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**IMPLICATIONS AND PREDICTORS OF EMOTIONAL CONTROL DURING  
ADOLESCENCE: A DAILY DIARY STUDY**

A Thesis in

Human Development and Family Studies

by

Mackenzie Lane

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The thesis of Mackenzie Lane was reviewed and approved by the following:

Gregory M. Fosco  
Professor of Human Development and Family Studies  
Associate Director of the Edna Bennett Pierce Prevention Research Center  
Thesis Advisor

Lisa Gatzke-Kopp  
Professor of Human Development and Family Studies

Charles Geier  
Associate Professor of Human Development and Family Studies  
Professor-in-Charge, Graduate Program  
Co-Director, Center for Brain, Behavior, and Cognition (CBBC)

## ABSTRACT

Emotion regulation is a key factor in adolescents' psychosocial adjustment and well-being. One conceptualization of emotion regulation that remains under-examined is emotional control, a facet of one's subjective sense of emotion regulation. The current study provided a novel assessment of emotional control by examining emotional control level (mean) and lability (degree of fluctuation in emotional control from one day to the next). Daily diary data nested within a 1-year longitudinal study from 140 adolescents ( $M_{\text{age}} = 14.61$ , 62.1% female, 87.1% White) and their caregivers was used to assess two main aims: (1) implications of emotional control level and lability on depressive and anxiety symptoms, and (2) family-based predictors of emotional control level and lability. A series of multiple linear regression models were employed to examine whether emotional control level and lability were risk factors for increases in depressive and anxiety symptoms, accounting for adolescents' negative affect level and lability, over the course of one year, and whether family cohesion and caregiver emotion coaching were significant predictors of adolescent emotional control level and lability. Results suggested that emotional control level and lability were not directly associated with depression and anxiety outcomes; however, emotional control level moderated the relationship between emotional control lability and anxiety. For adolescents with high levels of emotional control, emotional control lability was a significant risk factor for increases in anxiety symptoms. In light of the second study aim, family cohesion was associated with better adolescent emotional control level and lability, whereas caregiver emotion coaching was not a significant predictor. These findings emphasize the important implications of bolstering stability in adolescents' emotional control for

adolescents experiencing symptoms of anxiety. One avenue this might be achieved is by promoting family cohesion in family-based intervention programming.

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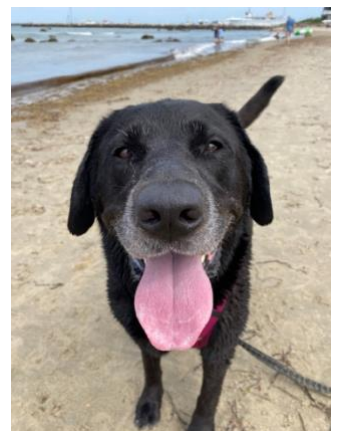
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## Chapter 1

### Introduction

#### Conceptualizing emotional control in adolescence

The ability to regulate emotions is a key factor in adolescents' psychosocial adjustment and well-being (Cole, 2014; Morrish et al., 2019; Zeman et al., 2006). Although definitions vary, emotion regulation generally refers to the ability to modulate the experience and expression of emotions to accomplish one's goals (Gross, 2015; Koval et al., 2023; Thompson, 1994). Adolescents with more adaptive emotion regulation skills tend to be higher in social competence, have greater success in school, and experience positive adjustment; alternatively, adolescents with poor emotion regulation skills tend to experience greater psychological distress and maladjustment, and are at risk for social problems, school dropout, and mental health problems such as depression and anxiety (Aldao et al., 2010; Zeman et al., 2006). Empirical research has largely emphasized infancy and early childhood as critical developmental periods for emotion regulation development, yet emotion regulation skills continue to develop and strengthen across the lifespan (Zimmermann & Thompson, 2014). Adolescence is an important developmental period for the study of emotion regulation given the rapidly occurring biological, cognitive, and social changes that create vulnerability to developing emotion regulatory processes (Allen & Sheeber, 2008). This period is inherently unstable as biological changes related to puberty are at play, emotions are more frequent and intense than in childhood and high interpersonal stress arises due to greater sensitivity to social interaction (Hollenstein & Lanteigne, 2018; Maciejewski et al., 2015; Young et al., 2019). Thus, the conceptualization of emotion regulation

in adolescence must appreciate that emotions and their regulation are in response to novel intrapersonal and contextual situations and demands (Lougheed & Hollenstein, 2012).

In this study, the term ‘emotional control’ is used to refer to one perspective of adolescents’ subjective sense of emotion regulation (Gratz & Roemer, 2003b; Gross & Muñoz, 1995). Historically emotion regulation has been conceptualized as a trait-like construct and measured using global self-report questionnaires assessing general tendencies to use certain emotion regulation strategies (Aldao et al., 2010). Despite the importance of strategy use and emotion regulation success, previous work has tended to assume: (1) there is little within-person variation in the extent to which various emotion regulation strategies are implemented, (2) there is little variation in an individual’s emotion regulation success, and (3) there is relatively little variation in the links between emotion regulation strategies and success, in that some strategies tend to evoke successful regulation while others do not, often referring to strategies as adaptive/maladaptive (De France & Hollenstein, 2022). Alternatively, the conceptualization of emotional control is in line with recent research on emotion regulation that focuses on one’s self-perception of emotion regulation success given that the strategies an individual implements within a specific situation and the perceived success, or lack thereof, that follows may be largely dependent on the individual and context (Blanke et al., 2020; Sheppes et al., 2014; Wylie et al., 2023). Still, a single dispositional value for emotional control may not capture the lived experience of adolescents who exist in contexts that are also undergoing considerable change across developmental and daily timescales (Brans et al., 2013; Naragon-Gainey et al., 2017; Teti & Fosco, 2021). The dynamic nature of adolescents’ developmental context may elicit day-to-day changes in adolescents’ experience of emotional control. Thus, in addition to capturing individual differences in *levels* of emotional control, I considered the degree to which

adolescents experience day-to-day fluctuations in emotional control, which is referred to as *emotional control lability*. To illustrate, two adolescents may have the same levels of emotional control (e.g., 5 out of 10), but one adolescent may report the same scores each day (low lability), while the other fluctuates from extremely high (e.g., 10 out of 10) to extremely low (e.g., 0 out of 10) scores across days (high lability). This example underscores how a single metric, reflecting levels of emotional control as a person-average, may provide an incomplete picture of adolescents' day-to-day experiences of emotional control. By assessing lability in emotional control, a more complete picture of the dynamic characteristics of adolescent emotional control is captured that would otherwise go unnoticed in traditional assessments (Fosco et al., 2019).

### **Implications of emotional control for adolescent internalizing psychopathology**

Depression and anxiety are among the most common mental health disorders during adolescence and the risk for symptoms manifesting for the first time rises dramatically during this developmental period (Rasing et al., 2017). Depression is characterized by deficits in positive affect and an excess of negative affect, especially sadness (Heller et al., 2019). These symptoms are coupled with the perception that negative events are unavoidable which elicits feelings of helplessness and hopelessness (Ehring et al., 2008; Zahn et al., 2015). Anxiety is characterized by frequent and intense negative emotional experiences - particularly around themes of threat such as fear and worry – as a result of being hypervigilant to emotional stimuli (Carthy et al., 2010; Mennin et al., 2007). Additionally, people with anxiety also feel substantial anticipatory distress and are overly concerned about future events as uncertainty about future negative situations diminishes how efficiently and effectively one can prepare which often

evokes avoidant behaviors and thoughts that can maintain anxious states (Grupe & Nitschke, 2013). Uniquely, anxiety has also been associated with more instability in negative affect than depression (Bosley et al., 2019; Heller et al., 2019). Depression and anxiety can have detrimental consequences for adolescents such as poor academic performance (Humensky et al., 2010), and increased risk for substance use (Cioffredi et al., 2021), suicidality (Balázs et al., 2013), and depression and anxiety later in life (Harrington, 1990; Pine et al., 1998). Thus, understanding risk factors that may be associated with depression and anxiety are critical to examine and target in preventive interventions as development of these disorders is a serious public health concern. Therefore, the current study provides a novel evaluation of emotional control level and lability as risk factors for adolescent internalizing psychopathology.

Adolescents vulnerable to internalizing psychopathology have lower perceptions of emotional control, resulting in prolonged and intensified negative emotional experiences due to their inability to reduce negative affect through effective emotion regulation strategies (Predatu et al., 2020; Schäfer et al., 2017; Silk et al., 2003). Thus, an inability to respond effectively to one's emotional experiences may constitute one pathway for increased risk of developing psychopathology as attempts to control emotional experiences may lead to increases in emotional arousal, leading to more attempts using ineffective emotion regulation strategies, ultimately contributing to heightened psychological distress (Barlow et al., 2016; Mennin et al., 2007). As a result, adolescents with low levels of emotional control perceive themselves as experiencing difficulties with emotion regulation across days, which serves to perpetuate the maintenance of negative affect and likely increases risk of depression and anxiety (Ehring et al., 2008; Schäfer et al., 2017). Alternatively, adolescents with high levels of emotional control generally perceive themselves as emotionally well-regulated and are less likely to experience symptoms of

depression and anxiety as they are able to effectively navigate daily emotional experiences.

However, the focus on emotional control levels historically overlooks the notion that youth may not feel the same degree of emotional control every day.

Guided by previous work on emotional lability (Silk et al., 2003), high emotional control lability is expected to be a risk factor for depression and anxiety. Adolescents who experience high emotional control lability may feel like their emotion regulatory processes are dictated by emotion-eliciting situations in their daily contexts given the instability from day to day. This might invoke feelings of helplessness and hopelessness as adolescents may believe negative emotional states are unavoidable and uncontrollable, ultimately increasing risk of depression (Zahn et al., 2015). Additionally, adolescents who experience high emotional control lability may feel worry and uncertainty about future negative emotion-eliciting situations which prevents how effectively one can prepare strategy use, often resulting in avoidant behaviors and thoughts that increase risk for anxiety (Grupe & Nitschke, 2013). Conversely, adolescents who experience low emotional control lability may feel emotionally stable and more assurance around their own ability to control their daily emotional experiences.

Alternatively, it may be that emotional control lability has different risk implications as a function of adolescents' levels of emotional control; thus, the interaction between emotional control level and lability might pose risk for depression and anxiety. For adolescents with high levels of emotional control, high emotional control lability may be associated with greater risk for depression and anxiety. Although high levels of emotional control generally reflect adolescents experience of feeling in control of their emotions on the surface, the deeper assessment of large day-to-day fluctuations in emotional control might indicate difficulties in

managing certain daily emotional experiences. These fluctuations may feel more intense for someone who is generally well-regulated which may elicit over-engagement in control mechanisms, leading to further negative affect and distress; contributing to increased risk for depression and anxiety. Alternatively, for adolescents with low levels of emotional control, more emotional control lability may not be associated with increased risk for depression and anxiety as greater lability suggests they are experiencing days of feeling more in control, evoking hope and confidence in their ability to navigate certain emotion-eliciting situations.

### **Differentiating emotional control from emotional experience in relation to adolescent internalizing psychopathology**

Although theories of internalizing psychopathology view adolescents' emotional control and emotional experience as highly related processes (Gross, 2015; Reitsema et al., 2022), a meaningful conceptual distinction between the two must be made to evaluate emotional control level and lability as distinct risk factors for depression and anxiety.

Emotional experiences refer to complex affective responses that permit evaluations of situations, differing in frequency, intensity, and valence by individuals and contexts (Cole et al., 2004; Frijda, 2009). Negative affect, or the subjective experience of negative emotional states such as anger, sadness, and anxiety, is most prominent in models of internalizing psychopathology (Naragon-Gainey et al., 2017; Paulus & Zvolensky, 2020). This is because persistent high levels of negative affect are core features of depression and anxiety (Hollenstein, 2015; Mennin et al., 2007). One mechanism through which experiencing frequent negative affect increases risk of developing depression and anxiety among adolescents may be explained by individual differences in the magnitude and duration of emotional experiences in response to



minor daily unpleasant situations. Adolescents who tend to experience more negative affect in unpleasant situations or perceive situations more negatively than others may experience a cumulative impact of heightened negative affect in response to unpleasant situations in daily life which poses increased risk for developing depression and anxiety (Kramer et al., 2014; Wichers et al., 2015). More recently, research has also focused on the dynamic aspects of affect, acknowledging that adolescents who show similar levels of negative affect can differ in how their negative emotions fluctuate from day-to-day (Larson & Lampman-Petratis, 1989; Reitsema et al., 2022). Negative affect lability is the degree to which negative affect fluctuates from day-to-day, capturing variability in affect as a function of time (Anestis et al., 2010; Beauchaine & Cicchetti, 2019; Bosley et al., 2019; Sobanski et al., 2010). Although, fluctuations in affect help individuals adequately respond to environmental changes and demands (Bos et al., 2019), there may be an optimal level of daily negative affect lability. Extremely low emotional lability may indicate rigidity to emotional states and extremely high emotional lability may indicate emotional instability (Wichers et al., 2015). Adolescents who experience extremely high negative affect lability may be more sensitive and have more volatile emotional responses to experiences and stressors in their daily contexts. As a result, negative emotions can be unpredictable and inconsistent further increasing risk for depression and anxiety as adolescents may feel uncertain about their future emotional states and perceive them as uncontrollable (Stringaris & Goodman, 2009).

Thus, it is evident from numerous studies that negative affect level and lability are especially relevant risk factors for depression and anxiety among adolescents; yet it is unclear whether emotional control level and lability serve as risk factors for depression and anxiety beyond adolescents' experience of negative affect level and lability. Adolescents' sense of

emotional control may be distinctly related to depression and anxiety through mechanisms associated with their ability to regulate their emotional experiences using emotion regulation strategies rather than through mechanisms related to experiencing higher or lower negative affect level and lability. If this is true, the current study will provide empirical evidence to the theoretical distinction between adolescents' emotional control and their emotional experience in relation to internalizing psychopathology. Therefore, the first aim of this study is to assess the role of emotional control level and lability as risk factors for adolescent internalizing psychopathology while accounting for negative affect level and lability to see if emotional control level and lability should be examined more closely in determining risk for depression and anxiety.

### **Family-based predictors of emotional control**

The second aim of this study is to evaluate whether global patterns of family relations predict adolescents' emotional control level and lability. This assessment informs which contexts meaningfully influence adolescents' emotional control and can be targeted in interventions as a way to promote better emotional control. The family environment is an important context to examine emotion socialization and development of emotion regulation in adolescence (Fosco et al., 2012; Herd et al., 2022; Morris et al., 2017). Family cohesion and caregiver emotion coaching are two family factors that have been identified as salient emotion socialization processes that may have implications for adolescents' emotional control level and lability.

*Family cohesion* refers to emotional bonds, warmth, and feelings of closeness, support, caring, and affection among family members (Olson et al., 2019). Although much of the early

work has been done with children (Eisenberg et al., 2005; Eisenberg & Fabes, 1994), families with high levels of cohesion create a positive and supportive emotional climate within the family that promote the development of adolescents' emotion regulation skills (Herd et al., 2020). Adolescents in highly cohesive families are more comfortable expressing and communicating their feelings, seeking guidance with challenging emotional experiences, and practicing emotion regulation strategies (Criss et al., 2016; Lucia & Breslau, 2006). As a result, adolescents in cohesive families may be more likely to experience higher levels of emotional control because they feel supported and safe in dealing with their daily experiences of emotions. Moreover, a highly cohesive family environment may be a context of consistency and less environmental volatility, amid the dynamic nature of adolescent contexts outside of the home (Herd et al., 2020; Morris et al., 2007). Thus, adolescents from highly cohesive families might be less likely to experience high lability in emotional control as they may use their family as a source of stability. In contrast, adolescents from less cohesive family environments may experience more frequent and unexpected negative emotions, be less comfortable communicating their emotions and feel less emotionally secure which may contribute to low emotional control levels and high emotional control lability (Eisenberg et al., 2005; Morris et al., 2007).

*Caregiver emotion coaching* refers to caregivers' awareness, responsiveness, and validation of emotions, and direct help with emotion identification and labeling (Gottman et al., 1996b, 1996a; Morris et al., 2007). This type of parenting practice, embedded in caregiver-adolescent interactions, involves the extent to which the caregiver views their child's negative emotions as an opportunity for intimacy, teaching, and problem-solving (Gottman et al., 1996b; Katz & Hunter, 2007). The theoretical and empirical work supporting caregiver emotion coaching has focused primarily on families with younger children; yet recent research has

recognized its importance in adolescence (Criss et al., 2016; Waslin et al., 2023). Adolescents need guidance in the form of emotional acceptance and direct communication about emotionally distressing situations (Katz & Hunter, 2007; Waslin et al., 2023). Caregivers who use emotion coaching strategies with their adolescents offer advice in the form of problem-solving, and convey confidence to their adolescents by validating and accepting their emotions, further promoting emotional autonomy and good emotion regulation skills (Katz et al., 2014; Klimes-Dougan & Zeman, 2007). Additionally, caregivers who use emotion coaching are more likely to model positive emotion regulation and management for their adolescent. Through communication and openness with their own emotional experiences, caregivers may effectively model strategies in how to deal with emotionally challenging situations (Katz & Hunter, 2007). Thus, adolescents whose caregivers use more emotion coaching may report high levels of emotional control and low lability as their caregivers promote autonomous emotion regulation skills through direct communication and emotional acceptance. Whereas adolescents whose caregivers use less emotion coaching may experience greater difficulties in regulating their emotions and a high degree of fluctuation in emotional control as they might be experiencing novel emotional situations with little guidance and confidence on how to effectively navigate them.

### **The current study**

The current study used daily diary data collected as part of a 1-year longitudinal study to assess whether emotional control level and lability were risk factors for depression and anxiety. Using these data, I evaluated whether emotional control level and lability - assessed using daily

diary methods - were associated with changes in depression and anxiety one year later in two ways: the first evaluated emotional control level and lability as distinct risk factors for depression and anxiety, and the second evaluated whether emotional control lability had different risk implications for different levels of emotional control by testing the interaction between the two. The second way was to evaluate whether emotional control level and lability needed to be considered in combination as risk factors for depression and anxiety. Negative affect level and lability were accounted for as covariates in these models to determine if emotional control dynamics were related to depression and anxiety above and beyond adolescents' experience of negative affect. Additionally, I evaluated whether global family factors correspond with between-person differences in emotional control level and lability. Five hypotheses were evaluated regarding the implications and predictors of adolescent emotional control:

- H1: Lower levels of emotional control and higher emotional control lability will be associated with increases in depressive symptoms at 1-year follow-up.
- H2: Lower levels of emotional control and higher levels of emotional control lability will be associated with increases in anxiety symptoms at 1-year follow-up.
- H3: Alternatively, there may be an interaction effect for emotional control level and lability. Specifically, for adolescents with high levels of emotional control, high emotional control lability will be associated with increases in depression and anxiety symptoms, whereas for adolescents with low levels of emotional control, high emotional control lability will not be associated with increases in depression and anxiety symptoms.
- H4: Higher levels of family cohesion and caregiver emotion coaching will be associated with higher levels of emotional control.

- H5: Higher levels of family cohesion and caregiver emotion coaching will be associated with lower emotional control lability.

## **Chapter 2**

### **Method**

#### **Participants**

This project was conducted using the sample that participated in the Family Life Optimizing Well-being (FLOW) study; the original sample was 150 two-caregiver families with adolescent children in Grades 9 or 10. However, ten families were excluded from the original sample due to missing data on daily emotional control. The current analytic sample included 140 two-caregiver families. The FLOW study was a daily diary study of families recruited through local high schools in central Pennsylvania. Data collection occurred between 2014 and 2017. Families were eligible for participation if they met six criteria: (a) two-caregiver family status, (b) adolescents lived in one household continuously, (c) internet access and means to complete daily surveys at home, (d) English fluency, (e) the participating adolescent was in 9th or 10th grade, and (f) one caregiver and adolescent agreed to participate (via consent, assent, respectively). Caregivers were between the ages of 30 and 61 ( $M_{\text{age}} = 43.35$ ,  $SD_{\text{age}} = 6.89$ ). Caregivers were predominantly female (95%) and identified as either the adolescents' mother (92.10%), stepmother (1.40%), aunt (0.70%), or foster mother (0.70%). An additional 5% of caregivers were fathers. Caregivers were either married or lived with their partner (95.70%). Most caregivers (97.10%) had at least a high school education or GED and had completed at least some college or specialized training (82.10%). Participating adolescents (62.10% female) were between the ages of 13 and 16 ( $M_{\text{age}} = 14.61$ ,  $SD_{\text{age}} = .83$ ) and identified as White (87.10%), (4.3%) African American/Black, (5.0%) Asian American, (.7%) Native

American/American Indian, and (2.8%) Other. Family income ranged from ‘Less than \$10,000,’ to ‘\$125,000 or more,’ (*median*= ‘\$70,000 - \$79,000’).

### **Procedure**

Families were recruited through emails sent to caregivers from school principals. Interested caregivers accessed a study webpage describing the purpose and design of the study then provided consent to participate and contact information. Research staff reviewed family eligibility, then sent adolescents a description of the study and an opportunity to assent or decline participation. Following consent/assent, caregivers and adolescents were each emailed their own baseline questionnaires. Upon receipt of both baseline questionnaires, person-specific links to daily questionnaires were sent separately to caregivers and adolescents each night at 7:00 p.m. for 21 consecutive days, followed by text message or phone call reminders, based on preference. Questionnaires were sent using Qualtrics Survey Software. Participants were instructed to complete the daily questionnaires before going to bed, although access links remained open until 9:00 a.m. the next morning. If participants completed questionnaires the following morning, they were instructed to report on the prior day. Daily questionnaires were identical each day and designed to be completed in approximately 5 min or less. Caregiver compliance on daily questionnaires was 96.80% ( $M_{\text{Days}} = 20.33$ ,  $SD_{\text{Days}} = 1.18$ , range = 14-21 days). Adolescents also exhibited high rates of compliance averaging 90.71% of questionnaires ( $M_{\text{Days}} = 19.05$ ,  $SD_{\text{Days}} = 2.42$ , range = 11-21 days).

Caregivers and adolescents were invited to complete baseline, daily diary, and 1-year follow up questionnaires as part of this study. Upon completion of baseline, 21 daily surveys,



and follow-up survey, all participants were compensated with a choice of gift cards (Amazon or Walmart). Each participant received \$25 after completing the baseline and \$35 after completing the follow-up survey. For the daily surveys, participants received \$2.50 for the first four surveys of each week and \$5.00 for the final three surveys of each week. Participants were able to earn up to \$135 for completing all baseline, daily diary, and follow-up surveys.

## Measures

### Baseline and 1-Year Follow-Up Global Assessments

Age, gender, and family income were collected at baseline and were included as covariates in the models. Adolescents reported on their *age* ( $M = 14.61$ ,  $SD = .83$ ) and *gender* (62.10% female). *Gender* was coded such that girls = 1 and boys = 0. Caregivers reported on their *family income* from a range of ‘Less than \$10,000,’ to ‘\$125,000 or more’.

Adolescents also reported on their perceptions of family cohesion, and caregivers reported on their use of emotion coaching in the baseline questionnaires. Adolescents reported on their depression and anxiety symptoms in the baseline and 1-year follow-up questionnaires. Adolescents’ reports of baseline depression and anxiety were included as covariates in the model’s predicting depression and anxiety at 1-year follow-up to assess change in psychopathology over the course of a year.

### ***Family Cohesion***

At baseline, adolescents reported on their perceptions of family cohesion by responding to the five-item short form of the Family Environment Scale (Bloom, 1985), which established good convergent validity with the original scale, and good reliability in the current sample ( $\alpha = .80$ ). Sample items, each rated using a 1 (*almost never*) to 5 (*almost always*) response scale include: “*Family members really helped and supported one another*” and “*There was a feeling of togetherness in our family.*” A global family cohesion score was calculated as the average of the five items ( $M = 4.24, SD = 0.63$ ), where higher scores indicate higher family cohesion.

### ***Caregiver Emotion Coaching***

Caregivers reported on their use of emotion coaching by responding to six items that assessed the previously established criteria for emotion coaching— awareness, acceptance, and coaching behaviors (Katz et al., 2012). Items were rated using a 1 (*not at all*) to 5 (*extremely*) response scale. Sample items include: “*I look for opportunities to help my child learn about his/her emotions*” and “*I am working with my child to be comfortable with his/her emotions.*” A global caregiver emotion coaching score was calculated as the average of the five items ( $\alpha = .87, M = 4.25, SD = 0.69$ ), where higher scores indicate higher caregiver emotion coaching.

### ***Depression***

Adolescents reported on their depression by completing the 10-item depression subscale of the Revised Child Anxiety and Depression Scale (Ebesutani et al., 2012) at baseline and 1-

year follow-up assessments. Adolescents rated how often they experienced symptoms such as, “*I have no energy for things,*” from 1 (*never*) to 4 (*always*). Higher values on this scale reflect higher levels of depressive symptoms. This measure has good reliability in the current sample ( $\alpha = .93$ ). Participants reported a mean score of 1.55 ( $SD = 0.59$ ) at baseline and 1.54 ( $SD = 0.63$ ) at 1-year follow-up.

### **Anxiety**

Adolescents reported on their anxiety by completing the 7-item Generalized Anxiety Disorder scale (Spitzer et al., 2006) at baseline and 1-year follow-up. Adolescents rated how often in the last 2 weeks they experienced symptoms such as, “*Feeling nervous, anxious, or on edge,*” from 1 (*not at all*) to 4 (*nearly every day*). Higher values on this scale reflect higher levels of anxiety symptoms. This measure has excellent reliability in the current sample (Cronbach’s  $\alpha = .94$ ). Participants reported a mean score of 1.64 ( $SD = 0.77$ ) at baseline and 1.58 ( $SD = 0.77$ ) at 1-year follow-up.

### **Daily Assessments**

Adolescents reported on their perceptions of emotional control and negative affect in the daily questionnaires. Adolescents’ daily reports of emotional control and negative affect were used to provide levels and lability of each. Negative affect level and lability were included as covariates in the model’s predicting depression and anxiety symptoms at 1-year follow-up to differentiate between adolescents’ emotional control and emotional experience.

### ***Emotional Control Level***

Adolescents reported on their emotional control each day by responding to one item, “*Did you feel in control of your emotions today?*”, rated on a 0 (*none of the time*) to 10 (*all of the time*) slider scale with precision of 0.1. This item was adapted from the Difficulties in Emotion Regulation Scale (Gratz & Roemer, 2003a) for a daily timescale. Emotional control levels were calculated in R by computing the intraindividual mean of daily reports of emotional control for each adolescent ( $M = 8.30$ ,  $SD = 1.85$ ). Higher values on this measure reflect higher levels emotional control.

### ***Emotional Control Lability***

Emotional control lability scores were calculated in R from the same one item measure of emotional control, “*Did you feel in control of your emotions today?*”, by computing mean squared successive difference (MSSD) scores for each adolescent. Each adolescent’s MSSD, or emotional control lability score, was calculated by computing the difference from one value (day report) to the next, squaring the difference, taking the sum of the squared differences and dividing by the number of non-missing elements. The MSSD score captures both variability and temporal dependency as it measures the extent of individual’s change from one day to the next across all days (Jahng et al., 2008). Participants reported a mean score of 5.17 ( $SD = 6.71$ ). Higher scores of emotional control lability reflect greater fluctuation of emotional control across days, while lower scores reflect smaller fluctuations of emotional control.

### *Negative Affect Level*

Adolescents reported on their negative affect each day by responding to 3, 2-item subscales corresponding with anger, depression, and anxiety. An overall score of daily negative affect was calculated using the average of the anger, depression, and anxiety subscales each day. Sample items included, “*How much of the time today did you feel ANGRY?*” and “*How much of the time today did you feel WORRIED?*”, rated on a 0 (*none of the time*) to 10 (*all of the time*) slider scale with precision of 0.1. This measure was adapted from the Profile of Mood States-Adolescents (Terry et al., 1999) for a daily timescale. Negative affect levels were calculated in R by computing the intraindividual mean of daily reports of negative affect for each adolescent ( $M = 1.40$ ,  $SD = 1.58$ ). Higher values on this measure reflect higher levels of negative affect.

### *Negative Affect Lability*

Negative affect lability scores were calculated in R from the same one item measure of negative affect by computing mean squared successive difference (MSSD) scores for each adolescent, as described above for emotional control lability. Negative affect lability reflects the degree to which, on average, each person’s level of negative affect differs from the level that preceded it across all days. Participants reported a mean score of 2.39 ( $SD = 3.43$ ). Higher scores of negative affect lability reflect greater fluctuation of negative affect across days, while lower scores reflect smaller fluctuations of negative affect.

## Data Analysis Plan

Preliminary analyses were conducted prior to hypothesis testing by calculating descriptive statistics and correlation analyses among study variables. Then, hypotheses were tested using a model-building approach that systematically added predictors to linear regression models in two sets of analyses. In this model-building approach, I first tested simple effects of the main predictors in each set of analyses, accounting for baseline levels of the dependent variable when appropriate; then added demographic covariates; then added interaction terms when appropriate; and finally, added negative affect level and lability as covariates in the first set of analyses. By using this approach, it was possible to identify the most parsimonious model, and reduce demands on statistical power. Regression models were estimated using R statistical software (R Core Team, 2021) using the `lm` function in the base R stats package and figures were generated using the `ggplot2` R package (Wickham, 2016). This analytic approach tested the predictive power of the main predictors in the models, examined interaction effects, and controlled for covariates. Independent variables were mean centered in all models by subtracting the mean from each individual observation. Results are presented as unstandardized regression coefficients.

The first set of analyses focused on evaluating emotional control level and lability as predictors of depression and anxiety. The model-building approach was conducted by first testing a model with the main predictors and baseline dependent variable (Model 1), then adding demographic covariates (Model 2), then adding interaction terms (Model 3), then adding negative affect level and lability including the interaction term if statistically significant (Model 4). Hypotheses 1 and 2 were evaluated by whether adolescent emotional control level and lability

were associated with depressive (H1) and anxiety (H2) symptoms at 1-year follow-up.

Hypothesis 3 was evaluated by whether the interaction term between emotional control level and lability was statistically significant in the models. The regression equation for these hypotheses in the final model (Model 4) was as follows, using depression to illustrate:

$$\text{Dep}_i = \beta_{0i} + \beta_{1i}\text{BaselineDep} + \beta_{2i}\text{ECLLevel} + \beta_{3i}\text{ECLAbility} + \beta_{4i}\text{ECLLevel}*\text{ECLAbility} + \\ \beta_{5i}\text{NALLevel} + \beta_{6i}\text{NALAbility} + \beta_{7i}\text{Age} + \beta_{8i}\text{Gender} + \beta_{9i}\text{Income} + e_i,$$

where  $\beta_{0i}$  indicates the mean adolescent depression in our sample;  $\beta_{1i}$  indicates the relation with depression for each one unit increase in baseline depression, holding all other predictors constant;  $\beta_{2i}$  indicates the relation with depression for each one unit increase in emotional control level and  $\beta_{3i}$  indicates the relation with depression for each one unit increase in emotional control lability, holding the other predictors constant;  $\beta_{4i}$  indicates the interaction term between emotional control level and lability;  $e_i$  are residual unexplained differences that are assumed to be independent and normally distributed. Covariates in the model were adolescent's age, gender, and their family's income, as well as negative affect level and lability. Analyses predicting adolescent anxiety were conducted using the same approach as described above for depression.

The second set of analyses focused on predicting emotional control level and lability from family-based predictors. The model-building approach was conducted by first testing a model with the main predictors (Model 1), then adding demographic covariates (Model 2). Hypotheses 4 and 5 were evaluated by whether family cohesion and caregiver emotion coaching

were associated with adolescent emotional control levels (H4) and emotional control lability (H5). Specifically,

$$ECLevel_i = \beta_{0i} + \beta_{1i}FamCohesion + \beta_{2i}CEmoCoaching + \beta_{3i}Age + \beta_{4i}Gender + \beta_{5i}Income + e_i,$$

where  $\beta_{0i}$  reflects the mean emotional control level within our sample;  $\beta_{1i}$  reflects the relation with emotional control level for each one unit increase in family cohesion, holding all other predictors constant and  $\beta_{2i}$  likewise reflects the relation with emotional control level for each one unit increase in caregiver emotion coaching, holding all other predictors constant;  $e_i$  are residual unexplained differences that are assumed to be independent and normally distributed. Covariates in the model were adolescent's age, gender, and their family's income. Analyses predicting emotional control lability were conducted using the same approach as described above for emotional control level.



## Chapter 3

### Results

#### Descriptive statistics

Descriptive statistics are presented in Table 1. Adolescents generally reported high levels of family cohesion ( $M = 4.24$ ,  $SD = 0.63$ , Range 2.6–5) and caregivers generally reported high levels of emotion coaching ( $M = 4.25$ ,  $SD = 0.69$ , Range 2.33–5). Adolescents generally reported high levels of emotional control ( $M = 8.31$ ,  $SD = 1.85$ , Range 0.96–10) and low emotional control lability ( $M = 5.21$ ,  $SD = 6.83$ , Range 0–38.54). An examination of the distribution of emotional control lability indicated one extreme case (38.54) should be explored. Thus, analyses were conducted on the full sample and repeated while omitting this case. The results did not differ, so I opted to keep the extreme case in the final analytic sample as this case might reflect an adolescent who may be at risk for depression and anxiety. Adolescents generally reported low levels of negative affect ( $M = 1.40$ ,  $SD = 1.58$ , Range 0–6.76) and low negative affect lability ( $M = 2.39$ ,  $SD = 3.43$ , Range 0–19.49). Finally, adolescents generally reported low levels of depression and anxiety at baseline (depression  $M = 1.55$ ,  $SD = 0.59$ , Range 1–3.90; anxiety  $M = 1.64$ ,  $SD = 0.77$ , Range 1–3.90) and 1-year follow-up (depression  $M = 1.54$ ,  $SD = 0.63$ , Range 1–4; anxiety  $M = 1.58$ ,  $SD = 0.77$ , Range 1–4).

Table 1: *Descriptive Statistics*

	<b>N</b>	<b>M</b>	<b>SD</b>	<b>Median</b>	<b>Min</b>	<b>Max</b>	<b>Range</b>
1. Age	140.00	14.61	0.83	15.00	13.00	16.00	3.00
2. Gender	140.00	0.62	0.49	1.00	0.00	1.00	1.00
3. Family Income	140.00	8.03	3.23	8.00	1.00	12.00	11.00
4. Depression (baseline)	140.00	1.55	0.59	1.40	1.00	3.90	2.90
5. Anxiety (baseline)	140.00	1.64	0.77	1.29	1.00	4.00	3.00
6. Family cohesion	140.00	4.24	0.63	4.40	2.60	5.00	2.40
7. Caregiver emotion coaching	140.00	4.25	0.69	4.33	2.33	5.00	2.67
8. Emotional control level	140.00	8.31	1.85	8.90	0.97	10.00	9.04
9. Emotional control lability	140.00	5.21	6.83	2.54	0.00	38.54	38.54
10. Negative affect level	140.00	1.40	1.58	0.73	0.00	6.76	6.76
11. Negative affect lability	140.00	2.39	3.43	0.86	0.00	19.49	19.49
12. Depression (follow-up)	140.00	1.54	0.63	1.30	1.00	3.90	2.90
13. Anxiety (follow-up)	140.00	1.58	0.77	1.29	1.00	4.00	3.00

N=140; M = Mean; SD = Standard Deviation

### Zero-order correlations

Correlations are presented in Table 2. Adolescents who had higher emotional control levels also tended to have lower emotional control lability ( $r = -.44, p < .05$ ). Adolescents who had higher negative affect levels also tended to have higher negative affect lability ( $r = .63, p < .01$ ). Adolescents who had higher emotional control levels also tended to have lower negative affect levels ( $r = -.65, p < .01$ ) and lability ( $r = -.39, p < .01$ ). Adolescents who had higher emotional control lability also tended to have higher negative affect levels ( $r = .44, p < .01$ ) and lability ( $r = .72, p < .01$ ). Further, adolescents who had higher levels of emotional control also tended to report lower levels of depression and anxiety at 1-year follow-up (depression  $r = -.44, p < .01$ ; anxiety  $r = -.30, p < .01$ ). Adolescents who had higher emotional control lability also tended to report higher levels of depression and anxiety at 1-year follow-up (depression  $r = .21, p$

< .05; anxiety  $r = .19, p < .05$ ). Adolescents who had higher negative affect level and lability also tended to report higher depression (level  $r = .49, p < .01$ ; lability  $r = .31, p < .05$ ) and anxiety (level  $r = .35, p < .01$ ; lability  $r = .19, p < .05$ ).

Unexpectedly, adolescents' reports of family cohesion and caregivers' reports of emotion coaching were not statistically significantly correlated ( $r = .14, p = .11$ ). Adolescents who had higher family cohesion also tended to have higher emotional control levels ( $r = .43, p < .01$ ) and lower emotional control lability ( $r = -.19, p < .05$ ). Caregivers' reports of their emotion coaching were not significantly correlated with adolescents' emotional control level ( $r = .06, p = .51$ ) or lability ( $r = -.04, p = .67$ ). Despite the uncorrelated nature between these variables, I opted to test these relationships in the analytic models because of the proposed empirical research question assessing caregiver emotion coaching and adolescent emotional control, and theory supporting the relationship between caregiver emotion coaching and adolescent emotion regulation.

Table 2: *Correlations*

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Age													
2. Gender	-0.03												
3. Family Income	-0.13	-0.05											
4. Depression (baseline)	0.02	0.11	-0.01										
5. Anxiety (baseline)	0.04	0.24**	0.06	0.66**									
6. Family Cohesion	0.01	-0.01	0.15	-0.35**	-0.32**								
7. Caregiver Emotion Coaching	-0.08	0.03	-0.03	-0.09	0.13	0.14							
8. Emotional Control Level	-0.02	-0.09	0.00	-0.59**	-0.46**	0.43**	0.06						
9. Emotional Control Lability	0.11	0.1	0.05	0.21*	0.43**	-0.19*	-0.04	-0.44**					
10. Negative Affect Level	-0.01	0.16	0.00	0.69**	0.64**	-0.37**	-0.12	-0.65**	0.44**				
11. Negative Affect Lability	0.04	0.14	-0.01	0.34**	0.52**	-0.23**	-0.03	-0.39**	0.72**	0.63**			
12. Depression (follow-up)	0.03	0.13	0.04	0.51**	0.35**	-0.25**	-0.21*	-0.44**	0.21*	0.49**	0.31**		
13. Anxiety (follow-up)	-0.03	0.17**	0.12	0.35**	0.40**	-0.11	-0.14	-0.30**	0.19*	0.35**	0.19*	0.69**	

Note: \*  $p < .05$ ; \*\* $p < .01$ ; total  $N = 140$ , Age was measured at baseline

### **Hypotheses 1-3: Testing the relations between emotional control level and lability and depression and anxiety at 1-year follow-up**

In order to test Hypotheses 1-3, a series of multiple linear regression models were conducted under the model-building framework. Results from the models examining the relationships between emotional control level and lability and adolescents' depressive (H1) and anxiety (H2) symptoms, and the moderating effect of emotional control level on the association between emotional control lability and both dependent variables (H3) are reported in Table 3.

The first set of models, predicting adolescent depression, all were statistically significant and accounted for 29-31% of the variance in the outcome variable. In Model 1a, emotional control level and lability were not statistically significantly associated with depressive symptoms (EC level  $\beta = -.07, p = .05$ ; EC lability  $\beta = .00, p = .58$ ). In Model 2a, when adolescent age, gender, and family income were added to the model, emotional control level was statistically significantly associated with depression ( $\beta = -.07, p < .05$ ); whereas emotional control lability remained non-significant ( $\beta = .00, p = .69$ ). In Model 3a, the significant main effect of emotional control level was again not statistically significantly associated with depression ( $\beta = -.06, p = .08$ ). This suggests that the relation between emotional control level and depression may not be a reliable association. The main effect for emotional control lability remained not statistically significantly associated with depression ( $\beta = .01, p = .34$ ) in Model 3a. The interaction effect between emotional control level and lability was not statistically significantly associated with depression ( $\beta = .01, p = .21$ ), and thus was not included when computing Model 4a. In the final model, emotional control level and lability were not statistically significantly associated with depression after adding all covariates, including negative affect level and lability (EC level  $\beta = -.06, p = .13$ ; EC lability  $\beta = -.01, p = .56$ ). As a whole, these models did not

provide support to the hypotheses that emotional control level and lability were associated with adolescent depression as main effects (H1), or as an interaction effect (H3).

The second set of models, predicting adolescent anxiety, all were statistically significant and accounted for 18-24% of the variance in the outcome variable, as reported in Table 3. In Model 1b, emotional control level and lability were not significantly associated with anxiety (EC level  $\beta = -.07, p = .09$ ; EC lability  $\beta = .00, p = .81$ ). In Model 2b, when age, gender, and family income were added, emotional control level and lability remained not statistically significantly associated with anxiety (EC level  $\beta = -.07, p = .08$ ; EC lability  $\beta = .00, p = .80$ ). After adding the interaction term between emotional control level and lability in Model 3b, the main effects for emotional control level and lability remained not statistically significantly associated with anxiety (EC level  $\beta = -.05, p = .22$ ; EC lability  $\beta = .01, p = .35$ ). The interaction effect between emotional control level and lability was statistically significant ( $\beta = .02, p < .01$ ); thus, was included in Model 4b. In the final model, emotional control level and lability were not statistically significantly associated with anxiety as main effects after adding all covariates, including negative affect level and lability (EC level  $\beta = -.02, p = .59$ ; EC lability  $\beta = .01, p = .29$ ); however, the interaction effect remained statistically significantly associated with anxiety ( $\beta = .02, p < .05$ ). Probing the interaction, simple slopes analyses revealed that for adolescents who were higher (+1 SD) in emotional control level, emotional control lability was statistically significantly associated with increases in anxiety over time ( $\beta = .04, p < .05$ ); however, for adolescents who were lower (-1 SD) in emotional control levels, higher emotional control lability was associated with decreases in anxiety over time ( $\beta = -.02, p = .29$ ) (see Figure 1). As a whole, these models did not provide support to the hypothesis that emotional control level and lability

were associated with adolescent anxiety as main effects (H2); yet they did provide support to the hypothesis that for adolescents with high levels of emotional control, high emotional control lability was associated with increases in anxiety (H3).

Table 3: Results from multiple linear regression models examining how emotional control level and lability are associated with adolescent depression and anxiety at 1-year follow-up

Predictors	Depression				Anxiety			
	Model 1a: β (SE)	Model 2a: β (SE)	Model 3a: β (SE)	Model 4a: β (SE)	Model 1b: β (SE)	Model 2b: β (SE)	Model 3b: β (SE)	Model 4b: β (SE)
Intercept	<b>1.54*** (.05)</b>	<b>1.58*** (.06)</b>	<b>1.61*** (.06)</b>	<b>1.57*** (.06)</b>	<b>1.58*** (.06)</b>	<b>1.64*** (.08)</b>	<b>1.71*** (.08)</b>	<b>1.71*** (.08)</b>
Baseline DV	<b>.41*** (.10)</b>	<b>.40*** (.10)</b>	<b>.41*** (.10)</b>	<b>.30** (.11)</b>	<b>.33*** (.09)</b>	<b>.31** (.09)</b>	<b>.35*** (.09)</b>	<b>.31** (.11)</b>
EC Level	-.07 (.03)	<b>-.07* (.03)</b>	-.06 (.03)	-.06 (.04)	-.07 (.04)	-.07 (.04)	-.05 (.04)	-.02 (.05)
EC Lability	.00 (.01)	.00 (.01)	.01 (.01)	-.01 (.01)	.00 (.01)	.00 (.01)	.01 (.01)	.01 (.01)
EC Level x EC Lability	--	--	.01 (.01)	--	--	--	<b>.02** (.01)</b>	<b>.02* (.01)</b>
NA Level	--	--	--	.06 (.05)	--	--	--	.07 (.06)
NA Lability	--	--	--	.02 (.02)	--	--	--	-.02 (.03)
Age	--	.02 (.06)	.03 (.06)	.03 (.06)	--	-.02 (.07)	.01 (.07)	.01 (.07)
Gender	--	-.10 (.09)	-.08 (.10)	-.08 (.09)	--	-.14 (.13)	-.07 (.13)	-.08 (.13)
Family Income	--	.01 (.01)	.01 (.01)	.01 (.01)	--	.02 (.02)	-.02 (.01)	.02 (.02)
R <sup>2</sup>	.29***	.30***	.30***	.31***	.18***	.19***	.24***	.24***

Note: \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ ; Unstandardized regression coefficients are presented; Significant coefficients in bold text; DV = Dependent Variable; EC = Emotional Control

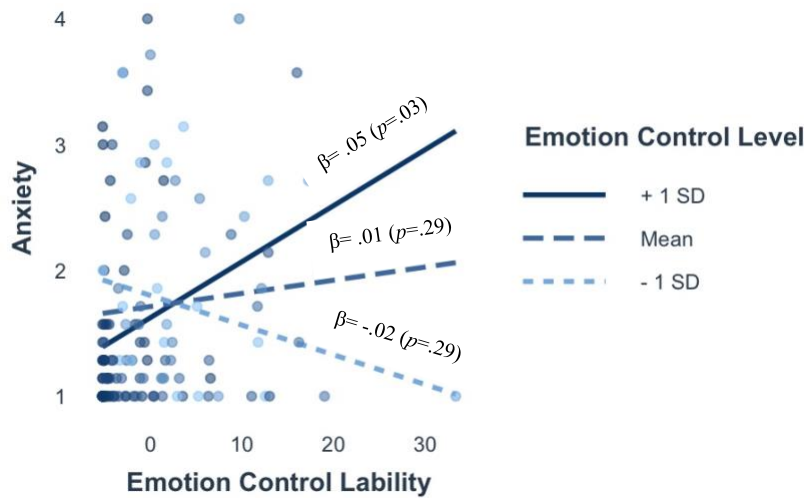


Figure 1: Association between emotional control lability and anxiety symptoms, moderated by emotional control level.

### **Hypotheses 4 & 5: Testing family-based predictors of emotional control level and lability**

In order to test Hypotheses 4 and 5, a series of multiple linear regression models were conducted under the model-building framework. Results from the models examining the relationships between family cohesion and caregiver emotion coaching and emotional control level (H4) and lability (H5) are presented in Table 4.

The first set of models, predicting emotional control level, were statistically significant and accounted for 18-19% of the variance in the outcome variable. In Model 1, family cohesion was statistically significantly positively associated with adolescent emotional control level ( $\beta = 1.24, p < .001$ ), whereas caregiver emotion coaching was not statistically significantly associated with adolescent emotional control level ( $\beta = -.01, p = .98$ ). In Model 2, when age, gender, and family income were added, family cohesion was statistically significantly positively associated with adolescent emotional control level ( $\beta = 1.27, p < .001$ ), whereas caregiver emotion coaching was not ( $\beta = -.01, p = .95$ ). Specifically, adolescents in families with higher cohesion reported feeling more in control of their emotions; yet this effect was not observed for adolescents whose caregivers reported high emotion coaching. As a whole, these models provided support to the hypothesis that family cohesion was associated with adolescents' emotional control level, but not caregiver emotion coaching (H4).

The second set of models, predicting emotional control lability, were not statistically significant.<sup>1</sup> In Model 1, family cohesion was statistically significantly negatively associated

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<sup>1</sup> Significant regression coefficients were still interpreted given  $R^2$  is an omnibus test of the overall model, making it difficult to reach significance if poor predictors are included in the model (King, 1986). Models were run without caregiver emotion coaching (poor predictor) and the models became statistically significant, although the overall scale of  $R^2$  did not change. However, caregiver emotion coaching was left in the models because of the pre-planned analysis and theory supporting the relationship between caregiver emotion coaching and adolescent emotion regulation.

with adolescent emotional control lability ( $\beta = -2.05, p < .05$ ), whereas caregiver emotion coaching was not statistically significantly associated with adolescent emotional control lability ( $\beta = -.10, p = .90$ ). In Model 2, when age, gender, and family income were added, family cohesion was statistically significantly negatively associated with adolescent emotional control lability ( $\beta = -2.24, p < .05$ ), whereas caregiver emotion coaching was not ( $\beta = .01, p = .99$ ). Specifically, adolescents in families with higher cohesion reported experiencing smaller day-to-day fluctuations in emotional control; yet this effect was not observed for adolescents whose caregivers reported high emotion coaching. As a whole, these models provided support to the hypothesis that family cohesion was associated with adolescents' emotional control lability, but not caregiver emotion coaching (H5).<sup>2</sup>

Table 4: Results of multiple linear regression model examining how family cohesion and caregiver emotion coaching are associated with emotional control level and lability

Predictors	EC Level		EC Lability	
	Model 1: $\beta$ (SE)	Model 2: $\beta$ (SE)	Model 1: $\beta$ (SE)	Model 2: $\beta$ (SE)
Intercept	<b>8.31*** (.14)</b>	<b>8.53*** (.23)</b>	<b>5.21*** (.57)</b>	<b>5.76*** (.72)</b>
Family Cohesion	<b>1.24*** (.23)</b>	<b>1.27*** (.23)</b>	<b>-2.05* (.91)</b>	<b>-2.24* (.92)</b>
Caregiver Emotion Coaching	-.01 (.21)	-.01 (.21)	-.10 (.84)	.01 (.84)
Age	--	-.08 (.18)	--	1.04 (.7)
Gender	--	-.35 (.29)	--	-1.46 (1.17)
Family Income	--	-.04 (.05)	--	.21 (.18)
R <sup>2</sup>	.18***	.19***	0.04	0.07

Note: \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ ; Unstandardized regression coefficients are presented; Significant regression coefficients in bold text; EC = Emotional Control

<sup>2</sup> Of note, the significant effects of family cohesion in these models were cautiously interpreted given the low overall scale of R<sup>2</sup>.



## Chapter 4

### Discussion

This study evaluated adolescents' daily ratings of emotional control – a facet of their subjective sense of emotion regulation (Gratz & Roemer, 2003b; Gross & Muñoz, 1995). The current study adds to the existing emotion regulation literature by capturing dynamic characteristics of emotional control and evaluating the implications for adolescent depression and anxiety. This study assessed adolescent reports of their emotional control on a daily basis for 21 days, thus enabling examinations of emotional control level and lability, which can only be assessed using intensive longitudinal methods, such as daily diary methods. A second strength of this study was the use of negative affect level and lability as covariates in the models. This is because negative affect level and lability are well-evidenced risk factors for adolescent depression and anxiety (Bosley et al., 2019; Dejonckheere et al., 2019; Stringaris & Goodman, 2009), and may play a role in the relationship between emotional control level and lability and internalizing psychopathology; thus by accounting for negative affect level and lability in the models, the current study provided evidence for the distinct implications of adolescents' emotional control level and lability for adolescent depression and anxiety. A third strength of this study was the examination of family relationships predicting emotional control level and lability to guide intervention work. Emotional control is an important prevention concern because poor emotion regulation has been consistently associated with poorer peer and romantic relationships, school performance, and greater psychological distress and maladjustment (Aldao et al., 2010; Zeman et al., 2006). As I discuss below, the findings point to assessing emotional control level and lability as a novel approach to capturing a more complete picture of adolescents' daily emotional control and as risk factors for future anxiety symptoms. Additionally, results indicate

that family cohesion is a reliable predictor of adolescent emotional control level and lability, offering an avenue for family-based interventions aimed at promoting better emotional control.

### **The relations between emotional control level and lability and depression and anxiety**

Regarding the first study aim, I tested the implications of emotional control level and lability for internalizing psychopathology in two ways: as main effects and as an interaction. The first way, with hypotheses that emotional control level and lability would be associated with changes in adolescent depression and anxiety over the course of a year, was not supported in this sample. However, the second way evaluating the interaction between emotional control level and lability, was supported in relation to anxiety, not depression. This finding suggests emotional control level and lability need to be considered in combination to understand risk for anxiety.

For adolescents who had higher emotional control levels, high emotional control lability was a risk factor for increases in anxiety symptoms over time. This finding suggests that greater day-to-day fluctuations in emotional control pose more risk for developing anxiety over time for adolescents who are generally high in emotional control. It may be that fluctuations in emotional control feel more intense for adolescents who are generally well-regulated; prompting them to over-engage in emotion regulation strategies that provide short term relief yet perpetuate symptoms of anxiety specifically on days when they experience less emotional control. This interpretation is in line with theoretical underpinnings relating emotion regulation and anxiety symptoms (Barlow et al., 2016; Mennin et al., 2007; Spindler et al., 2016). Adolescents experiencing symptoms of anxiety tend to be hypervigilant to emotional stimuli which increases vulnerability to frequent and intense emotional experiences, making it difficult to manage

negative emotions through effective strategy use, which may be experienced as feeling out of control of one's emotions (Carthy et al., 2010). Additionally, adolescents experiencing symptoms of anxiety often have trouble managing uncertainty of future negative emotion-eliciting situations as it diminishes how efficiently and effectively one can prepare responses that may reduce the negative impact of particular situations (Grupe & Nitschke, 2013). Therefore, adolescents with high levels of emotional control may be especially vulnerable to the impact of instability in emotional control and rely heavily on avoidance strategies for managing negative emotional experiences to prevent the momentary emergence of intense feelings of being out of control, unintentionally increasing risk for anxiety. Importantly, this effect remained significant when accounting for adolescents' negative affect level and lability, suggesting that the observed changes in anxiety may not merely be a function of adolescents' experiences of negative affect level and lability but also adolescents' tendency to not feel the same degree of emotional control every day. Although experiences of high levels and lability of negative affect have been associated with anxiety (Bosley et al., 2019; Heller et al., 2019; Paulus & Zvolensky, 2020), this finding suggests there are meaningful implications of emotional control lability for anxiety for adolescents who are generally high in emotional control. These adolescents may have unique difficulties managing certain negative emotional experiences through the use of emotion regulation strategies, leading to experiencing more symptoms of anxiety. In other words, regardless of the degree to which adolescents experience negative affect, this finding suggests adolescents' sense of emotional control is particularly important for anxiety. This finding adds to recent research encouraging the evaluation of adolescents' subjective sense of emotion regulation in addition to measuring emotion regulation strategy use to best measure emotional control in daily life as the likelihood of using a specific strategy, experiencing regulatory

success, and the association between a given strategy and success is individually and contextually dependent (De France & Hollenstein, 2022; Haines et al., 2016; Vaughan-Johnston et al., 2020; Wylie et al., 2023).

In contrast to the finding for anxiety, the hypothesis that predicted emotional control levels would moderate the relationship between emotional control lability was not supported for depression. It may be that lability in emotional control, regardless of emotional control level, is a less critical risk factor for depression compared to anxiety. Adolescents experiencing symptoms of depression tend to experience deficits in positive affect and persistent negative affect (Ehring et al., 2008; Zahn et al., 2015). Additionally, when faced with negative emotions, adolescents experiencing depression generally tend to engage in emotion regulation strategies that sustain negative affect and maintain a depressed mood such as suppression and rumination (De France et al., 2019; Lennarz et al., 2019). This enduring depressed mood is uniquely associated with depression and is different than instability that is more commonly found among individuals with anxiety (Heller et al., 2019). Therefore, risk for depression may be more related to the complicated associations between strategy use, negative affect, and emotional control level rather than emotional control lability. Adolescents experiencing depression might not be sensitive to day-to-day changes in emotional control due to their persistent depressed mood, thus high emotional control lability does not confer risk for depression the same way it does for anxiety. However, this finding should be interpreted with caution given associations between emotion regulation and depression have been evidenced in a wide range of studies (Aldao et al., 2010; Naragon-Gainey et al., 2017; Schäfer et al., 2017).

### **Family-based predictors of emotional control level and lability**

The second study aim was to evaluate hypotheses about the role of family cohesion and caregiver emotion coaching in relation to adolescents' emotional control level and lability. Family cohesion and caregiver emotion coaching have been identified as salient emotion socialization processes that have implications for the development of emotion regulation in adolescence (Fosco et al., 2012; Herd et al., 2022; Morris et al., 2017); thus examining these family factors in relation to emotional control in the current study was meaningful to provide potential family-based targets in prevention programming as a way to promote better emotional control. I hypothesized that cohesion and emotion coaching parenting would be promotive factors for better emotional control, specifically, higher emotional control levels and lower emotional control lability.

The hypotheses that family cohesion would be associated with adolescents' emotional control level and lability were supported, suggesting that family cohesion may support better emotional control among adolescents. More specifically, adolescents in families with higher cohesion reported higher levels and smaller daily fluctuations of emotional control. These findings are consistent with previous work linking family cohesion with more adaptive emotion regulation among adolescents (Criss et al., 2016; Herd et al., 2020). Higher family cohesion might cultivate a positive, comfortable family environment for adolescents to express and communicate their feelings, seek support, and practice emotion regulation strategies for novel emotional experiences (Olson et al., 2019; Thompson & Meyer, 2007). Adolescents in cohesive families may be more likely to experience higher levels of emotional control because the emotional climate may be more conducive to frequent discussions pertaining to the adolescent's daily experiences and expression of negative emotions through which they feel comfortable,

supported, and safe in dealing with their daily emotional experiences (Thompson & Meyer, 2007). Additionally, this may promote stability in emotional control if adolescents feel they have a reliable place to seek support and guidance in navigating daily stressors and experiences. A highly cohesive family environment may also reduce risks related to variability in adolescents' daily contexts, creating a consistent, stable environment, where they experience less frequent and unexpected negative emotions; contributing to lower emotional control lability (Eisenberg et al., 2005). It may also be that there is less family chaos in a highly cohesive family environment (Fosco et al., 2022), eliciting feelings of stability and security in adolescents' emotion regulatory processes. However, the finding related to emotional control lability should be cautiously interpreted because the proportion of variance in emotional control lability predicted by cohesion, coaching, and other covariates in the models was especially low. Thus, family cohesion appears to play a meaningful role in emotional control lability, but this outcome is predicted by much more than just family cohesion.

The second family factor that was evaluated in this study was caregivers' emotion coaching. Contrary to findings for cohesion, emotion coaching was not associated with adolescents' emotional control level or lability. These findings are inconsistent with previous findings linking caregiver emotion coaching with more adaptive emotion regulation skills among adolescents (Criss et al., 2016; Katz & Hunter, 2007; Klimes-Dougan & Zeman, 2007; Waslin et al., 2023). However, it may be that the measure of emotional control in the current study differs conceptually from other studies measures of emotion regulation. More specifically, the current study evaluated adolescents' daily ratings of emotional control in their natural contexts, whereas previous work measured emotion regulation by employing self-report questionnaires and observing adolescents' emotion regulation during interactions with their caregivers during

laboratory sessions (Criss et al., 2016; Katz & Hunter, 2007). It may be that caregiver emotion coaching is more strongly related to these measures of adolescent emotion regulation because they capture real-time emotion regulation concurrently with emotion coaching, suggesting the effects of emotion coaching may be more strongly related to measures of adolescent's emotion regulation that occur closer to caregiver-adolescent interactions. Moreover, extant research has identified that the peer context is an important factor contributing to the development of adolescents' emotion regulation skills (Herd & Kim-Spoon, 2021). It may be that adolescents seek more direct support and guidance with their emotional experiences from their peers as opposed to their caregivers given that establishing autonomy from one's caregivers is a developmentally salient task in adolescence (Berndt, 2023; Furman & Buhrmester, 1992).

### **Implications for prevention science**

The current findings highlight the implications of emotional control level and lability for adolescent anxiety, and family cohesion as a potential approach for promoting higher and more stable emotional control. The findings, being non-clinical in nature, may inform prevention programming for adolescent anxiety. Prevention programs for adolescent anxiety are scarce and lasting effects are small, with relatively larger effect sizes observed for indicated prevention programs compared to universal and selective (Hugh-Jones et al., 2021; Rasing et al., 2017). Yet, one way prevention of anxiety might be achieved through an up-stream approach is to promote family cohesion through family-based intervention programming to bolster adolescents' emotional control. Family-based interventions have been shown to be effective at improving proximal outcomes in this developmental period and might be applied to promote more adaptive

emotional control and decrease anxiety symptoms among adolescents. For example, the Iowa Strengthening Families Program: For Parents and Youth Ages 10-14 (SFP 10–14; Kumpfer et al., 1996) is a seven-session, universal family-based prevention program shown to be an effective and cost beneficial (Crowley et al., 2012; Spoth et al., 2002) intervention for improving family functioning and climate as well as decreasing and delaying long-term outcomes such as substance use initiation and youth problem behavior (LoBraico et al., 2019; Redmond et al., 2009; Spoth et al., 2013). Specifically, Iowa SFP 10-14 includes components such as positive family relationships, self-regulation and stress management, and problem-solving, that could better adolescents' emotional control and decrease risk of anxiety. Alternatively, the Family Check-Up (FCU; Dishion & Stormshak, 2007) could be implemented as a more adaptive, three-session brief intervention to potentially enhance family cohesion as studies have demonstrated the effectiveness of FCU for promoting better family cohesion (Caruthers et al., 2014; Van Ryzin & Nowicka, 2013). Taken together, family cohesion is key for family-based intervention effectiveness of long-term outcomes (Van Ryzin et al., 2016), and might be leveraged to promote better emotional control among adolescents and decrease risk for anxiety as a result but further work using longitudinal studies are needed. Interventions might consider including content mostly targeted at promoting close, supportive family relationships to provide adolescents with a comfortable, stable environment to develop their own repertoire of emotion regulation strategies and feel safe in practicing those strategies for navigating novel emotional challenges in daily life. Additionally, the current findings point to the value of intensive longitudinal methods (e.g., daily diary) for assessing adolescents' daily emotional control. Such methods allow assessments to capture the rich contexts in which emotional control naturally occurs and facilitates evaluating dynamic features of emotional control across days (Haines et al., 2016). Thus, intervention



programming might make use of daily diary methods by incorporating them in interventions to provide real-time tracking of the change processes from day-to-day and over the course of an intervention to help practitioners evaluate the effectiveness of the intervention with families (Fosco & Lydon-Staley, 2020).

### **Limitations and future directions**

There were several limitations to this study. First, the sample was relatively low risk in terms of family structure as adolescents were from two-caregiver families with caregivers predominantly married or cohabiting. Future work should replicate these findings in samples that include more diverse family structures such as single-parent, adoptive, and lesbian, gay, bisexual, transgender, and queer (LGBTQ) families to learn how family cohesion and caregiver emotion coaching operate in other family structures and relate to adolescents' emotional control, which could pose different implications for family-based preventive interventions. Adolescents also generally reported low levels of negative affect and internalizing psychopathology; thus, future work should replicate these findings in clinical samples to assess if the interactive effects of emotional control level and lability are related to clinical levels of internalizing psychopathology to learn if emotional control is a critical symptom of depression and anxiety. Second, greater racial and ethnic diversity in the sample would provide a more generalizable test of emotional control as an outcome associated with family cohesion and as a precursor risk factor for adolescent anxiety. Emotional control may be experienced differently due to varying cultural norms across racial and ethnic groups that impact how individuals appraise emotional stimuli, including whether emotional experiences are perceived as undesirable or uncontrollable,

and how emotions are regulated, by prioritizing the needs of the individual or the whole group (individualistic vs. collectivistic orientation) (Weiss et al., 2022); thus replicating the current study in a more racially and ethnically diverse sample would strengthen the generalizability of our findings and inform our understanding of emotional control as it is experienced by individuals from different racial and ethnic backgrounds. Another limitation was the use of caregiver's reports of emotion coaching as it may not be an accurate depiction of how caregiver emotion coaching is perceived to the adolescent and likely biases the association with adolescent outcomes. It has been found that adolescent reports of parenting are consistently associated with adolescent adjustment and well-being outcomes, demonstrating the need to use adolescent reports of family factors when predicting adolescent outcomes (De Los Reyes & Ohannessian, 2016; Hou et al., 2020). Future work should explore the association between caregiver emotion coaching and adolescent emotional control level and lability with adolescents' and caregivers' reports of emotion coaching to learn if adolescents and caregivers perceive emotion coaching the same and if divergence may explain the null findings related to emotional control. Additionally, we examined emotional control level and lability with a one-item self-report scale, which allowed us to assess emotional control from a subjective perspective in adolescents' natural contexts, reflecting the personally relevant aspect of regulatory success regardless of the various emotion regulation goals one may have (e.g., down-regulate negative affect, reduce physiological arousal, etc.) (Wylie et al., 2023). However, examining only one facet of such a multidimensional, complex construct is problematic because it is not able to capture the more nuanced aspects contributing to individual differences in daily regulatory processes such as daily emotion regulation strategy use, contextual factors influencing strategy use, and associations between emotion regulation strategy use and success. Future ecological momentary assessment

studies should consider assessing emotion regulation through measuring both emotion regulation strategy use (generally and momentarily) and emotional control, as well as other contextual factors (e.g., emotional intensity) to comprehensively evaluate adolescents' experience of emotional control (De France & Hollenstein, 2022; Koval et al., 2023). In line with this, future work could also use multilevel models to assess within-person research questions on emotional control dynamics. This could further inform prevention implications for emotional control lability as a risk factor for anxiety as patterns of daily emotional control might be partially explained by use of certain emotion regulation strategies which could be harnessed in interventions to promote stability in emotional control across contexts and days. Additionally, accounting for positive affect as well as negative affect in the models assessing risk for depression and anxiety would provide a more complete assessment of the role of emotional control as experiences of positive affect may be particularly salient for predicting depression since experiencing deficits in positive affect is a core symptom of depression (Young et al., 2019). Finally, the correlational nature of the results is limiting. While the data come from a longitudinal, daily diary study design, no experimental conditions or random assignment were included, therefore no causal inferences or directionality of the results can be made which is especially relevant given the inconsistency in the literature about the directionality of the complex relationships between negative affect, emotion regulation, and psychopathology (Aldao et al., 2010; De France et al., 2019).

## Conclusion

Overall, the current study provided a novel conceptualization of emotion regulation by examining adolescent emotional control level and lability. Namely, emotional control lability was a significant risk factor for anxiety symptoms among adolescents with high levels of emotional control. This remained true after accounting for negative affect level and lability across days suggesting that well-regulated adolescents' tendency to not feel the same degree of emotional control every day has meaningful risk implications for anxiety beyond experiencing negative emotions. Additionally, family cohesion appeared to be a reliable predictor of emotional control level and lability, yet support was not found for caregiver emotion coaching. These findings emphasize the importance of considering both emotional control level and lability in efforts to identify risk for anxiety as well as promoting family cohesion in family-based interventions aimed at improving adolescent well-being. Future studies should further examine the role of dynamic characteristics of adolescent emotion regulation in internalizing psychopathology, as well as direct more attention to understanding emotion socialization processes in adolescence.

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