful, timid (Watson & Tellegen, 1985).

From evolutionary perspective, the concept of mood was explained by promotion and prevention. According to regulatory focus theory, promotion represents aproaching to reward and prevention represents escaping punishment (Brockner & Higgins, 2001). This underlying mechanism of human behavior can also point to the source of mood (Brockner & Higgins, 2001, Gable & Harmon-Jones, 2010).

The concept of mood has been measured using various scales and many kinds of experimental designs in the literature. In experimental design of mood studies, the mood induction method is a commonly used approach. Common mood induction techniques include listening to music (e.g. Gultepe & Cosgun, 2015; Vella et al., 2025), watching

emotionally charged images (Griffiths et al., 2025) or films/video clips (e.g. Gyurak et al., 2012) and autobiographical recall (e.g. De Dreu et al., 2008). In recent years, the social exclusion paradigm (Cyberball) has also been used to manipulate mood (e.g. Raczy & Orzechowski, 2021). In fact, Cyberball is not a real mood induction method. However, in this game, negative mood is revealed through social exclusion. Previous studies have discussed the advantages and disadvantages of each type of mood induction method. For example, researchers emphasize that mood induction via music is largely dependent on individual preferences (Vella et al., 2025). In other wors, individual's musical preference can alter the results of mood manipulation. In terms of emotionally charged images or films, it can be difficult to find a single manipulation tool that can appeal to both older and younger adolescents simultaneously. For example, a negative image that moderately negative affects a person in younger adolescence may have no effect at all in older adolescence, or vice versa. That is why, Cyberball was preferred in the study because it can be used in both older and younger adolescent groups. Furthermore, this game was fun and engaging for both older and younger adolescents.

Fiske and Taylor (2017) emphasized that mood is a long-lasting and less intense emotional state that often lacks clear explanation. Researchers have found a significant relationship between mood and EFs in their studies (e.g. Ashby et al., 1999; De Dreu et al., 2008; Hirt et al., 2008; Wang et al., 2017). According to the neuropsychological theory of Ashby and colleagues (1999), positive mood increases dopamine levels in the brain and thereby improving cognitive functions across various tasks. Based on cognitive tuning model (Clore et al, 2014), positive mood promotes holistic and comparable cognitive process in the brain because people in positive mood perceived their environment as secure and problem-free. Accordingly, Ashby and colleagues (1999) found that moderate levels of positive mood may improve the performances on working memory and cognitive flexibility. On the other hand, Hirt and colleagues (2008) also stated that positive mood may be restricted to tasks that allows participants to sustain their positive feeling.

ER is a process by which people change the natural or spontaneous flow of their emotions (Koole, 2009). Mood and ER interact with each other in an individual's daily life and decision- making process (Gross, 2015). Using adaptive ER strategies (e.g. reappraisal) has been shown to have improving effects on positive mood and unadaptive ER strategies (e.g. suppression) has been shown to have negative effects on negative mood (Gross & John, 2003, Masumoto et al., 2016). Reijntjes and colleagues (2006) investigated the effects of ER

on mood changes by conducting a study with 176 participants from younger adolescents ages from 10 to 13 years. They found that a simultaneous increase was observed in positive mood when the amount of time spent on distractions under adverse conditions increased (Reijntjes et al., 2006).

As a result, within the scope of the literature, it is seen that the mood state of the individual is closely related to EFs. Previous studies have shown that mood can affect EFs and that the use of ER strategies (reappraisal and suppression) also influence individuals' moods. However, it is less clear whether adolescents' moods related to their ER strategies and how their mood states affect their ER strategies.

2.3. Executive Functions (Working Memory and Cognitive Flexibility)

Executive Functions (EFs) encompass broad cognitive processes that guide an individual's emotions, thoughts, and behavior response to given situation (Diamond, 2013). This cognitive process plays a significant role on individuals' physical, social and psychological health (Diamond, 2013).

EFs' components have a critical role in the process of emotional development (Zelezo et al, 2016). Throughout an individual's development from childhood to adulthood, EFs and ER skills continue to develop in a coordinated manner (Lantrip et al., 2015). One of the reason of this coordination is the age-dependent growth of prefrontal cortex (Steinberg, 2005). Prefrontal cortex (PFC) is highly linked with many areas of the brain and coordinates the activity of the brain areas (Diamond, 2013). The PFC is known to be connected to EFs (Karakaş & Karakaş, 2000) and ER (Ray & Zald, 2012) in the frontal lobes of brain.

Based on common view, the main components of EFs are working memory, cognitive flexibility and inhibitory control (Miyake et al., 2000). The other advanced skills are planning, reasoning and problem solving are considered high-level EFs and emerge from these three basic skills (Diamond, 2013). Miyake and colleagues (2000) explained that these three basic components are considered both related to each other and independent of each other. Three main components of EFs are commonly studied via both self-report and task-based measures in the literature. This thesis will focused on specifically two components of EFs: working memory and cognitive flexibility.

2.3.1. Working Memory

As a part of EFs, working memory performance appears to be important skill for successful emotion regulation. Working memory (WM) is also called as updating and defined as an ability to the storage of information in short-term memory and its retrieval when individiual needed or manupulate it (Baddeley & Hitch, 1994). As a part of EFs, WM operates to modify and process information. For this aim, WM should able to reach files, process files and transmit this data on files to other EFs componant (Fkunahashi, 2001).

There are numerous studies in the literature that emphasize the potential association of working memory with emotion regulation. Accordingly, Schmeichel and colleagues (2008) found that WM capacity is a significant cognitive ability in the ER process. Accordingly, individuals having high WM capacity were more successful in suppressing both positive and negative emotions than those with low WM capacity. Moreover, compared to those with low WM, those with high WM capacity were more successful in reappraising emotionally charged situations and were able to view the event more objectively (Schmeichel et al., 2008). In a current study conducted with an adolescent sample group, participants' WM capacity was tested in two emotionally neutral and negatively charged conditions (Griffiths et al, 2025). The study findings showed that the emotionally charged group performed worse in WM capacity than the neutral group (Griffiths et al, 2025). In another study where verbal and visual WM capacity were measured separately, only visual wm was found to be positively correlated with reappraisal (Rutherford et al., 2018). This study highlights the importance of measuring the two WM capacities separately.

2.3.2. Cognitive Flexibility

As a part of EFs, cognitive flexibility (CF) is also called set-shifting and is defined as an ability to adjust to new or unexpected situations and to transition between variables (Miyake et al., 2000). Based on definition, indidividual who has cognitive flexibility can easily adapt to changing priorities or demands or admit their mistakes (Friedman & Miyake, 2017). Martin & Anderson (1998) explained CF as an individual’s awareness, willingness, and confidence in the existence of different approaches to a given situation. In CF process, a series of top-down cognitive processes are activated during the control of thoughts and actions (Zelazo et al., 2016).

There is evidence that CF capacity is associated with both reappraisal and suppression, which are ER strategies (e.g. Fatima & Shahid, 2020). Fatima and Shahid (2020) stated that individuals with high CF capacity use ER strategies more frequently. In addition, individuals with low CF capacity tend to resort maladaptive strategies such as rumination and suppression (Dickson & Cislea, 2018). Conversely, Gyurak and colleagues' (2012) study did not find a significant relationship between EFs (updating and shifting) and ER ability. In this study, ER strategies were measured as downregulation and upregulation of high-valenced emotion rather than reappraisal or suppression strategies. Gyurak and colleagues' (2012) explained these inconsistent results with sample characteristics. Accordingly, these tests used to measure EFs are generally used to screen neuropsychological processes in psychological disorders. Therefore, it is stated that these tests and tasks used to measure EFs may be insufficient in identifying individual differences in a young and healthy sample.

Previous studies shown that EFs generally have been examined in terms of cognitive process of brain (Miyake et al., 2000). However, recent studies have shown that EFs encompass not only cognitive processes, but also emotional processes. This is because current brain studies have shown that cognitive processes activate not only the cognitive part of the brain, such as the cortex, but also emotional parts like the amygdala (Salehinejad et al., 2021). Current studies indicated that EFs classified as cool and hot systems (Zelazo & Carlson, 2012). Hot system emphasizes the emotional aspects underlying EFs and cool system emphasizes the pure cognitive mechanism (Zelazo & Carlson, 2012). As understood, the main difference between cool and hot EFs is the inclusion of the emotional component in the process. In the majority of EFs tasks and tests discussed by Miyake and colleagues (2000) and used in the literature employ cool EFs. Because there is a scarcity of standardized tasks that can be used to measure hot EFs. For this reason, researchers are conducting their studies by adding emotion-containing stimuli to cool standardized EFs tasks (Atalay & Kızılöz, 2023).

As a result, previous studies shown that EFs have a fundamental role on the process of ER (Atalay & Kızılöz, 2023). However, researchers also pointed out these correlations can be varied based on the used task (Snyder et al, 2015).

2.4. Adolescence

Adolescence is a developmental period that starts with puberty (nearly age 10) and lasts until approximately age 24 (Sawyer et al., 2018). This period is divided into three sub-terms which are early / younger ages between 10 and 13, mid-ages between 14 and 17 and late / older ages between 18 and 22 (Steinberg, 2005). In early and middle adolescence terms, peer interaction is particularly important. Individuals are more sensitive to peer acceptance and rejection (Sebastian et al., 2010) and more conscious of other people's views (Parker et al., 2005). This developmental period is related to physical and biological changes, pressures from school or the workplace, an increasing need for independence, and variability of social interactions (Casey et al., 2010). Furthermore, during this period, internalization and externalization symptoms increase and emotional instability is more common (Lee et al., 2014). Kessler and colleagues (2007) stated that adolescence is a time period of increased vulnerability to mental health risks, because nearly three-quarters of psychological illnesses seen in adulthood begin before 24 years old.

Adolescence is characterized by a greater intensity of biological, psychological, and social challenges (Sawyer et al., 2012). Overcoming these difficulties is depend on the ability of efectively regulate emotions (Thomson, 1994). Ayduk and Kross (2010) pointed out there is a link between using of regulation strategies for ER and long-term mental health (e.g., Ayduk & Kross, 2010; Casey, 2015; Kessler et al., 2007).

A variety of neurobiological models have been developed to clarify the behavior of adolescents over time (Casey, 2015). The dual- system model is one of the most well-known of these models and this model states that self-control occurs by establishing a balance between "*hot*" and "*cool*" system (Casey et al., 2008). While the cool system a cognitive system that is driven by neutral, flexible, and strategic thinking, the hot system is emotionally motivated by reflexes, desires and fears (Casey et al., 2008). This dual-system approach was used to describe the distinctions between adults and adolescents in risky decision-making and reward-seeking (Steinberg et al., 2018). Steinberg and colleagues (2018) conducted a cross-cultural study in 11 countries with ages ranging from 10 to 30 and they found that while reward seeking the highest in adolescence around age 19, self-control keeps improving through the mid-20s. This imbalance between delayed cognitive control and high emotional-motivational reactivity is believed to be the cause of adolescent emotional dysregulation, which raises the risk of mental illness (Crone & Dahl, 2012). Second is the triadic behavioral

model (Ernst et al., 2006) which describes the distinctions between adults and adolescents. According to this model, the hot system or emotional system is motivated by approaching reward and avoiding harm and the balance between two system is important in adolescence. Furthermore, there is a tendency to reward during adolescence, and this tendency can lead to a weaker regulatory control system due to modifications of the hormones (Ernst et al., 2006).

Thirdly, Casey and colleagues (2008) proposed the imbalance model. This model is based on experimental research that looks at the complete developmental cycle from childhood to adolescence and adulthood. This model suggests that imbalances in brain circuitry caused by regional neurochemical, anatomical, and functional variation in the brain during development could account for nonlinear behavioral changes during adolescence (Casey et al., 2008). Based on the three models of adolescent neurodevelopment, Casey (2015) stated that the reason of adolescents are more likely to experience psychopathology and engage in risky behavior is because of delayed development of brain mechanisms underlying cognitive control.

During adolescence, the amount of grey matter gradually decreases in the part of the brain that controls complex human behaviors, particularly the prefrontal cortex (Schweizer et al., 2016). With this, it has been discovered that the amygdala and other subcortical emotion processing regions significantly expand in size from middle childhood to older adolescence (Schumann et al., 2004). Simultaneously, the development of connectivity among brain regions involved in emotion regulation is ongoing (Ernst, 2014). Paus and colleagues (2008) pointed out that the structural and functional maturation of the brain areas responsible for ER occurs over a comparatively long period of life.

Adolescence is a time in which social and executive functions (working memory, inhibitory control, cognitive flexibility) is essential for ER development (Somerville & Casey, 2010). With respect to age and emotional regulation, the research indicates that the development of ER skills during childhood and adolescence is closely linked to neurobiological maturation (Ahmed et al., 2015). Previous behavioral and neuroimaging studies revealed that there are differences in implicit and explicit ER throughout the adolescence period. Silver and colleagues (2012) investigated developmental changes in ER across adolescence from ages 10 to 23. In this study, participants were asked to visualized

themselves far away from the picture to decrease negative emotion with age (Silver et al., 2012). They reported a linear increase in regulation success until age 18, then it was stable.

Similarly, developmental growth was tested for regulatory success using reappraisal strategies in early, middle, and late adolescence (McRea et al., 2012). In this study, adolescents were watched upsetting images and then were asked to use various reappraisal strategies to decrease their discomfort. The results shown that regulation success increased linearly during the period of adolescence (McRea et al., 2012). Another study on distancing was conducted on the age range from 6 to 23 and the results also revealed that the ability of self-distancing rised linearly with age (Silvers et al, 2017). Contrary to predictions, Nook and colleagues (2019) found different results. In this study, researchers showed participants unpleasant images and instructed them to vocalize their thoughts while reappraising them. The results also shown that there is no correlation between age and ER success in participants aged 10 to 23 (Nook et al., 2019). Similarly, Ahmed and colleagues (2018) also investigated developmental progress in emotion regulation using a temporal distancing strategy from 12 to 22 years old. They discovered no correlation between age and downregulation of emotion (Ahmed et al., 2018). This study was then replicated with a larger sample to test the validity and reliability of the temporal distancing task, and the results were slightly modified (Suksasilp et al., 2021). Suksasilp and colleagues (2021) found age differences between older (18-21 ages) and younger (10-11 ages) adolescents. Compared to early adolescents, late adolescents were better adapted imagining themselves in the distant future and were better reduced their distress (Suksasilp et al., 2021).

Based on the literature findings investigating the age-dependent development of ER in adolescence, there are findings that ER strategies (reappraisal, suppression and temporal distance) both develop (e.g. McRea et al., 2012; Silver et al., 2012; Silver et al., 2017; Suksasilp et al., 2021) and remain stable with age (Ahmed et al., 2018; Nook et al., 2019). These findings show that there is still no consensus on whether the use of ER strategies continues to develop in adolescence.

2.5. Current Study

2.5.1. The Importance of the Study

When the ER literature is revised, it is seen that adolescence is a very important time period to explore ER process and cognitive process. During these stages, individuals acquire a broad repertoire of ER strategies, including adaptive strategies such as cognitive reappraisal (Schweizer et al., 2020). Indeed, adolescents experience greater affective fluctuations and are more sensitive to the experience of positive, rewarding experiences when compared to adults and children (Riediger et al., 2011). On the other hand, adolescence is also a time of increasing vulnerability to internalizing and externalising psychopathologies associated with poor ER (Kessler et al., 2007). Therefore, it is important to understand how ER develops during this time period, and how ER process is related to ongoing EFs (Sebastian et al., 2010). There is some consensus that maturation of EFs is slower than development of emotional process (e.g. Ernst et al., 2006; Shulman et al., 2016).

Mood is a long-lasting and lower intensity feeling and generally occurs without a specific cause (Fiske & Taylor, 2017). It is known that mood affects an individual's EFs. Researchers have found a significant relationship between mood and EFs in their studies (Ashby et al., 1999; De Dreu et al., 2008; Hirt et al., 2008; Wang et al., 2017). Furthermore, Gross (2015) stated that mood and ER interact with each other in an individual's daily life and decision- making process. Related to this, there are a few studies how the using of ER strategies affects individual's mood state in the literature (Masumoto et al., 2016; Reijntjes et al., 2006). Based on Gross (2015) view, mood may also affect the use of ER strategies. Similar with the relation between mood and EFs, there can be an interaction between mood states (positive and negative) and ERstrategies. Moreover, positive or negative mood can affect the use of ER strategies in different way. However, relative to children or adults, few studies have investigated the link between mood and ER strategies in adolescence and to our knowledge, no studies have yet investigated how mood affects ER strategies.

When the previous researches are examined within the context of the literature, it is seen that the relationships between mood, EFs, and ER are generally measured in pairs. In this context, it is thought that the current thesis will contribute to the literature by investigating the moderating role of EFs in the relationship between mood and ER strategies, in addition to the direct age-dependent relationship between mood and ER strategies.

Within the scope of this thesis, a multi-method approach was applied. This is because sometimes different mood paradigms may produce different results, and this situation causes some methodological problems (Williams and Zadro, 2001). Williams and Zadro (2001) proposed a multi-method approach to reduce the problems arising from paradigms and to increase the reliability of these results. Multi-method approach is also called methodical triangulation (Bekhet & Zauszniewski, 2012). Based on methodical triangulation, both Derogatis Affect Balance Scale (DABS) and Cyberball Paradigm were used to measure perceived and manipulated mood states respectively. Also, three ER strategies were measured with two different ER scales. Emotion Regulation Questionnaire for Child and Adolescent (ERQ-CA) measured perceived reappraisal and suppression. Temporal Distance Emotion Regulation Task (TDERT) is also measured temporal distance ER strategy.

Research Questions in Study 1

RQ 1: Do different mood states (positive / negative) (DABS) predict perceived ER strategies (Reappraisal and Suppression measured with ERQ – CA)?

RQ 2: Do different mood states (positive/negative) (DABS) predict EF performance (working memory and cognitive flexibility measured with ACT and CFT, respectively)?

RQ 3 : Do older adolescents show higher scores on mood (DABS), working memory (ACT), cognitive flexibility (CFT) and ER strategies (Reappraisal, Suppression and Temporal distance) (ERQ – CA) (TDERT) than younger adolescents?

RQ 4: Does working memory (ACT) have a moderator role in the relation between mood (positive / negative) (DABS) and perceived ER strategies (Reappraisal and Supression measured with ERQ – CA)?

RQ 5: Does cognitive flexibility (ACT) have a moderator role in the relation between mood (positive / negative) (DABS) and perceived ER strategies (Reappraisal and Supression measured with ERQ – CA)?

Research Questions in Study 2

RQ 6: Do mood manipulations (positive, negative and control) (Cyberball) affect ER strategies (reappraisal, suppression and temporal distance measured with ERQ – CA and TDERT respectively)?

RQ 7: Do mood manipulations (positive, negative and control) (Cyberball) affect EF performances (working memory and cognitive flexibility measured with ACT and CFT, respectively)?

RQ 8: Do older adolescents show higher scores on working memory (ACT), cognitive flexibility (CFT) and ER strategies (reappraisal, suppression and temporal distance) (ERQ – CA) (TDERT) than younger adolescents?

RQ 9: Does working memory (ACT) have a moderator role in the relation between moods and ER strategies (reappraisal, suppression and temporal distance measured with ERQ – CA and TDERT respectively)?

RQ 10: Does cognitive flexibility (CFT) have a moderator role in the relation between moods and ER strategies (reappraisal, suppression and temporal distance measured with ERQ – CA and TDERT respectively)?

3. STUDY 1

3.1. Method

3.1.1. Participants in Study 1

A total of 179 participants participated to the Study 1. 90 older adolescents (18-21 ages) (*Mean age* = 20.27, *SD* = .79) (*male = 10, female = 80*) from Ankara Yıldırım Beyazıt University (AYBU) undergraduate students and 89 younger adolescents (10-12 ages) (*Mean age* = 11.20, *SD* = .40) (*male* = 36, *female* = 53) from a state school's secondary stage students participated in Study 1.

The criterion sampling method was used. Before the data collection part, the participants were given an informed consent form (see Appendix 1) with details about the study. Only participants who volunteered, approved the informed consent form participated in the study. Written consent (Informed Consent Form) was obtained in 2 copies, and 1 copy was given to the participant. Younger adolescents and their parents were informed about the study and permissions were obtained from the parents and all participants before the study (see Appendix 2). Older adolescents were given extra points for their subjects, while younger adolescents were given an agenda as an incentive.

Only native Turkish speakers recruited to the study concern that second-language learners might have difficulty comprehending the audio-instructions. The inclusion and exclusion criteria for the selection of participants are listed below (see Table 1).

Table 1. Inclusion and Exclusion Criteria and Further Questions in Study 1 and Study 2

Inclusion criteria
• Being volunteer to participate in the study
• Not having a neurological or psychiatric diagnosis
• Not using any psychiatric or neurological drug that may affect cognitive processes
• Being a native Turkish language speaker
Exclusion criteria
• Not volunteering to participate in the study
• Having a neurological or psychiatric diagnosis
• Being on any medication that might affect cognitive processes
• Being an international student
• The participant's statement that he/she is sleepless
Further questions (for teachers of 10-12 year olds only)
● Does your student have any diagnosis of mood disorder?
● Is your student diagnosed with dyslexia?
● Is your student diagnosed with dyscalculia?

Before the data collection part, the participants were given an informed consent form with details about the study. Only participants who volunteered, approved the form, and agreed to participate included in the study. Older adolescents were given extra points for their subjects, while younger adolescents were given an agenda as an incentive.

3.1.2. Materials in Study 1

Demographic Information Form (DIF)

DIF was included the questions about age, gender and level of class.

Derogatis Affects Balance Scale (DABS)

The scale developed by Derogatis and collegues (1995) is used to measure multidimensional affect and mood states (see Appendix 3). This scale composes of two sub-dimensions which are positive and negative mood. In total, there are 40 emotional adjectives, 20 of them reflect positive mood and 20 reflect negative mood. This is a self-report scale that participants fill out that about their emotions. Participants are asked to score their emotions they experienced during the last two weeks on a scale of 0 to 4, where 0 is the lowest and 4 is the highest. As the scores get closer to 4, the mood is experienced more, while the scores closer to 0 indicates that it is experienced less. The positive mood sub-

dimension had an internal consistency of .93, while negative mood sub-dimension had an internal consistency of .94 (Derogatis & Melisaratos, 1979). The positive mood sub-dimension had also a test-retest reliability of .75 over the period of two weeks, while negative mood sub-dimension had a reliability of .42 (Derogatis & Melisaratos, 1979).

The scale items and instructions, originally in English, were translated into Turkish by the researcher, and during this process, the opinions of two experts were consulted and one of whom works in the field of emotions.

This test is also a paid test used commonly for clinical purposes. It was conducted with e-provide which is responsible association of this test for the original form of the scale and usage permission. The necessary permissions were obtained from the link given in the parenthesis (https://eprovide.mapi-trust.org).

Emotion Regulation Questionnaire for Child and Adolescent (ERQ-CA)

The scale was prepared based on Emotion Regulation Questionaire developed by Gross and John (2003) for children and adolescents by Gullone and Taffe (2012) (see Appendix 6). ERQ-CA is a self-report scale designed to evaluate the habitual use of two perceived ER strategies. The scale has 10 items which are composed of two well-known sub-dimensions: Reappraisal (6 items) and Suppression (4 items). Assessment is conducted using a five-point likert scale from 1 to 5 (1 = strongly disagree, 2 = disagree, 3 = partially agree, 4 = agree, 5 = stronly agree). High scores on sub-scales indicate that the ER strategy represented by that subscale is frequently used. The Cronbach's alpha internal consistency coefficient was found between .82 and .86 for the perceived reappraisal subscale, and between .69 and .79 for the perceived suppression subscale (Gullone & Taffe, 2012). The coefficient of test-retest reliability varies between .37 and .47 for the reassessment subscale and between .40 and .63 for the perceived suppression subscale (Gullone & Taffe, 2012). The scale was adapted to Turkish by Tetik and Onder (2021). The Cronbach’s alpha internal consistency coefficient was calculated .79 for the perceived reappraisal subscale and .53 for the perceived suppression subscale (Tetik & Onder, 2021).

Temporal Distancing Emotion Regulation Task (TDERT)

Temporal Distancing Emotion Regulation Task (TDERT) was developed by Ahmed in 2017 (see Appendix 7). The validity and reliability of this task were also conducted by Suksasilp and colleagues (2021). The scenarios and instructions used in the task were translated into Turkish by the researcher, and the opinions of two experts, one of whom works in the field of emotions, were consulted.

Participants listen to stimuli composed of short sentences that portray either negatively valenced scenarios (e.g., "*You catch some people talking about you behind your back*") or neutral scenarios (e.g., "*You put on your sweater in the morning*") (Ahmed, 2017). The negative stimuli sort into three sets of ten negative scenarios and each of the three sets of negative scenarios is randomized to one of the three strategy conditions: (a) adopting a distant-future perspective, (b) adopting a near-future perspective, or (c) no distance condition (Suksasilp et al., 2021). In total, there are four conditions: no distance neutral, no distance negative, near-future negative, distant-future negative respectively (Ahmed, 2017). Following each scenario, individuals are asked to scored their discomfort ("*How upset do you feel right now?*") and arousal ("*How anxious/stressed do you feel right now?*") on self-report scales with scores from 1 to 9 (low to high) on the keypad (Suksasilp et al., 2021). TDERT had an acceptable reliability scores. Intraclass correlation scores of TDERT based on a single- rater, *ICC* = .59, 95% c_1 (.39, .73).

The Auditory Consonant Trigram (ACT) Test

ACT is a paper and pencil test which was originally developed by Brown in 1958 to measure WM via verbal stimuli and the values of the test were first presented by Stuss and colleagues in 1987. The test consists of a total of 20 items, each item consisting of 3 consonant letters (Kademli et al., 2021). The test is administered as follows: each item is read aloud to the participant by the researcher in a specific time and in a specific tone. After that, the participant is asked to recall the letters as much as they can. At the beginning of the test, the researcher reads an instruction to the participant containing the information about the test. As described in the instruction, participants repeat the first five items in sequence as they hear them (e.g. P Z B). Then, a two or three digit number is added after each item (e.g. N D J- 75 / R D T – 188) and after a specified waiting period, the participant is expected to say that they remember it. The letters and numbers used in each item are presented

differently. The researcher notes each answer on a form. The form was prepared seperately for each participants by researcher. The total number of correct answers indicates the participant's score on this test. Turkish adaptation of the test was conducted by Anıl and colleagues in 2003. Their reliability results were .85. Kademli and colleagues (2021) were also tested normative values of ACT and reached .75 Cronbach's alpha value (Appendix 8).

Cognitive Flexibility Task (CFT)

Cognitive Flexibility Task (CFT) was developed by Cambaz and Unal (2021) to examine the individual's performance on CF. In CFT, individuals are asked to create five sentences using words from eight varied categories presented in a shuffled word list (see Appendix 9). Accordingly, CF score is calculated by subtracting one from the total number of words from different categories used in each sentence. The overall score is obtained by summing the CF scores produced for each sentence (Cambaz & Unal, 2021). Participants should use two or more words from different categories to get points in every sentence. There is no time limit for the study.

3.1.3. Procedure in Study 1

Before starting to study, ethical approval has obtained from AYBU Social and Human Sciences Ethics Committee (Decision date: 15.03.2023, Decision number: 03-61) (Appendix 8). Then a research permission petition has submitted to the AYBU Social Sciences Institute for getting the research permission from the Ministry of Education (Appendix 9). Before the main study, a pilot study was conducted with 24 participants for TDERT and CFT. The pilot study showed that both tasks performed as intended.

The participants were participated in the same schedule: Demographic Information Form (DIF), DABS, ERQ-CA, and TDERT respectively. Cognitive Tasks were given to the participants by the "*counter balance*" method. This means that Cognitive Tasks (CFT and ACT) were given alternately between themselves. A participant number was created for the participants and the application order was written. The study was conducted face to face. For this, the researcher prepared a time schedule and participants participated to the study individually. The study took approximately 55 minutes for each participant. The flow chart for Study 1 is presented in Figure 2.

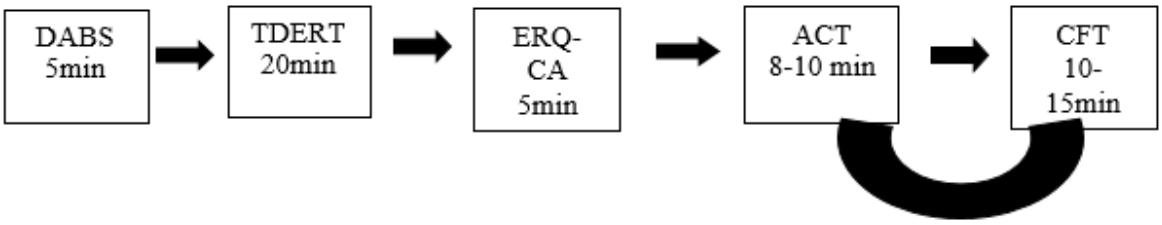


Figure 2. The flow chart for Study 1

3.1.4. Data Analysis in Study 1

Data analysis was conducted on older and younger sample groups separately. First, all the data were entered into excel program to calculate mean scores of sub-scales for each participant. There was no missing value on both two sample groups. The pre-processing stage started with data screening, checking for missing values, outlier controls and assumption tests on the DABS, ERQ-CA, TDERT, CFT, ACT. Older and younger adolescent groups were examined separately both in data cleaning and on the examination of RQ 1, RQ 4, and RQ 5. The assumption controls are important for conducting parametric tests (Field, 2024). Second, descriptive analyses or assumption tests were conducted to check central dispersion measures and skewness-kurtosis values on older and younger adolescent groups respectively. Third, boxplot was run to see outliers on each variable. According to Field (2024), if the *z* score is greater than 3.29, it is considered as an outlier. When the z score of sub-scales were checked, two high values were found in younger and one in older sample group. These three scores were changed with the next highest score plus one (Field, 2024).

Then, correlation analyses were conducted between mood (positive and negative) (DABS) and perceived ER strategies (reappraisal and suppression) (TDERT, ERQ-CA). Correlation analyses also were conducted between mood (positive and negative) (DABS) and EFs (working memory and cognitive flexibility) (ACT and CFT). After that, to investigate the effect of age (older vs. younger group) on mood, EFs and perceived ER strategies, independent sample t-test analyses were performed. Then, to investigate the moderation effects of EFs (working memory and cognitive flexibility) on the relationship between mood (DABS) and perceived ER strategies (ERQ-CA), the moderation analyses were conducted. All the analyses were conducted with both SPSS 23 program and JAMOVİ statistical software.

3.2. Results for Study 1

3.2.1. Preliminary Analysis of Older Adolescent Data: Descriptive Statistics and Parametric Assumption Testing

In this section, the descriptive statistics of older adolescent group were presented. The normality test results (considered Shapiro-Wilk results) revealed that the Negative- No Distance, Negative – Near Distance, DABS negative, ERQ-CA Suppression and CFT mean scores were normally distributed ($p > .05$) (see Table 2). On the other hand, Control – No Distance, Negative – Distant Future, DABS positive, ERQ-CA Reappraisal and ACT scores were not normally distributed on older adolescents ($p < .05$) (see Table 2).

According to Field (2024) normal distribution tests (Kolmogorov Simirnov or Shapiro Wilk) can be significant in the large samples. Therefore, interpreting normality based on the values of skewness and kurtosis, Q-Q plots or histograms is a better alternative criterion instead of normality tests. According to George and Mallery (2024), skewness and kurtosis values are acceptable between +2 and – 2 for normal distribution assumption. Therefore, it was determined that the data in each subscale were normally distributed (see Table 3).

Table 2. Distribution of Normality Results of the Scales on Older Adolescents in Study 1

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	*df*	*P*	Statistic	*Df*	*p*
Cont-NoDist	.18	90	.00	.94	90	.00
Neg-NoDist	.09	90	.00	.98	90	.34*
Neg-Near	.09	90	.01	.99	90	.43*
Neg-Distant	.11	90	.03	.97	90	.02
DABSnegative	.06	90	.07	.98	90	.21*
DABSpositive	.08	90	.01	.96	90	.01
ERQ-CAreapp	.11	90	.00	.97	90	.03
ERQ-CAsuppress	.08	90	.01	.98	90	.11*
ACT	.08	90	.01	.97	90	.03
CFT	.10	90	.00	.98	90	.41*

Note. Cont-NoDist: Control- No Distance, Neg-NoDist: Negative – No Distance, Neg-Near: Negative- Near Future, Neg-Distant: Negative- Distant Future, ERQ-CAsuppress: ERQ-CAsuppression, ERQ-CAreapp: ERQ-CAreappraisal.
*$p > .05$

Table 3. Descriptive Statistics about Older Adolescents in Study 1

	N	*M*	*SD*	*Skewness*	*SE*	*Kurtosis*	*SE*
Cont-NoDist	90	5.08	.21	-.16	.25	1.27	.50
Neg-NoDist	90	2.01	.43	.36	.25	.24	.50
Neg-Near	90	2.81	.44	.05	.25	.35	.50
Neg-Distant	90	3.99	.56	.44	.25	.69	.50
DABSnegative	90	1.40	.59	.29	.25	-.36	.50
DABSpositive	90	2.29	.65	-.47	.25	-.31	.50
ERQ_CAreapp	90	3.66	.72	-.20	.25	.82	.50
ERQ_CAsuppress	90	2.70	.79	.15	.25	-.48	.50
ACT	90	51.28	4.97	.52	.25	.13	.50
CFT	90	13.52	4.07	-.17	.25	-.31	.50

Note. Cont-NoDist: Control- No Distance, Neg-NoDist: Negative – No Distance, Neg-Near: Negative- Near Future, Neg-Distant: Negative- Distant Future, ERQ-CAsuppress: ERQCAsuppression, ERQ-CAreapp: ERQ-CAreappraisal, *N*: Number of participants, *M*: mean, *SD*: standard deviation, *SE*: standard error

3.2.2. Preliminary Analysis of Younger Adolescent Data: Descriptive Statistics and Parametric Assumption Testing

The descriptive statistics were presented about younger adolescents. The normality test results (considered Shapiro-Wilk results) revealed that, Negative – Near Distance, Negative – Distant Future, DABS negative and ACT mean scores were normally distributed ($p > .05$) (see Table 4). On the other hand, Control – No Distance, Negative- No Distance, DABS positive, ERQ-CA Reappraisal, ERQ-CA Suppression and CFT mean scores were not normally distributed on younger adolescents ($p < .05$) (see Table 4). Also, skewness and kurtosis values were given to indicate normal distribution. Except for one value (Control-No Distance), skewness and kurtosis values were distributed between +2 and – 2. Therefore, the current values were normally distributed on younger adolescents (see Table 5).

Table 4. Distribution of Normality Results of the Scales on Younger Adolescents in Study 1

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	*df*	*p*	Statistic	*df*	*p*
Cont-NoDist	.25	89	.00	.84	89	.00
Neg-NoDist	.11	89	.01	.95	89	.00
Neg-Near	.07	89	.20	.99	89	.69*
Neg-Distant	.10	89	.05	.99	89	.51*
DABSnegative	.08	89	.20	.98	89	.10*
DABSpositive	.10	89	.03	.94	89	.00
ERQ_CAreapp	.12	89	.01	.97	89	.04
ERQ_CAsuppress	.09	89	.07	.97	89	.04
ACT	.08	89	.16	.98	89	.10*
CFT	.15	89	.00	.94	89	.00

Note. Cont-NoDist: Control- No Distance, Neg-NoDist: Negative – No Distance, Neg-Near: Negative- Near Future, Neg-Distant: Negative- Distant Future, ERQ-CAsuppress: ERQ-CAsuppression, ERQ-CAreapp: ERQ-CAreappraisal.
*$p > .05$

Table 5. Descriptive Statistics of Younger Adolescents in Study 1

	N	*M*	*SD*	*Skewness*	*SE*	*Kurtosis*	*SE*
Cont-NoDist	89	5.18	.27	1.50	.25	2.34	.50
Neg-NoDist	89	2.10	.57	.85	.25	1.06	.50
Neg-Near	89	2.93	.64	-.07	.25	-.56	.50
Neg-Distant	89	3.72	.57	.04	.25	.18	.50
DABSnegative	89	1.50	.69	.56	.25	-.36	.50
DABSpositive	89	2.89	.67	-.93	.25	-.31	.50
ERQ_CAreapp	89	3.55	.64	-.54	.25	.64	.50
ERQ_CAsupp	89	2.70	.79	.07	.25	.34	.50
ACT	89	45.79	5.36	-.54	.25	.78	.50
CFT	89	9.09	3.59	.86	.25	.89	.50

Note. Cont-NoDist: Control- No Distance, Neg-NoDist: Negative – No Distance, Neg-Near: Negative- Near Future, Neg-Distant: Negative- Distant Future, ERQ-CAsupp: ERQ-CAsuppression, ERQ-CAreapp: ERQ-CAreappraisal, N: Number of participants, M: mean, SD: standard deviation, SE: standard error.

3.2.3. RQ 1 on Older Adolescents: The Relationship between Mood (Positive / Negative) and Perceived ER Strategies (Reappraisal and Suppression)

The first research question of this study predicts that "*Do different mood states (positive / negative) predict perceived ER strategies (Reappraisal and Suppression) (ERQ – CA)?"*

In order to examine RQ 1 on older adolescents, Pearson correlation was carried out. The results revealed that there was a significant weak positive correlation between positive

mood and perceived reappraisal (r = .23, R^2 = .05, p = .03). The shared variance between positive mood and perceived reappraisal was 5.30 %. The effect size was weak but the relationship between positive mood and perceived reappraisal was still significant. Also, there was a significant moderate negative correlation between positive mood and perceived suppression (r = -.38, R^2 = .14, p < .001). The shared variance between positive mood and perceived suppression was 14.44 %. The effect size between positive mood and perceived supression was moderately significant. On the other hand, there was not a significant correlation between negative mood and perceived reappraisal (r = -.17, p = .10) and also negative mood and perceived suppression, (r = .13, p = .21).

After the correlation analyses, two linear regression analyses were conducted separately on the significant correlation results on older adolescents. Firstly, linear regression model was conducted between positive mood and reappraisal. Secondly, linear regression model was conducted between positive mood and suppression.

Before the regression analysis, the assumptions specific to regression analysis were checked. According to Field (2024), there were three assumptions tests before conducting regression analysis. First, the histogram of standardized residual values were examined and residual values were distributed normally in both reappraisal and suppression strategies (see Figure 3 and Figure 4). Second, the assumption of homoscedasticity was examined. Scatterplot was drawn between ZPRED (z scores of predicted values) and ZRESID (z scores of residuals) and examined. These scatterplot patterns were distributed partially homogenously and partially linearly in reappraisal plot and distributed more homogenously and more linearly in suppression plot. These scatterplots indicated that the homoscedasticity and linearity assumptions were not perfect but still acceptable (see Figure 5 and Figure 6). Third, influential case studies were conducted to evaluate the fitness of the regression models. For this aim, the residuals were converted to z-scores and checked more than 3.29 as an outlier. There was not any z-score more than 3.00, more than 1% of sample cases have not z-score more than 2.50 and more than 5% of sample cases have not z-score more than 2.00 (Field, 2024).

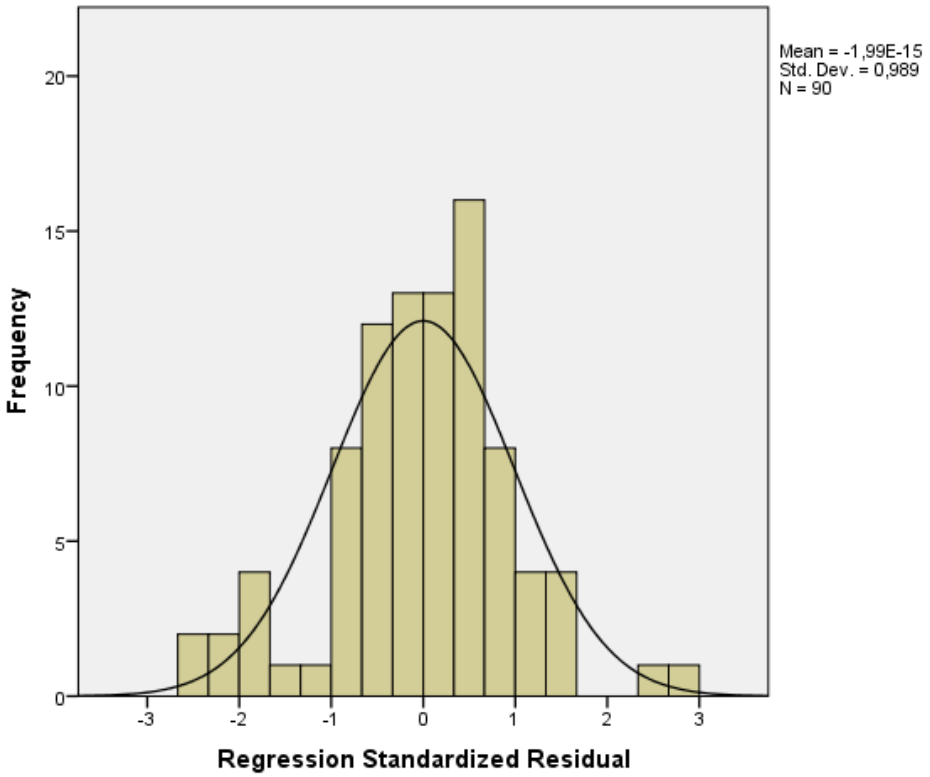


Figure 3. Regression Standardized Residual of Reappraisal in Older Adolescent Group in Study 1

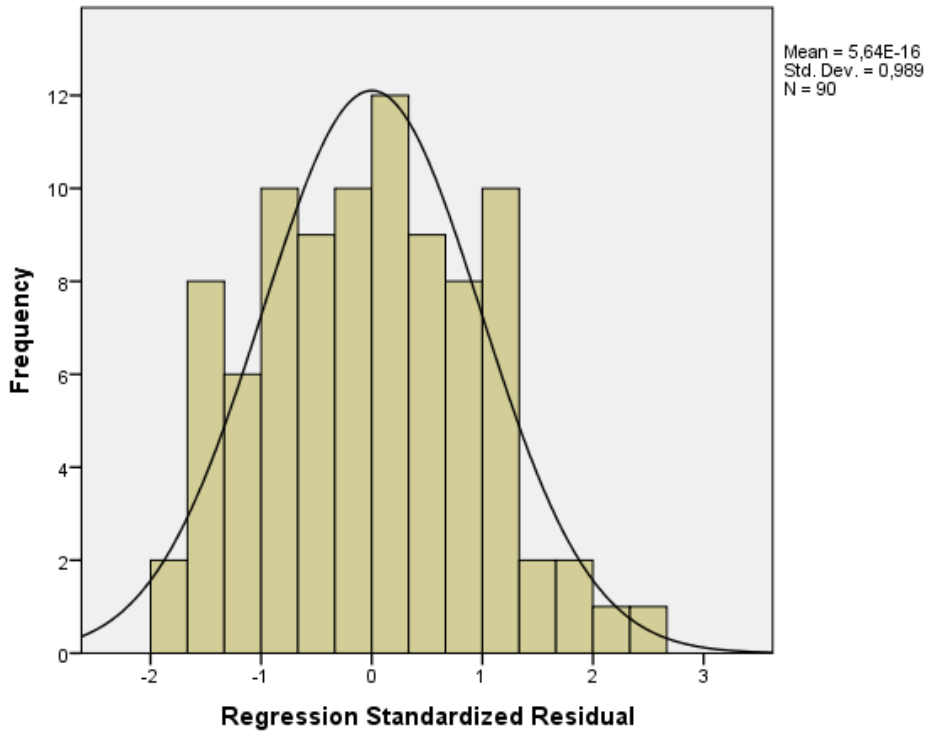


Figure 4. Regression Standardized Residual of Suppression in Older Adolescent Group in Study 1

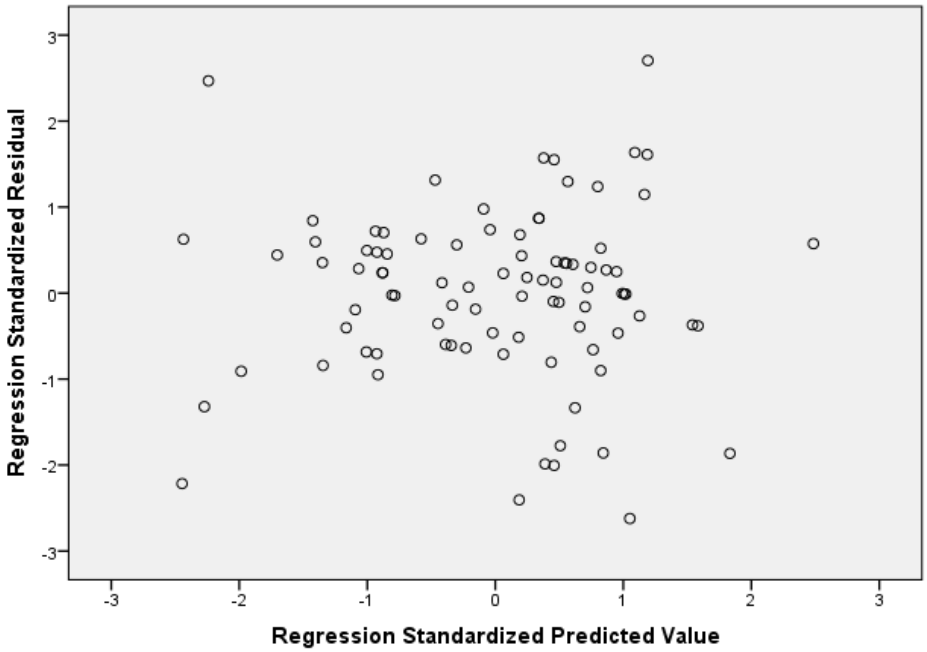


Figure 5. Scatterplot of Reappraisal in Older Adolescent Group in Study 1

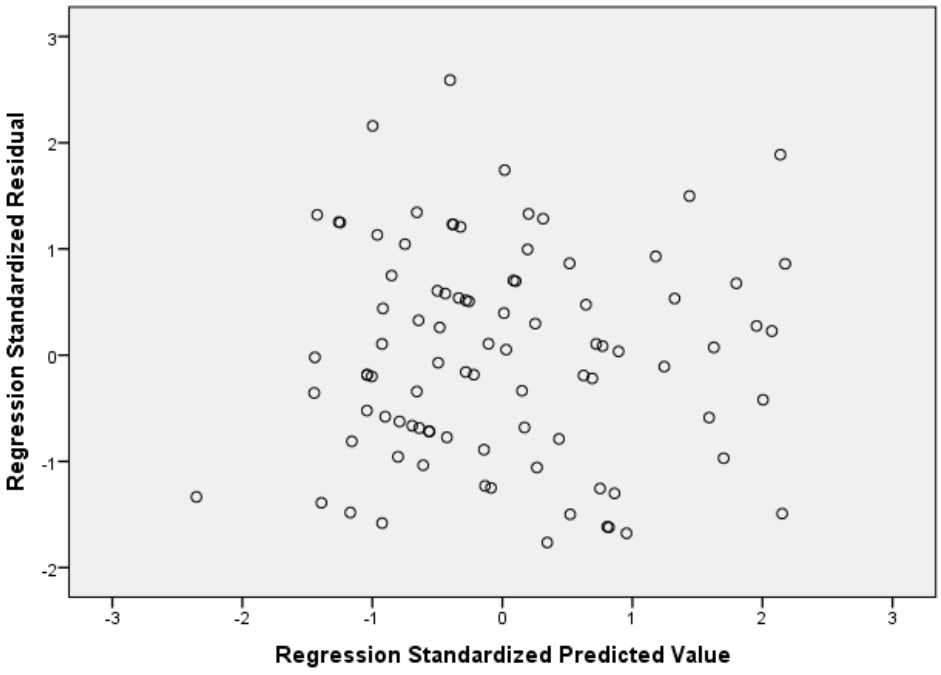


Figure 6. Scatterplot of Suppression in Older Adolescent Group in Study 1

Scatterplot (dot scatter) and Pearson correlation analysis results showed that there was a negatively significant relationship between positive mood and perceived suppression strategy. According to the results of the simple linear regression analysis of the relationship between positive mood and perceived reappraisal ability, the model was not significant (F (2, 89) = 2.56, $df = 89$, p =.11).

In the linear regression analysis, the model was found to be significant F (2, 89) = 15.01, $df = 89$, $p < .001$). R^2 result showed that the created model explained 15% of the total variance. It has been determined that positive mood significantly moderately negatively predicts the perceived suppression ability (β = -.38, B = -.48, SE = .13, t =-3.62, df = 89, p < .001, 95% BCa corrected CI [-.74, -.22]).

3.2.4. RQ 1 on Younger Adolescents: The Relationship between Mood (Positive / Negative) and perceived ER Strategies (Reappraisal and Suppression)

In order to examine RQ 1 on younger adolescents, Pearson correlation was also carried out on younger adolescent sample. The results revealed that there was a significant positive correlation between positive mood and perceived reappraisal r = .37, R^2 = .14, p < .001. The shared variance between positive mood and perceived reappraisal is 13.69 %. The effect size between positive mood and perceived reappraisal is moderately significant.

There was a significant positive correlation between negative mood and perceived suppression r = .23, R^2 = .05, p = .03. The shared variance between negative mood and perceived suppression is 5.29 %. The effect size is low but the relationship between positive mood and perceived suppression is still significant. There is no correlation between negative mood and perceived reappraisal, p = .15 and also no correlation between positive mood and perceived suppression, p = .12.

After the correlation analyses, two linear regression analyses were conducted separately on the significant correlational results on younger adolescents (between positive mood and perceived reappraisal; between negative mood and perceived suppression).

Before the regression analysis, assumption tests were conducted. First, the histogram of standardized residual values were examined and residual values were distributed normally in both perceived ER strategies (reappraisal and suppression) (see Figure 7 and Figure 8). Second, the assumption of homoscedasticity was examined. Scatterplot was drawn between

ZPRED (z scores of predicted values) and ZRESID (z scores of residuals) and examined. These scatterplot patterns were distributed partially homogenously and partially linearly in reappraisal plot and distributed more homogenously and more linearly in suppression plot. These scatterplots indicated that the homoscedasticity and linearity assumptions were not perfect but it is still acceptable (see Figure 9 and Figure 10). Third, influential case studies were conducted to evaluate the fitness of the regression models. For this aim, the residuals were converted to z-scores and checked more than 3.29 as an outlier. There is not any z-score more than 3.00, more than 1% of sample cases have not z-score more than 2.50 and more than 5% of sample cases have not z-score more than 2.00 (Field, 2024).

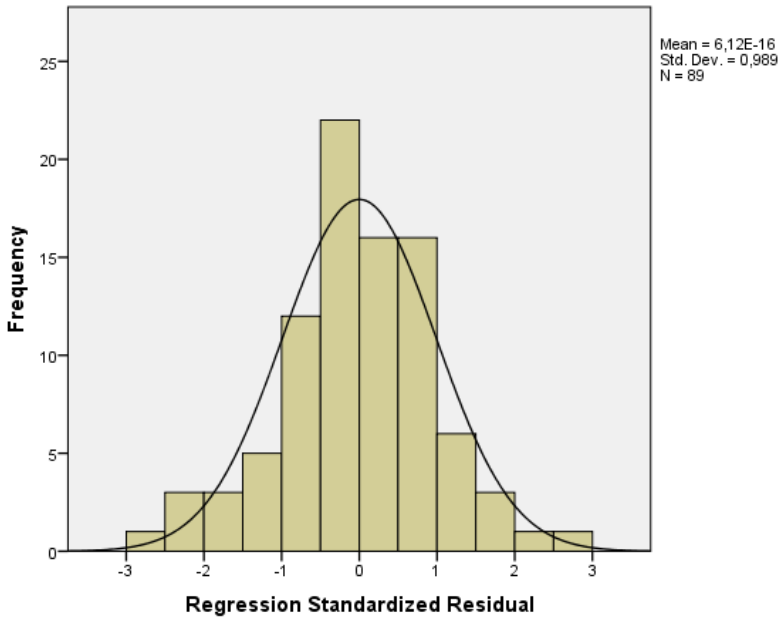


Figure 7. Regression Standardized Residual of Perceived Reappraisal in Younger Adolescent Group in Study 1

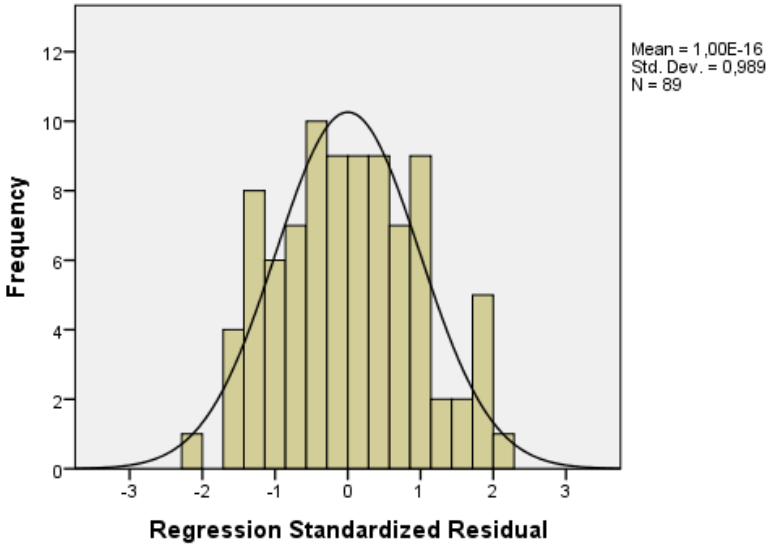


Figure 8. The Regression Standardized Residual of Perceived Suppression in Younger Adolescent Group in Study 1

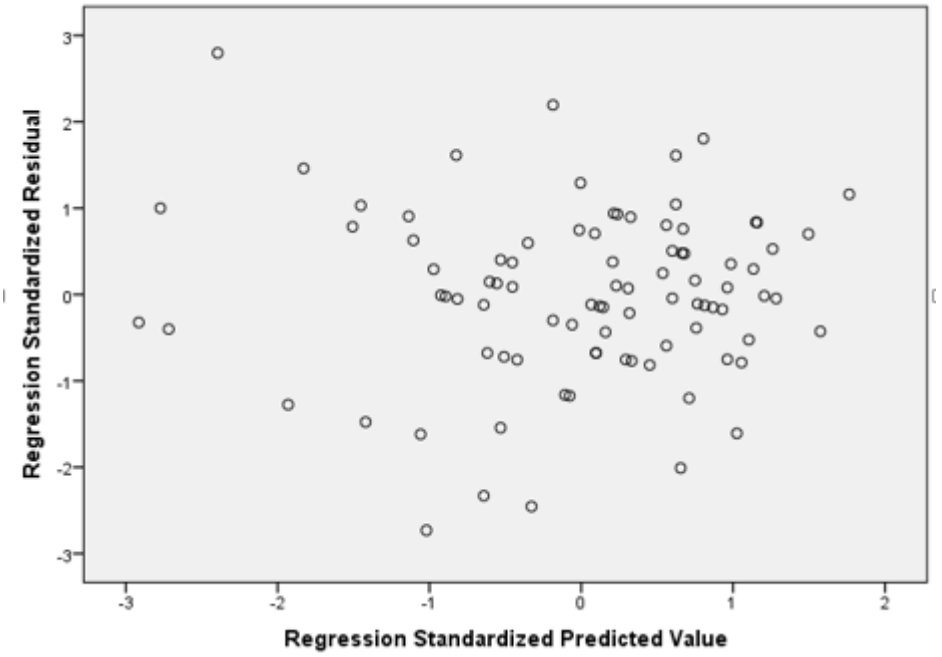


Figure 9. The Scatterplots of Perceived Reappraisal in Younger Adolescent Group in Study 1

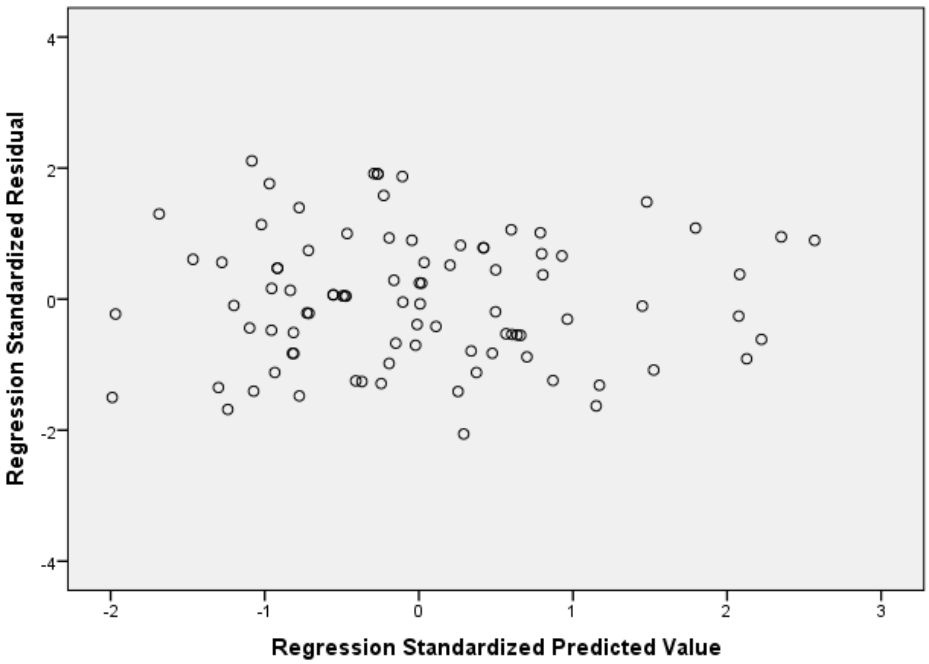


Figure 10. The Scatterplots of Perceived Suppression in Younger Adolescent Group in Study 1

Scatterplot (dot scatter) and Pearson correlation analysis results show that there is a positive significant linear relationship between positive mood and perceived reappraisal strategy. According to the results of the regression analysis, the model was found to be significant (F (2, 88) = 13.64; df = 88, p = .001). R^2 result shows that the created model explains 14 percent of the total variance. It has been determined that positive mood significantly predicts perceived reappraisal strategy (β =.37, B = .37, SE = .11, t = 3.37, p = .001, df = 88, 95% BCa corrected CI [.15, .59]).

The regression analysis of the relationship between negative mood and perceived suppression strategy revealed that the model was found to be significant (F (2, 88) = 5.01, p =.03). R square result shows that the created model explains 5 percent of the total variance. It has been determined that negative mood significantly predicts perceived suppression strategy (β =.23, B = .20, SE = .14, t = 1.67, p = .10, df = 88, 95% BCa corrected CI [.05, .51]).

3.2.5. RQ 2 The Relationship between Mood States (Positive / Negative) and EFs (WM and CF) on Total Sample (Younger and Older Adolescents)

The second research question of this study predicts that "*Do different mood states (positive/negative) (DABS) predict working memory (ACT) and cognitive flexibility (CFT)?*"

In order to examine RQ 2 on total sample, Pearson correlation was conducted. The results revealed that negative mood was significantly negatively related to working memory $r = -.28$, $R^2 = .08$, $df = 178$, $p < .001$. The shared variance between negative mood and working memory was 7.84 percent. The effect size was low but the relationship between negative mood and working memory was still significant. Furthermore, positive mood was significantly positively related to working memory, $r = .21$, $R^2 = .04$, $df = 178$, $p < .001$. The shared variance between positive mood and working memory was 4.41 percent. The effect size was low but the relationship between positive mood and working memory was still significant. Negative mood was also negatively moderately significantly related to cognitive flexibility $r = -.37$, $R^2 = .14$, $df = 178$, $p < .001$. The shared variance between negative mood and cognitive flexibility was 13.69 %. The effect size between negative mood and cognitive flexibility was moderately significant. Positive mood was also positively significantly related to cognitive flexibility $r = .28$, $R^2 = .08$, $df = 178$, $p < .001$. The shared variance between positive mood and cognitive flexibility was 7.84 %. The effect size was weak but the relationship between positive mood and cognitive flexibility was still significant.

After the correlation analyses, regression analyses were conducted on the relationship between predictor (DABS) and predicted variable (CFT and ACT) to see the way of relationship on the significant results. Scatterplot (dot scatter) plots were shown that there is no significant linear line between mood conditions and EFs performances on four regression models. Despite this, regression analyses were conducted and reported p values on four regression models: DABS positive and ACT, $p = .37$; DABS positive and CFT, $p = .14$; DABS negative and ACT, $p = .19$; DABS negative and CFT, $p = .19$.

In order to examine RQ 2 on older adolescents, Pearson correlation was carried out on older adolescent sample. The correlation analysis was revealed that working memory (ACT) was not correlated with positive mood $r = .07$, $p = .51$ and negative mood $r = .00$, $p = 1.00$. Also, no significant relationship was found between mood conditions (positive and

negative) and cognitive flexibility (CFT); positive mood $r = .14$, $p = .18$ and negative mood, $r = -.07$, $p = .54$.

In order to examine RQ 2 on younger adolescents, Pearson correlation was carried out on younger adolescent sample. The correlation analysis was revealed that working memory (ACT) was positively correlated with positive mood $r = .25$, $R^2 = .06$, $p = .02$. The shared variance between working memory and positive mood is 6.25 percent. The effect size is low but the relationship between working memory (ACT) and positive mood is still significant. On the other hand, working memory (ACT) was not correlated with negative mood $r = -.13$, $p = .24$. Also, no significant relationship was found between mood conditions (positive and negative) and cognitive flexibility (CFT); positive mood $r = .12$, $p = .29$ and negative mood $r = -.07$, $p = .51$.

3.2.6. RQ 3 The Mean Differences between Older and Younger Adolescents

The third research question of this study predicts that "*Do older adolescents show better performance on mood (DABS), working memory (ACT), cognitive flexibility (CFT) and ER strategies (Temporal distance, Reappraisal and Suppression) (TDERT) (ERQ – CA) than younger adolescents?*"

In order to examine RQ 3, independent sample t-test was conducted. The results revealed that older adolescents' scores on two conditions of TDERT (control- no distance and negative-distant future) ($M = 5.08$, $SD = .22$; $M = 4.01$ $SD = .62$ respectively) were differed significantly from younger adolescents on two conditions of TDERT ($M = 5.18$, $SD = .27$, $M = 3.72$, $SD = .57$), $df = 178$, $p < .01$ (see Table 6). Younger adolescents' DABS negative mean scores ($M = 2.89$, $SD = .66$) were higher than older adolescents scores ($M = 1.40$, $SD = .59$) and DABS positive mean scores ($M = 1.50$, $SD = .69$) were lower than older adolescents scores ($M = 2.29$, $SD = .65$), $df = 178$, $p < .001$ (see Table 6). ERQ-CA perceived suppression results were shown that younger group ($M = 3.06$, $SD = .80$) used perceived suppression strategy more than older group ($M = 2.70$, $SD = .79$) $p < .001$ (see Table 6). Lastly, older adolescents' working memory and cognitive flexibility mean scores ($M = 51.28$, $SD = 4.97$; $M = 13.52$, $SD = 4.07$, respectively) were higher than younger adolescents ($M = 45.79$, $SD = 5.36$, $M = 9.09$, $SD = 3.59$ respectively), $df = 178$, $p < .001$ (see Table 6). According to the independent samples t-test results, it was observed that there was a

significant difference between younger and older adolescents in terms of mood, ER and EFs (see Table 6).

Table 6. Independent sample t-test on older vs. younger adolescents in Study 1

	Young_Old	*N*	*M*	*SD*	*SE*	*T*	*df*	Sig(2-tailed)
Cont-NoDist	Old	90	5.08	.22	.02	-2.80	177	.01*
	Young	89	5.18	.27	.03	-2.79	166.85	
Neg-NoDist	Old	90	2.01	.43	.04	-1.24	177	.21
	Young	89	2.10	.57	.06	-1.24	163.07	
Neg-NearFut	Old	90	2.81	.44	.05	-1.35	177	.18
	Young	89	2.92	.64	.07	-1.35	156.62	
Neg-DistFut	Old	90	4.01	.62	.06	3.31	177	<.001*
	Young	89	3.72	.57	.06	3.31	176.27	
DABSnegatif	Old	90	1.40	.59	.06	-15.82	177	<.001*
	Young	89	2.89	.66	.07	-15.81	174.25	
DABSpozitif	Old	90	2.29	.65	.07	7.84	177	<.001*
	Young	89	1.50	.69	.07	7.84	176.11	
ERQ_CAreappraisal	Old	90	3.61	.72	.08	.54	177	.59
	Young	89	3.55	.64	.07	.54	174.88	
ERQ_CAsuppress	Old	90	2.70	.79	.08	-2.82	177	<.001*
	Young	89	3.06	.80	.08	-2.81	176.95	
ACT	Old	90	51.28	4.97	.52	7.11	177	<.001*
	Young	89	45.79	5.36	.57	7.10	175.71	
CFT	Old	90	13.52	4.07	.43	7.72	177	<.001*
	Young	89	9.09	3.59	.38	7.73	174.78	

Note. Cont-NoDist: control- no distance, NegNoDist : negative - no distance, NegDistFut : negative - distant future, Neg-NearFut : negative - near future, N : number of participants, M : mean. SD: standart devision, SE: standard error.
*$p < .05$

3.2.7. RQ 3 The Mean Differences on TDERT and ANOVA Results among Older and Younger Adolescents

To see the mean differences between TDERT conditions, repeated measure ANOVA analysis was conducted. TDERT conditions are implemented within design. Mauchly's test of sphericity was shown that homogenity of varience test was achieved across groups, *Mauchly's* $W = .96, \chi^2 = 7.44, df = 5, p > .001$.

Repeated Measure ANOVA (Within design) results have shown that the mean scores of four conditions have differed significantly from each other ($p < .001$) (see Table 7).

Table 7. Tests of Within-Subjects Effects in Study 1

Source		Type III Sum of Squares	*df*	Mean Square	*F*	*p*	Partial Eta Squared
factor1	Sphericity Assumed	942.90	3	314.30	1796.71	<.001*	.91
factor1 * older/ younger	Sphericity Assumed	4.74	3	1.58	9.02	<.001*	.05

**p < .001*

Table 8. Tests of between subject effect (Older vs. Younger) in Study 1

Source	Type III Sum of Squares	*df*	Mean Square	*F*	*p*	Partial Eta Squared
Intercept	8664.07	1	8664.07	20860.852	<.001*	.99
older/younger	.01	1	.01	.03	.86	<.001*
Error	73.51	177	.41			

**p < .001*

The mean scores of four conditions Control- No Distance, Negative - No Distance, Negative - Distant Future, Negative - Near Future have been compared to each other one by one on pairwise comparisons table (Table 9). The results have shown that the mean scores of each condition was differed from the other condition significantly ($p < .001$). This means adopting temporal distance strategy reduced the level of distress relative to other conditions. Distant future strategy produced the least distress.

Table 9. Pairwise Comparison among TDERT conditions in Study 1

(I) factor1	(J) factor1	Mean Difference (I-J)	*SE*	*p*	95% Confidence Interval for Difference	
					Lower Bound	Upper Bound
1	2	3.08*	.04	< .001*	2.99	3.15
	3	2.26*	.04	< .001*	2.18	2.35
	4	1.28*	.05	< .001*	1.19	1.37
2	3	-.81*	.04	< .001*	-.90	-.73
	4	-1.80*	.05	< .001*	-1.89	-1.70
3	4	-.98*	.04	< .001*	-1.07	-.89

Note. 1 = Control - No Distance, 2 = Negative – No Distance, 3 = Negative - Near Future, 4 = Negative - Distant Future
$p < .001$

3.2.8. RQ 4 on Older Adolescents: The Moderating Role of ACT

The forth research question of this study investigates that *"Does working memory (ACT) have a moderating role in the relation between mood and perceived ER strategies (Reappraisal and Suppression) (ERQ – CA)?*"

In order to examine RQ 4 in older adolescent group, four different moderation analyses were conducted on JAMOVİ statistical software.The results have shown that ACT does not have a moderator role on the relation between mood (positive and negative) and perceived ER strategies (Reappraisal and Suppression) in older adolescent group.

The insignificant results were listed below:

The role of ACT between positive mood and perceived reappraisal in the older adolescent group, $p = .24$.

The role of ACT between positive mood and perceived suppression in the older adolescent group, $p = .16$.

The role of ACT between negative mood and perceived reappraisal in the older adolescent group, $p = .20$.

The role of ACT between negative mood and perceived suppression in the older adolescent group, $p = .83$.

3.2.9. RQ 4 on Younger Adolescents: The Moderator Role of ACT

In order to examine RQ 4 in younger adolescent group, four different moderation analyses were conducted. The results have shown that ACT does not have a moderator role on the relation between mood (positive and negative) and perceived ER strategies (Reappraisal and Suppression) in younger adolescent group.

The insignificant results were listed below:

The role of ACT between positive mood and perceived reappraisal in the younger adolescent group, $p = .30$.

The role of ACT between positive mood and perceived suppression in the younger adolescent group, $p = .13$.

The role of ACT between negative mood and perceived reappraisal in the younger adolescent group, $p = .27$.

The role of ACT between negative mood and perceived suppression in the younger adolescent group, $p = .37$.

3.2.10. RQ 5 on Older Adolescents: The Moderator Role of CFT

The fifth research question of this study investigates that "*Does cognitive flexibility (CFT) have a moderator role in the relation between mood and perceived ER strategies (Reappraisal and Suppression) (ERQ - CA)?"*

In order to examine RQ 5 in older adolescent group, four different moderation analyses were conducted. The results were revealed that CFT has a moderator role on the relation between positive mood exogenous (predictor) variable and perceived reappraisal endogenous (predicted) variable in older adolescent group ($p = .02$) (see Table 10) and at different levels of the moderator (CFT) (see Table 11). Furthermore, the significance score on the relationship between current positive mood and perceived reappraisal increased from "$p = .04$" to "$p = .02$" with the inclusion of the CFT variable in the process (see Table 10).

Table 10. The Moderation Analysis of CFT on the Relation between DABS Positive Exogenous Variable and the ERQ-CA Perceived Reappraisal Endogenous Variable on Older Adolescents in Study 1

			95% Confidence Interval			
	Estimate	***SE***	**Lower**	**Upper**	***Z***	***P***
DABSpositive	0.23	0.11	0.01	0.46	2.02	0.04
CFT	0.01	0.02	-0.03	0.04	0.31	0.76
DABSpositive ✻ CFT	0.06	0.03	0.01	0.11	2.26	0.02*

Note. The table shows the effects of predictor (DABS positive) on the ERQ-CA reappraisal dependent variable at the moderator role of CFT, *$p < .05$

Table 11. Simple Slope Estimates of the Moderator (CFT) on Older Adolescents in Study 1

			95% Confidence Interval			
	Estimate	***SE***	**Lower**	**Upper**	***Z***	***P***
Average	0.23	0.12	< 0.001	0.46	1.97	0.05*
Low (-1SD)	-0.02	0.15	-0.31	0.27	-0.12	0.90
High (+1SD)	0.48	0.18	0.13	0.83	2.73	0.01*

Note. The table shows the effect of the predictor (DABS positive) on the dependent variable (ERQ_CA reappraisal) at different levels of the moderator (CFT), *$p < .05$

In the other three moderation analyses, CFT does not have a moderator role in older adolescent group. The insignificant results were listed below:

The role of CFT between positive mood and perceived suppression in the older adolescent group, $p = .62$.

The role of CFT between negative mood and perceived reappraisal in the older adolescent group, $p = .61$.

The role of CFT between negative mood and perceived suppression in the older adolescent group, $p = .76$.

3.2.11. RQ 5 on Younger Adolescents: The Moderator Role of CFT

In order to examine RQ 5 in younger adolescent group, four different moderation analyses were conducted. The results were revealed that CFT has a moderator role on the relation between negative mood exogenous (predictor) variable and perceived suppression ability endogenous (predicted) variable in younger adolescent group ($p = .04$) (see Table 12) and at different levels of the moderator (CFT) (see Table 13). Furthermore, the significance score on the relationship between current negative mood and perceived suppression decreased slightly from "$p = .03$" to "$p = .04$" with the inclusion of the CFT variable in the process (see Table 12). The results were still significant.

Table 12. The Moderation Analysis of CFT on the Relation between DABS Negative Exogenous Variable and the ERQ-CA Perceived Suppression Endogenous Variable on Younger Adolescents in Study 1

			95% Confidence Interval			
	Estimate	***SE***	**Lower**	**Upper**	***Z***	***P***
DABSnegative	0.25	0.11	0.02	0.48	2.11	0.03*
CFT	0.02	0.02	-0.02	0.06	0.88	0.38
DABSnegative ✻ CFT	0.07	0.03	< 0.00	0.14	2.01	0.04*

Note. The table shows the effects of predictor (DABS negative) on the dependent variable (ERQ-CA suppression) at the moderator role of CFT, *p < .05

Table 13. Simple Slope Estimates of the Moderator (CFT) on Younger Adolescents in Study 1

			95% Confidence Interval			
	Estimate	***SE***	**Lower**	**Upper**	***Z***	***p***
Average	0.25	0.12	0.01	0.48	2.05	0.04*
Low (-1SD)	-0.01	0.18	-0.36	0.36	-0.03	0.97
High (+1SD)	0.50	0.16	0.18	0.82	3.05	<0.001*

Note. The table shows the effect of predictor (DABS negative) on the dependent variable (ERQ_CA suppression) at different levels of the moderator (CFT), *p <. 05

In the other three moderation analyses, CFT does not have a moderator role in younger adolescent group. The nonsignificant results were listed below:

The role of CFT between positive mood and perceived reappraisal in the younger adolescent group, p = .63.

The role of CFT between positive mood and perceived suppression in the younger adolescent group, p = .15.

The role of CFT between negative mood and perceived reappraisal in the younger adolescent group, p = .61.

3.3. Discussion for Study 1

The aim of Study 1 was to examine the link of mood (positive and negative) with perceived ER strategies (reappraisal and suppression) and executive functions [working memory (WM) and cognitive flexibility (CF)]. For this aim, five research questions were examined. First, it was tested whether there is a relationship between current mood states (positive/negative) and perceived ER strategies (reappraisal and suppression) about the self. The results showed that current positive mood of the participants was moderately and negatively related to perceived suppresison strategy and weakly and positively related to peceived reappraisal strategy in older adolescent group. It was also revealed that current positive mood of the participants was moderately and positively related to peceived reappraisal strategy in younger adolescent group. Additionally, regression results also confirmed that there is a positively significant relationship between positive mood and perceived reappraisal and also a negatively significant relationship between positive mood and perceived suppression strategy.

According to Broaden and Built Theory (Fredrickson, 1998; Fredrickson, 2000), positive emotions broaden attention and also help to see the whole picture by scanning the environment quickly. This broader perspective allows the individual to rethink and reappraise the negative situation. The previous studies found that using perceived reappraisal strategy enhances positive mood and reduces negative mood (Masumoto et al., 2016; Reijntjes et al., 2006). Reappraisal strategy also emphasizes thinking from a broader perspective. In this content, the current results were consistent with the previous literature. That is why it can be thought that these two mechanisms (positive mood and perceived reappraisal strategy) might support each other.

At this point, it is important to remember that the direction of causality between mood (positive and negative) and perceived ER strategies (reappraisal and suppression) cannot be tested as the current data are correlational. The direction of causality attempted to be measured in the second study. In this study, while the participants were in a positive mood at the time of filling out the scales, they tried to remember how they did ER in the past and in general. While doing this, people retrieve the general information about themselves stored in the semantic region of their autobiographical memory and make a decision about how they behaved by using this information (Conway and Pleydell-Pearce, 2000). While the person is in a positive mood at that moment, they tend to remember the perceived reappraisal

strategy they used in the past. In other words, as the positive mood increases, the person tends to define themselves as "*reappraising*" more and "*suppressing*" less, while as the current positive mood decreases, the person tends to define themselves as "*reappraising*" less and "*suppressing*" more.

The other researchers have also provided the evidence that negative mood constricts the focus of attention (Fredrickson & Branigan, 2005; Rowe et al, 2007). However, in terms of negative mood, there was only one significant link between negative mood and perceived suppression in younger group, whereas the regression analysis was not significant and negative mood did not also predict ER strategies in older group. Regarding negative mood, Ashby and colleagues (1999) argued that the effects of negative mood are more complex and unpredictable than the effects of positive mood.

Second, the linkage between different mood states (positive/negative) and EFs (WM and CF) were also examined. The results of the present study showed no link between positive/ negative moods and CF when considering the older adolescents. There was also a weak positive correlation between positive mood and WM in younger group. After that, when the all sample come together (older and younger adolescents) and analyses were conducted with the total sample (179), it was found that positive mood was significantly weakly and positively correlated with WM and CF. It was also found that negative mood was negatively and weakly correlated with WM and negative mood was also negatively and moderately correlated with CF. In other words, positive mood was seen to be positively related to EFs (WM and CF) in adolescence, while negative mood was seen to be negatively related to EFs (WM and CF). The current study provides results consistent with previous literature suggesting that positive mood improves cognitive functions, particularly in CF (Ashby et al., 1999; De Dreu et al., 2008; Hirt et al., 2008; Wang et al., 2017). Lyubomirksy and colleagues (2005) stated that individuals in a positive mood are likely to be flexible and creative since they have richer associations within existing knowledge frameworks. In addition, a substantial body of research on negative affect suggests that, in comparison to positive affect, the effects of negative affect are more complex and unpredictable (e.g. Ashby et al., 1999; De Dreu et al., 2008). Three theories come to mind to explain these results. First of all, neuropsychological theory of positive affect (Ashby et al., 1999) is relevant to these findings. According to this theory, positive affect raises dopamine levels in the brain, especially in the anterior cingulate and prefrontal cortex, which in turn improves cognitive function on certain tasks. Indeed, moderate levels of positive affect may improve the

performances on working memory and cognitive set selection (Ashby et al., 1999). Second, Hirt and colleagues (2008) addressed hedonic contingency theory (Wegener & Petty, 1994) that suggests people who are in a positive mood choose their activities more carefully than people who are in a neutral or negative mood because fewer activities will be able to sustain or elevate their current mood. Furthermore, positive mood is connected to cognitive flexibility to the extent that it allowed mood maintenance. Thus, their results suggest that positive mood effects may be restricted to tasks that allows participants to sustain their positive feeling (Hirt et al., 2008). According to cognitive tuning model (Clore et al, 2014), as a third theory, individuals in a positive affect, perceive their environment as safe and problem-free, thus positive affect promotes holistic and analogous basic process cognition in the right hemisphere (Derryberry, 1989). People are inclusive in their thinking and switch cognitive categories. In other words, positive affect boost cognitive flexibility (Ashby et al., 1999). Negative affect, on the other hand, signals to the individual that the situation is dangerous, threatening and distressing. To correct the current situation, specific action must be taken necessitating a more limited, systematic and analytical approach (Ambady & Gray, 2002). Additionally, negative moods like anxiety or fear cause constrained cognitive categories (Mikulincer et al., 1990) decreased cognitive flexibility (Carnevale & Probst, 1998) and a reduced capacity for attentional switching (Derryberry & Reed, 1998).

Third**,** age differences (younger vs. older) on mood (positive and negative), EFs (WM and CF) and use of ER strategies (temporal distance, reappraisal and suppression) were tested. It was observed that early adolescents and late adolescents were found to be different from each other in terms of the moods. In terms of positive mood, late adolescents had significantly higher scores than early adolescents. When compared for negative mood, early adolescents had significantly higher scores than late adolescents. Older adolescents also have shown better results on WM and CF tasks than younger group. Consistent with the literature, it can be seen that EFs improve with age (e.g. Dimond, 2013; Lantrip et al., 2015). Based on perceived ER strategies, perceived suppression strategy decreased with age, however, mean differences in the use of the perceived reappraisal strategy did not differ significantly with age. Inconsistent with this perceived reappraisal ability result, Silver and colleagues (2012) found that age has a linear and quadratic effect on perceived reappraisal success during early and mid-adolescence. On the other hand, a recent scoping review study (Shum et al., 2024) examining 58 study results in adolescence and found that the majority of research that looked at age did not reveal a correlation between age and frequency of perceived reappraisal use.

These conflicting findings in adolescents may be explained by individual differences in development. The prefrontal control region connected with successful ER is the last brain regions to fully develop in adolescence (Ochsner & Gross, 2008); therefore, this brain region may not yet be fully developed during adolescence. Thus, the ability to use ER strategies can vary depending on the cognitive development of adolescents.

Forth, the moderator role of WM was examined on the relationship between the moods (positive and negative) and perceived ER strategies (reappraisal and suppression) on older and younger adolescent groups respectively. The results were shown that, no significant moderator role of WM on the relationship between moods (positive or negative) and perceived ER strategies (reappraisal or suppression). In more detail, WM does not have a moderator role on four relationship combination between positive mood and perceived suppression; positive mood and perceived reappraisal; negative mood and perceived suppression; negative mood and perceived reappraisal on older and younger adolescent groups.

Fifth, the moderator role of CF was examined on the relationship between the moods (positive and negative) and perceived ER strategies (reappraisal and suppression). The results showed that CF have a significant moderator role on the relationship between positive mood and perceived reappraisal strategy in older group. CF have also a significant moderator role on the relationship between negative mood and perceived suppression strategy in younger group. When these results are evaluated together with the findings of RQ 1, it is seen that the significance level of the relationship between current positive mood and perceived reappraisal strategy increased with the inclusion of the CF moderator variable in older adolescent group. Conversely, the inclusion of the CF moderator variable in younger adolescents reduced the significance of the relationship between current negative mood and perceived suppression and in fact, this shows also a positive effect. In other words, the moderator role of CF influenced positively the linear relationship between two negative variables (current negative mood and perceived suppression). In this respect, these two significant results are another original contribution to the literature. RQ 4 and RQ 5 were also discussed in the General Discussion section along with RQ 9 and RQ 10.

In conclusion, the present findings are mostly consistent with previous literature. Both the present and previous literature results have shown that the enhancing and expanding effects of positive mood are related to perceived ER strategies (reappraisal and suppression)

and EFs (CF and WM). Furthermore, it has been observed that moods, ER and EFs improves with age during adolescence.

In Study 1, mood was measured with DABS which is a self-report scale and the correlational analyses were conducted. Related to this, Coşgun and Gültepe (2013) stated that using self-report scales in mood studies would cause a limitation. This limitation may stem from the possibility that individuals who see themselves mostly in a positive mood may lead to a bias when answering the questions. In the second study, mood was manipulated using Cyberball paradigm (negative and control) and the effects of mood was measured on perceived ER strategies and EFs.

4. STUDY 2

4.1. Method

4.1.1. Participants in Study 2

In this study, 191 adolescents participated to the study. 101 older adolescents (18-21 ages) (*Mean age* = 19.56, *SD* = .79) (*male = 40, female = 61*) from Ankara Yıldırım Beyazıt University (AYBU) undergraduate students and 90 younger adolescents (10-12 ages) (*Mean age* = 11.13, *SD* = .34) (*male* = 45, female = 45) from a state secondary school participated in Study 2. Participants consisted of volunteer adolescents who did not participate in Study 1. Participants were randomly assigned to three conditions (negative, positive and control mood).

The convenience sampling method was used. Before the data collection part, the participants were given an informed consent form with details about the study. Only participants who volunteered, approved the informed consent form participated in the study. Written consent (Informed Consent Form) was obtained in 2 copies, and 1 copy was given to the participant. Younger adolescents and their parents were informed about the study. Permissions were obtained from the parents and participants before the study. Older adolescents were given extra points for their subjects, while younger adolescents were given an agenda as an incentive.

Only native Turkish speakers were recruited to the study. Because, it was concerned that second-language learners might have difficulty understanding the audio-instructions.

The inclusion and exclusion criteria for during the selection of participants are all the same with Study 1 criteria. These criteria given in Study 1 participants section (see Table 1).

Before the data collection part, the participants were given an informed consent form with details about the study. Only participants who volunteered, approved the form, and agreed to participate included in the study. Older adolescents were given extra points for their subjects, while younger adolescents were given an agenda as an incentive.

4.1.2. Materials in Study 2

Demographic Information Form

Demographic information form was given in Study 1 materials.

Cyberball Paradigm

Mood was manupulated on positive, negative and control conditions via Cyberball Paradigm. Cyberball Paradigm (see Appendix 10) was developed by Williams and colleagues in 2000 to create emotional manipulation through ostracism. This paradigm commonly used in the mood studies to manupulate mood in adolescent samples (e.g. Gross, 2009; Ruggieri, 2013; Sebastian et al., 2010). This paradigm was originally used to manipulate in two conditions: negative and control. In this study, based on current examples from the literature, a positive condition was also added (e.g. Raczy & Orzechowsk, 2021). This is a ball-throwing game played with three players on a computer. Depending on the number of balls the participant receives, their mood was to manupulated on positive or negative mood. The control group did not play this game. In the game, participants in negative condition got the ball only two times then they did not get another ball until the end of the game. Participants in positive condition got the ball fifteen times. Total number of ball throwing are thirty. Each participant can get the ball a maximum of twelve times (Williams et al., 2000). Participants thought they were playing the game online. However, in reality, it was a computer-generated game designed by the researcher.

If a researcher aims to measure an affective experience rather than an emotion, "*Self Assesment Mainkin*" may be used (Bradley & Lang, 1994). Based on this reference, self assessment of manipulation was given in the manipulation check.

Manipulation Check

At the end of the Cyberball, individuals were asked to check the manipulation which are commonly used after Cyberball Paradigm (Williams et al., 2000). First, "*I was ignored or excluded*" (give a value between 1 and 5) and second, "*Assuming that the ball should be thrown to each person equally (33% if three people; 25% if four people), what percentage*

of the throws did you receive?" (give a value between 1 and 5/rate this on a scale between 1 and 5). 1 means "*not at all*" and 5 means "*very much*" (Williams et al., 2000).

After the manipulation check, participants were asked to fill out a short mood scale. This mood scale is the sub-scale of Need-Treat Scale (Williams et al., 2000) which commonly used with Cyberball Paradigm. As related to the current research, only one sub-dimension of this scale was used. This sub-scale includes eight items about positive and negative mood, such as good, bad and angry. Participants scored their mood states during Cyberball game on a scale between 1 and 5. 1 is lowest and 5 is highest score in the scale. The evaluation was based on the total score for both positive and negative mood.

The results of manipulation checks were represented in the beginning of Study 2 results section.

Emotion Regulation Questionnaire for Child and Adolescent (ERQ-CA)

ERQ-CA details was given in Study 1.

Temporal Distancing Emotion Regulation Task (TDERT)

TDERT details was given in Study 1.

The Auditory Consonant Trigram (ACT)

ACT details was given in Study 1.

Cognitive Flexibility Task (CFT)

CFT details was given in Study 1.

4.1.3. Experimental Design in Study 2

In order to test the effect of mood manipulation on perceived ER strategies (RQ 6), the experimental design of the research was 3 (Mood: Positive, Negative, and Control) x 2 (perceived ER Strategies: Reappraisal, and Suppression) one way ANOVA design (see

Table 14). Older and younger adolescents were tested separately. Dependent variable was the total scores obtained from ERQ-CA in each condition.

Table 14. Experimental Design of the Present Research for RQ 6 in Study 2

n_{total} = 191		Reappraisal	Suppression
Younger Adolescence (10-12 ages)	Positive Mood	n = 30	
	Negative Mood	n = 30	
	Control Mood	n = 30	
Older Adolescence (18-21 ages)	Positive Mood	n = 33	
	Negative Mood	n = 38	
	Control Mood	n = 30	

In order to test the effects of mood manipulation on temporal distance ER strategy (RQ 6), the experimental design of the research was 3 (Mood: Positive, Negative, and Control) x 4 (Temporal Distance: Negative-Distant Future, Negative-Near Future, Negative-No Distance, and Neutral No Distance) factorial mixed ANOVA design with repeated measures in the last factor (see Table 15). Older and younger adolescents were tested separately. Dependent variable was the total scores obtained from TDERT in each condition.

Table 15. Experimental Design of the Present Research for RQ 6 in Study 2

n_{total} = 191		Negative -Distant Future	Negative -Near- Future	Negative -No Distance	Neutral- No Distance
Younger Adolescence (10-12 ages)	Positive Mood	n = 30			
	Negative Mood	n = 30			
	Control Mood	n = 30			
Older Adolescence (18-21 ages)	Positive Mood	n = 33			
	Negative Mood	n = 38			
	Control Mood	n = 30			

In order to test the effect of mood manipulation on EFs (RQ 7), the experimental design of the research for working memory was 3 (Mood: Positive, Negative, and Control) one way ANOVA design (see Table 16). Dependent variable was the total scores obtained from ACT. Also, the experimental design of the research for cognitive flexibility was 3 (Mood: Positive, Negative, and Control) one way ANOVA design (see Table 17). Older and younger adolescents were tested separately. Dependent variable was the total scores obtained from CFT.

Table 16. Experimental Design of the Present Research for RQ 7 (Working Memory) in Study 2

n_{total} = 191	Positive Mood	Negative Mood	Control
Younger Adolescence (10-12 ages)	n = 30	n = 30	n = 30
Older Adolescence (18-21 ages)	n = 33	n = 38	n = 30

Table 17. Experimental Design of the Present Research for RQ 7 (Cognitive Flexibility) in Study 2

n_{total} = 191	Positive Mood	Negative Mood	Control
Younger Adolescence (10-12 ages)	n = 30	n = 30	n = 30
Older Adolescence (18-21 ages)	n = 33	n = 38	n = 30

4.1.4. Procedure in Study 2

Before starting to Study 2, ethical approval has obtained from AYBU Social and Human Sciences Ethics Committee (Decision date: 15.03.2023, Decision number: 03-61) (see Appendix 6). Then a research permission petition has submitted to the AYBU Social Sciences Institute for getting the research permission from the Ministry of Education (see Appendix 7). In Study 2, Study 1 was replicated with a different mood manipulation: Cyberball. Cyberball Paradigm was applied in three mood conditions (positive, negative and control). Participants were randomly assigned the conditions.

Younger participants were invited from Saray Imamhatip Secondary School and older participants were invited from Ankara Yıldırım Beyazıt University students. Both are a state school and university in Türkiye. The participants were participated in the same schedule: Demographic Information Form, Cyberball Paradigm, ERQ-CA, and TDERT respectively. Cognitive tests were given to the participants by the "*counterbalancing*" tecnique. This means that Cognitive tests (CFT and ACT) were given alternately between themselves. At the beginning of the study, before the Cyberball Paradigm, a two-sentence text which not containing any emotion was written by participants on the study form. This was done to bring all participants to a neutral mood.

A participant number was created for the participants and the application order was written. The study was conducted face to face. For this, the researcher prepared a time

schedule and participants took part to the study individually. At the end of the study, it was explained to the participant that Cyberball Paradigm is not a real online game, but is structured to provide mood manipulation. The study took approximately 55 minutes for each participant. The flow chart for Study 1 was presented in Figure 11.

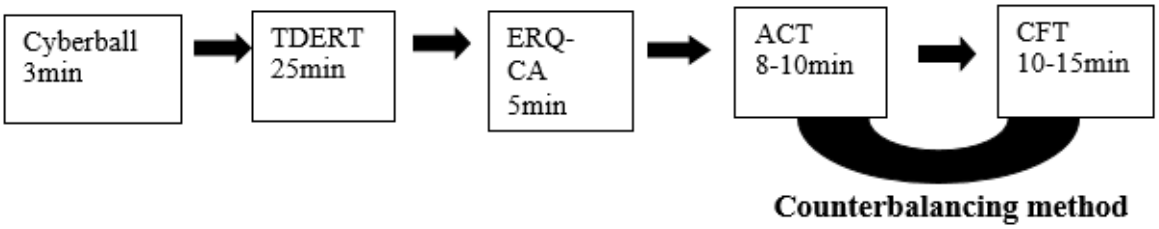


Figure 11. The flow chart for Study 2

4.1.5. Data Analysis in Study 2

All the data were entered into excel program and mean scores of sub-scales were calculated in this programme. There was no missing value on both two sample groups. The pre-processing stage started with data screening, checking for missing values, outlier controls and assumption tests on TDERT, ERQ-CA, ACT, CFT. Older and younger adolescent groups were examined separately both in data cleaning and on the examination of RQ 1, RQ 2, RQ 4, and RQ 5. After these assumption tests were succeeded, it was decided to conduct parametric tests. Before the data analysis, Cyberball manipulation checks for negative, positive and control conditions were tested using independent t-test and one way ANOVA analysis. Then, descriptive analyses were conducted to check whether the data had a normal distribution for the older and younger adolescent groups, respectively. Afterwards, boxplot was run to see outliers on each variable. According to Field (2024), if the z score is greater than 3.29, it is considered an outlier. When it was checked the z score of sub-scales, it was found one high value in younger and one in older sample group. These two scores were changed with the next highest score plus one (Field, 2024). After the assumption tests, it was started to the main analysis. First, one way ANOVA were conducted to see the effects of mood conditions (negative and control) (Cyberball) on perceived ER strategies (reappraisal and suppression) (ERQ-CA) and then, repeated measure ANOVA was conducted to see the mood effects on temporal distance ER strategy. Second, one way ANOVA were conducted to see the effects of mood conditions (negative and control) (Cyberball) on EFs performance (working memory and cognitive flexibility) (ACT and CFT). Third, to investigate the effects of age (younger vs. older group) on EFs and perceived

ER strategies, independent sample t-test analyses were performed. Forth, to investigate the moderator roles of EFs (working memory and cognitive flexibility) on the relationship between mood conditions (positive, negative and control) (Cyberball) and perceived ER strategies (reappraisal, suppression and temporal distance) (ERQ-CA and TDERT respectively), it was conducted the moderation analyses in JAMOVİ. All the analyses were conducted with both SPSS 23 program and JAMOVİ statistical software.

4.2. Results in Study 2

4.2.1. Preliminary Analysis of Older Adolescent Data: Manipulation Checks, Descriptive Statistics and Parametric Assumption Testing

Manipulation Checks

Manipulation checks were examined prior to the analyses. The participants assigned to the negative condition reported higher negative mood (N = 38, M = 3.97, SD = .94) than the positive condition (N = 33, M = 1.48, SD = .57) (t (69) = -13.22, p < .001, d = -2.49, 95% CI [-2.87, -2.11]. Additionally, the participants in the negative mood condition reported receiving less throws overall (M = 1.32, SD = .47) compared to the participants in the positive mood condition (M = 2.76, SD = .56) (t (69) = 11.78, p < .001, d = 1.44, 95% CI [1.20, 1.69]).

In addition, the manipulations were checked with the mood scale, which is a sub-dimension (mood dimension) of the need-threat scale. The need-threat scale is widely used in the literature after the cyberball paradigm. In order to test the manipulations (positive, negative and control) differed each other on mood scale (positive and negative), one way ANOVA was conducted. The results shown that the participants assigned to the negative condition reported less mean score (N = 38, M = 1.37, SD = .36) than control (N = 30, M = 3.33, SD = .77) and positive condition (N = 33, M = 3.14, SD = .77) on positive mood (F(2, 98) = 99.86, df = 2, p < .001). On the other hand, the participants on negative condition reported the highest score (N = 38, M = 3.47, SD = .75) compared to positive (N = 33, M = 1.65, SD = .63) or control conditions (N = 30, M = 1.72, SD = .73) on negative mood, F(2, 98) = 75.58, df = 2, p < .001 (see Table 18).

Post hoc tests were performed with Bonferroni correction and the tests indicated that only negative condition differed significantly from other condition in both positive and negative mood respectively, ($p < .001$). However, positive and control conditions were not statistically significantly different from each other (see Table 19). That is why, positive and control conditions were combined and analyses were performed on these two mood conditions (negative and control). When combined, these findings confirmed that mood manipulations (negative and control) were successful.

Table 18. Mood Manipulation Checks via One Way ANOVA on Older Adolescents in Study 2

		Sum of Squares	*Df*	Mean Square	*F*	*p*
positiveDD	Between Groups	83.07	2	41.53	99.85	<.001*
	Within Groups	40.76	98	.42		
	Total	123.83	100			
negativeDD	Between Groups	75.55	2	37.77	75.58	<.001*
	Within Groups	48.98	98	.50		
	Total	124.53	100			

Note. positiveDD: positive mood, negativeDD: negative mood, *$p < .001$

Table 19. Post-hoc Tests with Bonferroni Correction between Mood Conditions on Older Adolescents in Study 2

Dependent Variable	(I) condition	(J) condition	Mean Difference (I-J)	*SE*	*p*	95% Confidence Interval	
						Lower Bound	Upper Bound
positiveDD	positive	negative	1.78*	.15	<.001*	1.40	2.15
		control	-.19	.16	.74	-.59	.21
	negative	control	-1.96*	.16	<.001*	-2.35	-1.58
negativeDD	positive	negative	-1.82*	.17	<.001*	-2.22	-1.41
		control	-.07	.18	1.00	-.50	.37
	negative	control	1.75*	.17	<.001*	1.33	2.17

*. The mean difference is significant at the 0.05 level.
Note. postiveDD: Positive mood, negativeDD: Negative mood

Descriptive Statistic

In this section, the descriptive statistics were presented about older adolescent group. The results were revealed that, Negative – Near Distance, Negative – Distant Future and ERQ-CA Reappraisal mean scores were normally distributed ($p > .05$) (see Table 20). On

the other hand, Control – No Distance, Negative- No Distance, ERQ-CA Suppression, ACT and CFT mean scores were not normally distributed on older adolescents ($p < .05$) (see Table 20) . According to Field (2024) normal distribution tests (Kolmogorov Simirnov or Shapiro Wilk) can be significant in the large samples. Therefore, the results should be interpreted with the values of skewness and kurtosis. According to George and Mallery (2024), skewness and kurtosis values are acceptable between +2 and – 2 for normal distribution assumption. Therefore, it was decided the current values were normally distributed (see Table 21).

Table 20. Distribution of Normality Results of the Scales on Older Adolesents in Study 2

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	*df*	*p*	Statistic	*Df*	*p*
Cont-NoDist	.15	101	.00	.93	101	<.001
Neg-NoDist	.13	101	.00	.96	101	.01
Neg-Near	.11	101	.01	.98	101	.16*
Neg-Distant	.06	101	.20	.98	101	.09*
Reappraisal	.12	101	.00	.98	101	.07*
Suppression	.10	101	.02	.97	101	.02
ACT	.16	101	.00	.91	101	<.001
CFT	.09	101	.03	.97	101	.02

Note. Cont-NoDist: Control- No Distance, Neg-NoDist: Negative – No Distance, Neg-Near: Negative - Near Future, Neg-Distant: Negative - Distant Future, Reappraisal: ERQ-CAreappraisal, Suppression: ERQ-CAsuppression.
*$p > .05$

Table 21. Descriptive Statistics on Older Adolescents in Study 2

	N	*M*	*SD*	*Skewness*	*SE*	*Kurtosis*	*SE*
Cont-NoDist	101	5.26	.34	.63	.24	.14	.48
Neg-NoDist	101	2.37	.63	.36	.24	-.80	.48
Neg-Near	101	3.04	.57	-.28	.24	-.46	.48
Neg-Distant	101	3.95	.77	.32	.24	- .28	.48
Reappraisal	101	3.56	.65	-.25	.24	-.01	.48
Suppression	101	2.86	.86	.12	.24	-.86	.48
ACT	101	53.15	4.58	-.89	.24	.15	.48
CFT	101	9.49	4.58	.34	.24	-.54	.48

Note. Cont-NoDist: Control- No Distance, Neg-NoDist: Negative – No Distance, Neg-Near: Negative - Near Future, Neg-Distant: Negative - Distant Future, Reappraisal: ERQ-CAreappraisal, Suppression: ERQ-CAsuppression, N: Number of participants, M: mean, SD: standard deviation, SE: standard error

4.2.2. Preliminary Analysis of Younger Adolescent Data: Manipulation Checks, Descriptive Statistics and Parametric Assumption Testing

Manipulation Checks

Manipulation checks were examined prior to the analyses. The participants assigned to the negative condition reported higher excluded (N = 30, M = 3.70, SD = .75) than the positive condition (N = 30, M = 1.47, SD = .73), t (58) = -11.69, df = 2, p < .001, d = -2.23, 95% CI [-2.62, -1.85]. Additionally, the participants assigned to the negative mood condition reported receiving less throws overall (M = 1.60, SD = .62) compared to participants in the positive mood condition (M = 3.30, SD = .65) (t (58) = 10.34, df = 2, p < .001, d = 1.70, 95% CI [1.37, 2.03].

In addition, the manipulations were checked with the mood scale, which is a sub-dimension of the need-threat scale. The need-threat scale is widely used in the literature after Cyberball paradigm. One way ANOVA analysis was performed to test whether the manipulations (positive, negative and control) differed from each on the mood scale (positive and negative). The results shown that participants assigned to the negative condition reported the lowest mean score (N = 30, M = 1.59, SD = .54) compared to control (N = 30, M = 3.34, SD = .80) and positive condition (N = 30, M = 3.60, SD = .78) on positive mood, F (2, 87) = 69.71, p < .001. On the other hand, the participants on negative condition reported the highest score (N = 30, M = 3.93, SD = .61) compared to positive (N = 30, M = 1.62, SD = .64) or control (N = 30, M = 1.82, SD = .69) conditions on negative mood, F (2, 87) = 118.71, p < .001 (see Table 22).

Post hoc tests were performed with Bonferroni correction and the tests indicated that only negative condition differed significantly from the other condition, p < .001. However, positive and control conditions were not statistically significantly different from each other (see Table 23). That is why, positive and control conditions were combined and analyses were performed on these two mood conditions (negative and control). When combined, these findings confirmed that mood manipulations (negative and control) worked successfully.

Table 22. Mood Manipulation Checks on One Way ANOVA on Younger Adolescents in Study 2

		Sum of Squares	*df*	Mean Square	*F*	*p*
positiveDD	Between Groups	71.63	2	35.81	69.71	< .001*
	Within Groups	44.70	87	.51		
	Total	116.32	89			
negativeDD	Between Groups	98.45	2	49.23	118.71	<.001*
	Within Groups	36.08	87	.42		
	Total	134.53	89			

Note. positiveDD: positive duygudurum, negativeDD: negative duygudurum.
*$p < .001$

Table 23. Post-hoc Tests with Bonferroni Correction between Mood Conditions on Younger Adolescents in Study 2

			Bonferroni				
Dependent Variable	***(I) condition***	***(J) condition***	***Mean Difference (I-J)***	***SE***	***p***	**95% Confidence Interval**	
						Lower Bound	**Upper Bound**
positiveDD	positive	negative	2.01*	.19	<.001*	1.56	2.46
		control	.26	.19	.50	-.19	.71
	negative	control	-1.75*	.19	<.001*	-2.20	-1.30
negativeDD	positive	negative	-2.31*	.17	<.001*	-2.71	-1.90
		control	-.20	.17	.76	-.60	.21
	negative	control	2.12*	.17	<.001*	1.71	2.52

*. The mean difference is significant at the 0.05 level.
Note. positiveDD: Positive Mood, negativeDD: Negative Mood

Descriptive statistics

The descriptive statistics were presented about younger adolescents. The results were revealed that Negative – No Distance, Negative – Near Distance, Negative – Distant Future, ERQ-CA Reappraisal and ERQ-CA Suppression mean scores were normally distributed ($p > .05$) (see Table 24). On the other hand, Control – No Distance, ACT and CFT mean scores were not normally distributed on younger adolescents ($p < .05$) (see Table 24). Skewness and kurtosis values were also given to indicate normal distribution. Skewness and kurtosis values were distributed between +2 and – 2. Therefore, it was decided the current values were normally distributed on younger adolescents (see Table 25).

Table 24. Distribution of Normality Results of the Scales on Younger Adolescents in Study 2

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	*df*	*p*	*Statistic*	*df*	*p*
Cont-NoDist	.16	90	.00	.94	90	< .001
Neg-NoDist	.08	90	.20	.98	90	.23*
Neg-Near	.08	90	.20	.98	90	.13*
Neg-Distant	.08	90	.20	.99	90	.40*
Reappraisal	.09	90	.06	.97	90	.08*
Suppression	.10	90	.04	.98	90	.26*
ACT	.09	90	.06	.95	90	.03
CFT	.17	90	.00	.97	90	< .001

Note. Cont-NoDist: Control- No Distance, Neg-NoDist: Negative – No Distance, Neg-Near: Negative - Near Future, Neg-Distant: Negative - Distant Future, Reappraisal: ERQ-CAreappraisal, Suppression: ERQ-CAsuppression.
*$p > .05$

Table 25. Descriptive Statistics of Younger Adolescents in Study 2

	N	*M*	*SD*	*Skewness*	*SE*	*Kurtosis*	*SE*
Cont-NoDist	90	5.27	.31	.68	.25	.23	.50
Neg-NoDist	90	2.24	.51	.38	.25	.08	.50
Neg-Near	90	2.89	.50	.34	.25	-.34	.50
Neg-Distant	90	3.66	.61	.15	.25	-.19	.50
Reappraisal	90	3.51	.67	-.17	.25	-.16	.50
Suppression	90	3.01	.78	.25	.25	-.32	.50
ACT	90	43.19	5.59	-.43	.25	.18	.50
CFT	90	6.21	2.16	.66	.25	.31	.50

Note. Cont-NoDist: Control- No Distance, Neg-NoDist: Negative – No Distance, Neg-Near: Negative - Near Future, Neg-Distant: Negative - Distant Future, Reappraisal: ERQ-CAreappraisal, Suppression: ERQ-CAsuppression, N: Number of participants, M: mean, SD: standard deviation, SE: standard error

4.2.3. RQ 6 on Older Adolescents: The Effects of Mood Manipulations (Negative and Control) on Perceived ER Strategies (Reappraisal, Suppression and Temporal Distance)

The sixth research question of this study is that "*Do mood manipulations (negative and control) (Cyberball) affect perceived ER strategies (Reappraisal, Suppression and Temporal distance measured with ERQ – CA and TDERT respectively)?"*

In order to examine RQ 6 on older adolescents, two different analyses were conducted. First, the effects of mood manipulations on perceived ER strategies (reappraisal and suppression) were tested with one way ANOVA analysis. The results revealed that mood

manipulations (negative and control) did not statistically significantly affect perceived ER strategies (reappraisal and suppression) (see Table 26).

Table 26. The Effects of Mood Manipulations on Perceived ER Strategies (Reappraisal and Suppression) on Older Adolescents in Study 2

		Sum of Squares	*df*	Mean Square	*F*	*p*
Reappraisal	BetweenGroups	.06	1	.056	.13	.72
	Within Groups	41.85	99	.42		
	Total	41.91	100			
Supression	BetweenGroups	.06	1	.06	.07	.79
	Within Groups	73.12	99	.74		
	Total	73.18	100			

*$p > .05$

The effects of mood manipulations on temporal distance ER strategy were tested with repeted measure ANOVA design. Mauchly's test of sphericity showed that the homogenity of varience test was achieved on each group, *Mauchy's W* = .90, X^2 (5) = 10.62, $p > .05$ (see Table 27). The results revealed that temporal distance ER strategy outcomes differed significanly from each other across mood conditions (negative and control) (see Table 28).

Table 27. Mauchly's Test of Sphericity on Temporal Distance ER Strategy in Study 2

Within Subjects Effect	*N*	Mauchly's W	Approx. Chi-Square	*Df*	*P*
Temporal Distance(4)	101	. 90	10.62	5	.06*

*$p > .05$

Table 28. Tests of Within-Subjects Effects of Mood Manipulations on Temporal Distance ER Strategy on Older Adolescents in Study 2

Source		Type III Sum of Squares	*df*	Mean Square	*F*	*p*	Partial Eta Squared
Distance	Sphericity Assumed	447.30	3	149.10	669.90	< .001*	.87
distance * condition	Sphericity Assumed	6.95	6	2.32	10.41	< .001*	.10

Note. Distance*: Temporal* Distance; condition: mood conditions (positive vs. negative), *$p > .05$

4.2.4. RQ 6 on Younger Adolescents: The Effects of Mood Manipulations (Negative and Control) on Perceived ER Strategies (Reappraisal, Suppression and Temporal Distance)

In order to measure RQ 6 on younger adolescents, two different analyses were conducted. First, the effects of mood manipulations on perceived ER strategies (reappraisal and suppression) were tested with one way ANOVA analysis. The results revealed that mood manipulations (negative and control) did not statistically significantly affect perceived ER strategies (reappraisal and suppression) ($p > .05$) (see Table 29).

Table 29. The Effects of Mood Manipulations on ER Strategies (Reappraisal and Suppression) on Younger Adolescents in Study 2

		Sum of Squares	*df*	*Mean Square*	*F*	*p*
Reappraisal	Between Groups	.15	1	.15	.32	.57
	Within Groups	40.20	88	.46		
	Total	40.35	89			
Supression	Between Groups	.64	1	.64	1.06	.31
	Within Groups	53.11	88	.60		
	Total	53.75	89			

*$p < .05$

Second, the effects of mood manipulations on temporal distance ER strategy were tested with repeted measure ANOVA design. Mauchly's test of sphericity was shown that homogenity of varience test was not achieved on TDERT on younger group, *Mauchy's W* = .621, X^2 (5) = 41.253, $p < .001$ (see Table 30). The results revealed that temporal distance ER strategy outcomes differed significanly from each other across mood conditions (negative and control), $p < .05$ (see Table 31).

Table 30. Mauchly's Test of Sphericity on Temporal Distance ER Strategy in Study 2

Within Subjects Effect	*N*	*Mauchly's W*	*Approx. Chi-Square*	*df*	*p*
Temporal Distance	90	.62	41.25	5	< .001*

Table 31. Tests of Within-Subjects Effects of Mood Manipulations on Temporal Distance ER Strategy in Study 2

Source		*Type III Sum of Squares*	*df*	*Mean Square*	*F*	*Sig.*	*Partial Eta Squared*
Distance	Sphericity Assumed	412.56	3	137.52	925.02	< .001*	.91
	Lower-bound	412.56	1.00	412.56	925.02	< .001*	.91
distance * condition	Sphericity Assumed	1.55	3	.52	3.47	.02*	.04

4.2.5. RQ 7 on Older Adolescents: The Effects of Mood Manipulations (Negative and Control) on EFs (WM and CF)

The seventh research question is that *"Do different mood manipulations (negative and control) affect EFs (working memory and cognitive flexibility)?"*

In order to measure RQ 7 on older adolescents, one way ANOVA was conducted. The results revealed that there were different results on two EFs (working memory and cognitive flexibility). The effects of mood manipulations were statistically significant on working memory, $p < .05$. The participants assigned to the negative mood condition had statistically significantly higher WM scores ($M = 54.55$, $SD = 5.55$) than the participants in control mood condition ($M = 51.60$, $SD = 5.13$), F (1, 99) = 7.37, $df = 100$, $p < .05$ (see Table 32). However, the effects of mood manipulations were not statistically significant on cognitive flexibility, $p > .05$ (see Table 32).

Table 32. The Effects of the Mood Manipulations on Working Memory and Cognitive Flexibility via One Way ANOVA Analyses on Older Adolescents in Study 2

		Sum of Squares	*df*	Mean Square	*F*	*p*
ACT	BetweenGroups	206.20	1	206.20	7.37	.01*
	Within Groups	2768.47	99	27.96		
	Total	2974.67	100			
CFT	BetweenGroups	4.59	1	4.59	.22	.64
	Within Groups	2090.63	99	21.12		
	Total	2095.23	100			

*$p < .05$

4.2.6. RQ 7 on Younger Adolescents: The Effects of Mood Manipulations (Negative and Control) on EFs (WM and CF)

In order to test RQ 7 on younger adolescents, one way ANOVA was conducted. The results revealed that the participants assigned to the control mood condition had higher working memory task scores (M = 44.43, SD = 5.05) than the participants in negative mood condition (M = 40.70, SD = 5.85) and the results were statistically significantly, F (1, 88) = 9.81, df = 89, $p < .05$ (see Table 33). The results also showed that the participants assigned to the control mood condition had higher cognitive flexibility task scores (M = 6.65, SD = 2.09) than participants in negative mood condition (M = 5.37, SD = 2.06) and the results were statistically significantly, F(1, 88) = 7.62, df = 89, $p < .05$ (see Table 33).

Table 33. The Effects of the Mood Manipulations on Working Memory and Cognitive Flexibility via One Way ANOVA Analyses on Younger Adolescents in Study 2

		Sum of Squares	*Df*	*Mean Square*	*F*	*p*
CFT	Between Groups	34.67	1	34.67	8.15	.01*
	Within Groups	374.32	88	4.25		
	Total	408.99	89			
ACT	Between Groups	278.76	1	278.76	9.81	<.01*
	Within Groups	2501.03	88	28.42		
	Total	2779.789	89			

*$p < .05$

4.2.7. RQ 8: The Mean Differences between Older and Younger Adolescents

The eighth research question of this study predicts that *"Do older adolescents show better performance on working memory (ACT), cognitive flexibility (CFT) and ER strategies (Temporal distance, Reappraisal and Suppression) (TDERT) (ERQ – CA) than younger adolescents?"*.

In order to measure RQ 8, independent sample t-test was conducted. The results revealed that older adolescents' TDERT negative-distant future subscale results (M = 3.95, SD = .77) were differed significantly from younger adolescents' TDERT negative-distant future subscale results (M =3.73, SD = .55), df = 190, $p < .05$ (see Table 34). Older adolescents' WM mean scores (M = 52.71, SD = 5.45) were higher than younger adolescents (M = 43.59, SD = 5.19), df = 190, $p < .001$. Older adolescents' CF mean scores (M = 9.49,

SD = 4.58) were also higher than younger adolescents (*M* = 6.22, *SD* = 2.16), *df = 190, p* < .001. The results also showed that there are no significant mean differences on TDERT control- no distance, negative - no distance, negative - near future, ERQ-CA perceived reappraisal and suppression between older and younger adolescents *p* = >.05 (see Table 34).

Table 34. Independent sample t-test between older and younger adolescents in Study 2

	Young_Old	*N*	*M*	*SD*	*SE*	*t*	*df*	*Sig(2-tailed)*
Cont-NoDist	Older	101	5.26	.34	.03	-.23	189	.82
	Younger	90	5.27	.31	.03	-24	188.87	
Neg-NoDist	Older	101	2.37	.63	.06	1.41	189	.16
	Younger	90	2.26	.51	.05	1.43	187.65	
Neg-NearFut	Older	101	3.04	.57	.06	1.53	189	.13
	Younger	90	2.92	.50	.05	1.54	188.97	
Neg-DistFut	Older	101	3.95	.77	.08	2.25	189	.03*
	Younger	90	3.73	.55	.06	2.29	180.90	
Reappraisal	Old	101	3.56	.65	.06	.56	189	.57
	Young	90	3.51	.67	.07	.56	184.56	
Suppression	Old	101	2.86	.86	.09	-1.23	189	.22
	Young	90	3.01	.78	.08	-1.24	188.93	
ACT	Old	101	52.71	5.45	.54	11.91	189	< .001*
	Young	90	43.19	5.59	.59	11.89	185.35	
CFT	Old	101	9.49	4.58	.46	6.18	189	< .001*
	Young	90	6.22	2.16	.23	6.41	145.82	

Note. Cont-NoDist: control- no distance, NegNoDist: negative - no distance, Neg-NearFut: negative - near future, NegDistFut: negative - distant future, N: number of participants, M: mean. SD: standart devision, SE: standard error.

*$p < .05$

4.2.8. RQ 9 on Older Adolescents: The Moderator Role of ACT

The nineth research question of this study investigates that *"Does working memory (ACT) have a moderator role* in *the relation between mood manipulations (negative and control) and ER strategies (reappraisal, suppression and temporal distance) (ERQ – CA)(TDERT)?*"

In order to examine RQ 9 in older adolescent group, three different moderation analyses were conducted. The moderation analyses were conducted on JAMOVİ statistical software. The results have shown that ACT does not have a moderator role on the relation

between mood manipulations (negative and control) and ER strategies (reappraisal, suppression and temporal distance) in older adolescent group.

The nonsignificant results were listed below:

1. The role of ACT between mood manipulations (negative vs. control) and perceived reappraisal in the older adolescent group, $p = .45$.
2. The role of ACT between mood manipulations (negative vs. control) and perceived suppression in the older adolescent group, $p = .23$.
3. The role of ACT between mood manipulations (negative vs. control) and temporal distance ER strategy (distant future condition) in the older adolescent group, $p = .80$.

4.2.9. RQ 9 on Younger Adolescents: The Moderator Role of ACT

In order to examine RQ 9 in younger adolescent group, three different moderation analyses were conducted. The results have shown that ACT does not have a moderator role on the relation between mood manipulations (negative and control) and ER strategies (reappraisal, suppression and temporal distance) in younger adolescent group.

The nonsignificant results were listed below:

1. The role of ACT between mood manipulations (negative vs. control) and perceived reappraisal in the younger adolescent group, $p = .47$.
2. The role of ACT between mood manipulations (negative vs. control) and perceived suppression in the younger adolescent group, $p = .37$.
3. The role of ACT between mood manipulations (negative vs. control) and temporal distance ER strategy (distant future condition) in the younger adolescent group, $p = .72$

4.2.10. RQ 10 on Older Adolescents: The Moderator Role of CFT

The tenth research question of this study investigates that "*Does cognitive flexibility (CFT) have a moderator role in the relation between mood manipulations (negative and*

control) and ER strategies (reappraisal, suppression and temporal distance) (ERQ – CA) (TDERT)?"

In order to examine RQ 10 on older adolescent group, three different moderation analyses were conducted. The results have shown that CFT does not have a moderator role on the relation between mood manipulations (negative and control) and ER strategies (reappraisal, suppression and temporal distance) in older adolescent group.

The nonsignificant results were listed below:

1. The role of CFT between mood manipulations (negative vs. control) and perceived reappraisal in the older adolescent group, $p = .26$.

2. The role of CFT between mood manipulations (negative vs. control) and perceived suppression in the older adolescent group, $p = .05$.

3. The role of CFT between mood manipulations (negative vs. control) and temporal distance ER strategy (distant future condition) in the older adolescent group, $p = .68$.

4.2.11. RQ 10 on Younger Adolescents: The Moderator Role of CFT

In order to examine RQ 10 on younger adolescent group, three different moderation analyses were conducted. The results have shown that CFT does not have a moderator role on the relation between mood manipulations (negative and control) and ER strategies (reappraisal, suppression and temporal distance) in younger adolescent group.

The nonsignificant results were listed below:

1. The role of CFT between mood manipulations (negative vs. control) and perceived reappraisal in the younger adolescent group, $p = .99$.
3. The role of CFT between mood manipulations (negative vs. control) and perceived suppression in the younger adolescent group, $p = 1.00$.
4. The role of CFT between mood manipulations (negative vs. control) and temporal distance ER strategy (distant future condition) in the younger adolescent group, $p = .99$.

4.3. Discussion for Study 2

The aim of Study 2 was to examine the effects of mood manipulations (negative and control) (Cyberball) on ER strategies (reappraisal, suppression and temporal distance) and executive functions [working memory (WM) and cognitive flexibility (CF)]. For this aim, five research questions were examined. In fact, In Study 2, Study 1 was replicated with different measurement tool. To manupulate mood, Cyberball Paradigm was used instead of DABS and a temporal distance ER strategy (TDERT) was actively included in the analyses.

First, the effects of mood manipulations were tested on ER strategies (reappraisal, suppression and temporal distance). The results showed that mood manipulations (negative and control) did not statistically significantly affect perceived ER strategies (reappraisal and suppression). On the other hand, it was revealed that temporal distance ER strategy (TDERT) outcomes differed significanly from each other across mood conditions (negative and control). In other words, being negative vs. control mood affects the using of temporal distance ER strategy. First, the reason for these results can be a manipulation tool. Cyberball is a paradigm of ostracism (Williams et al., 2000) and it was also used to manipulate mood in the literature (e.g. Raczy & Orzechowski, 2021). Hovever, the current study did not support these findings. In our study, positive and control conditions did not statistically significantly differ from each other in this study. Therefore, these two mood states are accepted as the control state. This does not mean the paradigm completely failed; rather, it can be interpreted as it did not perform as expected. Second, Cyberball Paradigm is not a method of precisely manipulating mood. This paradigm attempts to manipulate moods through exclusion and inclusion in the game. Furthermore, in this study, Cyberball did not elicit a positive mood as described in the literature (e.g. Raczy & Orzechowski, 2021). If a different mood induction method had been used in the study (e.g. autobiographical recall), the results could have been changed.

Second, the effects of mood manipulations were investigated on EFs (WM and CF). The results revealed that older and younger adolescents showed different results in the same mood state. Accordingly, the participants assigned to the negative mood had higher WM scores than the participants in control mood in older group and mood manipulations did not affect CF scores significantly in older group. However, in younger group, the participants assigned to the negative mood condition had lower WM and CF scores than the participants in control condition. In other words, being in a negative mood impaired EFs in the younger

group, while it enhanced EFs (specifically WM) in older group. First, these inconsistant results bring to mind that mood manipulation (Cyberball Paradigm) may not have performed as well as intended. In a study, Raczy and Orzechowski (2021) found that Cyberball Paradigm elicited mood states (positive, negative and control). As mentioned before, this does not mean the paradigm completely failed; rather, it can be interpreted as it did not perform as expected. Another reason of the inconsistent results may be that the concept of hot and cool EFs was overlooked when selecting the ACT and CFT measurement tools. Indeed, recent studies have emphasized the use of hot EFs in the emotion-related studies (Martins et al., 2018). Martins and collegues (2018) pointed out that although there is a strong correlation between hot and cool CF, only hot CF was associated with ER.

Third, age- related differences (younger vs. older adolescents) in EFs (WM and CF) and the use of ER strategies (temporal distance, reappraisal and suppression) were investigated. The results showed that older adolescents' temporal distance ER scores were higher than younger adolescents' scores. In other words, older adolescents were more successful than younger adolescents in the strategy of distancing themselves from the emotional situation. Older adolescents have also shown better results on WM and CF tasks than younger adolescents. Current results are also consistent with previous literature (e.g. Lantrip et al., 2015). Perceived reappraisal and suppression strategies scores were not differ significantly between older and younger adolescents.

Forth, the moderating role of WM was examined on the relationship between the mood manipulation conditions (negative and control) and ER strategies (perceived reappraisal, perceived suppression and temporal distance) on older and younger adolescent groups respectively. The results showed that WM (ACT) does not have a moderating role on the relation between mood manipulation conditions (negative and control) and ER strategies (perceived reappraisal, perceived suppression and temporal distance). In more detail, WM does not have a moderating role on six relationship combination between negative mood and perceived suppression; negative mood and perceived reappraisal; negative mood and temporal distance; control mood and perceived suppression; control mood and perceived reappraisal; control mood and temporal distance on older and younger adolescent groups.

Fifth, the moderating role of CF was examined on the relationship between the mood manipulation conditions (negative and control) and perceived ER strategies (reappraisal and

suppression) on older and younger adolescent groups respectively. The results showed that, CF (CFT) does not have a moderating role on the relation between mood manipulation conditions (positive or negative) and perceived ER strategies (reappraisal or suppression). RQ 9 and RQ 10 were discussed in the General Discussion section along with RQ 4 and RQ 5.

5. GENERAL DISSCUSSION

The aim of this study was to investigate the effects of mood, age, EFs on ER strategies. For this aim, two different studies were conducted.

In Study 1, five RQs were tested to examine the link of mood (positive and negative) with perceived ER strategies (reappraisal and suppression) and executive functions [working memory (WM) and cognitive flexibility (CF)]. In Study 2, five RQs were also tested to examine the effects of mood manipulation (Cyberbal), age (older vs. younger adolescents) and EFs (WM and CF) on ER strategies (reappraisal, suppression and temporal distance) (ERQ-CA and TDERT respectively). To raise the reliability of the results, different scales and tasks were used to measure same subject. Mood was measured with a self-report scale (DABS) in Study 1 and manupulated with a task (Cyberball Paradigm) in Study 2. ER strategies were also measured with a scale (ERQ-CA) and a task (TDERT) simultaneously.

First, the links between mood and ER strategies were tested via self-report scale (DABS) in Study 1 and a paradigm (Cyberball Paradigm) in Study 2. The results obtained from Study 1 have shown that current positive mood positively related to perceived reappraisal and negatively related to perceived suppression. However, mood manipulations (negative and control) did not statistically significantly affect perceived ER strategies (reappraisal and suppression) in Study 2. In other words, the results obtained from Study 2 did not support Study 1 based on perceived reappraisal and perceived suppression strategies (ERQ-CA). It can be because of the manipulation task (Cyberball). Cyberball paradigm was performed in this study to manupulate mood. As previously mentioned, Cyberball paradigm may not have manipulated mood as intended. These inconsistent results can be explained by differences in the measuring instruments used. To handle these obstacles, multimethod approach has been suggested (Alpay, 2023). The approach discussed has been attempted to be applied in this thesis. Cyberball Paradigm is also not a real mood induction method. This paradigm attempts to manipulate mood through exclusion and inclusion in the game. The results of the study might be different if a different mood induction method had been used (e.g. autobiographical recall).

Study 2 also tested the effects of Cyberball Paradigm (negative vs. control) on a novel ER strategy called the temporal distance ER strategy (TDERT) and significant results were found across mood conditions (negative vs. control). This means that being negative vs.

control mood affects the using of temporal distance ER strategy. When Cyberball Paradigm had no effect on ERQ-CA, it did have an effect on TDERT. These two inconsistent results in Study 2 also showed the importance of multimethod approaches. Accordingly, it was yielded different results from different ER strategies and measurement tools (ERQ-CA and TDERT) using the same mood manipulation in the same sample group.

Previous studies have found that using reappraisal strategy enhances positive mood and reduces negative mood (Masumoto et al., 2016; Reijntjes et al., 2006). Reappraisal strategy also emphasizes thinking from a broader perspective. Fredrickson's (2000) "*Broaden and Built Theory"* has argued that positive mood expands thought repertories and improve creative thinking (Hirt et al., 2008). Opposite of this, negative mood constricts the focus of attention (Fredrickson & Branigan, 2005). This broader perspective allows the individual to rethink and reappraise the negative situation. As a result, the thesis findings regarding the first research question partially supported the previous literature.

Second, in Study 1, the links between mood and EFs (WM and CF) were tested and then in Study 2, the effects of mood manipulations on EFs (WM and CF). In Study 1, positive mood was positively related to EFs (WM and CF), while negative mood was seen to be negatively related to EFs (WM and CF) in total adolescent sample. In Study 2, being in a negative mood impaired EFs in the younger group, while it enhanced EFs (specifically WM) in older group. As disscussed in the part of Study 2 Discussion, one of the reason for the inconsistent results may be that the concept of hot and cool EFs was overlooked when selecting the ACT and CFT measurement tools. Indeed, recent studies have emphasized the use of hot EFs in the emotion-related studies (Martins et al., 2018). Martins and collegues (2018) pointed out that although there is a strong correlation between hot and cool CF, only hot CF was associated with ER.

Third, older adolescents were better use the distancing strategy themselves from the emotional situation than younger adolescents in both Study 1 and Study 2. Older adolescents have also shown better results on WM and CF tasks than younger adolescents in both Study 1 and Study 2. Current results are also consistent with previous literature (e.g. Diamond, 2013; Satterthwaite et al., 2013). On the other hand, perceived reappraisal strategy was not changed significantly during the age in the both two studies. Additionally, perceived suppression strategy decreased slightly in Study 1 and stayed similar in Study 2 during the age. Similar to the results obtained, there are also differences in the literature findings. Some

studies showed that perceived reappraisal ability developed with age (e.g. Silver et al., 2012). While, the other studies revealed that the use of perceived reappraisal ability stayed stable during adolescence (e.g. Shum et al., 2024). Individual differences in development could potentially explain these conflicting findings among adolescents. The prefrontal control region connected with successful ER is the last brain regions to fully develop in adolescence (Ochsner & Gross, 2008). The development of the prefrontal cortex in the brain continues until the mid-20s (Casey, 2015). Therefore, individual differences in development of adolescence may affect the results. In other words, due to environmental and genetic factors, individual differences may be observed in the development of ER skills. The ability to use ER strategies can vary depending on the cognitive development of adolescents.

Shum and colleagues (2024) also noted a link between perceived cognitive reappraisal and well-being and that perceived cognitive reappraisal should be actively encouraged in early years. Previous studies also found that individuals are more likely to use perceived reappraisal rather than perceived suppression with age, and that using perceived reappraisal enhances positive mood and reduces negative mood (Masumoto et al., 2016). The use of temporal distance strategy also increased with age. Older adolescents had higher TDERT scores than younger adolescents. Adopting temporal distance strategy also reduced the degree of distress relative to other conditions. Distant future strategy was produced the least distress. This finding is consistent with the validity and reliability study of TDERT (Suksasilp et al., 2021), compared to younger adolescents, older adolescents reported projecting further into the future and were more effective at relieving their discomfort. Previous current literature also found out that temporal distancing is crucial for emotional resilience in the negative events and promotes positive affect and longer-term well-being (Ahmed et al., 2018; Bruehlman-Senecal and Ayduk, 2015; Bruehlman-Senecal et al., 2016; Suksasilp et al., 2021).

Forth, there is a significant consensus in the literature that EFs are the underlying mechanism of ER process (Salehinejad et al., 2021; Toh et al., 2024). Furthermore, the potential relationship between mood and ER strategies suggests that EFs, as individual differences, may play a moderating role in this relationship. For this reason, the moderator roles of WM and CF were investigated on this relationship. The moderating role of WM was examined on the relationship between the moods (positive and negative) and perceived ER strategies (reappraisal and suppression) on older and younger adolescent groups respectively in Study 1. In Study 2, the moderating role of WM was examined on the relationship between

the mood manipulation conditions (negative and control) and perceived ER strategies (reappraisal and suppression) on older and younger adolescent groups respectively. RQ 9 in Study 2 replicated RQ 4 in Study 1 with different mood measurement tool. The results are the same. WM (ACT) does not have a moderator role on the relation between mood and perceived ER strategies.

Fifth, In Study 1, the moderating role of CF was examined on the relationship between the mood (positive and negative) and perceived ER strategies (reappraisal and suppression) on older and younger adolescents respectively. In Study 2 the moderating role of CF was examined on the relationship between the mood manipulation conditions (negative and control) and perceived ER strategies (reappraisal, suppression and temporal distance) on older and younger adolescent groups respectively. For the RQ 5, there were some differences on moderating role of CF in Study 1 and Study 2. In Study 1, there were two significant moderating role of CF on the relation between positive mood and perceived reappraisal strategy in older group and also negative mood and perceived suppression strategy in younger group. These results are valuable, because, the inclusion of CF as a moderator in the process created a positive effect in both relationship. In Study 2, CF (CFT) did not have a moderating role on the relation between mood and ER strategies. Our findings were not consistent with recent literature findings. Further, a recent study has emphasized the moderating role of EFs in explaining the relationship between ER strategies (particularly reappraisal) and life satisfaction (Toh & Yang, 2022). In this study, Toh and Yang (2022) revealed that common EFs have a significant moderating role in this relationship. In more detail, while the moderating effects of WM and inhibitory control were noticeable, CF did not moderate in this relationship (Toh & Yang, 2022). These inconsistent results can be explained by the task selection used in EFs. Indeed, cool EFs' measurement tools can be a reason for inconsistent results. At this point, the focus has shifted to these EFs' tasks due to the scarcity of standardized measurement tools that measure the hot dimension of EFs. Therefore, there is a need for standardized measurement tools to measure hot EFs.

As a result, these two studies have shown that mood has an effect on perceived and manipulated ER strategies and EFs. Furthermore, the significant differences were found between younger and older adolescents in terms of mood, ER strategies and EFs, and these differences showed a positive improvement with age. These findings are consistent with previous literature. This study is, to our knowledge, the first to examine the relationship between mood and ER strategies in adolescents, categorized by age groups, a topic not

previously studied in the literature. Furthermore, the significant results obtained make a substantial contribution to the literature.

Furthermore, it was reached two significant moderating role of CF in younger and older adolescent group in this thesis. In both significant moderator analysis findings, CF was found to positively influence the relationship between mood and perceived ER strategies. In this respect, these two significant results are another original contribution to the literature.

6. CONCLUSION AND SUGGESSION

Within the scope of this thesis, the effects of mood on EFs (working memory and cognitive flexibility) and ER strategies (reappraisal, suppression and temporal distance) were tested in both older and younger adolescent groups. The effects of age during adolescence were also tested in relation to mood, EFs and ER strategies. The moderator role of EFs on relationship between mood and ER strategies were also tested. For this aim, two different studies were conducted.

1. In the thesis, both mood and ER strategies were measured via self-scale and manipulation. This multimethod approach or methodical triangulation aimed to increase the validity and reliability of the results by testing the same topic on different samples with the same characteristics.
2. As far as is known, the research on the relationship between mood and ER strategies is limited and there is no research on how mood affects ER strategies (reappraisal, suppression and temporal distance). In Study 1, current positive mood (DABS) correlated with perceived reappraisal and suppression (ERQ-CA) in both older and younger adolescents. In Study 2, mood manipulations (negative vs. control) (Cyberball) affected temporal distance ER strategy (TDERT) in both older and younger adolescents. Therefore, both self-scale mood measurement and mood manipulation predicted and affected ER strategies. Consequently, the findings obtained with this thesis have attempted to contribute to the literature. Future studies may test this relationship using different mood manipulations and ER strategies.
3. Our findings show that positive mood has a significant positive impact on the use of ER strategies and EFs. Thus, educators should consider the potential impact of adolescents' current positive moods on their use of ER strategies and EFs when preparing course content and practices. In addition, organizing various ER seminars or trainings in schools to may be beneficial in terms of increasing emotional awareness.
4. In this dissertation, a new temporal distance ER task (TDERT) was used in addition to the widely used ER scale (ERQ-CA). This is valuable for measuring

the aspect of ER using both state and trait assessment. Future studies may use different ER manipulations that are similar to daily life use.

5. In terms of the relation between mood and EFs, positive mood was positively related to EFs (WM and CF), while negative mood was seen to be negatively related to EFs (WM and CF) in total adolescent sample (Study 1). Furthermore, it was found that negative mood negatively affected WM and CF scores compared to the control group in younger adolescents, while negative mood positively affected EFs scores (specifically WM) in older adolescents (Study 2). The reason for the inconsistent results may be that the concept of hot and cool EFs was overlooked when selecting the ACT and CFT measurement tools (in Study 2). In future studies, in emotion-focused studies, hot WM and CF tasks may be preferred when selecting tools to measure EFs. Future studies could be also conducted with different components of EFs (e.g., inhibition). Furthermore, previous literature frequently emphasizes the limited number of measurement tools that can be used to measure hot EFs. Therefore, there is a need to develop new emotion-focused measurement tools in future studies.
6. The older adolescent participants consisted of university students. In Study 1, the number of female participants was higher than male participants because there were more female students in the departments studied. Therefore, gender balance was taken into account in Study 2. Future studies should also paid attention gender balance.
7. CF played a moderating role in both the relationship between positive mood and perceived reappraisal strategy in older group, and the relationship between negative mood and perceived suppression strategy in younger group (Study 1). Further research should be conducted into the mediating and regulatory role of EFs in future studies.

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8. APPENDICES

APPENDIX 1. INFORMED CONSENT FORM

Bilgilendirilmiş Onam Formu

Değerli Katılımcı,

Bu çalışma Ankara Yıldırım Beyazıt Üniversitesi Genel Psikoloji doktora tezi kapsamında Prof. Dr. Cem Şafak ÇUKUR ve Dr. Öğretim Üyesi Funda SALMAN danışmanlığında Araştırma Görevlisi Pınar SOYDAŞ tarafından yürütülmektedir. Çalışmanın amacı Duygu Durum, Yaş ve Yönetici İşlevler' in Duygu Düzenleme üzerindeki etkisini araştırmaktır. Size yöneltilen sorular üzerine düşünerek açık ve dürüst bir şekilde yanıtlamanız çok önemlidir. Soruları cevaplarken her bir maddeyi dikkatle okumanız ve hiç bir soruyu boş bırakmamanız önem arz etmektedir. Sizden herhangi bir kimlik bilgisi istenmeyecek ve cevaplamanız tamamen gizli tutulacaktır. Çalışmanın başında size verilen katılımcı numaranızı ilgili yere yazmanız önemlidir. Çalışmamızın tamamlanması toplam ortalama 40 dakika sürmektedir.

Araştırmaya katılım tamamen gönüllülük esasına dayanmaktadır. Çalışmaya katılmama veya katıldıktan sonra herhangi bir anda çalışmadan çıkma hakkına sahipsiniz.

Bu formlardan elde edilecek bilgiler toplu olarak analiz edilecek ve bilimsel amaçlı kullanılacaktır. Araştırma ile ilgili herhangi bir konuda e-mail yoluyla (…@ahievran.edu.tr) bilgi alabilirsiniz. Değerli katkılarınız için teşekkür ederiz.

APPENDIX 2. PARENTAL CONSENT LETTER

Sayın Veli;

Çocuğunuzun katılacağı bu çalışma, "Duygu Durum, Yaş ve Yönetici Fonksiyonların (Bilişsel Esneklik ve Çalışma Belleği) Duygu Düzenleme üzerindeki etkileri" adıyla, Şubat 2024- Kasım 2024 tarihleri arasında yapılacak bir araştırma uygulamasıdır.

Araştırma Uygulaması: Anket şeklindedir.

Araştırma T.C. Milli Eğitim Bakanlığı'nın ve okul yönetiminin de izni ile gerçekleşmektedir. Araştırma uygulamasına katılım tamamıyla gönüllülük esasına dayalı olmaktadır. Çocuğunuz çalışmaya katılıp katılmamakta özgürdür. Araştırma çocuğunuz için herhangi bir istenmeyen etki ya da risk taşımamaktadır. Çocuğunuzun katılımı **tamamen sizin isteğinize bağlıdır**, reddedebilir ya da herhangi bir aşamasında ayrılabilirsiniz. Araştırmaya katılmamama veya araştırmadan ayrılma durumunda öğrencilerin akademik başarıları, okul ve öğretmenleriyle olan ilişkileri etkilemeyecektir.

Çalışmada öğrencilerden kimlik belirleyici hiçbir bilgi istenmemektedir. Cevaplar tamamıyla gizli tutulacak ve sadece araştırmacılar tarafından değerlendirilecektir.

Uygulamalar, genel olarak kişisel rahatsızlık verecek sorular ve durumlar içermemektedir. Ancak, katılım sırasında sorulardan ya da herhangi başka bir nedenden çocuğunuz kendisini rahatsız hissederse cevaplama işini yarıda bırakıp çıkmakta özgürdür. Bu durumda rahatsızlığın giderilmesi için gereken yardım sağlanacaktır. Çocuğunuz çalışmaya katıldıktan sonra istediği an vazgeçebilir. Böyle bir durumda veri toplama aracını uygulayan kişiye, çalışmayı tamamlamayacağını söylemesi yeterli olacaktır. Anket çalışmasına katılmamak ya da katıldıktan sonra vazgeçmek çocuğunuza hiçbir sorumluluk getirmeyecektir.

Onay vermeden önce sormak istediğiniz herhangi bir konu varsa sormaktan çekinmeyiniz. Çalışma bittikten sonra bizlere e-posta ile ulaşarak soru sorabilir, sonuçlar hakkında bilgi isteyebilirsiniz. Saygılarımızla,

Araştırmacı :Araş. Gör. Pınar SOYDAŞ

İletişim bilgileri :Ankara Yıldırım Beyazıt Üniversitesi/Psikoloji Bölümü/ ....@aybu.edu.tr

Velisi bulunduğum ..... sınıfı ..... numaralı öğrencisi .....'in yukarıda açıklanan araştırmaya katılmasına izin veriyorum.
(Lütfen formu imzaladıktan sonra çocuğunuzla okula geri gönderiniz*).

Tarih: ../...../.....

Veli Adı-Soyadı- İmza :

Telefon Numarası:

APPENDIX 3. DERAGOTIS AFFECT BALANCE SCALE

Adı Soyadı: Doğum Tarihi (Gün/Ay/Yıl):
Katılımcı no: Cinsiyeti: Okul ve Sınıfı:

Deragotis Duygulanım Denge Ölçeği (DABS)

Aşağıda insanların bazen nasıl hissettiklerini tanımlayan kelimelerin bir listesi bulunmaktadır. **Bugün de dâhil olmak üzere geçtiğimiz birkaç hafta içinde bu duygulardan herhangi birini yaşayıp yaşamadığınızı düşününüz.** Lütfen her maddenin karşısına deneyiminizi en iyi tanımlayan rakamı yazınız. Cevabınız için aşağıdaki ölçeği kullanınız:

0	1	2	3	4
Asla	Nadiren	Bazen	Sık sık	Daima

_____ 1. Sinirli
_____ 2. Uzgün
_____ 3.Pişman
_____4.
_____5.
_____6.
_____7.
_____8.
_____9.
_____10
_____11
_____12
_____13.
_____14.
_____15.
_____16.
_____17.
_____18.
_____19. Utanmış
_____20. Öfkeli
____21. Neşeli
____22. Tatmin olmuş
____23.
____24.
____25.
____26.
____27.
____28.
____29.
____30.
____31.
____32.
____33.
____34.
____35.
____36.
____37.
____38. Halinden memnun
____39. Hayat dolu
____40. Sıcak kanlı

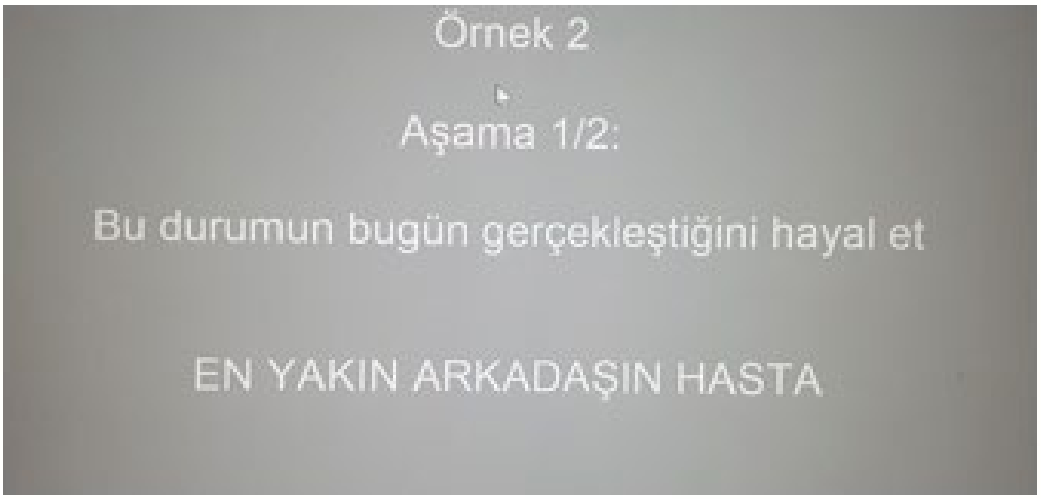
APPENDIX 4. EMOTION REGULATION QUESTIONNAIRE FOR CHILD AND ADOLESCENT (ERQ-CA)

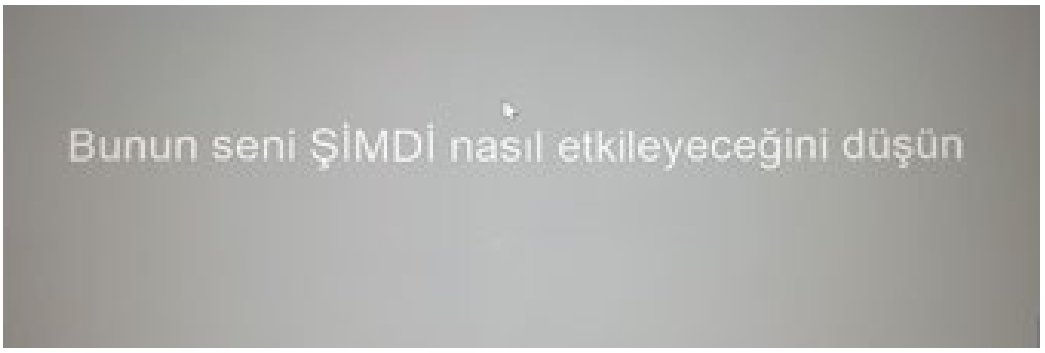
ÇEDDO

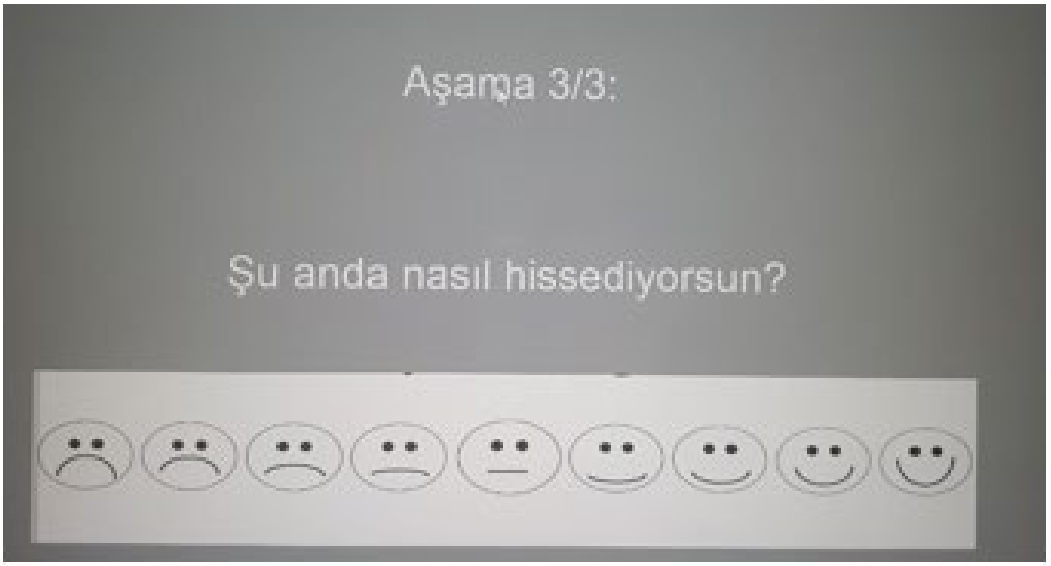
Aşağıda numaralandırılmış ifadeler yer almaktadır. Lütfen her bir ifadeyi okuyun ve sonra **size en doğru görünen seçeneğin altına çarpı (X) işareti koyun.** Bazı ifadeler aynı görünebilir, fakat önemli noktalarda birbirlerinden farklıdırlar, bu sebeple dikkatlice okuduğunuzdan emin olun.

	Kesinlikle Katılmıyorum	Katılmıyorum	Yarı Yarıya	Katılıyorum	Kesinlikle Katılıyorum
1. Daha mutlu hissetmek istediğimde farklı şeyler düşünürüm.					
2. Duygularımı kendime saklarım.					
3 k					
4 e					
5 y					
6					
7 k					
8 d					
9 e					
10. Bir konuda daha az kötü hissetmek istediğimde (örneğin; üzgün, kızgın ya da endişeliyken), konuyla ilgili düşünme şeklimi değiştiririm.					

APPENDIX 5. TEMPORAL DISTANCE EMOTION REGULATION SCALE







APPENDIX 6. THE AUDITORY CONSONANT TRIGRAM

İŞİTSEL ÜÇLÜ SESSİZ HARF SIRALAMASI TESTİ

Katılımcı No:

Tarih:

Bilişsel Görev no:

	Uyarıcı	Baş. Sayısı	Gecikme	Yanıt	Doğru Sayısı
1.	RLS	-	0		
2.	PZB	-	0		
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.	PHK	89	9		
19.	ZDG	158	18		
20.	CZF	91	3		

	Doğru Harf Sayısı	Toplam Doğru Hatırlanan Harf Sayısı
0 sn gecikme		
3 sn gecikme		
9 sn gecikme		
18 sn gecikme		

APPENDIX 7. COGNITIVE FLEXILITY TASK TABLE OF WORDS

CFT CÜMLELER

Katılımcı no:

Bilişsel Görev no:

APPENDIX E. COGNITIVE FLEXIBILITY TASK TABLE OF WORDS

Sevinç	Gömlek	Tren	Gururlu	Etek
Yatak	İnek	Bilgisayar	Ceket	Bisiklet
Sandalye	Dolap	Heyecan	Sınıf	Mutsuz
Tablet	Kanepe	Öğretmen	Hüzün	Kazak

APPENDIX 8. ETHICAL COMMITTEE APPROVAL

ANKARA YILDIRIM BEYAZIT ÜNİVERSİTESİ (AYBÜ)
SOSYAL VE BEŞERİ BİLİMLER ETİK KURULU
PROJE ONAY BELGESİ

Ankara Yıldırım Beyazıt Üniversitesi İnsan ve toplum Bilimleri Fakültesi Psikoloji bölümü akademisyenlerinden ve öğrencilerinden Pınar SOYDAŞ'in, "The effect of Mood,Age and Executive Functions (Cognitive Flexibility and Working Memory) on Emotion Regulation" adlı araştırması değerlendirilmiştir.*(Bu kısım başvuru sahibi tarafından doldurulmalıdır)*

Proje etik açısından uygun bulunmuştur. [X]
Proje etik açısından geliştirilmesi gerekmektedir. [ ]
Proje etik açısından uygun bulunmamıştır. [ ]

AYBÜ SOSYAL VE BEŞERİ BİLİMLER ETİK KURULU KARARI (Etik Kurul tarafından doldurulacaktır)	
Araştırma kodu (Yıl – Araştırma sıra no)	2023 - 61
Başvuru formunun Etik Kurula ulaştığı tarih	10. 03. 2023
Etik Kurul Karar toplantı tarihi ve karar no	15.03.2023 / 03 - 61
Yer	Ankara Yıldırım Beyazıt Üniversitesi, Esenboğa Külliyesi
Katılımcılar	Formda imzası bulunan üyelerimiz toplantıya katılmıştır.

KURUL BAŞKANI VE ÜYELER:

		İmza
Prof. Dr. Hakkı ODABAŞ	Başkan	[ ]
Prof. Dr. Musa ÖZTÜRK	Üye	[ ]
Doç. Dr. Ömer ASLAN	Üye	[ ]
Doç. Dr. Özge GÖKBULUT ÖZDEMİR	Üye	[ ]
Doç. Dr. Ali POLAT	Üye	[ ]
Dr. Öğr. Üyesi Nur Betül ATAKUL	Üye	[ ]
Dr. Öğr. Üyesi Recep YORULMAZ	Üye	[ ]
Dr. Öğr. Üyesi Semih CEYHAN	Üye	[ ]
Dr. Öğr. Üyesi Keziban Büşra KAYNAK EKİCİ	Üye	[ ]
Dr. Öğr. Üyesi Gülay YAZICI	Üye	[ ]
Öğr. Gör. Dr. İrem ŞENGÜL	Üye	[ ]

APPENDIX 9. MEB STUDY APPROVAL

T.C.
ANKARA VALİLİĞİ
Milli Eğitim Müdürlüğü

Sayı : E-14588481-605.99-88494283 31.10.2023
Konu : Araştırma İzni

ANKARA YILDIRIM BEYAZIT ÜNİVERSİTESİ REKTÖRLÜĞÜNE
(Sosyal Bilimler Enstitüsü Müdürlüğü)

İlgi: a) MEB Yenilik ve Eğitim Teknolojileri Genel Müdürlüğünün 2020/2 sayılı Genelgesi.
b) 18.10.2023 tarihli ve 227590 sayılı yazınız.

Enstitünüz Psikoloji Anabilim Dalı Doktora Programı öğrencisi Pınar SOYDAŞ'ın "Duygu durum, Yaş ve Yönetici Fonksiyonların Duygu Düzenleme Üzerindeki Etkisi" konulu çalışması kapsamında İlimiz Pursaklar ilçesine bağlı ortaokullarda uygulama talebi ilgi (a) Genelge çerçevesinde komisyonumuzca incelenmiştir.

Yapılan inceleme sonucunda, söz konusu araştırmanın Müdürlüğümüzde muhafaza edilen ölçme araçlarının; Türkiye Cumhuriyeti Anayasası, Milli Eğitim Temel Kanunu ile Türk Milli Eğitiminin genel amaçlarına uygun olarak, ilgili yasal düzenlemelerde belirtilen ilke, esas ve amaçlara aykırılık teşkil etmeyecek, eğitim-öğretim faaliyetlerini aksatmayacak şekilde okul ve kurum yöneticilerinin sorumluluğunda, gönüllülük esasına göre uygulanması Müdürlüğümüzce uygun görülmüş olup çalışma tamamlandıktan sonra çalışmanın bir nüshasının **30 iş günü içerisinde arge06_arastirma@meb.gov.tr adresine PDF olarak gönderilmesi** gerekmektedir.

Bilgilerinizi ve gereğini rica ederim.

Yaşar KOÇAK
Vali a.
Milli Eğitim Müdürü

Ek:
Uygulama Araçları

Dağıtım:
Gereği:
Ankara Yıldırım Beyazıt Üniversitesi

Bilgi:
Pursaklar İlçe MEM

E-14588481-605.99-88494283 - 27182045 - 27182045

APPENDIX 10. CYBERBALL PARADIGM SCREENSHOT

