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The Association Between Current Maternal Psychological Control, Anxiety Symptoms, and Emotional Regulatory Processes in Emerging Adults

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Abstract

Background and Objectives.—High levels of psychological control (PC), the (intentional or unintentional) attempt by parents to control their child’s emotional experience, have been associated with increased risk for anxiety in youth. However, little is known regarding the association between PC and anxiety in emerging adulthood, a developmental period marked by various life transitions and high risk for the onset of internalizing symptoms, or about the relation between current parental PC and emotional regulatory processes during this stage. The current study examined whether perceived maternal PC was significantly associated with anxiety symptoms and both objective (psychophysiological; respiratory sinus arrhythmia) and subjective (self-reported) emotion regulatory processes.

Methods.—Participants ($N = 125$; ages 18 to 25) completed self-reports on their anxiety symptoms, emotion regulation abilities, and perceptions of their mother’s behavior, and participated in a laboratory stressor, the Trier-Social Stress Test, while psychophysiological data were acquired.

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Ms. Goger had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

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Conflict of Interest

We have no conflicts of interest to disclose – although this study was supported with grants (details on title page), the design; collection, analysis, and interpretation of data; and write-up were entirely our own.

Results.—Emerging adults who reported higher maternal PC also reported higher anxiety symptoms and evidenced greater emotion regulation difficulties on both objective and subjective indices than those who reported lower maternal PC. Moreover, the association between PC and anxiety levels was statistically mediated by self-reported emotion regulation difficulties.

Limitations.—Results of this study should be interpreted in light of its limitations, which include it being cross-sectional in nature with a primarily female sample. Further, *perceptions* of maternal, but not paternal, parenting were examined.

Conclusions.—Findings might have implications for targeting both psychological control and emotion regulation difficulties in personalized anxiety interventions during this high-risk developmental period.

Keywords

emerging adulthood; psychological control; anxiety; emotion regulation; psychophysiology

1. Introduction

Anxiety disorders are one of the most prevalent mental health problems in the United States, affecting approximately 15-30% of youth and 20-30% of adults (Beesdo, Knappe, & Pine, 2009; Kessler et al., 2005; Merikangas et al., 2010; Remes, Brayne, Van Der Linde, & Lafortune, 2016). While anxiety typically initially emerges during the pediatric period (Beesdo-Baum & Knappe, 2012), it confers significant risk for increased anxiety and other psychiatric and physical health problems in emerging adulthood (Bittner et al., 2007; Chavira, Garland, Daley, & Hough, 2008; Costello, Egger, & Angold, 2005; Fichter, Kohlboeck, Quadflieg, Wyschkon, & Esser, 2009; Pine, Cohen, Gurley, Brook, & Ma, 1998). Moreover, some data suggest that emergence of certain types of anxiety (e.g., panic disorder, generalized anxiety disorder) and related symptoms and disorders (e.g., post-traumatic stress; Arnett, Žukauskien, & Sugimura, 2014; Beesdo-Baum & Knappe, 2012; Schulenberg, Sameroff, & Cicchetti, 2004) is more common in emerging adulthood. The role of individual vulnerabilities, including genetic and physiological predispositions, for anxiety is widely accepted (Eley & Plomin, 1997; Gregory & Eley, 2007) yet much remains unclear about factors that contribute to its onset and maintenance. A large body of research implicates environmental and social factors in the risk for anxiety development, including parenting behaviors (Nanda, Kotchick, & Grover, 2011). One such parenting behavior is psychological control (PC), which is an attempt by parents, either advertently or inadvertently, to guide their children both behaviorally and emotionally by intruding upon their personal autonomy, withdrawing attention or affection when the child disappoints them, inducing guilt, and generally leveraging their emotional bond with their children (Barber, 1996).

We first discuss the connection between parental PC and anxiety in both children and emerging adults, then examine how subjective and objective emotion regulation are associated with both anxiety and PC, and finally discuss how these three constructs might be linked with one another.

1.1. Links between Parental Psychological Control and Anxiety

1.1.1. Psychological Control during Childhood and Adolescence.—Research examining the connection between parental PC and anxiety has predominantly focused on pediatric populations (i.e., under age 18) with little focus on emerging adults (ages 18 to 25; Arnett, 2007; Manzeske & Stright, 2009). In contrast to firm or behavioral control—which serves to control the child’s behavior by giving explicit instructions or threatening the removal of a privilege—PC serves to control what the child does *and* how he or she feels about it. The parent’s goal may not necessarily be to *deliberately* control the child’s emotional experience (e.g., make the child feel guilty), and the parent may or may not be aware that the content of their communication reflects psychologically controlling statements (Grolnick, 2002). Notably, in certain youth samples (e.g., racial/ethnic minorities), PC may represent an expression of love and therefore not necessarily lead to maladjustment (Driscoll, Russell, & Crockett, 2008; Halgunseth, Ispa, & Rudy, 2006). Nonetheless, parental PC may inadvertently impede one’s ability to develop a sense of self as separate from parents (Schaefer, 1965) as well as hinder broader emotional development.

Children whose parents evidence high levels of PC subsequently experience a variety of negative psychological outcomes, such as lower self-esteem and increased symptoms of anxiety, depression, aggression, and somatic complaints (Barber, Olsen, & Shagle, 1994; Bean, Bush, McKenry, & Wilson, 2003; Gonzalez & Weersing, 2014; Olsen et al., 2002). These data are supported by experimental studies in which manipulating (i.e., increasing) parental control leads to increases in child anxiety (de Wilde & Rapee, 2008; Thirlwall & Creswell, 2010). Indeed, meta-analyses have found that parental PC and child anxiety are associated (McLeod, Wood, & Weisz, 2007), with the relationship being stronger for older, compared to younger, children (van der Bruggen, Stams, & Bögels, 2008). These findings may suggest that parental behavior might be increasingly more relevant throughout offspring development, including during emerging adulthood, when one might expect parents’ influence to wane.

1.1.2. Psychological Control during Emerging Adulthood.—It is unlikely that parental influence terminates as soon as an offspring enters emerging adulthood. This developmental stage is marked by a wide variety of transitions and life changes (e.g., completion of high school, beginning college or employment, moving out of the home) including a focus on growing independence, identity establishment, and determination of one’s own beliefs and goals (Arnett, 2000; Schwartz, Zamboanga, Luyckx, Meca, & Ritchie, 2013; Tanner, 2006). During this time, it is possible that parenting behavior might become *less* important during emerging adulthood, as the offspring is legally able to separate more fully from parents and may be less concerned about parental opinions or be less affected by parental influences. However, it may also be possible that high levels of parental PC may interfere with identity formation (Manzeske & Stright, 2009) during this time period *and*, as young adults are increasingly relying on parents in terms of housing and financial support for longer than they used to (Qian, 2012), may experience new negative effects of parental PC that occurs as they attempt to navigate the early stages of adulthood. A small but growing literature has linked psychological adjustment in emerging adults to their current perceptions of family relationships, including parental PC (Abaied & Emond, 2013; García

Mendoza, Sánchez Queija, & Parra Jiménez, 2018; Leondari & Kiosseoglou, 2002; Luyckx, Soenens, Vansteenkiste, Goossens, & Berzonsky, 2007; Manzeske & Stright, 2009; Urry, Nelson, & Padilla-Walker, 2011). As emerging adulthood may be a sensitive developmental window for psychological maladjustment and development or worsening of anxiety (Arnett, Žukauskien, & Sugimura, 2014; Schulenberg, Sameroff, & Cicchetti, 2004); young adult perceptions of high current parental psychological control may exacerbate such risk. Factors such as difficulties with emotion regulation, which has been separately associated with both anxiety and psychological control, might be especially important to gain a broader understanding of the psychological experiences of emerging adults experiencing parental PC.

1.2. Emotion Regulation, Anxiety, and the Potential Role of Parental Psychological Control

Some evidence suggests that a perceived lack of control over events may mediate the relationship between perceptions of parental PC and youth anxiety symptoms (Nanda et al., 2011), and several developmental models of anxiety propose that PC may hinder youths' emotional development and sense of autonomy (Manzeske & Stright, 2009; Nanda et al., 2011). Below we describe the putative role of emotion regulation in the relationship between PC and anxiety.

1.2.1. Emotion Regulation and Anxiety.—Emotion regulation is the subjective experience of one's ability to manage one's emotional experience (i.e., being aware of and accepting emotions, managing the experience of negative emotions; having limited access to emotion regulation strategies and therefore failing to engage in any directed emotion regulation; Gratz & Roemer, 2004) and/or the objective psychophysiological processes meant to downregulate biological stress responses, defined here as the physical arousal or experienced emotions during a situation perceived as threatening. It is not surprising that emotion regulation is a mechanism proposed to be implicated in the development and maintenance of anxiety. Experimental studies have demonstrated that manipulating an individual's emotion regulation by "intervening" and providing a skill or reappraisal strategy to manage emotional discomfort has resulted in improved emotion regulation (Gross, 1998) while instructing individuals to suppress their emotions or attempt to avoid them leads to poorer regulation (Gross & Levenson, 1997). Emotion regulation is a critical skill when managing stress or during the experience of significant anxiety, as an inability to appropriately regulate one's emotional experience when encountering a feared stimuli (Cisler, Olatunji, Feldner, & Forsyth, 2010) may lead to avoidance (the core maintaining feature of anxiety disorder; Tull & Roemer, 2007). Over time, this cycle may become problematic, as avoidance may teach individuals that they are not able to tolerate enduring distressing emotional states (Amstadter, 2008) and may lead to significant anxiety and other internalizing problems (Compas et al., 2017).

Importantly, the vast majority of emotion regulation work has focused on subjective (i.e., self-reported ratings). Objective measures of regulation remain relatively unexplored, although they have high utility for reflecting real-time processes that influence behavior and of which the individual is unaware (e.g., Thomas, Aldao, & De Los Reyes, 2012). One of

these objective psychophysiological measures thought to reflect emotional arousal and regulation (Appelhans & Luecken, 2006; Craske et al., 2008) is respiratory sinus arrhythmia (RSA), which is a measurement of heart rate variability in synchrony with respiration (Butler, Wilhelm, & Gross, 2006; Gentzler, Santucci, Kovacs, & Fox, 2009). Higher baseline and less reactive RSA during stress generally indicate more effective regulation and lower anxiety, while a lower baseline and excessive RSA suppression (sometimes called “withdrawal”) during stress indicates less effective regulation and higher anxiety (Beauchaine, 2001; Fortunato, Gatzke-Kopp, & Ram, 2012). Said differently, RSA suppression indicates that the parasympathetic nervous system is working “harder” to maintain homeostasis during stressful situations and may reflect broad deficits in both emotional and psychophysiological functioning. Prior work has demonstrated that subjective self-report and objective physiological measures have low convergence, and each predict unique variance in anxiety (De Los Reyes, Aldao, Thomas et al., 2012), suggesting that both types of measurement are important to capture emotion regulation’s relationship with anxiety and might also be important in its association with parental PC in emerging adults.

1.2.2. Proposed Links between Psychological Control and Emotion

Regulation in Anxiety.—Prior work has found that individuals who perceive high levels of parental PC may subjectively feel unable to manage their emotions (Manzeske & Stright, 2009; Williams & Woodruff-Borden, 2015). Simultaneously, studies of children and adolescents have found that difficulties with emotion regulation are associated with anxiety (Schneider, Arch, Landy, & Hankin, 2016; Suveg, Morelen, Brewer, & Thomassin, 2010). Thus, we hypothesize that PC may be linked to indices of emotion regulation. Of importance, these three constructs – psychological control, emotion regulation (measured both objectively and subjectively), and anxiety symptoms – have not been studied in concert in emerging adults or prospectively during an acute stressor. Studying these constructs *simultaneously* may provide valuable insights into identifying modifiable risk factors for anxiety during a high-risk developmental window.

1.3. Present Study

The current study aims to fill gaps in the extant literature that links PC to anxiety and emotion regulation in emerging adults by addressing the following questions:

Aim 1: Is emerging adult perception of parental PC associated with anxiety symptoms? We hypothesized that perceived PC and anxiety symptoms would be positively associated in emerging adulthood based on the extant child literature.

Aim 2: Is emerging adult perception of parental PC associated with both objective and subjective measures of emotion regulation? We hypothesized that higher PC would be a) negatively associated with RSA (i.e., be associated with RSA suppression) during an acute social stressor, and b) positively associated with self-reported emotion regulation (i.e., higher self-reported emotion regulation difficulties as measured by lack of awareness, clarity, or acceptance of emotions; difficulties with impulse control and engaging in goal directed behavior; and limited access to emotion regulation strategies, Gratz & Roemer, 2004).

Aim 3: Does perceived parental PC exert a statistical indirect effect on anxiety in emerging adults via their subjective report of emotion regulation (i.e., mediation)? We hypothesized that the association between PC and anxiety would be statistically mediated by self-reported emotion regulation.

2. Method

2.1. Participants and Procedure

All study procedures were approved by the university Institutional Review Board. Emerging adults ($N = 125$; ages 18-25; $M_{age}/Sd = 18.76/1.34$; 76.8% female) were recruited using an undergraduate subject pool at a state university in southern California. Eligible participants: 1) were aged 18 to 25 years; 2) were able to complete consent and questionnaires in English; 3) had a biological mother¹ who was alive; 4) lived with biological mother at least half the time while growing up; 5) were in current contact with biological mother for at least 30 min per week—either in person or via phone.

The sample was ethnically diverse with 72% of participants identifying as a racial and/or ethnic minority (48% Hispanic/Latino, 21.6% Asian or Pacific Islander, 16.8% White, 9.6% Biracial, 2.4% Black, 1.6% other; see Table 1).

Most participants (71.2%) reported to be in their first year of college, with some (17.6%) being in their second year, and few being in their third year and beyond (11.2%). Over half (59.2%) of participants reported currently living with their parents, although 61.6% reported to meet their college expenses through means other than their parents, including loans and employment (i.e., financial independence). Participants reported being in contact with their mothers an average of 597.02 min (9.95 hrs; range = 30 – 4500 min) per week. The majority of participants reported that their mothers were married (70.4%); had some college experience, a college degree, or graduate training (22.4%, 27.2%, and 8.0% respectively); and were currently employed full time (56.8%). Similarly, fathers were reported to have either college or graduate training experience (50.4%) and to be currently employed full time (73.6%). Most participants reported to have an individual income of \$4,999 or less (69.6%), and a household income of \$40,000 or more (43.2%).

In regard to self-reported mental health histories, the vast majority of participants self-reported on the demographic questionnaire that they never received formal lifetime diagnoses of any behavioral, emotional, or psychiatric problems, with rates of endorsement ranging from .8% of drug and alcohol abuse diagnosis to 8.8% of any type of anxiety diagnosis.

The current study was part of a larger investigation that assessed cognitive bias and stress reactivity in emerging adults (Authors, in preparation). Participants were first screened through the online subject pool to determine whether they were eligible based on age and ability to speak proficient English. Those who met initial eligibility criteria through the

¹Mothers were required to be biological mothers in order to control for the genetic influence in risk for anxiety and emotion regulation.

subject pool then scheduled their laboratory study session. During the lab session, all participants completed written informed consent, self-report questionnaires, and a social stress task. For the present investigation, the psychophysiological data collection suite was not available for the first 70 participants; therefore, RSA was not collected for the entire sample due to unavailability of equipment at the beginning of data collection. Self-report data, including report of parenting behavior, were available for the entire sample.

2.2 Measures

2.2.1. Demographics.—Participants completed a demographics questionnaire that included questions about gender, age, ethnicity, year in college, living situation (living with parents, roommates, dorms, alone), financial dependence, and amount of time spent interacting with their biological mother.

2.2.2. Maternal Psychological Control.—The Child’s Report of Parental Behavior Inventory—Psychological Control Scale (CRPBI-C-30; Schludermann & Schludermann, 1988) was used to assess current level of perceived maternal psychological control. This subscale consists of 10 items such as “My Mom...tells me of all the things she has done for me,” and “...says if I really cared for her, I would not do things that cause her to worry,” which can be answered on a scale from 1 (*Not like...*) to 3 (*A lot like...my mother*). A higher score indicates higher perceived PC. Notably, participants were not asked to report on their perceptions of their mother’s PC retrospectively, but were asked to think about how they perceive their mother’s behavior towards them *currently*. While initially developed for use with children, the CRPBI has demonstrated good internal consistency with emerging adults (Baumgardner & Boyatzis, 2018; Safford, Alloy, & Pieracci, 2007, Schwarz, Barton-Henry, & Pruzinsky, 1985). In this study, Cronbach’s $\alpha = .90$ for this CRPBI subscale of psychological control.

2.2.3. Anxiety Symptoms.—The State Trait Anxiety Inventory-Trait Scale (STAI-T; Spielberger, 1983) was used to assess anxiety symptoms. The *STAI-T* consists of 20 items assessing trait anxiety (i.e., participants are asked to read statements and then circle the answer to each statement to indicate how they “*generally*” feel day-to-day, not how they feel currently). The STAI is normed for use in adults and its positive psychometric properties are well-documented (e.g., Barnes, Harp, & Jung, 2002). Response options range from 1 (*almost never*) to 4 (*almost always*), with higher scores indicating higher anxiety symptoms. In this sample, Cronbach’s $\alpha = .91$.

2.2.4. Emotion Regulation

2.2.4.1. Subjective Measure: The Difficulties with Emotion Regulation Scale (DERS; Gratz & Roemer, 2004) was used to assess subjective emotion regulation. The DERS consists of 36 items, such as “I have difficulty making sense out of my feelings,” and “When I’m upset, I have difficulty focusing on other things,” which can be answered on a scale from 1 (*Almost Never*) to 5 (*Almost Always*). A higher score indicates more self-reported difficulty with emotion regulation. This scale was originally developed and validated with emerging adults (Gratz & Roemer, 2004), with good internal consistency in this sample (Cronbach’s $\alpha = .87$).

2.2.4.2. Objective Measure: Psychophysiological reactivity as measured via respiratory sinus arrhythmia was acquired during a laboratory social stressor, the Trier-Social Stress Test (TSST, Kirschbaum, Pirke, & Hellhammer, 1993, described below). RSA was measured as the difference between maximum and minimum change in heart rate during respiration. RSA was acquired over six task segments: (1) resting baseline, during which the participant stood quietly for 3 min, (2) talking baseline, during which the participant read standardized stories out loud for 3 min in order to detect changes physiology due simply to speaking, and (3-5) the three “active” segments of the TSST meant to induce stress (preparing job interview speech, giving job interview speech, and math task; described in more detail below), (6) followed by a three-minute recovery period, during which participants were again asked to stand quietly for 3 min. Participants wore continuously recording electrodes on their right collarbone and left lower rib, with a respiration belt tightened around the torso. Measurements were collected via the Biopac MP150 system (BioPac Systems Inc., Goleta, CA), which was located in an adjacent room and received information wirelessly with a research assistant monitoring the equipment. The data were prepared and cleaned with AcqKnowledge (Biopac Systems, Santa Barbara, CA, USA) and analyzed with MindWare software (MindWare Technologies, Ltd., Gahanna, OH).

2.2.5. Stress Task: Trier Social Stress Test.—Participants completed the Trier Social Stress Test (TSST; Kirschbaum, Pirke, & Hellhammer, 1993), which is a standardized laboratory task designed to elicit acute social stress in a performance-based situation. The TSST requires participants to first pretend they are interviewing for a job and then prepare (5 min) and deliver (5 min) a speech in front of two neutral/stoic research assistants acting as Committee Members, who are videotaping and purportedly evaluating the participants’ performance (no such evaluation actually took place). Next, the participants were asked to perform mental arithmetic operations for 5 min while being given standardized prompts that they have made an error and need to start over, or that they should respond more quickly. The TSST has been shown to reliably elicit an objective stress response in participants and has been widely deemed an excellent laboratory method to induce psychological stress under controlled conditions (e.g., von Dawans, Kirschbaum, & Heinrichs, 2011). After all study procedures were completed, participants were debriefed about the TSST.

2.3. Data Analytic Plan

Statistical analyses were conducted using the IBM SPSS Statistics Version 21 Software (IBM Corp., 2012). Predictors, outcomes, and residuals were inspected for normality; however given that psychophysiological data are often skewed (e.g., Cruz, 2009), we anticipated non-normality of psychophysiological data, which was accounted for in our analytic plan with the use of mixed models (West, Welch, & Galecki, 2014). All predictors were found to be normally distributed, while (as expected), the psychophysiological data were not across all time points (skewness/kurtosis levels at different time points: Time 1 (1.89/3.40), Time 2 (2.18/5.59), Time 3 (1.46/1.84), Time 4 (1.29/.787), Time 5 (1.62/2.71), Time 6 (1.77/2.28). For Aim 1, linear regression was used to test the association between perceived PC (CRPBI-PC subscale) and anxiety (STAI-T). For Aim 2a, a mixed models analysis was performed on a subsample of 72 participants with available psychophysiological data (as described in the Method, physiological data was not collected

for the entire sample due to unavailability of equipment at the beginning of data collection) to test the hypothesis that perceived maternal PC statistically predicted RSA trajectories over the course of the TSST. Maternal psychological control (continuous variable) was a fixed factor, the intercept was randomized, and time (RSA during the resting and talking baselines, phases of the TSST, and recovery period) was a continuous repeated measures effect, centered at zero for resting baseline (Segment 1), as is typical in studies using mixed models with the TSST (e.g., Rozenman, Vreeland, & Piacentini, 2017). Interactions between time (linear and quadratic) and psychological control were also tested. A compound symmetry covariance matrix was used for its ability to account for correlations between multiple measurements for each individual, given that we assumed that RSA measurements within participant would be correlated with one another during the course of the TSST, while retaining a parsimonious model. Only factors and repeated time measures that demonstrated significant main and/or interaction effects were retained in the final model. We planned *a priori* to conduct post-hoc comparisons of estimated marginal means (EMMs) and simple slopes for significant interactions; we explicitly tested EMMs for group differences for TSST Segment 4 (job interview), TSST segment 5 (error feedback) and segment 6 (recovery period). A *p*-value of less than .05 was used to determine statistical significance. For Aim 2b, a linear regression was used to examine the association between perceived psychological control and self-reported difficulties with emotion regulation (DERS).

Finally, for Aim 3, Hayes' PROCESS macro (2013) was used to examine whether maternal psychological control exerted an indirect effect on anxiety via self-reported emotion regulation (i.e., statistical mediator).

Across analyses, gender effects were explored and found to be non-significant.

3. Results

3.1. Aim 1: Maternal Psychological Control is Associated with Anxiety in Emerging Adults

The predicted model accounted for a significant proportion of anxiety symptoms, $R^2 = .15$, $F(1,123) = 20.92$, $p < .001$. Perceived maternal PC ($\beta = .381$, $p < .001$) was significantly and positively associated with anxiety; for each one-point increase in perceived PC, participants' anxiety symptoms increased by .69 points. Exploratory follow-up analyses were conducted to test whether this relationship was contingent on how much time emerging adults spent with their mother, whether or not they lived with their mother, or were financially dependent on her. None of these variables were significant covariates.

3.2. Aim 2a: Perceived Psychological Control Predicts Objective Emotion Regulation During an Acute Social Stressor

Mixed models analysis indicated a final model with both linear and quadratic effects for time, perceived PC as a significant fixed factor, and significant PC x time interactions for both linear ($\beta = 0.18$, $SE = 0.07$, $t = 2.73$, CI: 0.05, 0.32, $p = .007$) and quadratic time ($\beta = -0.02$, $SE = 0.01$, $t = -2.19$, CI: -0.04, -0.00, $p = .029$; see Table 2 for estimates of fixed effects). There was also a significant linear, but not quadratic, main effect of time ($\beta =$

-2.84 , $SE = 1.20$, $t = -2.37$, $CI: -5.20, -0.48$, $p = .018$), suggesting that, overall, RSA suppression occurred across participants across the task phases.

Per our *a priori* analytic plan, simple slopes and EMMs were examined for the highest-order significant interaction (PC x quadratic time: $F(1, 354.411) = 4.80$, $p = .029$). For ease of interpretation, PC scores on the CRPBI were split into 1 standard deviation (SD) above the mean (high psychological control), at the mean, and 1 SD below the mean (low psychological control), with low psychological control as the reference group. Examination of simple slopes indicated that, compared to the group scoring 1 SD below the mean CRPBI, the group scoring 1 SD above the mean exhibited greater and significant slope change (i.e., sharper decrease) in RSA over time ($\beta = 0.33$, $SE = 0.13$, $t = 2.57$, $CI: 0.08, 0.58$, $p = .01$).

In regard to mean group comparisons across phases of the TSST, we examined EMMs between groups by time point (Figure 1). Significant group differences emerged during the math task ($F(2, 344.869) = 3.62$, $p = .028$) and recovery ($F(2, 410.38) = 3.81$, $p = .023$) time points. Emerging adults who reported higher levels of perceived PC (CRPBI 1 SD above sample mean) exhibited relatively more RSA suppression (i.e., lower RSA mean scores during task segments) than the group who endorsed mean levels of perceived PC during the math task (Mean difference = 4.15, $SE = 1.55$) and recovery period (Mean difference = 7.79, $SE = 2.83$). However, unexpectedly, the group of emerging adults who reported high perceived psychological control did not differ from those reporting low psychological control on mean RSA suppression at any phase of the TSST (all p 's > .05).

3.3. Aim 2b: Perceived Psychological Control is Associated with Subjective Emotion Regulation

Simple linear regression indicated that perceived maternal PC accounted for a significant proportion of variance explained in self-reported emotion regulation ($R^2 = .08$, $F(1, 123) = 10.59$, $p = .001$). The association was significant and positive such that each one-point increase in perceived PC was associated with a 1.05-point increase in emotion regulation difficulty ($\beta = .281$, $t = 3.25$, $CI: 0.41, 1.69$, $p = .001$, $b_0 = 82.76$).

3.4. Aim 3: Association Between Perceived Psychological Control and Anxiety is Partially Statistically Mediated by Emotion Regulation

Using the SPSS PROCESS macro (Hayes, 2013), the overall model accounted for a significant proportion of variance explained in anxiety symptoms, $R^2 = .48$, $F(2, 122) = 56.41$, $p < .001$. Both perceived PC ($b = .38$, $SE = .12$, $p = .002$) and self-reported emotion regulation ($b = .29$, $SE = .03$, $p < .001$) were unique statistical predictors of anxiety symptoms, but emotion regulation partially statistically mediated the effect of maternal PC on anxiety symptoms. As depicted in Figure 2, perceived PC was a significant statistical predictor of emotion regulation (path a; $b = 1.05$, $SE = .32$, $p = .002$), and emotion regulation was a significant statistical predictor of anxiety (path b; $b = .31$). Using bootstrapping procedures with 20000 bootstrapping samples and a 95% confidence interval, the outer limits confidence intervals for this coefficient were computed to be .12 and .50, indicating a significant association. The overall association between PC and anxiety was significant (path c; $b = .69$, $SE = .15$, $p < .001$), and the association between maternal PC

and anxiety remained significant after adding the statistical mediator (emotion regulation) to the model (path c' ; $b = .38$, $SE = .12$, $p = .002$), suggesting partial statistical mediation.

4. Discussion

The transition from adolescence to adulthood is marked by change in many life domains and presents high risk for psychological maladjustment broadly, and anxiety specifically (Arnett, Žukauskienė, & Sugimura, 2014; Schulenberg, Sameroff, & Cicchetti, 2004). To understand the interplay of social and individual factors that may be associated with this risk, we probed the associations between perceived maternal PC, objective and subjective measures of emotion regulation, and anxiety symptoms in a large and racially/ethnically diverse sample of emerging adults.

Higher perceived maternal PC was associated with higher anxiety in emerging adults. These findings are consistent with prior studies in children (e.g., McLeod, Wood, & Weisz, 2007; Nanda et al., 2011) and suggest that the impact of this parental behavior occurs beyond adolescence and in emerging adulthood, although it may be possible that this relationship is bidirectional, or that an individual's anxiety symptoms (e.g., threat-based thinking) result in perceptions that parents are psychologically controlling. Interestingly, this link persisted regardless of current amount of contact with and financial dependence on the mother. Although the cross-sectional nature of this work does not permit for determining whether this relationship is due to perceptions of maternal behavior in childhood/adolescence that persist into adulthood or is a function of the emerging adults' perceptions of their parent's behavior as they begin to transition towards independence (Leondari & Kiosseoglou, 2002), these findings parallel those in youth in regards to the association between perceptions of parenting and anxiety symptoms (Barber, Olsen, & Shagle, 1994; de Wilde & Rapee, 2008; Thirlwall & Creswell, 2010; McLeod, Wood, & Weisz, 2007; van der Bruggen, Stams, & Bögels, 2008). Considering that the participants in the current study were predominately first year college students and on average approximately 19 years old, future investigations will also be important to determine the timing of this relationship; specifically, whether and when the association between perceived PC and adverse mental health outcomes might diminish as emerging adults continue to develop towards independence. Other important considerations for future work that were outside of the scope of the present study include emerging adult perceptions versus parent perceptions (versus objective measures) of parenting behavior, and the likely interactive influences of parenting behavior and youth behavior (Pettit, Laird, Dodge, Bates, & Criss, 2001). Nonetheless, this study adds to the small but growing literature indicating that perceived parenting behavior is linked to psychological maladjustment in emerging adults (Abaied & Emond, 2013; García Mendoza, Sánchez Queija, & Parra Jiménez, 2018; Leondari & Kiosseoglou, 2002; Luyckx, Soenens, Vansteenkiste, Goossens, & Berzonsky, 2007; Manzeske & Stright, 2009; Urry, Nelson, & Padilla-Walker, 2011).

As predicted, perceived PC was also associated with both subjective and objective measures of emotion regulation. In regard to subjective emotion regulation, emerging adults who perceived higher levels of PC from their mother also perceived themselves to have greater

difficulties with emotion regulation. This suggests that these individuals are at least somewhat aware of struggles to manage their emotions and emotional responses to events.

Similarly, in regard to objective regulation during a laboratory stressor, compared to emerging adults who perceived lower levels of maternal PC, those who perceived higher maternal PC exhibited greater suppression in respiratory sinus arrhythmia (RSA) over the course of the stressor task, reflecting greater physiological exertion (i.e., poorer emotion regulation). RSA trajectories did not significantly differ between emerging adults who self-reported low and mean levels of perceived maternal PC. Somewhat surprisingly, mean values of RSA during the TSST did not differ between emerging adults who self-reported higher and low perceived maternal PC at any task time point, but those who reported high PC *did* differ from those reporting mean levels during the math task and recovery period. Taken in the context of the quadratic time effect (i.e., curvilinear relationship between PC) and group x time slopes over the course of the stressor, it appears that the significant RSA suppression that occurred for the group reporting high PC (particularly during later stages of the TSST and recovery period) may account for this finding. No mean group differences were found during the job preparation or interview segments (i.e., the first portions of the stressor). This may be due, at least in part, to the baseline levels of RSA in this sample (although groups did not significantly differ from each other) and/or due to the fact that the timing of parasympathetic reactivity occurs over the course of minutes rather than milliseconds (as does sympathetic reactivity), and often requires several minutes to modulate initial sympathetic reactivity (Appelhans & Luecken, 2006). Future work might begin to clarify whether objective emotion regulation measures should be best measured in terms of slope change over the course of a stressor, mean reactivity during a particular portion of a stressor, or (most likely) both provide the best measures with which to understand relationships between perceived parental PC and emotion regulation.

Importantly, these data provide the first step in linking PC and both objective and subjective measures of emotion regulation. This multi-method approach allowed us to demonstrate the relationship between PC and emotion regulation during an acute stressor as it occurred in real time; future work might extend this work to real-life stressful experiences rather than laboratory tasks. Additionally, future work might use more ecologically valid tasks (e.g., extending the literature on parent-child interactions to parent-young adult interactions; Hudson & Rapee, 2001; Gonzalez, Moore, Garcia, Thienemann, & Huffman, 2011) to directly examine interactions between parents and emerging adults to determine whether results can be replicated.

Finally, the association between perceived maternal PC and anxiety symptoms was partially statistically mediated by self-reported difficulties with emotion regulation. This is consistent with previous assertions that higher levels of perceived maternal PC may undermine the development of autonomy, a sense of control, and emotional independence in children (Chorpita & Barlow, 1998; Nanda et al., 2011). It is possible that PC might interfere with emerging adults' ability to learn emotion regulation or other vital skills (e.g., adaptive coping strategies)—especially if they have experienced PC throughout their formative years—which in turn may interfere with their abilities to successfully respond to demands and

pressures of adult life and put them at increased risk of psychopathology, including anxiety (Campbell-Sills & Barlow, 2007; Mennin, Holaway, Fresco, Moore, & Heimberg, 2007).

While emotion regulation difficulties accounted for a significant amount of variance in anxiety symptoms, it is notable that there was a remaining association between perceived maternal PC and anxiety levels of emerging adult offspring that was not accounted for by emotion regulation. Future work is needed to elucidate other variables that might link PC to increased anxiety in offspring, including parental anxiety and other familial processes, as well as the long-term effects of repeated exposure to and/or perceptions of PC. Alternatively, it is also possible that anxious emerging adults are more likely than non-anxious emerging adults to perceive their mothers as psychologically controlling due to biased perceptions about the source of anxious feelings and/or their ability to manage interpersonal conflict or interactions more generally. Finally, prospective longitudinal work would allow these associations to be tested in true mediation models with temporal precedence to examine how these relationships may unfold over time.

4.1. Limitations

Results of this study should be interpreted in light of its limitations. The study was cross-sectional, taking place over the course of a single laboratory visit; therefore, we were only able to examine associations and are not able to speak to the time course of these relationships. It is possible that other, non-measured variables might be associated with the variables examined in this study and might illuminate some of these processes further. For example, PC is only one parenting behavior that has been associated with offspring psychopathology; other behaviors such as lack of warmth or autonomy granting have also been implicated in youth adverse outcomes, although they tend to be more closely related to depression (e.g., Sheeber, Davis, Leve, Hops, & Tildesley, 2007). RSA was not tested as a mediator of the association between perceived PC and anxiety for a number of reasons: RSA was measured “longitudinally” (i.e., in real time over the course of a stressor task) therefore cannot mediate non-temporal outcomes, and we did not collect longitudinal data to be able to determine whether RSA influenced anxiety during the stressor or whether prior state or trait anxiety predicted RSA withdrawal during stress. As described above, future longitudinal work is needed to examine how these variables might relate and influence one another over time from childhood through emerging adulthood. Future studies might also use other biological measures, such as catecholamines (e.g., as in saliva), that may or may not replicate our findings in the examination of psychological control, emotion regulation, and anxiety, or might use tasks other than the TSST—which is socially and performance-based—to examine a range of stress responses to different types of stimuli. In addition, PC and anxiety were measured as a self-report; therefore, we can only examine associations with emerging adult *perceptions* of parenting and cannot exclude the possibility that emerging adults who subjectively feel more anxious might also be more likely to perceive their mothers as more psychologically controlling. Although research is needed to determine the extent to which actual parenting behavior and offspring perception of behavior are related to offspring outcome, the *perception* of one’s parent as psychologically controlling has implications for psychological adjustment in offspring (Siqueland, Kendall, & Steinberg, 1996). Moreover, prior studies have found that there is poor convergence between perceived

anxiety during a stressor and objective measures (De Los Reyes et al., 2012; Hoehn-Saric & McLeod, 2000). Our goal herein was to examine self-reported trait anxiety as measured by a commonly utilized scale in both research and practice settings, although future investigations may certainly advance the field by also examining *perceived* and *objective measures of anxiety during* a stressor. Similarly, although we did collect information about general psychopathology, these were self-reported endorsement of diagnoses. No diagnostic interview took place and we therefore cannot be certain about the reliability or validity of the diagnoses themselves or their rates (they are likely underestimates). Further, the gender ratio in the emerging adult sample was quite uneven (76.8% female) and participants were primarily first-year college students approximately 19 years of age, making a replication of the study advisable. It is possible that first-year college students are experiencing more anxiety due to the adjustment to college and/or entrance into the beginning stages of emerging adulthood and the same associations might not be seen in samples with a wider age-range of emerging adults. Finally, this study only considered the relationship between perceptions of mothers' PC and offspring's anxiety. Examination of perceptions of *paternal* PC is warranted in future work.

A major strength of this study was its multi-method approach, which allowed us to examine both objective and subjective measures of emotion regulation and glean insight into emerging adults' differing experience when faced with an acute laboratory stressor.

Additionally, even though a college sample was used, the sample was diverse both in terms of ethnicity/race, and in terms of college experience: many of the emerging adults commuted to school, roughly half still lived with their parents, and a significant portion was fairly financially independent of their parents.

4.2 Clinical Implications and Future Directions

This study was the first to examine the association between perceived PC, anxiety symptoms, and both subjective and objective measures of emotion regulation in emerging adults. The findings provide valuable preliminary data that may expand existing models of anxiety development to emerging adulthood and rich data for hypothesis generation in future longitudinal designs. Specifically, this work expands three previously distinct fields of research: by 1) extending PC and anxiety in childhood to emerging adults (McLeod, Wood, & Weisz, 2007), 2) acquiring both objective and subjective measures of emotion regulation, and 3) examining relationships between PC and anxiety, and emotion regulation and anxiety, to link PC and emotion regulation. Considering that parents are usually the first and often one of the most important roles in the lives of many individuals, it is critical to explore all facets and consequences of the dynamic of the parent-child relationship, even as children transition into early adulthood.

If replicated, this work has important implications for anxiety interventions. Currently, the most well-supported anxiety treatments are individual-focused rather than family-focused. Emerging adult and perceptions of, or objectively high psychologically controlling parent behavior may provide useful intervention targets that might reduce symptoms by improving interpretations and/or interaction patterns. Additionally, given prior work that has experimentally manipulated emotion regulation strategy and found it to impact anxiety

symptoms (Gross, 1998; Gross & Levenson, 1997), poor emotion regulation may be a personal risk factor that could be identified and preventatively intervened upon in order to prevent and/or treat anxiety. Ultimately, it may be possible that both psychological control and emotion regulation serve as personalized intervention targets for emerging adults who have elevations in one, the other, or (more likely) both. Altogether, the present findings provide support for relationships between perceived psychological control, (objective and subjective) emotion regulation, and anxiety in emerging adulthood; future studies of these constructs in emerging adulthood may lead to elucidation of anxiety mechanisms for personalized intervention efforts.

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Result Highlights

- Perceived maternal psychological control (PC) is positively associated with anxiety
- Higher PC is associated with greater self-reported emotion regulation difficulties
- Association between PC and anxiety is partially mediated by emotion regulation
- Higher PC is associated with greater overall change in RSA slope during TSST task
- Higher PC is associated with greater RSA suppression during TSST math and recovery

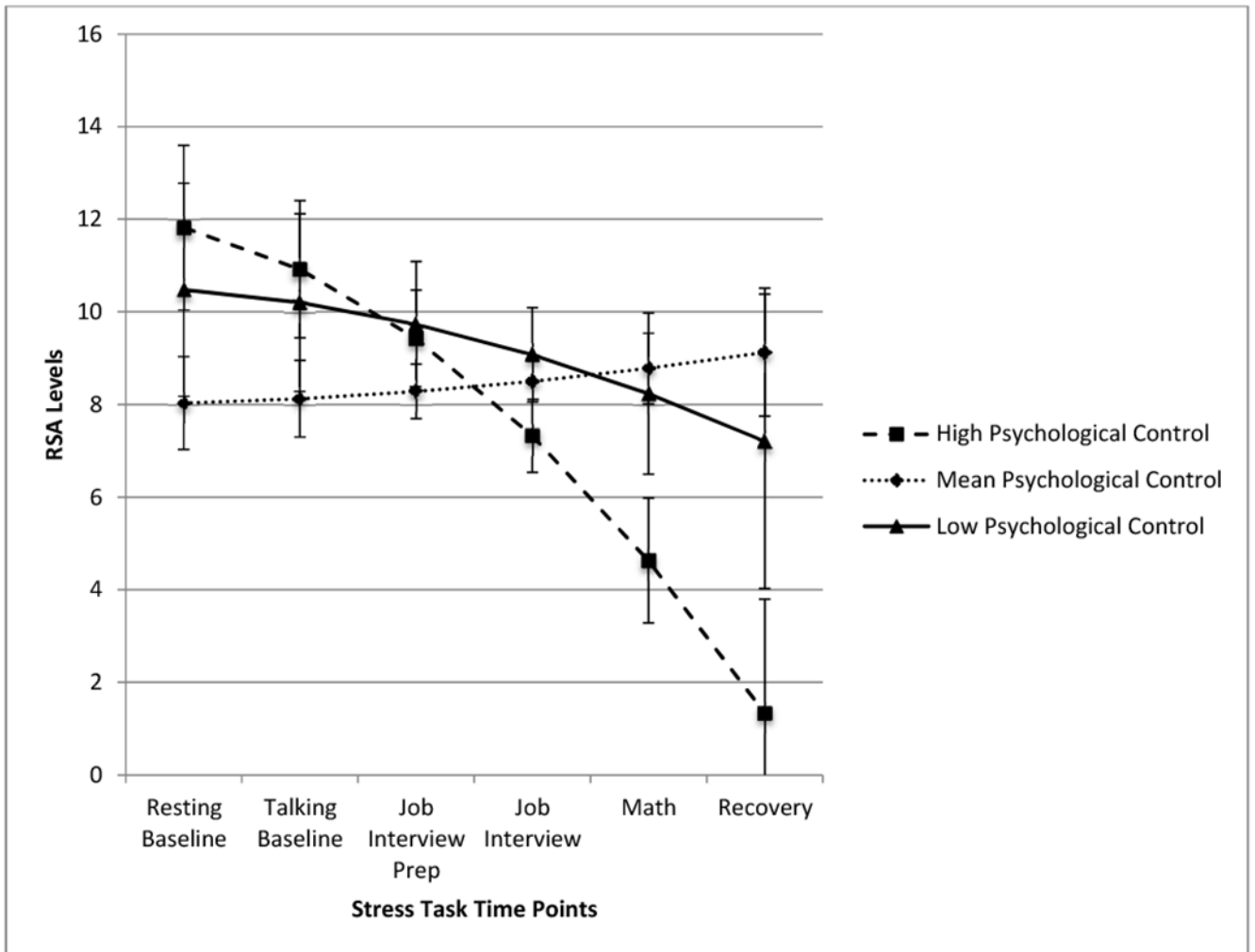
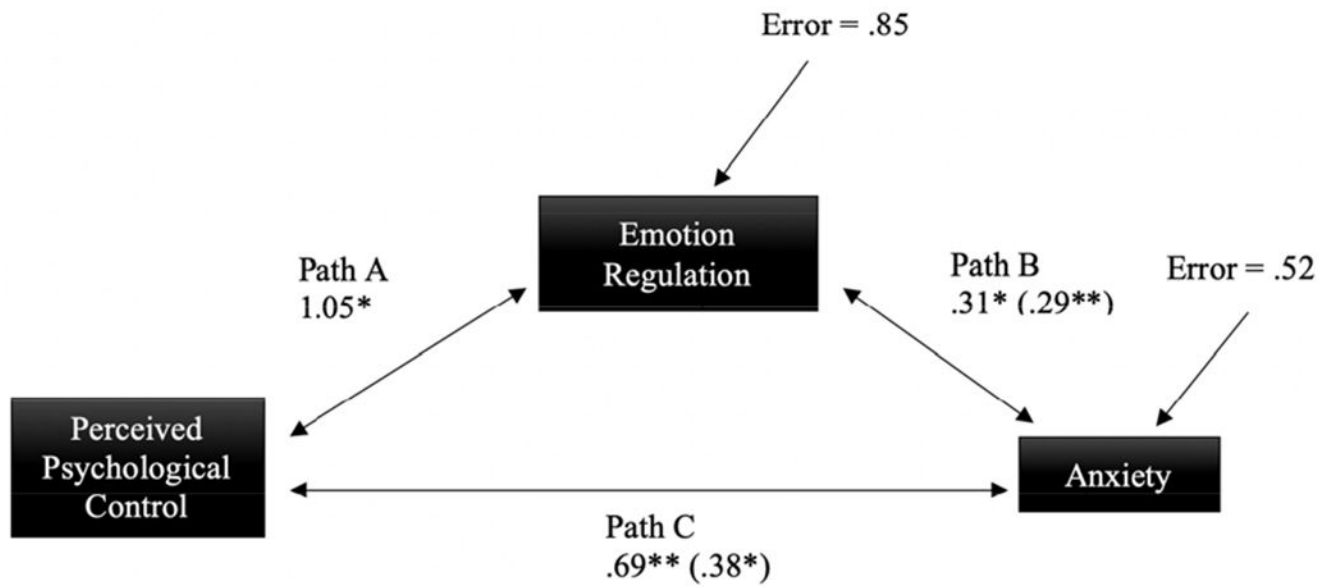


Figure 1. RSA trajectories during stress task at low (1 standard deviation below the mean), mean, and high (1 standard deviation above the mean) levels of perceived psychological control.



Note: Error = $1 - R^2$. * $p < .05$. ** $p < .01$.

Figure 2.
Self-reported emotion regulation partially statistically mediates the relationship between psychological control and anxiety symptoms.

Table 1.Participant Characteristics ($N = 125$)

Age	18.76 (1.34)
Sex (% female)	76.8% female
Race/Ethnicity	
Hispanic/Latino	48%
Asian/Pacific Islander	21.6%
White	16.8%
Biracial	9.6%
Black	2.4%
Other	1.6%
Year in College	
First Year	71.2%
Second Year	17.6%
Third Year or Beyond	11.2%
Living with Parents	59.2%
College Expenses not via Parents	61.6%
Mean Time in Contact with Mom	597.02 min/wk

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Table 2.

Estimates of Fixed Effects: Perceived Psychological Control Predicts RSA Suppression Over Time

Independent Variables	B	SE	<i>p</i>	95% CI	
Psy. Control	- 0.42	0.12	< .001	- 0.66	- 0.19
Time	- 2.83	1.20	.018	- 5.2	- 0.48
Time ²	0.30	0.17	.078	- 0.03	0.63
Psy. Control x Time	0.18	0.07	.007	0.05	0.32
Psy. Control x Time ²	- 0.02	0.01	.029	- 0.04	- 0.002

There were no significant slope differences between groups who self-reported mean levels and low levels of perceived PC ($\beta = 0.21$, SE = 0.18, $t = 1.12$, CI: -0.15, 0.57, $p = .26$).