

ABSTRACT

Title of Dissertation: EXPRESSIVE SUPPRESSION IN
MIDDLE CHILDHOOD: LINKS WITH
NEGATIVE EMOTION,
PHYSIOLOGY, AND PROSOCIAL
BEHAVIOR

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A commonly used strategy for regulating emotions is known as expressive suppression (ES), in which a person attempts to conceal ongoing emotion-expressive behavior. ES has been frequently studied in adults and ample evidence indicates that it is linked to a host of negative outcomes, including depression and anxiety, suicide ideation, worse relationship and social functioning, cognitive impairment, and negative health outcomes. Relatively little is known about ES in children, despite the potential for ES to have lasting consequences on development (e.g., by contributing to a negative developmental cascade in which poor emotion regulation interferes with emerging competencies). The present study used a multi-method approach to investigate the emotional, physiological, and social behavioral correlates of both state and trait ES in middle childhood, a time when patterns

of emotion regulation become more stable. Children ages 9 to 11 ($n=117$) reported their trait ES before coming into the lab, and then were randomly assigned to suppress or not suppress while watching a sad movie scene. Skin conductance was measured during and after the movie scene, and children gave multiple reports of their subjective emotions over the duration of the visit. After the movie scene, all children participated in tasks measuring prosocial behavior and empathy for others' distress. Results indicated that trait suppression predicted skin conductance levels during the movie scene but did not predict emotions or social behavior. Group assignment did not affect outcomes. Exploratory analyses suggested that spontaneous ES of the control group during the movie scene predicted greater subjective feelings of sadness while suppressing. Additionally, exploratory mixed-effects models with child ratings of emotion nested within individuals suggested that trait sadness ES predicted changes in subjective sadness over the duration of the visit.

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EMOTION, PHYSIOLOGY, AND PROSOCIAL BEHAVIOR

by

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Chapter 1: Introduction

Emotion regulation (ER) refers to processes for monitoring, evaluating, and modifying an individual's emotional reactions (Thompson, 1994). It is a widely studied topic in the psychological literature because the way individuals regulate their emotions has far-reaching influences on almost every aspect of their functioning, including mental health and illness, social competence, physical health, relationship functioning, and personal well-being (e.g., Cole & Deater-Deckard, 2009; Cole, Michel, & Teti, 1994; for a review, see Eisenberg, Hofer, & Vaughan, 2007).

Individuals employ a variety of different strategies for regulating their emotions. One commonly used strategy is known as expressive suppression, in which a person attempts to conceal ongoing emotion-expressive behavior. This includes suppression of both negative and positive emotions (e.g., a wife hiding anger from her husband to avoid relationship conflict, a child stifling inappropriate laughter).

Expressive suppression (ES) is characterized by the process model of emotion regulation, which is a framework for categorizing various strategies (Gross, 2002). This model views an individual's emotional reaction as unfolding over time and distinguishes between different forms of ER based on the point along the timeline at which they impact the emotion-generative process. Expressive suppression, for example, occurs after the emotional response has already been activated and thus it involves attempts to regulate the behavioral component of an existing emotion (by, in this case, concealing its outward expression). Other strategies attempt to regulate emotions before they arise or have become fully activated by, for example, cognitively reappraising the significance of an event, thereby lessening its emotional impact. Expressive suppression and other

temporally delayed strategies are known as “response-focused,” as opposed to strategies occurring earlier in the timeline of unfolding emotional response that are known as “antecedent-focused” (e.g., cognitive reappraisal; Gross, 2014).

Expressive suppression has been frequently studied in adults and ample evidence indicates that it is linked to a host of negative outcomes, including depression and anxiety, increased suicide ideation, worse relationship and social functioning, cognitive impairment, and negative health outcomes, including a marker of inflammation that predicts cardiovascular disease (see Gross, 2013, for a review).

Given these negative effects and the fact that expressive suppression is a commonly used ER strategy, understanding more about suppression is an important task for researchers. Specifically, investigating ES in childhood could inform prevention and intervention efforts to discourage the emergence and early reliance on this ER strategy, as well as the subsequent negative outcomes. As many researchers have noted, investing in early intervention/prevention can be more efficient and effective than waiting until problems have already arisen (National Research Council and Institute of Medicine Committee on the Prevention of Mental Disorders and Substance Abuse among Children, Youth, and Young Adults, 2009).

Surprisingly, however, relatively little is known about ES in children, and yet the importance of investigating childhood suppression is highlighted by two widely accepted notions in developmental psychology. First, patterns of organizing, understanding, and expressing emotions become established early in development, and set children onto a developmental trajectory that, while malleable, is increasingly stable over time (Eisenberg, Hofer, Sulik, & Spinrad, 2015). Second, individual differences in children’s ER predict

almost every domain of child development, including mental health, social functioning, emotional well-being, cognition and academic achievement, and physical health (Calkins, 1994; Campos, Frankel, & Camras, 2004; Eisenberg et al., 1995, 2004; Keane & Calkins, 2004; Saarni, Campos, Camras, & Witherington, 2006; Thompson, 1994). Many of the processes known to be negatively affected by suppression in adults (e.g., stress physiology, empathy) undergo critical periods of growth and transformation during childhood. Reliance on suppression during these periods of development may have lasting consequences (e.g., by contributing to a negative developmental cascade in which poor ER interferes with emerging competencies, which then begets further interference in related processes; Blair et al., 2015; Masten & Cicchetti, 2010). To illustrate this point, childhood is a vital time for learning interpersonal skills, such as how to treat others kindly and to act prosocially. Children who successfully learn these skills foster more positive relationships and peer interactions, are better adjusted, perform better in school, and are less likely to be aggressive in later years (see Eisenberg, Fabes, & Spinrad, 2006, for a review). However, successful learning of empathic, prosocial behavior is greatly influenced by a child's ability to regulate his or her emotions (Eisenberg, Spinrad, & Morris, 2013). Poor ER could interfere with this developing skill set, ultimately interfering with other aspects of social and emotional functioning. In summary, studying suppression earlier in development may contribute to a deeper understanding of ways to improve or prevent negative developmental outcomes.

Given the importance of understanding expressive suppression earlier in development, the present study will investigate the effects of ES in children on multiple domains of functioning. Specifically, it will focus on the suppression of negative emotion,

as children learn from a young age that the expression of negative emotions is often responded to less favorably than the expression of positive emotions (Malatesta & Haviland, 1982), and so its regulation can be more difficult to manage (see Webb, Miles, & Sheeran, 2012).

I will first outline the developmental trajectory of suppression to highlight when and how it develops. I will then discuss three important outcomes/correlates of expressive suppression in children: negative emotions, physiology, and prosocial behavior. For each of these, I will present: (a) theory regarding how suppression might influence these factors; (b) a brief summary of evidence for these effects in adulthood, where the majority of evidence can be found; and (c) a review of the available evidence for these effects in childhood, noting gaps in the literature. For a discussion of precursors to individual differences in children's suppression use, as well as a broader discussion and literature review of ES in childhood and adolescence, see Appendix A. After presenting previous research, I will describe the present study aims and hypotheses, followed by the study methods. Then, I will present the data analysis plan and study results. Finally, I conclude by discussing and interpreting the findings in light of previous research, as well as discussing limitations of the present study and directions for future research.

Developmental Trajectory of Expressive Suppression

Crucial to understanding expressive suppression in children is an understanding of when and how it develops. In this section, I will outline the developmental trajectory of suppression, including the normative development of some social and cognitive skills that support its emergence. I will then briefly review evidence for age-related differences in suppression use, as well as evidence for the role of gender.

During infancy and toddlerhood, children rely heavily on caregivers to provide external emotion regulation (Thompson, 1991); within the first few years they increasingly self-regulate with a limited number of strategies (e.g., averting gaze away from distressing stimuli; Eisenberg et al., 2015). Some early self-regulatory roots of the ability to expressively suppress may be evident by 12 months. For example, insecurely attached (avoidant) children can minimize negative emotional expressions directed toward attachment figures, despite having increased physiological indicators of distress; these infants also show more activity in the left prefrontal cortex during stressful events, which is associated with the inhibition of emotional behavior (see Gander & Buchheim, 2015). In addition, a recent study suggests that 1-year-olds can detect inauthentic emotions in other people (Walle & Campos, 2014). This emerging understanding that true emotions can differ from those outwardly presented may underlie children's later suppression of their own emotions.

Between ages 2 and 5, considerable advances in cognitive, sociocognitive, brain, motor, and language development contribute to the emergence of more diverse self-regulatory strategies (Eisenberg et al., 2015). A notable example relevant to suppression is the development of effortful control (EC), which includes the ability to willfully suppress a dominant response in favor of a subdominant response (Rothbart & Bates, 2006). The ability to consciously and effortfully suppress emotional reactions is first observed around age 4, when physiological and structural changes in the prefrontal cortex improve emotion inhibition (Cole, 1986; Eisenberg, Shepard, Fabes, Murphy, & Guthrie, 1998; Moriguchi & Hiraki, 2013). In addition, preschoolers begin to form an explicit understanding that emotional expression does not necessarily match emotional experience (Harris, Donnelly,

Guz, & Pitt-Watson, 1986), due in part to their emerging explicit theory of mind (i.e., the ability to attribute mental states to oneself and others and to understand that others have mental states that differ from one's own; Banerjee & Yuill, 1999; Wellman, Cross, & Watson, 2001). Preschoolers' theory of mind also supports their ability to alter their own outward emotion expressions (Banerjee & Yuill, 1999), perhaps because they can understand that doing so creates a false belief in others (e.g., Peterson, Wellman, & Liu, 2005).

Between ages 6 and 10, developments in children's metacognitive skills allow them to employ more sophisticated, cognitively-based strategies, such as reappraisal and mental distraction (e.g., Terwogt & Stegge, 1995; Zimmer-Gembeck & Skinner, 2011), so behaviorally-based strategies such as suppression become part of a larger repertoire. In line with this developmental progress, frequency of suppression use becomes more trait-like, as some children rely on suppression relatively frequently, whereas other children favor different strategies from their growing repertoire (Penza-Clyve, Zeman, & Sim, 1999; Suveg, Hoffman, Zeman, & Thomassin, 2009). Around age 9, individuals' ER patterns become more stable (Cole & Kaslow, 1988; Cole et al., 1994), and thus habitual use of suppression during this time may be carried forward into adolescence and adulthood. Consistent with the increasing stability of trait suppression, children can provide reliable self-reports of their own trait suppression by age 9, with stability over a 12-month period (Gullone & Taffe, 2012; Penza-Clyve & Zeman, 2002; Zeman, Shipman, & Penza-Clyve, 2001).

During adolescence, increasing cognitive maturity and flexibility contributes to the use of emotion regulation strategies to support long-term goals (Zimmer-Gembeck &

Skinner, 2011). Between the ages 11 and 17, metacognition improves (Weil et al., 2013), which facilitates adolescents' ability to attend to and reflect on their own emotional states (Eisenberg et al., 2015). These trends might lead to the reasonable prediction that suppression declines during adolescence. However, adolescence also brings heightened awareness of the interpersonal consequences for certain emotional displays (Shipman, Zeman, & Stegall, 2001; Zeman & Shipman, 1997). In addition, adolescence may be a period of heightened vulnerability for emotion dysregulation due to functional and structural changes in brain regions involved in emotion generation and regulation (Ahmed, Bittencourt-Hewitt, & Sebastian, 2015). Thus, multiple factors contribute to changes in suppression use during adolescence. In the next section I will summarize the evidence for age-related changes in suppression use, from early childhood through young adulthood.

Age-Related Changes in Suppression Use: Empirical Findings

Studies comparing rates of suppression in early and middle childhood find that older children are more likely to suppress than younger children. Fuchs and Thelen (1988) found that 1st graders were less likely to report that they would hide how they felt from someone else, compared to 4th and 6th graders (who did not differ from each other in likelihood of reporting emotions). Zeman and Garber (1996) reported that 3rd and 5th graders, compared to 1st graders, were more likely to say that they would not show their emotions in hypothetical scenarios. These findings are consistent with evidence indicating that children's understanding of social rules for emotion expression and regulation (i.e., display rules) increases until about 5th grade, when it reaches a plateau (Gnepp & Hess, 1986; Saarni, 1979; Talwar, Murphy, & Lee, 2007; Zeman & Garber, 1996). Thus,

younger children may not fully understand that suppression of emotions is expected in certain circumstances.

Studies comparing rates of suppression from middle childhood through adolescence or young adulthood produce mixed results. Some studies have found that suppression decreases during this period (e.g., Gullone, Hughes, King, & Tonge, 2010; Lanteigne, Flynn, Eastabrook, & Hollenstein, 2014; Larsen et al., 2012), supporting the notion that increasing maturation and experience give rise to more sophisticated, effective emotion regulation strategies (John & Gross, 2004). Other studies, however, found no age-related differences or within-person changes (e.g., Gresham & Gullone, 2012; Gullone & Taffe, 2012; Jaffe, Gullone, & Hughes, 2010; Lantrip, Isquith, Koven, Welsh, & Roth, 2016; Larsen et al., 2013; Sullivan, Helms, Kliever, & Goodman, 2010). Still others (though relatively rare) found the opposite trend (Hollenstein, McNeely, Eastabrook, Mackey, & Flynn, 2012; Zhao, Zhang, & Zheng, 2014), or non-linear trends (e.g., suppression was higher in middle adolescence compared to early and late adolescence; Zeman & Shipman, 1997). A large study across ages 11 to 50 found a main effect in which suppression increased with age; however, the main effect was qualified by an interaction such that age differences were apparent only for sadness and fear, but not anger, suppression (Zimmerman & Iwanski, 2014). Thus, the inconsistent results may be explained by unmeasured moderators of age-related differences.

In summary, suppression use increases in frequency from early through middle childhood, with inconsistent age-related trends thereafter (which are likely influenced by type of emotion suppressed or other unexplored moderators).

Gender

This developmental picture may be complicated by gender, as some evidence indicates males report more suppression than females (e.g., Gresham & Gullone, 2012; Gullone & Taffe, 2012; Gullone et al., 2010; Zhao et al., 2014), whereas other studies find no gender differences (e.g., Penza-Clyve & Zeman, 2002; Zeman, Shipman, & Suveg, 2002) or gender differences based on type of emotion or age of the children (e.g., Fuchs & Thelen, 1988; Zeman & Garber, 1996). In addition, the effects of suppression may differ for boys and girls (e.g., de Veld, Riksen-Walraven, & de Weerth, 2012), as might age-related changes (Gullone et al., 2010; Lanteigne et al., 2014; Larsen et al., 2012). For example, Gullone et al. (2010) found that, while average suppression use decreased longitudinally from age 9 to 15 regardless of gender, the rates of change were relatively stable for males but became less pronounced with age for females. Thus, although gender may play a role, more research is needed to understand how and under what circumstances gender influences suppression and its effects in children.

Links between Expressive Suppression and Negative Emotions, Physiology, and Prosocial Behavior: Theory and Evidence

In this section I will discuss links between suppression and three important domains of functioning: subjective negative emotions, physiological responding, and empathy/prosocial behavior. These domains reflect critical aspects of development that influence a host of other outcomes during childhood.

For each domain, I will first present theory, followed by a summary of evidence in adults, and then a summary of evidence in children. In addition, I will distinguish between evidence for self- or parent-reported habitual (“trait”) suppression and situation-specific (“state”) suppression, given that state and trait ER strategies are likely distinct phenomena

(e.g., Egloff, Schmukle, Burns, & Schwerdtfeger, 2006; Ehring, Tuschen-Caffier, Schnülle, Fischer, & Gross, 2010; Eisenberg et al., 2015; Gračanin, Kardum, & Hudek-Knežević, 2016; Lanteigne et al., 2014; Webb et al., 2012) supported by different neural circuits (Goodkind, Gyurak, McCarthy, Miller, & Levenson, 2010). Last, I will provide a summary of some notable directions for future research. For a more detailed discussion of future directions, see Appendix A.

Suppression and Negative Emotions

A common goal of ER is to increase positive affect and/or decrease negative affect. However, response-focused strategies such as suppression are generally less effective at achieving a desired emotional state (compared to antecedent-focused), because these strategies require effortful management of an emotional response that has already been activated, a process known to deplete cognitive resources (Baumeister, 2014). According to a limited resource model of self-control (Muraven, Tice, & Baumeister, 1998), depleting cognitive resources (i.e., ego depletion) impairs subsequent efforts to self-regulate, including efforts to regulate emotions. Thus, situational (state) suppression may ironically cause *more* negative affect. Indeed, several studies have found that suppression is a cognitively demanding form of ER that impairs subsequent self-control efforts (e.g., Gross, Richards, & John, 2006; Muraven et al., 1998; Richards & Gross, 1999, 2000; Richards, Butler, & Gross, 2003; Szczygieł & Maruszewski, 2015), and a recent meta-analysis found that ego depletion leads to heightened negative affect (Hagger, Wood, Stiff, & Chatzisarantis, 2010), an effect which may occur simultaneously or for a period after regulatory efforts have ended, before cognitive resources have been replenished (Geisler & Schröder-Abé, 2015).

Suppression may also be less effective at altering negative emotions because attempts to monitor and control thoughts or emotions often have the paradoxical effect of making them more salient. According to Wegner's (1994) ironic process theory of mental control, when an individual suppresses, an unconscious monitoring process scans their ongoing thoughts or feelings, comparing them to the suppressed content in order to detect failures. The need to hold in mind the suppressed content makes it more mentally accessible (Wenzlaff & Wegner, 2000). Although this theory is traditionally about cognitive control and thought suppression, the same monitoring processes may apply to behavioral expressions, because individuals must be continually aware of their outward presentation, comparing it to their desired state.

In addition to temporary increases in negative emotion induced by state suppression, trait suppression may also contribute to chronically elevated negative affect and associated psychological symptoms. Children express negative emotions to communicate effectively with others and to self-regulate (Campos, Campos, & Barrett, 1989). Inhibiting negative emotional expression may interfere with their ability to effectively communicate, resulting in a lack of social support for managing negative emotions and fewer opportunities for developing self-regulation skills. Over time, this could lead to feelings of helplessness and hopelessness in coping with negative emotions and to a state of chronic dysphoria.

Evidence in adulthood. Overall, available evidence in adults supports the notion that both trait and state suppression either increase negative emotions (e.g., Brans, Koval, Verduyn, Lim, & Kuppens, 2013; Dalgleish, Yiend, Schweizer, & Dunn, 2009; Dan-Glauser & Gross, 2011; Geisler & Schröder-Abé, 2015; Gross & John, 2003; Gross et al.,

2006; Matthies, Philipsen, Lackner, Sadohara, & Svaldi, 2014) or do not decrease them (e.g., Gross, 1998; Gross & Levenson, 1993, 1997; Egloff et al., 2006; Kalokerinos, Greenaway, & Denson, 2015). For example, an experience-sampling study of various ER strategies found a link between instances of expressive suppression in daily life and increases in negative affect (Brans et al., 2013). Additionally, a recent meta-analysis indicated that trait suppression is associated with states characterized by heightened negative affect such as depression and anxiety (Hu et al., 2014).

In support of ego depletion as a mechanism of this association, Geisler and Schröder-Abé (2015) found that expressive suppression during a conflict task predicted more negative affect, but this link was absent for individuals with high baseline self-regulatory strength (measured with high-frequency heart rate variability; HF-HRV). They concluded that because these individuals had more self-regulatory resources to draw from, suppression did not interfere with ability to regulate negative affect. In another study, daily reports of suppressing emotions while pursuing a goal (a task requiring cognitive resources) were related to reduced goal effort, competence, and success across time, as well as greater depressed mood (Low, Overall, Hammond, & Girme, 2017).

Evidence in childhood. Whereas several studies provide evidence that children high in trait suppression have more internalizing symptoms (e.g., depression, anxiety) and are more emotionally dysregulated (e.g., Betts, Gullone, & Allen, 2009; Eastabrook, Flynn, & Hollenstein, 2014; Gullone & Taffe, 2012; Hasking et al., 2010; Hughes, Gullone, Dudley, & Tonge, 2010; Hughes, Gullone, & Watson, 2011; Larsen et al., 2012, 2013; Suveg & Zeman, 2004; Tillery, Cohen, Parra, Kitzmann, & Howard Sharp, 2015; Voon, Hasking, & Martin, 2014a; Zeman et al., 2002), few studies have measured how

state suppression is associated with acute emotional responding. In one sample of adolescent girls, spontaneous expressive suppression during a social stress task was positively correlated with subsequent feelings of shame, but not with depressive symptoms, social anxiety, or difficulty regulating emotions (Lanteigne et al., 2014). During a parent-child conflict task, adolescents' observed patterns of emotion regulation were created using latent profile analysis, with one profile representing expressive suppression (i.e., high subjective negative emotion, with low expressed negative emotion, and moderate heart rate reactivity). Contrary to expectations, teens with this profile of emotion regulation had *lower* mother-reported general anxiety symptoms compared to the low reactive profile (Turpyn, Chaplin, Cook, & Martelli, 2015). It is unclear whether this finding suggests suppression is an adaptive emotion regulation strategy during the conflict task, or whether parents of suppressing teens reported fewer symptoms because they less often witness the outward manifestation of anxiety due to the nature of suppression. In a rare experimental study, school-aged children instructed to expressively suppress negative emotion while watching an emotionally-evocative video reported greater negative emotion than when they were instructed to express negative emotions (Musser et al., 2011). In addition, some experimental evidence suggests that suppression reduces cognitive resources in children (Gunzenhauser & von Suchodoletz, 2014), lending support for the role of ego depletion in state suppression.

Suppression and Physiological Responding

Researchers have long been interested in how individuals regulate their physiological stress responses, as adequate stress responding is important for physical and psychological health (Charmandari, Tsigos, & Chrousos, 2005; McEwen, 1998). For

example, repeated and long-lasting activation of the stress system negatively affects immune functioning (e.g., Sapolsky, 2004). Investigating stress responding is especially important during childhood, when physiological systems such as the HPA-axis are still developing, and an individual's reactions to stressors during childhood at least partly determine stress responding later in life (Heim & Nemeroff, 2002). Notably, ER strategies contribute to an individual's ability to regulate physiological responses to stressors, with some ER strategies effectively downregulating the stress response, and others exacerbating it (e.g., Wilson, Barnes-Holmes, & Barnes-Holmes, 2014). Given that suppression is a cognitively demanding, effortful form of ER (Baumeister, 2014), it may be that suppression is physiologically arousing and activates the stress system. Consistent with this idea, ego depletion causes mental fatigue and perceptions of a task as more difficult (see Hagger et al., 2010), which increases sympathetic nervous system arousal because the body compensates for the fatigue and perceived challenge by providing increased energy (Wright, Stewart, & Barnett, 2008; Wright et al., 2007).

Over a longer timescale, trait suppression may also lead to physiological dysregulation during negative or stressful tasks. For example, those who often suppress have fewer opportunities to rely on others for co-regulation and social support, leaving them with fewer strategies for coping with emotional arousal (e.g., Shipman & Zeman, 2001).

Evidence in adulthood. In adults, state suppression has been consistently linked to increased sympathetic nervous system activation, with changes most consistently occurring in electrodermal activity (e.g., Ben-Naim, Hirschberger, Ein-Dor, & Mikulincer, 2013; Butler et al., 2003; Egloff et al., 2006; Gračanin, Kardum, & Hudek-Knežević,

2013; Gross, 1998; Gross & Levenson, 1993, 1997; Kunzmann, Kupperbusch, & Levenson, 2005; Roberts, Levenson, & Gross, 2008). This effect has been replicated across age, gender, and type of emotion suppressed. Trait suppression has been linked to physiological stress responding via increased C-Reactive Protein (a marker of inflammation; Appleton, Buka, Loucks, Gilman, & Kubzansky, 2013) and higher cortisol reactivity during a stressful task (Lam, Dickerson, Zoccola, & Zaldivar, 2009).

Evidence in childhood. Little is known about the physiological effects of specific ER strategies in children (Davis, Quiñones-Camacho, & Buss, 2016), but four studies can shed light on the effects of state suppression. The first study measured 10-year-olds' spontaneous suppression during a social stress task and found it generally correlated with *reduced* stress reactivity (indexed by cortisol and alpha-amylase reactivity; de Veld et al., 2012). The authors suggested that the unexpected results may be due to the correlational nature of the design, as more stressed children may be less able to suppress. In two other studies, school-aged children (some diagnosed with ADHD) watched emotional videos and were told to “imagine what the main character was feeling” (Musser et al., 2011; Musser, Galloway-Long, Frick, & Nigg, 2013). In this within-subjects design, one condition instructed children to suppress emotional expressions, and the other to facially mimic the character's feelings. These studies found no effects of negative emotion suppression on sympathetic nervous system arousal (i.e., cardiac pre-ejection period); however, these findings may not generalize to normative populations, or to instances when children must suppress their own naturally occurring emotions, rather than imagining (and suppressing) a fictional character's emotions. These studies also found that suppressing negative expressions increased children's respiratory sinus-arrhythmia (RSA; an index of

parasympathetic nervous system activity) compared to baseline. The fourth study assessed the heart rate, subjective emotional feelings, and observed emotional expressions of adolescent girls during a social stress test and found no difference in heart rate among girls who suppressed (i.e., girls whose inner emotions differed from their outward expression) compared to girls whose inner emotions matched their outward expressions (Lanteigne et al., 2014).

Five studies have examined links between children's trait suppression and physiological responding. In a sample of adolescent females, no relation emerged between suppression and sympathetic or parasympathetic nervous system activation during a public speaking task (measured using spectral decomposition of heart period data; Hollenstein et al., 2012). In a study described previously, the heart rate of adolescent girls during a social stress test did not differ as a function of suppression (Lanteigne et al., 2014). Similarly, adolescents' cortisol and heart rate reactivity during (and their heart rate and cortisol recovery after) a social stress test were not related to their trait suppression (Shapero, Abramson, & Alloy, 2016). Mother-reported (rather than self-reported) trait suppression was also not related to 9- to 11-year-olds' stress reactivity during a social stress task (measured with salivary cortisol and alpha-amylase; de Veld, Riksen-Walraven, & de Weerth, 2014). School-aged children's suppression was not related to their respiratory sinus arrhythmia reactivity during a frustrating task (Borelli et al., 2017). In addition, although it did not technically assess physiological responding, a sixth study offers some evidence that suppression is associated with health and physical processes in youth ages 10 to 17. This study reported that more frequent hospitalizations for pain crises and

somatization were related to self-reported suppression among youth with sickle-cell disease (Tsao, Jacob, Seidman, Lewis, & Zeltzer, 2014).

Suppression and Prosocial Behavior

As previously mentioned, the ability to act prosocially is an essential part of healthy social development which can influence the quality and quantity of interpersonal relationships. As with emotions and physiology, suppression may impair prosocial behavior through the common mechanism of ego depletion. To the extent that prosocial behavior requires self-regulatory resources (with ample evidence that it does; see Eisenberg, 2010, for a review), children who often suppress may be less able to act prosocially due to reduced volitional resources to act on behalf of others.

Beyond ego depletion, suppression may also reduce prosocial behavior by increasing personal distress. When children are personally distressed, they focus on reducing their own aversive emotions and thus are unable to focus on the needs of others, resulting in less prosocial behavior (e.g., Eisenberg et al., 1989, 1990, 1993). If children's trait and state suppression do indeed result in increased negative emotions and physiological arousal (components of personal distress), these effects may reduce prosocial behavior.

A third potential mechanism stems from the notion that suppressing one's own emotions may result in reduced affective empathy. Affective empathy requires the recognition of another person's emotional state and the ability/willingness to experience a similar emotional state and is a main driver of prosocial behavior (see Decety, Bartal, Uzevovsky, & Knafo-Noam, 2016). Expressing emotions is a social experience, because it means sharing and communicating inner subjective states with others, and yet children

who often suppress do not share their inner emotions, signaling an emotional disconnect between themselves and other people. In a recent study, adults instructed to suppress facial expressions of emotion showed impairment in their ability to recognize others' emotional expressions relative to a control group (Schneider, Hempel, & Lynch, 2013). Thus, it may be that state suppression temporarily disrupts a person's ability to connect with or recognize the emotions of another person, which would also disrupt empathy and attempts to act prosocially. In contrast, two recent studies found that trait suppression predicted *increased* responsiveness to others' affective cues (Aldinger et al., 2013; Petrican, Rosenbaum, & Grady, 2015). The authors explained this hypothesized link by reasoning that individuals who habitually suppress must develop compensatory mechanisms to more sensitively detect emotionally expressive behavior of social partners, because the suppressors' restricted affect often causes social partners to restrict their own affective behavior (Butler, Gross, & Barnard, 2014). Thus, state and trait suppression may differentially relate to prosocial behavior or may influence it through distinct mechanisms.

Evidence in adulthood. A growing body of evidence indicates that adults' suppression has far-reaching interpersonal correlates. For example, in a study of young adults making the transition to college, both trait and state suppression were related to diminished social support, interpersonal closeness, and social satisfaction (Srivastava, Tamir, McGonigal, John, & Gross, 2009). Other studies have found that instructed suppression during face-to-face social interactions led to poor interpersonal coordination, decreased feelings of rapport, disrupted communication, more negative partner perceptions and hostile behavior, and inhibited relationship formation (Butler, Lee, & Gross, 2007; Butler et al., 2003). Likewise, studies of trait suppression reported

associations with lower social support, less relationship closeness, lower peer-rated likeability, and reduced emotion sharing (Gross, 2002; Gross & John, 2003; John & Gross, 2004). Only one study, however, has specifically tested links with adults' prosocial behavior, finding that trait suppression was negatively associated with both cognitive and affective empathy, as well as with self-reported prosocial tendencies (Lockwood, Seara-Cardoso, & Viding, 2014).

Evidence in childhood. Although theory predicts a link between suppression and reduced prosocial behavior in childhood, only a couple studies have investigated this topic. One study reported the lack of an association between trait suppression and empathy in a sample of 9- to 15-year-olds with elevated depressive symptoms (Hughes et al., 2011). Another study with English adolescents found that self-reported trait suppression was related to self-reported peer problems, but not to conduct problems, hyperactivity, or prosocial behavior (Flouri & Panourgia, 2014).

Future Directions

In summary, consistent with predictions made from the process model of emotion regulation, it is clear that suppression is linked to a host of negative outcomes among adults. As a relatively new area of study among children, however, several important questions remain open.

First, an important foundational question must be answered: Does suppression cause these negative outcomes in children, or do these negative outcomes (e.g., heightened stress responding) cause increased reliance on suppression? With so few experimental studies in children, little is known about the direction of effects. Often, researchers frame correlational studies in terms of suppression influencing other indicators of functioning,

such as depression, and interpret positive associations as indication of the negative effects of suppression. However, some longitudinal evidence suggests that adolescent depression predicts increasing suppression over time (and not the reverse; Larsen et al., 2012). In this model, adolescent depression led to decreasing parental support over time, which led the adolescents to more often hide their emotions, possibly because they believed others would not respond supportively to their distress. Evidence such as this highlights the need for more experimental evidence to determine the direction of effects and to infer causality. Given the strong experimental evidence in the adult literature, it is surprising that so few experiments have been done with children.

Related to this point is the issue that many fewer studies have assessed state, compared to trait, suppression in children. Whereas measures of trait suppression reflect more stable, habitual, and long-term tendencies in ER, measures of state suppression can inform the acute and short-term effects of suppression within a particular context. The information gleaned from both trait and state influences together can provide a more complete picture of the nature of suppression in childhood and adolescence, as each construct offers a complementary perspective (individual differences versus contextual). Moreover, there is evidence that these constructs independently influence aspects of development (e.g., Lanteigne et al., 2014). However, given that so few studies have investigated state suppression, even fewer have investigated both state and trait suppression within the same sample. Therefore, more multi-method studies are needed to understand both the acute effects of state suppression and the longer-term influences of trait suppression.

Second, substantial evidence shows that suppression among adults does not reduce negative affect, but ironically often has the opposite effect. Some evidence points to similar relations in childhood, with suppression predicting more psychological distress, but more research is needed, especially on state suppression.

Third, more studies investigating the physiological correlates of children's suppression are needed, in light of evidence that suppression is taxing on the sympathetic nervous system and habitual use of it may negatively impact health (e.g., Gross & Levenson, 1993).

Finally, only two studies have examined the impact of trait suppression on prosocial behavior (with none examining state suppression), despite compelling theory linking suppression to reduced empathy and prosocial behavior, and ample evidence for impaired interpersonal functioning in adulthood.

Present Study

The goal of the present study is to explore these areas for future research using a multi-method approach in which the emotional, physiological, and social correlates of both state and trait expressive suppression in children are examined. Given that state ES must be assessed in a particular context, children's instructed and intentional state suppression of sadness were examined in the present study. State ES was instructed so that suppression could be experimentally manipulated (although exploratory analyses also assessed spontaneous state suppression). State ES was intentional, rather than automatic, so that children could report on their suppression afterward and the success of the experimental manipulation could be determined. Finally, the suppression of sadness was measured, rather than anger, fear, or general distress, for several reasons. First, sadness is

a frequently encountered and regulated emotion, and some evidence indicates that it is more often suppressed than other negative emotions among children (Zeman & Garber, 1996) and adults (Dixon-Gordon, Aldao, & de los Reyes, 2015). Additionally, the relative frequency of sadness experienced in daily life may make sadness easier for children to suppress than fear or anger; indeed, a recent meta-analysis found that ER strategies most effectively regulate sadness compared to other negative emotions (see Webb et al., 2012). Thus, elicitation of sadness, compared to another negative emotion, increased the likelihood that the manipulation of state suppression was successful (i.e., that children were able to suppress when instructed). Moreover, to untangle the influence of suppression per se on physiology from the influence of the elicited negative emotion, the elicited negative emotion should ideally produce a different effect than that produced by suppression. Given that sadness decreases sympathetic nervous system arousal (or does not increase it), whereas fear and anger typically increase it (Fernández et al., 2012; Gilissen, Bakermans-Kranenburg, van IJzendoorn, & van der Veer, 2008; Marsh, Beauchaine, & Williams, 2008), elicitation of fear and anger may increase arousal in both study conditions, but for different reasons (either because of heightened negative emotion or because of suppression; see Kreibig, Wilhelm, Roth, & Gross, 2007).

Children ages 9 and 10 participated in the study, given that patterns of emotion regulation become more stable beginning in middle childhood (Cole & Kaslow, 1988; Gullone et al., 2010), and reliable individual differences in self-reported trait suppression become apparent around age 9 (Gullone & Taffe, 2012; Penza-Clyve & Zeman, 2002; Zeman et al., 2001). Trait suppression was measured with widely used self-report measures. State suppression was experimentally manipulated by random assignment of

children into 1 of 2 conditions while they watched an emotionally evocative movie scene: Children in the *suppression condition* were told to hide how they are feeling on the outside, whereas children in the *control condition* were given no specific emotion regulation instructions.

Both state and trait suppression were included in the present study because, given evidence that it may be the over-reliance on a given ER strategy rather than suppressing in any single context that has social or emotional costs (Bonanno & Burton, 2013; Diamond & Aspinwall, 2003), perhaps only trait suppression will predict the outcomes. Trait suppression is a more generalized construct, covering a range of contexts, and so measures of trait ES can address research questions about habitually suppressing over time. State suppression addresses research questions about the immediate, acute effects of suppressing in a given instance, and so can answer questions about causality.

Children's subjective emotional reactions were measured using self-ratings of emotions during and after the movie scene. Their physiological reactions were measured using indices of sympathetic nervous system arousal (i.e., electrodermal activity) collected while participants watched the scene and shortly afterward. Sympathetic, rather than parasympathetic, nervous system arousal (and specifically electrodermal activity) was chosen as the index of physiology because: 1) as described above, theories linking suppression to increased health problems involve chronic activation of the sympathetic nervous system (SNS), and electrodermal activity is a widely-used, easily interpretable measure of SNS activity. 2) PNS reactivity is thought to reflect self-regulatory effort (Porges, 1995), and some previous studies found that activation of PNS was associated with multiple ER strategies, including suppression, suggesting that using an ER strategy

requires self-regulatory effort (e.g., Butler, Wilhelm, & Gross, 2006). Thus, it may be that changes in PNS due to suppression would not differ from changes in PNS due to other ER strategies (including those linked to positive outcomes), leaving doubts about whether changes in PNS due to suppression are meaningful for developmental outcomes.

Consistent with this interpretation, studies with children find that ER strategies linked to positive outcomes, such as cognitive reappraisal and distraction, are related to PNS reactivity in the same way as suppression is related to PNS reactivity (Davis et al., 2016; Musser et al., 2011, 2013). In other studies, suppression effected SNS but not PNS (e.g., Demaree, Robinson, Everhart, & Schmeichel, 2004; Demaree et al., 2006). 3) No previous studies of children's suppression and physiology have examined electrodermal activity as an outcome, despite it being consistently related to adults' suppression; this is an important difference from previous studies because most previous studies did not find a link between suppression and children's physiology, leaving open the possibility that the physiological effects of suppression manifest in increased electrodermal activity, but not in other ways.

Social behavior was measured via observations of participants' prosocial comforting and helping behavior and empathic responding after the movie scene. A few additional measures served as checks for the effectiveness of the manipulation: (a) children's facial expressions were video-recorded for later analysis in order to determine whether children in the suppression condition were less expressive during the movie scene; and (b) after the movie scene, children were asked the extent to which they used suppression as an emotion regulation strategy during the video (following de Veld et al., 2012). Finally, to address concerns that there may be third variables influencing both

children's suppression and their behavior on the outcome variables (thus creating spurious relations between suppression and the outcomes), I included several measures as covariates, to control for their influence.

Hypotheses and aims

See Table 8 for a summary of all study hypotheses (and Table 9 for a summary of exploratory hypotheses).

Aim 1: To examine links between expressive suppression and subjective negative emotions in typically developing children.

Hypothesis 1a: Children randomly assigned to suppress their emotional expressions will experience greater increases in subjective negative emotion during and after exposure to a distressing stimulus relative to children assigned to not suppress.

Hypothesis 1b: Children's trait expressive suppression will be positively related to increases in their subjective negative emotions during and after exposure to a distressing stimulus.

Aim 2: To examine links between expressive suppression and physiological responding in typically developing children.

Hypothesis 2a: Children randomly assigned to suppress their emotional expressions will be more physiologically aroused during and after exposure to a distressing stimulus relative to children assigned to not suppress.

Hypothesis 2b: Children's trait expressive suppression will be positively related to physiological arousal during and after exposure to a distressing stimulus.

Aim 3: To examine links between expressive suppression and prosocial/empathic behavior in typically developing children.

Hypothesis 3a: Children randomly assigned to suppress their emotional expressions will be subsequently less prosocial and less empathic toward another person relative to children assigned to not suppress.

Hypothesis 3b: Children's trait expressive suppression will be negatively related to their prosocial behavior and empathy toward another person.

Justification for hypotheses.

I hypothesized that suppression would increase children's sadness because of theory and evidence from studies of both adults and children. Despite the mixed results in adults (i.e., some studies find that suppression increases negative affect and some find that suppression does not influence negative affect), the weight of evidence is in favor of a positive link between suppression and negative emotion. In addition, the evidence in children also points to a positive link: The study most similar to the present study (Musser et al., 2011), which examined the same age group and had children watch emotional movie scenes after being instructed to suppress, found that instructed suppression of negative emotion predicted greater negative emotion. However, given that only one study tested the effects of instructed suppression in children, and only two tested the relations of state suppression to children's emotions (both finding mixed results), it is possible that state suppression is not linked to children's sadness. Additionally, given that no studies have yet tested the relation of children's trait suppression to sadness, my hypotheses were derived from theory and adult research only.

I hypothesized that suppression would increase children's physiological arousal because there is evidence in both adults and children that suppression results in ego depletion, which can increase physiological arousal because the body compensates for the

fatigue and perceived challenge by providing increased energy (Hagger et al., 2010; Wright et al., 2008). Theory also points to the link between trait suppression and physiological arousal (e.g., social baseline theory). Although the hypothesis is consistent with many studies in adults, it is not consistent with most previous studies of children's suppression and physiology, which generally find no link. However, the foundation of my hypothesis rests on the fact that no previous studies with children measured electrodermal activity – an index of sympathetic nervous system arousal that is most consistently linked to physiology in adults. There were several ways in which the present study differed from previous studies, and those differences were selected because of their potential to reveal a link between children's suppression and physiology (e.g., measuring sadness rather than anger or frustration, which is more likely to decrease rather than increase arousal, thereby allowing the effects of suppression to be detected as an opposing effect). However, given the mixed results and sparse previous research in children on this topic, it is possible that there is no link between suppression and physiology in children (despite theoretical reasons for believing there may be).

I hypothesized that suppression would decrease children's prosocial behavior and empathy for similar theoretical reasons as described above (i.e., evidence in both adults and children that suppression results in ego depletion). Ego depletion impairs an individual's subsequent attempts to engage in behaviors requiring self-regulation, such as prosocial and empathic behavior (which involve effortful control, focused attention, regulating personal distress, and the ability to shift attention away from the self and the present activities in order to divert resources to help another person). Despite this theory, previous evidence in adults and children suggests that there is no link between suppression

and these social behaviors. However, my hypothesis is based on the fact that there were several ways in which the present study differed from previous studies. For example, differences included the age of the sample, the fact that the outcomes were observed rather than self-reported, and the inclusion of multiple, independently-coded types of prosocial/empathic responding. Moreover, despite previous research not finding a link between suppression and prosocial/empathic behavior, several previous studies with both adults and children suggest that suppression impacts social behavior in meaningful ways. For example, suppression during social interactions leads to poor interpersonal coordination, decreased feelings of rapport, disrupted communication, more negative partner perceptions, and hostile behavior. An individual feeling hostile and disconnected from others would be less likely to act prosocially or feel empathic toward them. Because of these compelling findings pointing to the many social effects suppression can have, and the fact that only two studies specifically examined prosocial behavior or empathy as an outcome, my hypothesis was consistent with the theory and related research (rather than the sparse previous research, which may not be replicable).

In summary, although my hypotheses are inconsistent with some previous research, they are based upon: a) well-supported theory; b) differences between the present and previous studies; and c) evidence that suppression can influence social behavior in significant ways. Despite my hypotheses, however, the possibility remains that the mixed (and lack of) previous research accurately reflects the null relation between children's suppression and some of the outcomes.

Chapter 2: Method

Participants

Children and a legal guardian were recruited across 6 months through flyers distributed at public elementary schools and posted at public locations such as grocery stores or museums, as well as through informal means (e.g., recommendations, list serves, social media; see Appendix B). Inclusionary criteria for children included: 9 or 10 years old, proficient in English, and typically developing (i.e., no diagnosis of a developmental disorder such as Autism). Inclusionary criteria for the legal guardian (hereafter referred to as “parent”) included: a primary caregiver of the child who lives with the child, proficient in English, and at least 18 years old. If a parent had more than one eligible child, the youngest child was selected for participation.

One hundred and seventeen dyads met eligibility criteria and participated in the study; 58 children were randomly assigned to the suppression groups and 59 to the control group. Of these 117 dyads, 1 did not receive the intended manipulation (one child refused to watch the movie scene and so did not receive the suppression instructions). See Figure 1 for a flowchart detailing participant retention and withdrawal, and Table 1 for participants’ demographic information by experimental group. An *a priori* power analysis of multiple regression models, with power set at 0.80 and Type I error rate of 0.05, indicated that a sample size of 81 would be sufficient to detect a medium effect (which is comparable to effect sizes found in previous studies with adults; e.g., Gross & Levenson, 1997).

Procedure

Interested parents were sent more information and scheduled for a single visit to the laboratory. Before visiting the laboratory, children were sent a link to answer a series of Likert-type questions assessing their trait suppression, which they were required to complete at least 24 hours before visiting the lab so that their responses to questions about trait suppression were less likely to influence their responding in the laboratory. The number of days that passed between children finishing this survey and attending the laboratory visit ranged from 1 to 62 ($M = 8.78$, $SD = 10.00$).¹ This survey also included some filler items so that the purpose of the study was not obvious. In addition, I asked parents about the child's gender and race/ethnicity before they came into the laboratory (so that the child could be randomized before arrival), as well as the child's month and year of birth and the parent's relationship to the child (to confirm eligibility).

Once in the laboratory, parents provided written informed consent and children provided verbal assent to participate (see Appendix C for consent and assent forms). Children were randomly assigned to either the suppression or control condition the day before their visit. The experimental conditions were stratified by gender and race/ethnicity to ensure equivalence on these dimensions. See Appendix D for more information about randomization, stratification, and procedures to maintain blindness in study personnel.

After providing informed assent, children went into a separate room with an experimenter while the parent went into an adjacent room. In the adjacent room, parents completed questionnaires assessing family and child demographic information, information about the child's caffeine consumption in the past 72 hours (as this may affect physiological measurements), and other constructs that served as covariates to control for their influence on the link between suppression and the outcomes (e.g., about the parent-

child relationship, child temperament and ER capacity, parent personality and behavior). Children were first familiarized with the equipment used to measure physiological reactions. They provided a baseline of their skin conductance level (SCL) during a two-minute resting period and during a two-minute period of watching affectively neutral pictures (following Musser et al., 2011, 2013; this type of baseline accounts for the physiological response of orienting and attending). Then, children were trained to rate their feelings of happiness, sadness, anger, and fear using 4-point scales (only sadness was used in the present study as an outcome, but the other emotions were used as potential baseline covariates; they were also included so that children did not focus on sadness). Children rated their current subjective emotions to provide an emotional baseline.

After providing baseline data, children began the experimental procedure. All children were told that they will watch a movie scene (which might be emotional), to watch and listen carefully, that they will be video-recorded, and that the video will be watched later by some other people to help them learn more about children. Then, condition-specific instructions followed. Children randomly assigned to the *suppression condition* were told: “For this part, while you're watching the movie scene, we don't want you to show how you're feeling with your face or your body. Nobody should be able to see what you're feeling by looking at you. So, as you watch, try your best to not show the camera how you really feel.” Following Richards and Gross (2000) and Gunzenhauser and von Suchodoletz (2014), the suppression instructions provided several variations in wording to ensure comprehension. Children in the *control condition* were not given any additional instructions (adapted from Davis et al., 2016). The comprehension of children in both conditions was checked by asking, “So what are you going to do while you

watch?” If children answered incorrectly or did not know, the instructions were repeated until the child answered correctly (following Davis et al., 2016). See Appendix E for the full suppression task instructions.

While watching the movie scene, children’s skin conductance levels were measured, and their facial expressions were video-recorded. After the scene, the experimenter took away the video-camera that they had previously told the children was recording them for other people to watch later, told the children that this camera will not be recording them anymore, and told them that this part of the study is done. In addition, the experimenter told children in the suppression condition, “Now that the movie scene is over, you don’t have to think about the instructions I gave you anymore, ok?” These statements were made to end any continuing suppression beyond the task, and to demonstrate a clear end to the task in which children were being watched by others. Then, children were asked: (a) to rate the emotions they felt while watching the scene, (b) to rate their current emotions, (c) to report the extent to which they used expressive suppression during the movie scene, and (d) whether they had seen the movie before.

After the experimental procedure, all children completed a task assessing their empathy and two tasks assessing their prosocial behavior. In between these tasks, children did a neutral activity with the experimenter (i.e., playing in the sandbox). This “filler” task had two purposes: 1) to separate the measures of empathy and prosocial behavior in time, and 2) to allow the child time to become comfortable and familiar with the experimenter that will display distress (and toward whom the child will be given the opportunity to respond prosocially).

After the empathy and prosocial behavior tasks, children were asked to rate their current emotions once more. Before leaving the laboratory, children watched two movie scenes intended to improve their mood. Upon leaving, parents and children were thanked, and children received a science certificate and \$10 as compensation.

All study procedures and materials were approved by the University of Maryland Institutional Review Board before data collection began (see Appendix F for the Approval Letter). The entire laboratory visit lasted approximately 60 minutes. See Appendix G for more information about the laboratory visit procedure timing and for the visit script.

Measures and materials

Demographic information. Before coming to the laboratory, parents reported their child's age, sex, and race/ethnicity, and their relationship to their child (e.g., mother, father) via email or over the phone. During their visit, parents also reported their own age, sex, and race/ethnicity, as well as family characteristics, including: number of siblings and sibling ages, annual household income, primary language spoken in the home, marital status, and education levels obtained by the parent. See Appendix H for the full demographic questionnaire.

Trait suppression. Before coming to the laboratory, children rated their trait suppression using a password-protected online survey website, Qualtrics. The survey consisted of some filler items and two trait suppression measures: 1) the expressive suppression subscale of the widely used Emotion Regulation Questionnaire for Children and Adolescents (ERQ-CA; Gullone & Taffe, 2012), and 2) the inhibition subscale of the Children's Sadness Management Scale (CSMS; Zeman et al., 2001).

The ERQ-CA expressive suppression subscale contains four statements that children rate on a 5-point Likert-type scale (1= *strongly disagree*, 5 = *strongly agree*). Examples of statements include: “When I’m feeling bad (e.g., sad, angry, or worried), I’m careful not to show it” and “I keep my feelings to myself.” In the present study, the former item (“When I’m feeling bad...”) was converted into three separate items assessing each of the emotions listed (e.g., “When I’m feeling sad, I’m careful not to show it”). The original ERQ (for adults) assesses two specific emotion regulation strategies (expressive suppression and cognitive reappraisal). The ERQ-CA was adapted for a younger population by simplifying some item content (e.g., “I control my emotions by not expressing them” became “I control my emotions by not showing them”) and by reducing the response scale from a 7-point scale to a 5-point scale.

Psychometric analyses of the ERQ-CA in a large sample of children and adolescents aged 10 to 18 years demonstrated good internal consistency ($\alpha = .75$ Suppression subscale) and stability over a 12-month period (Gullone & Taffe, 2012). The ERQ-CA scales correlate in the expected directions with measures of temperament, personality, and the parent-child relationship (Gullone & Taffe, 2012; Jaffe et al., 2010), and show discriminant validity in relation to adolescent depressive symptoms (Betts et al., 2009). In the present study, the modified suppression subscale of the ERQ-CA demonstrated good internal consistency ($\alpha = .77$).

The CSMS inhibition subscale differs from the ERQ-CA expressive suppression subscale in that it specifically assesses suppression of sadness. Given the present study’s focus on sadness suppression, this scale can provide a more targeted measurement of how children regulate sadness in particular. The CSMS has strong psychometric properties and

has been validated for children as young as age 9 (Zeman et al., 2001). It uses a 3-point Likert scale (1= *hardly ever*, 2=*sometimes*, 3=*often*) and includes 4 items: “I hold my sad feelings in,” “I hide my sadness,” “I get sad inside but don’t show it,” and “I’m afraid to show my sad feelings.” In the present study, the inhibition subscale of the CSMS demonstrated good internal consistency ($\alpha = .77$).

All items in the ERQ suppression subscale were averaged to create a composite of trait suppression (Cronbach’s $\alpha = .77$), and all items from the CSMS inhibition subscale were averaged to create a composite of sadness trait suppression (Cronbach’s $\alpha = .77$). See Appendix I for the trait suppression questionnaires and accompanying filler items.

Sadness-eliciting movie scene. To elicit negative emotion (i.e., sadness), children watched a 3-minute movie scene from the movie *The Champ* (Lovell & Zeffirelli, 1979). The scene depicts a boy crying because his father had been badly injured. In previous research, this scene was selected from a pool of over 250 films as being the most effective at eliciting sadness in an ethnically diverse sample, based on the intensity and discreteness of participants’ emotional responses (e.g., Gross & Levenson, 1995). This scene has also been used successfully to elicit sadness in middle childhood (Rice, Levine, & Pizarro, 2007).

Neutral picture stimuli. Baseline recordings of physiology were taken during an approximately 2-minute presentation of affectively neutral pictures from the International Affective Picture System (IAPS; Lang, Bradley, & Cuthbert, 2005). Pictures were presented on a large iMac computer screen for 5 seconds each in a slideshow format, following recommendations by Lang et al. (2005). Examples of pictures include

landscapes, inanimate objects, and people performing neutral activities (e.g., looking out of a window).

Outcome measures.

Subjective emotions. Children reported their discrete emotions (e.g., sadness and happiness) using simple 4-point scales to indicate the extent to which they feel or felt each emotion, with sadness always rated first, following previous experimental studies of emotion regulation in middle childhood (Davis & Levine, 2013; Davis et al., 2016). The 4-point scales depicted an increasingly high bar to reflect the increasing levels of emotion (see Appendix J). These scales were presented on a computer screen and children recorded their responses electronically.

Physiological reactivity. Continuous recordings of participants' electrodermal activity (EDA) were collected using Biopac MP150 and EDA100C amp. Electrodes were filled with Lectron II Conductivity Gel (hypo-allergenic, chloride-free) and strapped to the end digit of children's index and middle fingers of their non-dominant hand using Velcro straps. Electrodes were applied about 4 minutes before beginning the resting baseline period. EDA was measured in microsiemens.

Data were cleaned and analyzed using Biopac *AcqKnowledge* software, which was time-locked to each segment of the visit. A low pass filter of 1 Hz was applied, and data were resampled at 62.50 samples per second. Mean skin conductance level (SCL) for each child was calculated for each period: during a resting baseline, while watching neutral stimuli, while watching the movie scene for the suppression task, and while watching the movie scene for the empathy task. SCL was manually entered into Microsoft Excel separately by two research assistants, to compare data entry for errors. Discrepancies were

resolved by the first author (J. Gross) and transferred into SPSS for analysis. See Appendix K for the Biopac manual, detailing study protocols for collecting, cleaning, and analyzing physiological data.

Prosocial behavior and empathy. Children's prosocial comforting behavior and empathy were assessed with two measures used previously by Vinik, Almas, and Grusec (2011) with 9- to 12-year-olds (adapted from Davidov & Grusec, 2006; Zahn-Waxler, Radke-Yarrow, & King, 1979).

Empathy task. The first measure assessed children's empathy for the observed distress of characters in a movie scene. Children were told that they would watch a movie scene and that the researchers were interested to know their thoughts and feelings about the movie scene. Then, children watched a 3-minute segment from the movie *Finding Nemo*, in which a father fish watches his son being taken away by a diver and both father and son display considerable distress. Afterward, children were asked to describe their thoughts and feelings about the scene. Responses were video-recorded for later coding.

Responses were rated for levels of empathy toward both characters on a 6-point scale: -1 (negative response; e.g., attributing the outcome to Nemo's disobedience), 0 (no indication of empathy, just a description of the events viewed), 1 (low level of empathy, identification with characters but no explicit empathy; e.g., "Nemo must be scared"), 2 (explicit statement of empathy but not well elaborated; e.g., "I felt sad because Nemo couldn't find his dad"), 3 (medium level of empathy, explicit and well-elaborated statement of empathy; e.g., "If I were Nemo I would feel scared too"), and 4 (high level of empathy, explicit and well-elaborated statement of empathy; e.g., "I felt so bad for Nemo's dad. When you lose a son, that's really hard"). Coders also transcribed all

responses and recorded the number of words in each child's response. This variable was used as a potential covariate, to control for verbal expressiveness.

The coding system, which was refined based on pilot cases, was adapted from a previously used coding system for a similar task that demonstrated good reliability (see Vinik et al., 2011). In the present study, inter-coder reliability on the 75% of cases that were double-coded was calculated using Krippendorff's alpha reliability estimate. This estimate indicated good reliability in the present study ($\alpha = .86$). See the coding section below for more information about coding protocols and see Appendix L for the scoring manual.

Prosocial comforting task. The second measure assessed children's prosocial responding to the simulated distress of an experimenter. While playing together in the sandbox, the experimenter received a text message and said that she needed to check it. Then, displaying visible signs of upset, she explained that her dog was very sick, and she had to wait for the veterinarian to text her back to see if her dog would be OK. After explaining the situation, the experimenter looked at the child for 5 seconds, then looked at her phone for 10 seconds, and then set her phone down while saying, "this just makes me really sad". For the next 2 minutes, the experimenter looked down at the sandbox with visible distress, occasionally stating her distress verbally while glancing at the child (i.e., "I'm really worried about him," "I've had him since he was a puppy!", "I really hope he's OK"). During this time, the child's reactions were video-recorded for later coding, including verbal (e.g., asking how the dog is doing) and non-verbal (e.g., facial reactions of concern, orienting to the experimenter) displays. At the end of the task, the

experimenter received another text message. She checked her phone and was visibly relieved, stating, “He’s OK! I feel much better now!”

Responses were coded on a 5-point Likert-type scale ranging from 1 (no display of prosocial/empathic responding) to 5 (high degree of prosocial/empathic responding).

Prosocial behaviors that were coded included: physical soothing, verbal soothing (“I’m so sorry”), reframing the situation (e.g., “I’m sure your dog will be fine!”), sympathizing with the experimenter (e.g., “I’d be sad too if my dog got sick”), mirroring the experimenter’s sadness (e.g., “oh noooo!”), reflecting on a personal experience with a similar problem in which the situation ended well (e.g., “when my dog was sick, he got better!”), expressing hope (e.g., “I hope he’s OK”), attempts to distract the experimenter from her distress (e.g., by trying to engage her in play), and attempts to fix the situation (e.g., “you could get him some medicine”). The child’s concerned attention (i.e., engaging in the situation without being explicitly comforting) was also coded (e.g., seeking more information about the situation by asking questions, engaging the experimenter in conversation about pets, acknowledging what the experimenter said or the difficulty of the situation). The coding system, which was refined based on pilot cases, was adapted from a previously used coding system for similar tasks that has demonstrated good reliability (see Beier et al., 2018). In the present study, inter-coder reliability on the 88% of cases that were double-coded was calculated using Krippendorff’s alpha reliability estimate. This estimate indicated good reliability in the present study ($\alpha = .88$). See the coding section below for more information about coding protocols and see Appendix M for the scoring manual and coding sheet.

Prosocial helping task. In addition to the prosocial comforting task, another task measured children's prosocial helping behavior. As the experimenter entered the room with a box full of toys for the child to play with, she dropped one of the toys – a cup full of wooden sticks – about 2 feet behind the child. She said, “oops!” and then set the box of toys down next to the child, who was seated at the sand table. The experimenter then paused for a moment, looking at the dropped items and frowning, before starting to pick them up. Children could choose to either begin playing with the toys in the sand table or help the experimenter pick up the dropped items. During this time, children's behavior was video-recorded for later coding.

Responses were coded as 1 if the child helped pick up any items for any length of time and were coded as 0 if the child did not help pick up any items. 100% of the cases were double-coded and inter-coder agreement was 100%.

Manipulation checks.

Facial expressions. Following several previous experimental studies of expressive suppression (e.g., Demaree, Pu, Robinson, Schmeichel, & Everhart; Demaree et al., 2004; Gračanin et al., 2016; Pu, Schmeichel, & Demaree, 2010), children's facial affect during the suppression task was originally planned to be rated on a 9-point scale (1 = absence of any sign of negative emotion, 9 = very frequent and intensive displays of negative emotion). However, due to the lack of variability in children's facial expressions, the coding scale was reduced to a 5-point scale. Also, rather than coding only negative expressions, the scale also included positive emotional expressions (because the suppression task instructions did not specify which valence of emotion to suppress, and some children displayed high positive affect during the suppression task). The coding

scheme was adapted from the Facial Expression Coding System (FACES), which was initially developed to measure expressions in response to film clips and allows for the examination of a participant's entire body expressiveness. Reliability for FACES has routinely been high ($ICC = .7$ to $.99$; Kring & Sloan, 2007).

Coders were instructed to rate the affect by comparing participants' facial expressions during the emotion-inducing portion of the movie scene to their facial expression during the neutral picture stimuli. Video-recordings of participants' facial expressions were viewed in isolation with no sound. In the present study, inter-coder reliability on the 81% of cases that were double-coded was calculated using Krippendorff's alpha reliability estimate. This estimate indicated good reliability in the present study ($\alpha = .80$). See the coding section below for more information about coding protocols and see Appendix N for the scoring manual and coding sheet.

Self-reported state suppression. Following de Veld et al., 2012, an adapted version of the expressive suppression subscale of the ERQ-CA and the inhibition subscale of the CSMS were used to measure state suppression. For example, the original item "I control my emotions by not showing them" was changed to "While watching the movie scene, I controlled my emotions by not showing them." The instructions explained that emotions describe how you feel, and that in this case we want to know how the child had dealt with his or her emotions while watching the movie scene. All items from the ERQ were averaged to create a composite score of self-reported state suppression (Cronbach's $\alpha = .88$), and all items from the CSMS were averaged to create a composite of self-reported state sadness suppression (Cronbach's $\alpha = .80$).

Covariates. To address concerns that there may be additional variables that influence both children's suppression and their behavior on the outcomes (thus creating spurious relations between suppression and the outcomes), I included several covariates to control for their influence. Previous research suggests that aspects of the parent-child relationship could influence both suppression and children's prosocial behavior, physiological responding, and subjective emotions (e.g., parent-child attachment and parental response to child distress). In addition, traits of the parent and/or the child may be important for these variables (e.g., child's general emotion regulation ability, child's gender, parent's attachment style). Therefore, children reported on their attachment to their mother using a paper-and-pencil survey (the Security Scale; see Appendix O), and parents used a password-protected online survey website, Qualtrics, to report on their responses to child distress (the Coping with Children's Negative Emotions Scale; see Appendix P), their parental empathy (the Interpersonal Reactivity Index; see Appendix Q), their child's emotion regulation capacity (the Emotion Regulation Checklist; see Appendix R), their child's temperament (the Early Adolescent Temperament Questionnaire; see Appendix S), and their own adult attachment style (the Experiences in Close Relationships; see Appendix T).

Mother-child attachment. To assess children's perceptions of attachment security with their mother, children completed the Security Scale (Kerns, Klepac, & Cole, 1996; see Appendix O). This 24-item self-report questionnaire is presented in a format developed by Harter (1982) to minimize social desirability biases. Example items include: "Some kids worry that their mom might not be there when they need her, but other kids are sure their mom will be there when they need her," and "Some kids think their mom

does not listen to them, but other kids think their mom listens to them." Children indicated whether the response they chose was "*really true*" or "*sort of true*" for them. Each item was scored from 1 to 4, with higher scores indicating perceptions of greater security. All item responses were averaged to create a composite of mother-child attachment security (Cronbach's $\alpha = .89$). In previous studies, this measure has demonstrated good internal reliability and construct validity (Kerns et al., 1996).

Parental response to child distress. Parental response to child distress (PRD) was measured using the Coping with Children's Negative Emotions Scale (CCNES; Fabes, Poulin, Eisenberg, & Madden-Derdich, 2002; see Appendix P), a 72-item questionnaire in which caregivers rate the likelihood of possible responses to their own child's negative emotions in 12 hypothetical scenarios. The scenarios depict situations in which the child gets upset, angry, or distressed (e.g., "If my child is panicky and can't go to sleep after watching a scary TV show, I would:"), and the responses include six types of response to the emotion: (a) Distress Reactions (e.g., "get upset with him/her for being silly"), (b) Punitive Reactions (e.g., "tell him/her to go to bed or he/she won't be allowed to watch any more TV"), (c) Minimizing Reactions (e.g., "tell my child that he/she is over-reacting"), (d) Expressive Encouragement (e.g., "encourage my child to talk about what scared him/her"), (e) Emotion-Focused Reactions (e.g., "do something fun with my child to help him/her forget about what scared him/her"), and (f) Problem-Focused Reactions (e.g., "help my child think of something to do so that he/she can get to sleep; e.g., take a toy to bed, leave the lights on"). For each scenario, caregivers rate each possible response from 1 (*Very Unlikely*) to 7 (*Very Likely*). I averaged items from the Expressive Encouragement (Cronbach's $\alpha = .89$), Emotion-Focused (Cronbach's $\alpha = .80$), and

Problem-Focused (Cronbach's $\alpha = .75$) subscales to create a measure of Supportive PRD (36 items) and items from the Punitive (Cronbach's $\alpha = .74$), Minimizing Reactions (Cronbach's $\alpha = .83$), and Distress Reactions (Cronbach's $\alpha = .67$) subscales to create a measure of Unsupportive PRD (36 items). The CCNES has been used in multiple previous studies and has high internal and test-retest reliability and concurrent and construct validity (Fabes et al., 2002).

Parental empathy. Parental empathy was measured using the Interpersonal Reactivity Index (IRI; Davis, 1983; see Appendix Q), a 21-item self-report questionnaire with 3 subscales. The perspective-taking (PT) subscale assesses parents' cognitive capacity to assume the psychological perspective of their child (e.g., "I try to look at my child's side of a disagreement before I make a decision"). The empathic concern (EC) subscale assesses parents' compassion and concern for their child (e.g., "I often have tender, concerned feelings for my child when (s)he is going through a rough time"). The personal distress (PD) subscale assesses parents' self-focused negative emotions (e.g., "I sometimes feel helpless when I am in the middle of a very emotional situation with my child"). Each subscale contains 7 items presented as a 5-point Likert-type scale ranging from 1 (*does not describe me well*) to 5 (*describes me very well*). Items from each subscale were averaged to create a composite for each subscale, with higher scores indicating perspective-taking ability (Cronbach's $\alpha = .81$), empathic concern (Cronbach's $\alpha = .65$), or personal distress (Cronbach's $\alpha = .67$). In previous studies, the IRI has demonstrated high internal consistency and test-retest reliability (Davis, 1983).

Child emotion regulation. Children's emotion regulation capacity was assessed using the Emotion Regulation Checklist (ERC; Shields & Cicchetti, 1997; see Appendix

R), a 23-item questionnaire in which parents rate their children's general emotion regulation ability and emotional lability/negativity on two subscales. The emotion regulation subscale measures children's adaptive emotional control, sociability, and self-awareness (e.g., "can say when he/she is feeling sad, angry or mad, fearful or afraid," "displays appropriate negative emotions in response to hostile, aggressive, or intrusive acts by peers"). The lability/negativity subscale measures children's lack of emotional flexibility and negative emotionality/dysregulation (e.g., "exhibits wide mood swings," "is prone to angry outbursts"). Parents responded using a 4-point Likert-type scale ranging from 1 (*rarely/never*) to 4 (*almost always*). Items from each subscale were averaged to create a composite for each subscale, with higher scores indicating greater emotion regulation ability (Cronbach's $\alpha = .67$) or lability/negativity (Cronbach's $\alpha = .84$). The ERC has demonstrated high reliability and convergent validity (Shields & Cicchetti, 1997).

Child temperament. Children's temperament was assessed with the parent-reported Early Adolescent Temperament Questionnaire – Revised (EATQ-R; Ellis & Rothbart, 2001; see Appendix S), a 62-item questionnaire in which parents rate aspects of their child's temperament on 10 subscales: 1) activation control measures the ability to perform an action when there is a strong tendency to avoid it (e.g., "when asked to do something, does it right away, even if s/he doesn't want to"); 2) fear describes the tendency to experience unpleasant affect related to anticipation of distress (e.g., "worries about getting into trouble"); 3) aggression (e.g., "if very angry, might hit someone"); 4) affiliation has to do with the desire for warmth and closeness with others (e.g., "enjoys exchanging hugs with people s/he likes"); 5) attention relates to the ability to focus and

shift attention when desired (e.g., “finds it easy to really concentrate on a problem”); 6) depressed mood (e.g., “feels like crying over very little on some days”); 7) frustration refers to the tendency to experience unpleasant affect related to the interruption of ongoing tasks or goal blocking (e.g., “gets very frustrated when s/he makes a mistake in her/his school work”); 8) inhibitory control involves the ability to plan and suppress inappropriate responses (e.g., “is more likely to do something s/he shouldn’t do the more s/he tries to stop her/himself” [reverse-scored]); 9) shyness refers to behavioral inhibition to novelty and challenge, especially social (e.g., “is shy”); and 10) high intensity pleasure describes the pleasure derived from activities involving high intensity or novelty (e.g., “thinks traveling to Africa or India would be exciting and fun”). Parents responded using a 5-point Likert-type scale ranging from 1 (*almost always untrue of your child*) to 5 (*almost always true of your child*). Items from each subscale were averaged to create a composite for each subscale, with higher scores indicating greater activation control (Cronbach’s $\alpha = .82$), fear (Cronbach’s $\alpha = .55$), aggression (Cronbach’s $\alpha = .74$), affiliation (Cronbach’s $\alpha = .67$), attention (Cronbach’s $\alpha = .75$), depressed mood (Cronbach’s $\alpha = .63$), frustration (Cronbach’s $\alpha = .77$), inhibitory control (Cronbach’s $\alpha = .62$), shyness (Cronbach’s $\alpha = .88$), and high intensity pleasure (Cronbach’s $\alpha = .75$). Based on the results of a principal components analysis with varimax rotation in which three factors with Eigenvalues greater than 1 emerged, I averaged the fear, aggression, depressed mood, and frustration subscales to create the negative emotionality scale (24 items), averaged the affiliation, high intensity pleasure, and reverse-scored shyness subscales to create the positive emotionality scale (20 items), and averaged the activation control, attention, and inhibitory control subscales to create the effortful control scale (18 items). The EATQ-R has been validated among 8-

to 14-year-olds, showing good convergent validity with other personality scales and predictive validity in terms of psychopathological symptoms (Muris & Meesters, 2009).

Parents' adult attachment style. Adult attachment style was measuring used the revised Experiences in Close Relationships Scale (ECR-R; Fraley, Waller, & Brennan, 2000; see Appendix T), a widely-used self-report measure of adult attachment anxiety and avoidance in romantic relationships. Parents indicated the degree to which they agree or disagree with a series of 36 statements (e.g., "I prefer not to show others how I feel deep down," "I worry about being rejected or abandoned") using a 7-point Likert scale ranging from 1 (*Disagree Strongly*) to 7 (*Agree Strongly*). Items from each subscale were averaged to create a composite for each subscale, with higher scores indicating greater attachment anxiety (Cronbach's $\alpha = .90$) or attachment avoidance (Cronbach's $\alpha = .91$). The ECR-R demonstrates good test-retest reliability and good construct validity (Sibley, Fischer, & Liu, 2005).

Coding procedures and reliability

Coders were undergraduate and graduate research assistants, all blind to additional information about the child or parent. There were three coding teams: one for the empathy task, one for the prosocial comforting behavior task, and one for children's facial expressions. Each team had at least two primary coders and one back-up coder (in case a primary coder is unable to complete coding), in addition to the coding supervisor (a graduate student). See Appendix U for the Coding Training and Reliability Plan.

Training procedures. A random selection of recorded videos served as the training videos. Codes generated during the training phase were then discarded, and these

videos were replaced back into the pool of videos to be coded in later weeks once all coders were reliable, but they did not contribute to the final reliability numbers.

The first three videos were coded together in a group, led by the coding supervisor, with detailed explanations and examples. The remaining training videos were coded in private and independently by each coder, including the coding supervisor. These codes were then compared to those obtained by the supervisor and any discrepancies were discussed in depth. Training continued until all coders achieved inter-coder reliability of at least .70 with the graduate supervisor.

Coding procedures. Coders were assigned videos each week, some of which overlapped with at least one of the other coders' assigned videos for that week. Each week, every coder overlapped with every other coder on at least one video and coded at least one video on their own. In all cases, coders were blind to who was coding which video, were not permitted to code in the same room at the same time, and hid their folders containing their codes from all other coders. This was done to ensure that no coder was influenced by any other during the coding process. Overlapping codes were compared each week, and identical scores were retained as final data, whereas discrepant scores were discussed during a weekly meeting in order to determine the final score by consensus and to improve coders' reliability with each other by discussing reasons for the discrepancy. For each task, 75% to 88% of videos were double-coded. Coders were instructed to not code more than 2 hours in a single sitting in order to avoid coding fatigue (with at least 2 hours between each sitting).

The purpose of the weekly meetings was to prevent coder drift by identifying and discussing continuing bias, to review inter-coder reliability based on the overlapping

codes, and to resolve discrepancies through consensus. If consensus could not be reached, the discrepancy was resolved by the graduate supervisor (J. Gross). Three to six videos per week were also coded by a coding supervisor in order to assess the degree of weekly consistency with each of the coders. If inter-coder reliability fell below .70, coders returned to training until reliability was again sufficient. In the end, one coder had to be dropped from the empathy coding team due to failure to reach reliability with the coding supervisor.

Reliability. Inter-coder reliability for all variables was calculated using an SPSS macro called KALPHA, which uses Krippendorff's alpha (Hayes & Krippendorff, 2007), an estimate of reliability for subjective judgments made at any level of measurement, with any number of judges, and with or without missing data. Reliability greater than or equal to .70, otherwise with a percent agreement greater than 90%, is considered sufficiently reliable (Lombard, Snyder-Duch, & Bracken, 2002). Each week, both the cumulative and the weekly reliability was calculated, for each coder with the coding supervisor separately and for all coders together.

Chapter 3: Data Analysis Plan

General Analytic Considerations

All analyses were run using Mplus statistical software Version 6.12 (Muthén & Muthén, 1998-2011) and SPSS Version 22. First, I conducted manipulation checks to determine the success of the experimental manipulations. Then I presented descriptive statistics for all study variables, including means, standard deviations, and ranges, along with the bivariate associations among all key study variables. Finally, I conducted a series of multiple regression analyses to examine the unique contributions of both state and trait suppression to each outcome variable. Additionally, some exploratory analyses were included to inform directions for future studies.

Manipulation Checks

Manipulation checks were performed with a series of t-tests. To determine whether the sad film clips successfully elicited sadness, I compared average levels of sadness after watching the films to average levels of sadness at baseline. To determine whether the suppression condition suppressed more than the control condition, I compared rates of children's self-reported state suppression during the film clips across the two conditions. I also compared average amount of negative emotion in children's facial expressions across the two conditions, to confirm that children in the suppression condition displayed less negative emotion.

Descriptive Statistics and Bivariate Associations

I presented descriptive statistics for all key study variables, including means, standard deviations, and ranges. There are three primary predictor variables (Experimental condition, trait suppression on the ERQ, and trait sadness suppression on the CSMS),

seven outcome variables (subjective sadness during the movie scene and immediately after the movie scene, physiology during the movie scene and after the movie scene, prosocial comforting behavior, prosocial helping behavior, and empathy), and several demographic and control variables (e.g., child gender, child's secure attachment to mother, parent's responses to child distress – including supportive and unsupportive responses).

In addition, I calculated the bivariate correlations among all the key study variables using the Pearson product moment correlation coefficient and examined the expected associations to provide a basis for conducting subsequent multiple regression analyses.

I used t-tests to determine whether the two conditions differed on baseline variables or any demographic characteristics. Confirming initial equivalence of the conditions ensured that any differences found after the movie scene were due to the manipulation and not to pre-existing differences.

Multiple Regression Analyses

First, covariates were selected for each model. All models included baseline levels of the outcome as a covariate (if available). In addition, state suppression (condition) was always included in models with trait suppression as the predictor, and vice versa, in order to determine the influence of each type of suppression above and beyond the other type. A demographic, control, or other baseline variable was also included as a covariate if it was significantly associated with the outcome variable but not associated with a predictor variable (as determined with Pearson correlation coefficients or independent samples t-tests), to increase power.

Second, I examined whether the assumptions of multiple regression were violated by examining outliers and conducting tests of normality, linearity, homoscedasticity, and

multi-collinearity. Following others (e.g., Musser et al., 2011, 2013), I excluded from analyses children with baseline levels of emotion or physiology that were considered outliers, and children who never correctly repeated their condition instructions.

Once all assumptions were tested and the final set of included variables had been determined, I conducted a series of multiple regression analyses to investigate the effect of experimental condition on each of the seven outcome variables, and the relation between both types of trait suppression and each of the seven outcome variables (for a total of 21 models). All standardized and unstandardized coefficients, standard errors, *p*-values, *F*-values, and *R*² values were reported.

Exploratory Analyses

In addition to the primary analyses, I investigated 3 sets of exploratory analyses.

First, to address the possibility that the effect of the manipulation differed for children based on their level of trait suppression, I examined the interaction between state and trait suppression in predicting each outcome. These were exploratory analyses, given that there is both no previous research to support a specific hypothesis and rationale to support opposite predictions. For example, it may be that children who suppress often are more familiar with the task and less upset by it, and so they may not be as negatively affected by it as children for whom suppression is unfamiliar. Alternatively, it may be that children who suppress often are *more* affected by the manipulation, as they may be more emotionally dysregulated in general (due to theory that they would have had fewer opportunities for developing self-regulation skills without experience co-regulating emotions with others; Campos et al., 1989). To do this, I added a step to each model in which the interaction term was included. If the interaction did not significantly predict the

outcome in a given model, then the original model was retained. If the interaction significantly predicted the outcome, then the final model was the one in which the interaction was included. All significant interactions were probed using an online module (Preacher, Curran, & Bauer, 2006) to clarify the nature of the interaction.

Second, to address the notion that the effects of spontaneous (state) suppression may differ from those of instructed (state) suppression, I examined the relations between control group children's self-reported spontaneous suppression during the task and the outcomes. I could only examine control group children's spontaneous state suppression because they were not also *instructed* to suppress. Previous research highlights the importance of considering uninstructed ER use (Opitz, Cavanagh, & Urry, 2015).

Third, analyses related to children's subjective emotions were supplemented with multi-level models in which the emotion self-ratings were nested within persons, predicted by trait suppression or condition. This allowed for the sequential, multiple ratings of emotion to be considered within the same model, increasing power to detect effects of suppression, and allowed for *changes in emotion across time* to be considered as an outcome. These analyses were run in addition to the proposed multiple regression analyses as supplemental information offering a different perspective on the data (due to the fact that the study is powered to detect regression coefficients).

Chapter 4: Results

The results are organized into 5 sections: manipulation checks, descriptive statistics, bivariate associations between key study variables, principal analyses, and exploratory analyses. The principal analyses are subdivided into sections based on each study hypothesis. See Table 8 for a summary of the study hypotheses and primary results and see Table 9 for a summary of the exploratory hypotheses and results.

Manipulation Checks

Paired samples t-tests indicated that children's reported sadness levels before the movie scene ($M = 1.07$, $SD = .29$) were significantly lower than their sadness levels during the movie scene ($M = 2.69$, $SD = .85$), $t(115) = -19.59$, $p < .001$, and after the movie scene ($M = 1.49$, $SD = .58$), $t(115) = -7.17$, $p < .001$, indicating that the movie scene successfully elicited sadness.

Independent samples t-tests indicated that children assigned to the suppression condition reported more state sadness suppression on the CSMS ($M = 2.35$, $SD = .56$) during the movie scene than children assigned to the control condition ($M = 1.88$, $SD = .62$), $t(114) = 4.23$, $p < .001$. Children in the suppression condition also reported more state suppression on the ERQ ($M = 4.08$, $SD = 1.07$) than children in the control condition ($M = 3.09$, $SD = 1.29$), $t(114) = 4.50$, $p < .001$, indicating that the experimental manipulation was successful.

Results also indicated that, although children in the suppression condition ($M = 1.99$, $SD = 1.20$) were observed to be less expressive during the movie scene than children in the control condition ($M = 2.32$, $SD = 1.43$), this difference was not significant, $t(114) = -1.35$, $p = .180$.

Descriptive Statistics

Means, standard deviations, and ranges of all baseline variables and parent-reported covariates are presented by experimental group in Table 2. The suppression condition did not differ from the control condition on any of these variables (nor on any of the demographic variables; see Table 1), indicating initial equivalence of the experimental groups on these variables at baseline.

Means, standard deviations, ranges, skew, and kurtosis of all continuous outcomes variables are presented by experimental group in Table 3. The suppression condition did not differ from the control condition on any of these variables. The only dichotomous outcome variable was children's prosocial helping. Out of 93 children (24 had missing data, as this outcome was added late), 45 helped the experimenter pick up her dropped items (48%). The difference in proportion between the suppression and control groups was not significant, $\chi^2(1, n = 93) = .02, p = .904$.

All outcome variables were approximately normal for both experimental groups (skewness and kurtosis z-scores were within ± 2.58), except for the positive skew of self-reported sadness after the movie scene for the suppression group ($z_{\text{skew}} = 3.33$). Normality for both the suppression and control group was also assessed by visual inspections of Normal Q-Q Plots and histograms, which were consistent with the skew and kurtosis statistics (i.e., all appeared normal except for the positive skew of self-reported sadness after the movie scene for the suppression group). Attempts to normalize this variable through logarithmic transformation were successful at reducing the skew for the suppression condition (skew = .80, $SE = .32$) to an acceptable level. Subsequent analyses involving self-reported sadness after the movie scene used the log transformed variable.

Bivariate Associations between Key Study Variables

Using Pearson correlation coefficients, the bivariate associations between all the key study variables were calculated. Correlations among child-reported and outcome variables are presented in Table 4, and correlations among parent-reported covariates are presented in Table 5.

Correlations among child-reported, outcome, and parent-reported variables were also calculated (see Table 6), but only variables that were significantly associated with at least one other variable type are reported in the table due to space (i.e., parent-reported covariates not appearing in Table 6 were uncorrelated with all outcome and child-reported variables, and outcome or child-reported variables not appearing in Table 6 were uncorrelated with all parent-reported covariates).

Principal Analyses

All principal analyses were done using Mplus statistical software Version 6.12 (Muthén & Muthén, 1998-2011) and SPSS Version 22. In this section, I first report how covariates were selected for each model. Then I report how the assumptions of multiple regression were tested for each model. Finally, I present the results from a series of multiple regression analyses, with one section for each study hypothesis that includes: (a) a description of the basic models used to analyze the hypothesis; (b) the final selection of covariates for the models; and (c) a summary of the results, including all standardized coefficients, standard errors, *p*-values, *F*-values, and *R*² values. See Table 8 for a summary of the study hypotheses and main results.

Selecting covariates for each model. All models included baseline levels of the outcome (if available) as a covariate. In addition, state suppression (condition) was always

included in models with trait suppression as the predictor, and vice versa, in order to determine the influence of each type of suppression above and beyond the other type. Because the two trait suppression measures (i.e., ERQ and CSMS) were highly correlated ($r = .65, p < .001$), I used a composite measure (standardized average) whenever they both would have been predictor variables, in order to reduce multi-collinearity and reduce the number of predictors in the model. In addition, a demographic, control, or other baseline variable was also included as a covariate if it was significantly associated with the outcome variable, but not associated with any predictor variable (as determined with Pearson correlation coefficients or independent samples t-tests), to increase power.

Testing assumptions of multiple regression. For every analysis, I first checked whether the assumptions of multiple regression were met using tests of linearity, homoscedasticity, multi-collinearity, influential points, and normality of residuals.

Following others (e.g., Musser et al., 2011, 2013), I excluded from analyses children with baseline levels of physiology that were considered outliers, and children who never correctly repeated their condition instructions. All children correctly repeated their condition instructions; however, 2 children were considered outliers on their SCL while watching the neutral stimuli (above 3.29 *SDs* from the mean), and therefore were removed from analyses involving SCL.

Continuous outcome variables. The first assumption, linearity, was assessed by visually examining partial regression plots and a plot of studentized residuals against the predicted values for approximate linearity. The second assumption, homoscedasticity, was assessed by visual inspection of a plot of studentized residuals versus unstandardized predicted values for the presence of unequal variance of residuals across levels of the

predicted values. The third assumption, no multicollinearity, was assessed by identifying Tolerance values greater than 0.1. The fourth assumption, lack of influential points, was assessed by identifying cases having standardized residuals or studentized deleted residuals greater than ± 3 standard deviations (outliers), leverage values greater than 0.5, and values for Cook's distance above 1. The fifth assumption, normality of residuals, was assessed by visually examining the histogram of regression standardized residuals and the Normal P-P plot or Q-Q plot of regression standardized residual for approximate normality. In all cases, assumptions were met unless otherwise noted.

Dichotomous outcome variable. Binary logistic regression analyses were used to test models with children's prosocial helping as the outcome variable. The first assumption, linearity of the continuous predictor variables with respect to the logit of the outcome variable, was tested via the Box-Tidwell procedure. The second assumption, no multi-collinearity, was tested through an inspection of correlation coefficients and Tolerance/VIF values. The third assumption, lack of influential points/outliers, was tested by examining the studentized residuals for values greater than ± 2.5 standard deviations. In all cases, assumptions were met unless otherwise noted.

Hypothesis 1a: Children randomly assigned to suppress their emotional expressions will experience greater increases in subjective negative emotion during and after exposure to a distressing stimulus relative to children assigned to not suppress (Models 1 and 2).

Description of basic models. Two models were analyzed, both with experimental condition as the independent variable and child-reported trait suppression (composite) and child-reported sadness at baseline as covariates. Child reports of sadness *during* the movie

scene was the dependent variable in Model 1, and child reports of sadness *after* the movie scene (log transformed) was the dependent variable in Model 2.

For Model 2, the assumption of normality of residuals was somewhat violated (Q-Q plot visual inspection indicated some deviation from the diagonal line). However, the violation was not severe and so no transformations were performed because regression analyses are fairly robust to non-normality.

Additional covariates. Model 1 also included as covariates: parent-reported adult attachment avoidance on the ECR, personal distress on the IRI, and supportive responding to child distress on the CCNES, because these were significantly correlated with the dependent variable (sadness during the movie scene). No other demographic, control, or baseline variables were correlated with the dependent variable.

Model 2 did not include any additional covariates because no other demographic, control, or baseline variables were correlated with the dependent variable.

Results. The predictors in the multiple regression Model 1 explained a marginally significant proportion of variance in children's reported sadness during the film, $R^2 = .10$, $F(6, 109) = 2.12$, $p = .052$. Of the individual predictors, only parent-reported personal distress on the IRI significantly predicted, and parent-reported supportive response to child distress on the CCNES marginally predicted, children's sadness during the movie (see Table 7 for standardized coefficients, standard errors, and p-values).

The predictors in the multiple regression Model 2 did not explain a significant proportion of variance in children's reported sadness after the film, $R^2 = .03$, $F(3, 112) = 1.13$, $p = .341$. None of the individual predictors significantly predicted children's sadness after the movie (see Table 7).

Hypothesis 1b: Children’s trait expressive suppression will be positively related to increases in their subjective negative emotions during and after exposure to a distressing stimulus (Models 3 – 6).

Description of basic models. Four models were analyzed. Models 3 and 4 both included child-reported trait suppression on the ERQ as the primary predictor variable, with experimental condition and child-reported sadness at baseline as covariates. Child reports of sadness *during* the movie scene was the outcome variable in Model 3, and child reports of sadness *after* the movie scene (log transformed) was the outcome variable in Model 4. Models 5 and 6 both included child-reported trait sadness suppression on the CSMS as the primary predictor variable, with experimental condition and child-reported sadness at baseline as covariates. Child reports of sadness *during* the movie scene was the outcome variable in Model 5, and child reports of sadness *after* the movie scene (log transformed) was the outcome variable in Model 6.

Because they have the same outcome variable as Model 2, Models 4 and 6 also had moderate violations of the assumption of normality of residuals (i.e., Q-Q plot visual inspection indicated some deviation from the diagonal line). However, the violations were not severe and so no transformations were performed because regression analyses are fairly robust to non-normality.

Additional covariates. Because they had the same outcome variable as Model 1 (sadness during the movie scene), Models 3 and 5 also included as covariates: parent-reported adult attachment avoidance on the ECR, personal distress on the IRI, and supportive responding to child distress on the CCNES. However, parents’ supportive

responding to child distress on the CCNES was removed as a covariate from Model 5 because it was collinear with a predictor variable (trait sadness suppression on the CSMS).

Models 4 and 6 had the same outcome variable as Model 2 (sadness after the movie scene), and so they also did not include any additional covariates.

Results. The predictors in the multiple regression Model 3 explained a marginally significant proportion of variance in children's reported sadness during the film, $R^2 = .10$, $F(6, 109) = 2.08$, $p = .054$. Of the individual predictors, only parent-reported personal distress on the IRI significantly predicted, and parent-reported supportive response to child distress on the CCNES marginally predicted, children's sadness during the movie (see Table 7).

The predictors in the multiple regression Model 4 did not explain a significant proportion of variance in children's reported sadness after the film, $R^2 = .02$, $F(3, 112) = .85$, $p = .411$. None of the individual predictors significantly predicted children's sadness after the movie (see Table 7).

The predictors in the multiple regression Model 5 explained a marginally significant proportion of variance in children's reported sadness during the film, $R^2 = .09$, $F(5, 110) = 2.04$, $p = .087$. None of the individual predictors significantly predicted children's sadness during the movie, but parent-reported attachment avoidance on the ECR and personal distress on the IRI were marginally predictive (see Table 7).

The predictors in the multiple regression Model 6 did not explain a significant proportion of variance in children's reported sadness after the film, $R^2 = .04$, $F(3, 112) = 1.40$, $p = .288$. None of the individual predictors significantly predicted children's sadness after the movie (see Table 7).

Hypothesis 2a: Children randomly assigned to suppress their emotional expressions will be more physiologically aroused during and after exposure to a distressing stimulus relative to children assigned to not suppress (Models 7 and 8).

Description of basic models. Two models were analyzed, both with experimental condition as the independent variable and child-reported trait suppression (composite) and child baseline SCL (while watching neutral stimuli) as covariates. Children's SCL *during* the suppression task was the dependent variable in Model 7, and children's SCL *after* the suppression task was the dependent variable in Model 8.

Tests for influential points revealed that Model 7 contained 2 cases considered outliers and Model 8 contained 1 outlier (studentized deleted residual values of greater than +/- 3 standard deviations). These cases were removed from analyses of the corresponding model in which they were an outlier.

Additional covariates. Model 7 also included child's frequency of caffeine consumption (parent-reported) as a covariate because it was significantly correlated with the dependent variable, child SCL during the suppression task ($r = -.23, p = .014$), and was uncorrelated with other predictor variables. Other demographic variables were also correlated with child SCL during the suppression task, including child minority status ($r = -.22, p = .019$), parent minority status ($r = -.20, p = .037$), parent marital status ($r = .22, p = .022$), and parent education level ($r = .29, p = .002$), but they were excluded from the final model because they were collinear with another predictor variable (i.e., child SCL while watching neutral stimuli). (Several parent-reported variables were also correlated with the dependent variable but were excluded from the final model because they were collinear with child baseline SCL).

Model 8 also included child's frequency of caffeine consumption ($r = -.19, p = .042$) and parent personal distress on the IRI ($r = -.23, p = .012$) as covariates because they were significantly correlated with the dependent variable, child SCL after the suppression task, and were uncorrelated with other predictor variables. Other demographic variables were also correlated with child SCL after the suppression task, including child minority status ($r = -.26, p = .006$), parent minority status ($r = -.20, p = .034$), parent marital status ($r = .25, p = .007$), parent education level ($r = .35, p < .001$), and parent income ($r = .25, p = .008$), but they were excluded from the final model because they were collinear with another predictor variable (i.e., child SCL while watching neutral stimuli). (Several parent-reported variables were also correlated with the dependent variable but were excluded from the final model because they were collinear with child baseline SCL).

Results. The predictors in the multiple regression Model 7 explained a significant proportion of variance in children's SCL during the suppression task, $R^2 = .90, F(4, 104) = 224.73, p < .001$. Of the individual predictors, child-reported trait suppression (composite), children's frequency of caffeine consumption, and baseline SCL significantly predicted their SCL during the suppression task (see Table 7).

The predictors in the multiple regression Model 8 explained a significant proportion of variance in children's SCL after the suppression task, $R^2 = .84, F(5, 104) = 110.03, p < .001$. Of the individual predictors, only children's baseline SCL significantly predicted, and parent-reported personal distress on the IRI marginally predicted, children's SCL after suppressing (see Table 7).

Hypothesis 2b: Children's trait expressive suppression will be positively related to physiological arousal during and after exposure to a distressing stimulus (Models 9 – 12).

Description of basic models. Four models were analyzed. Models 9 and 10 both included child-reported trait suppression on the ERQ as the primary predictor variable, with experimental condition and child baseline SCL as covariates. Child SCL *during* the movie scene was the outcome variable in Model 9, and child SCL *after* the movie scene was the outcome variable in Model 10. Models 11 and 12 both included child-reported trait sadness suppression on the CSMS as the primary predictor variable, with experimental condition and child baseline SCL as covariates. Child SCL *during* the movie scene was the outcome variable in Model 11, and child SCL *after* the movie scene was the outcome variable in Model 12.

Tests for influential points revealed that Models 9 and 11 contained 2 cases considered outliers and Models 10 and 12 contained 1 outlier (studentized deleted residual values of greater than +/- 3 standard deviations). These cases were removed from analyses of the corresponding model in which they were an outlier.

Additional covariates. Models 9 and 11 had the same outcome variable as Model 7 (child SCL during the movie scene), so they included the same additional covariate (child's frequency of caffeine consumption).

Models 10 and 12 had the same outcome variable as Model 8 (child SCL after the movie scene), so they included the same additional covariates (child's frequency of caffeine consumption and parent personal distress on the IRI).

Results. The predictors in the multiple regression Model 9 explained a significant proportion of variance in children's SCL during the suppression task, $R^2 = .90$, $F(4, 104) = 229.64$, $p < .001$. Of the individual predictors, child-reported trait suppression on the ERQ, children's frequency of caffeine consumption, and children's baseline SCL significantly predicted their SCL during the suppression task (see Table 7).

The predictors in the multiple regression Model 10 explained a significant proportion of variance in children's SCL after the suppression task, $R^2 = .84$, $F(5, 104) = 109.29$, $p < .001$. Of the individual predictors, only parent-reported personal distress on the IRI and children's baseline SCL significantly predicted children's SCL after suppressing (see Table 7).

The predictors in the multiple regression Model 11 explained a significant proportion of variance in children's SCL during the suppression task, $R^2 = .89$, $F(4, 104) = 219.06$, $p < .001$. Of the individual predictors, only children's frequency of caffeine consumption and baseline SCL significantly predicted their SCL during the suppression task (see Table 7).

The predictors in the multiple regression Model 12 explained a significant proportion of variance in children's SCL after the suppression task, $R^2 = .84$, $F(5, 104) = 110.99$, $p < .001$. Of the individual predictors, only children's baseline SCL significantly predicted, and parent-reported personal distress on the IRI marginally predicted, children's SCL after suppressing (see Table 7).

Hypothesis 3a: Children randomly assigned to suppress their emotional expressions will be subsequently less prosocial and less empathic toward another person relative to children assigned to not suppress (Models 13 – 15).

Description of basic models. Three models were analyzed, all with experimental condition as the independent variable and child-reported trait suppression (composite) as a covariate. Children's prosocial comforting behavior was the dependent variable in Model 13, children's prosocial helping behavior was the dependent variable in Model 14, and children's empathy was the dependent variable in Model 15. Because prosocial helping behavior was a dichotomous variable, Model 14 was assessed using logistic regression.

Tests for influential points revealed that Model 14 contained 1 outlier (studentized residual value of -2.92 standard deviations). This case was inspected for potential data entry or procedural errors and other reasons why it would be considered an outlier. Upon further inspection it was determined that this case was the only one in which the parent was unmarried and the child did not help (i.e., 100% of children whose parent was not married helped the experimenter, except for this child). This case was kept in the analysis.

Additional covariates. For Model 13, the dependent variable (prosocial comforting behavior) was significantly correlated with parent education ($r = -.25, p = .009$), child sex ($r = .22, p = .020$), child-reported attachment security ($r = .20, p = .035$), parent-reported perspective-taking on the IRI ($r = .19, p = .037$), and parent-reported child positive emotionality on the EATQ ($r = .28, p = .003$). However, attachment security was excluded from the final model because it was collinear with another predictor variable.

Model 14 also included parent marital status ($r = -.43, p < .001$) and parent education ($r = -.30, p = .004$) as covariates because they were significantly correlated with the dependent variable, child helping behavior, and were uncorrelated with other predictor variables.

Model 15 also included child-reported baseline fear ($r = .19, p = .042$) as a covariate because it was significantly correlated with the dependent variable, child empathy, and was uncorrelated with other predictor variables.

Results. The predictors in the multiple regression Model 13 explained a significant proportion of variance in children's prosocial comforting behavior, $R^2 = .16, F(6, 105) = 3.41, p = .004$. Of the individual predictors, only parent education level and parent-reported child positive emotionality on the EATQ significantly predicted children's prosocial comforting behavior (see Table 7).

The logistic regression Model 14 was statistically significant, $\chi^2(4) = 22.32, p < .001$, Nagelkerke $R^2 = .29$. Of the individual predictors, only parent marital status significantly predicted children's prosocial helping behavior (see Table 7).

The predictors in the multiple regression Model 15 did not explain a significant proportion of variance in children's empathy, $R^2 = .07, F(3, 112) = 2.78, p = .128$. Of the individual predictors, only child-reported baseline fear significantly predicted children's empathy (see Table 7).

Hypothesis 3b: Children's trait expressive suppression will be negatively related to their prosocial behavior and empathy toward another person (Models 16 – 21).

Description of basic models. Six models were analyzed. Models 16, 17, and 18 all included child-reported trait suppression on the ERQ as the primary predictor variable, with experimental condition as a covariate. Child prosocial comforting behavior was the outcome variable in Model 16, child prosocial helping behavior was the outcome variable in Model 17, and child empathy was the outcome variable in Model 18. Models 19, 20,

and 21 all included child-reported trait sadness suppression on the CSMS as the primary predictor variable, with experimental condition as a covariate. Child prosocial comforting behavior was the outcome variable in Model 19, child prosocial helping behavior was the outcome variable in Model 20, and child empathy was the outcome variable in Model 21. Because prosocial helping behavior was a dichotomous variable, Models 17 and 20 were assessed using logistic regression.

Tests for influential points revealed that Models 17 and 20 contained the same outlier (studentized residual value of -3.68 and -2.89 standard deviations, respectively) as the outlier in Model 14. Because the reason it was identified as an outlier was the same as it was for Model 14 (i.e., it was the only one in a cell), this case was kept in the analyses.

Additional covariates. Because they had the same outcome variable as Model 13 (child prosocial comforting behavior), Models 16 and 19 also included as covariates: parent education, child sex, parent-reported perspective-taking on the IRI, and parent-reported child positive emotionality on the EATQ. However, parent education was removed as a covariate from Model 16 because it was collinear with a predictor variable.

Because they had the same outcome variable as Model 14 (child prosocial helping behavior), Models 17 and 20 also included as covariates: parent marital status and parent education. However, parent education was removed as a covariate from Model 17 because it was collinear with a predictor variable.

Models 18 and 21 had the same outcome variable as Model 15 (child empathy), so they included the same additional covariate (child-reported baseline fear).

Results. The predictors in the multiple regression Model 16 explained a marginally significant proportion of variance in children's prosocial comforting behavior, $R^2 = .10$, F

(4, 110) = 3.08, $p = .058$. Of the individual predictors, only child sex and parent-reported perspective-taking on the IRI significantly predicted children's prosocial comforting behavior (see Table 7).

The logistic regression Model 17 was statistically significant, $\chi^2(3) = 19.99$, $p < .001$, Nagelkerke $R^2 = .26$. Of the individual predictors, only parent marital status significantly predicted children's prosocial helping behavior (see Table 7).

The predictors in the multiple regression Model 18 did not explain a significant proportion of variance in children's empathy, $R^2 = .07$, $F(3, 112) = 2.74$, $p = .131$. Of the individual predictors, only child-reported baseline fear significantly predicted children's empathy (see Table 7).

The predictors in the multiple regression Model 19 explained a significant proportion of variance in children's prosocial comforting behavior, $R^2 = .16$, $F(6, 105) = 3.33$, $p = .012$. Of the individual predictors, only parent education level and parent-reported child positive emotionality on the EATQ significantly predicted children's prosocial comforting behavior (see Table 7).

The logistic regression Model 20 was statistically significant, $\chi^2(4) = 22.44$, $p < .001$, Nagelkerke $R^2 = .29$. Of the individual predictors, only parent marital status significantly predicted children's prosocial helping behavior (see Table 7).

The predictors in the multiple regression Model 21 did not explain a significant proportion of variance in children's empathy, $R^2 = .07$, $F(3, 112) = 2.64$, $p = .138$. Of the individual predictors, only child-reported baseline fear significantly predicted children's empathy (see Table 7).

Exploratory Analyses

In addition to the primary analyses, 3 sets of exploratory analyses were conducted. First, to address the possibility that the effect of the experimental manipulation differs for children based on their level of trait suppression, I examined the interaction between state and trait suppression in predicting each outcome (trait suppression was operationalized as the composite average between child-reported suppression on the ERQ and CSMS). To do this, I added a step to each model in which the interaction term is included. All significant interactions were probed using an online module (Preacher, Curran, & Bauer, 2006) to clarify the nature of the interaction.

Second, to address the notion that the effects of spontaneous (state) suppression may differ from those of instructed (state) suppression, I examined the relations between control group children's self-reported spontaneous suppression during the task and the outcomes.

Third, analyses related to children's subjective emotions were supplemented with multi-level models in which the emotion self-ratings were nested within persons, predicted by trait and state suppression. These analyses were run in addition to the multiple regression analyses as supplemental information offering a different perspective on the data. See Table 9 for a summary of the exploratory hypotheses and results.

Interactions between state and trait suppression. In all models that included a term for the interaction between state and trait suppression, the interaction term was non-significant (all $p > .11$; see Table 9).

Spontaneous state and trait suppression models. To test whether spontaneous suppression in the control group was related to children's self-reports of sadness during and after the movie scene, SCL during and after the movie scene, prosocial comforting,

prosocial helping, and empathy, I re-ran the same models described in the primary analyses, with two key differences. First, experimental condition was removed as a predictor (because the dataset contained only control group children) and trait suppression measures on the ERQ and CSMS were replaced by children's reported state suppression during the sad movie scene (using the ERQ and CSMS adapted for state suppression). Second, I used the same guidelines for selecting covariates in these models as I did for the primary analysis models. The covariates changed somewhat because the dataset contained only control group children (but the same pattern of results emerged whether I used the new covariates or the original covariates).

Results indicated that spontaneous suppression on the state ERQ significantly positively predicted children's reports of sadness during, $\beta = .28$, $SE = .12$, $p = .022$, and after, $\beta = .23$, $SE = .11$, $p = .029$, the movie scene. Consistent with these findings, spontaneous sadness suppression on the state CSMS also significantly positively predicted children's reports of sadness during, $\beta = .31$, $SE = .12$, $p = .008$, and after, $\beta = .29$, $SE = .10$, $p = .004$, the movie scene. Neither measure of spontaneous suppression predicted any of the other outcomes (physiology and prosocial/empathic behavior). See Table 9 for a summary of results.

Multi-level models predicting children's emotions. In a linear mixed-effects model with child ratings of sadness nested within individuals, I first tested how change over time during the visit (relative to baseline) predicted children's sadness ratings. Children's reports of sadness at baseline were significantly lower than sadness during, $F(1, 460.66) = 713.64$, $p < .001$ and after, $F(1, 460.66) = 47.44$, $p < .001$, the movie scene, but not significantly different from sadness after some delay, $F(1, 460.03) = .08$, $p = .777$,

and sadness at the end of the visit, $F(1, 460.53) = .93, p = .337$. In a separate model, I also tested whether the variable Time (including all 4 time points) was a linear predictor of sadness ratings and Time*Time was a quadratic predictor of sadness ratings (given that children watched an emotional movie scene during the visit, so sadness likely increased and then decreased as children recovered). In this model, there was an overall linear effect of Time on children's sadness, with sadness generally increasing across the visit, $F(1, 464.05) = 57.88, p < .001$. There was also a quadratic effect of Time*Time on children's sadness, $F(1, 464.67) = 106.60, p < .001$, indicating that sadness increased from baseline and then decreased again toward the end of the visit.

To the first model, I then added experimental condition as a Level 2 predictor to investigate whether the changes in sadness over time (relative to baseline) depended on group assignment. Results indicated that group assignment did not affect how children's sadness ratings changed from baseline to during the movie scene, $F(1, 454.81) = .03, p = .860$, after the movie scene, $F(1, 454.82) = .77, p = .382$, after some delay, $F(1, 454.82) = .08, p = .772$, and the end of the visit, $F(1, 455.35) < .001, p = .989$. In the second model, group assignment also did not interact with Time to predict sadness ratings, $F(1, 457.22) = .04, p = .834$, indicating that both the suppression and control conditions experienced the same general increase in sadness during the visit. Additionally, group assignment did not interact with Time*Time to predict sadness ratings, $F(1, 457.55) = .05, p = .829$, indicating that both conditions experienced the same quadratic change in sadness across the visit.

I also tested children's self-reported trait sadness suppression on the CSMS and trait suppression on the ERQ as Level 2 predictors of changes in sadness over time. Trait

suppression on the ERQ did not interact with changes over time to predict sadness. However, children's trait sadness suppression on the CSMS significantly moderated how their sadness ratings changed from baseline to during the movie scene, $F(1, 454.84) = 4.96, p = .026$, and marginally moderated how their sadness ratings changed from baseline to after the movie scene, $F(1, 454.84) = 3.60, p = .058$, (but did not moderate how sadness continued to change over the rest of the visit). To probe this interaction, I examined how the change in sadness from baseline to during the movie scene differed for children 1 *SD* below, 1 *SD* above, and at the mean in trait sadness suppression on the CSMS. Results indicated that, while all children reported an increase in sadness from baseline to during the movie, children higher in trait sadness suppression reported less of an increase. For children low in trait sadness suppression, sadness significantly increased from baseline to during the movie, $\beta = 1.76, SE = .09, t(454.84) = 20.56, p < .001$. For children at the mean in trait sadness suppression, sadness also significantly increased but not as strongly, $\beta = 1.62, SE = .06, t(454.84) = 26.91, p < .001$. For children above the mean in trait sadness suppression, the significant increase in sadness was even weaker, $\beta = 1.49, SE = .08, t(454.84) = 17.52, p < .001$.

Given this significant interaction between trait sadness suppression on the CSMS and changes in sadness from baseline to during the movie, I also examined whether trait sadness suppression interacted with the variable Time to predict linear changes in children's sadness from baseline across the entire visit. However, CSMS did not interact with Time to predict linear changes in children's sadness, $F(1, 457.01) = 1.65, p = .200$, indicating that the linear increase in sadness across the visit did not depend on children's trait sadness suppression. CSMS also did not interact with Time*Time to predict quadratic

changes in children's sadness, $F(1, 457.03) = 1.89, p = .170$, indicating that the quadratic increase and then decrease in sadness across the visit did not depend on children's trait sadness suppression.

Chapter 5: Discussion

The present study investigated the effects of expressive suppression in middle childhood on multiple domains of functioning, including subjective negative emotions, physiology (skin conductance levels), and empathy/prosocial behavior, in a racially diverse sample. Unlike many previous studies on ES in childhood, the present study used a multi-method, multi-informant approach to examine the correlates of both trait and state suppression using an experimental manipulation of state suppression and multiple self-reported measures of trait suppression, including one measure to examine specifically sadness suppression. To address the possibility that additional variables influenced both children's suppression and their behavior on the outcome variables (thus creating spurious relations between suppression and the outcomes), parents and children provided a wide range of additional measures as covariates (all widely used and well-validated), including mother-child attachment, child temperament and general emotion regulation capacity, and parents' behavior and personality.

In the following sections, I will first summarize the study results, discussing and interpreting each result in light of previous research. Then I will evaluate some of the limitations of the present study and propose directions for future research on expressive suppression in childhood and adolescence. Finally, I will consider implications of the study findings, and of the research topic in general, for intervening to improve child developmental outcomes.

Summary and Discussion of Study Results

Results from the primary analyses indicated that random assignment to the suppression or control condition did not affect children's subjective emotions, physiology,

or empathy/prosocial behavior. However, trait suppression was positively associated with skin conductance levels during the movie scene (but not associated with emotions or empathy/prosocial behavior). Therefore, most study hypotheses were not supported.

Hypotheses 1a: Children randomly assigned to suppress their emotional expressions will experience greater increases in subjective negative emotion during and after exposure to a distressing stimulus relative to children assigned to not suppress. This hypothesis was not supported, which is contrary to several previous studies of the effects of state suppression on adults' negative emotions (e.g., Dalgleish et al., 2009; Dan-Glauser & Gross, 2011; Geisler & Schröder-Abé, 2015; Matthies et al., 2014). The only other study to experimentally manipulate children's ES and assess effects on subjective emotions found that 7- to 9-year-old children instructed to suppress negative emotional expressions while watching a sad movie scene reported feeling more negative emotion than when they were instructed to facially mimic what the character in the movie scene was feeling (Musser et al., 2011). Thus, findings from the present study were not consistent with this single previous study with children, though methodological differences may explain the different findings.

The previous study asked children to suppress expressions of what they perceived *the character* might be feeling, rather than suppressing their own natural feelings, which is a different form of suppression altogether because it requires other cognitive abilities (e.g., affective perspective-taking) and does not involve hiding authentic sadness. Perhaps the biggest methodological difference, however, was the fact that the study was a within-subjects design and the comparison condition involved instructing children to facially mimic what the character might be feeling (rather than being given no instructions, like

the control group in the present study). It is possible that no effect was found in the present study because many children in the control group spontaneously suppressed, thereby weakening the manipulation by making the two conditions similar to each other. If the control group had been given specific instructions to do something else during the movie scene, perhaps fewer children would have spontaneously suppressed as a natural reaction. In the present study, all children were shown the video camera immediately before the task and told that other people would watch the videotape of them later (see Appendix E); given that public self-consciousness plays a role in self-presentational behaviors such as suppression in middle childhood (Banerjee, 2002a; Zeman & Garber, 1996), it is possible that a natural reaction to this situation was to spontaneously hide emotional reactions. In fact, all children were observed to show very little facial or bodily movement during the movie scene ($M = 2.16$, $SD = 1.33$), and children randomly assigned to suppress did not show significantly fewer facial expressions than children in the control group, suggesting that both groups suppressed their sadness equally or that the movie scene did not elicit enough sadness to require suppression. Given that all children reported significantly more sadness during and after the movie scene compared to baseline, however, it is more likely that the movie scene did elicit sadness but that both groups suppressed equally. Although the suppression group *reported* suppressing significantly more than the control group during the movie scene, it is possible that their reports were influenced by the suppression instructions given to them and the desire to report following instructions (i.e., “we don't want you to show how you're feeling with your face or your body. Nobody should be able to see what you're feeling by looking at you”; see Appendix E).

If the null findings are due to the fact that the control group suppressed as strongly as the suppression group, then few conclusions can be drawn about the true effect of ES on children's subjective emotions from the present study. Perhaps state suppression did in fact have substantial effects on children's sadness, but these effects cannot be detected by comparing experimental groups. Findings from the exploratory analyses are consistent with this interpretation: Children who spontaneously suppressed more during the movie scene were sadder during and after the movie scene, regardless of experimental condition (see Table 4).

Alternatively, the null findings could reflect a lack of association between state ES and negative emotionality in the population. Some studies of adults find that suppressing does not increase or decrease negative emotion (Gross, 1998; Gross & Levenson, 1993, 1997; Egloff et al., 2006; Kalokerinos et al., 2015). Thus, ES is often ineffective at decreasing undesirable feelings among adults, and in fact can also decrease positive emotions (e.g., Gross & Levenson 1993, 1997). State ES could be ineffective at decreasing negative emotions for children as well.

In summary, findings from the present study on the effects of state suppression on children's subjective emotions are inconclusive. Future studies should ensure that the control group suppresses as little as possible to maximize differences between the study conditions. To do this, future studies could use more than one control group to compare the effects of suppressing to the effects of several alternative options for emotion regulation that children might choose in real world situations (e.g., cognitively reappraising the situation, distracting themselves from the sadness) in addition to the effects of being given no regulatory instructions. Future studies might also include a

control group instructed to freely experience and express emotions: A recent meta-analysis of ER strategies (including ES) found that ER strategies had larger effects on outcomes when compared to control groups given instructions to experience emotions naturally (relative to control groups given no instructions or instructions not to regulate in a specific manner; Webb et al., 2012). Additionally, uninstructed ER choice should always be assessed, especially when the context involves emotionally intense stimuli (like the present study's movie scene, *The Champ*; Lovell & Zeffirelli, 1979), as individuals are more likely to deploy uninstructed ER strategies during emotionally intense contexts (Opitz et al., 2015). Future studies should also assess whether state ES decreases children's positive emotions during situations in which expressing or experiencing positive emotions would be adaptive, such as when meeting new people. If state ES decreases children's positive emotions while having no effect on their negative emotions (as it does among adults), then suppression might be considered an ineffective ER strategy for managing internal emotional states (when the goal of the individual is to feel better).

Hypothesis 1b: Children's trait expressive suppression will be positively related to increases in their subjective negative emotion during and after exposure to a distressing stimulus. This hypothesis was also not supported. Although multiple previous studies found connections between children's trait suppression and aspects of their emotional development, such as depression, anxiety, and shame (e.g., Betts et al., 2009; Hughes et al., 2011; Lanteigne et al., 2014; Lee, Kim, Park, & Park, 2017; Schäfer, Naumann, Holmes, Tuschen-Caffier, & Samson, 2017; Yeh, Bedford, Wu, Wang, & Yen, 2017; Zeman et al., 2002), few have examined links between trait suppression and acute negative emotions in response to distressing stimuli in the laboratory. Greater trait ES

does not always predict the likelihood of suppressing in a given context (Lanteigne et al., 2014), and in the present study, trait ES was not correlated with spontaneous ES on the ERQ ($r = .06, p = .492$) or spontaneous sadness ES on the CSMS ($r = .02, p = .81$). Given that exploratory analyses found that spontaneous ES of the control group during the movie scene predicted greater subjective feelings of sadness while suppressing, it is possible that the null findings are due to the fact that trait suppressors were not more likely to spontaneously suppress in the context of the present study.

However, the exploratory mixed-effects models with child ratings of emotion nested within individuals suggested that trait sadness ES predicted changes in subjective sadness from baseline to during the movie scene. Counterintuitively, children with higher trait sadness suppression experienced *less* of an increase in sadness from baseline to during the movie scene. The fact that these more powerful mixed-effects models indicated a link between trait sadness ES and subjective emotion during the movie scene suggests that the regression models testing the same link were underpowered. Had the present study included a larger sample, perhaps a significant relation would have been found between children's tendency to suppress sadness and their experience of sadness in the laboratory. What is unclear, however, is why higher trait sadness ES would predict less of an increase in sadness. More research is needed to confirm and understand this exploratory finding, including the possibility that children reporting high trait suppression are also less willing or able to acknowledge their sadness on a questionnaire.

In summary, the primary analyses suggest that trait suppression was not related to acute sadness during and following a sad movie scene; however, more powerful exploratory models suggest that spontaneous ES and trait sadness ES did predict

children's negative emotions. Future studies should test this hypothesis with a greater sample size. Future research should also consider testing non-linear models when investigating the relation between trait suppression and reports of negative emotion, as sufficiently high levels of trait suppression may interfere with children's ability or willingness to accurately report their internal subjective states. Unlike trait sadness ES on the CSMS, trait ES on the ERQ was not associated with negative emotion in the primary or exploratory models and did not approach significance; rather than being due to lack of power, it is more likely that trait ES on the ERQ did not predict children's subjective sadness because trait suppressors were not more likely to spontaneously suppress in the context of the present study. Future research should test this link in other contexts, given that individuals' choice of ER strategy is highly dependent on their situational goals (Eisenberg et al., 2015), and the ability to enact ER strategies successfully depends on the nature of the emotional induction, the specific emotion being regulated, and whether other people are present (see Webb et al., 2012). For example, differences between high and low trait suppressors may emerge during situations in which suppressing is difficult, because children who do not suppress habitually are not able to enact this strategy and instead rely on another strategy, whereas children who suppress often are able to do so expertly. Alternatively, it could be that the context of the present study (i.e., telling children that they are being watched by others while they watch a sad movie scene) elicited high rates of suppression from most children, regardless of trait ES (or regardless of the experimental manipulation, as discussed above), thus minimizing differences between high and low trait suppressors.

Hypothesis 2a: Children randomly assigned to suppress their emotional expressions will be more physiologically aroused during and after exposure to a distressing stimulus relative to children assigned to not suppress. This hypothesis was also not supported, suggesting that the theory of ES as an effortful form of ER that is physiologically arousing and activating of the stress system may not apply to children as it does for adults (e.g., Ben-Naim et al., 2013; Butler et al., 2003; Egloff et al., 2006). These findings are consistent with the only experimental studies of ES and physiology in children, which found no effects of being instructed to suppress negative emotional expressions on 7- to 11-year-olds' sympathetic nervous system arousal (Musser et al., 2011, 2013). The previous studies used different indices of children's SNS arousal (cardiac pre-ejection period), so the present study adds to the literature by demonstrating no effects of instructed ES on children's SCL as well. Electrodermal activity is one of the most consistently linked measures of physiology to ES in adults (e.g., Gračanin et al., 2013; Gross, 1998; Gross & Levenson, 1993, 1997; Kunzmann et al., 2005; Roberts et al., 2008), and yet this index had not been tested before among children.

Considering that so few studies have tested the effects of ES on children's physiology using experimental designs, more research is needed before conclusions can be drawn about the null effects. For example, no experimental studies have yet tested the effects of suppression in contexts other than watching movie scenes (such as interpersonal interactions). Additionally, no experimental studies have tested the effects of suppressing frustration, pain, anger, or fear, which could have markedly different influences on physiology than the suppression of sadness, given that the experience and expression of different emotions have distinct physiological effects (Fernández et al., 2012; Gilissen et

al., 2008; Marsh et al., 2008). Alternatively, as with Hypothesis 1a, it is also possible that the null findings are due to the fact that the control group suppressed as strongly as the suppression group in the present study's context. This possibility points to the need for future research using more contexts (see the following section on future research for further discussion about the context of state ES).

Hypothesis 2b: Children's trait expressive suppression will be positively related to physiological arousal during and after exposure to a distressing stimulus.

Unlike the hypothesis about the effects of state ES on physiology, the hypothesis about the physiological correlates of trait ES was partially supported. Children reporting higher trait ES on the ERQ (and higher trait ES on the composite measure) had greater SCL during the movie scene. This result is consistent with previous research on adults' suppression (e.g., Butler et al., 2003; Gross, 1998; Lam et al., 2009) and with the theory that trait suppression leads to physiological dysregulation during negative tasks because children who often hide their emotions have had fewer opportunities to rely on others for co-regulation and social support, leaving them with fewer strategies for coping with emotional arousal (Shipman & Zeman, 2001).

The link between trait ES and increased skin conductance could be due to high trait suppressors' history of regulating their internal emotional states alone, because others (e.g., attachment figures) do not realize they are feeling distressed. Having to always deal with upsetting emotions alone could take a physical toll on children's bodies, as they anticipate difficult or overwhelming situations without social support. Social baseline theory posits that reliance on trusted others is an evolutionary strategy for economizing an individual's energy expenditure through the social regulation of emotion (because trusted

others can be counted on to share the load associated with detecting environmental threats, regulating negative affect, and keeping the individual safe; Beckes & Coan, 2011). In the absence of others' support, either real or perceived, individuals are more likely to perceive higher costs for interacting with the environment, raising cardiovascular arousal and increasing threat-related neural activity (Beckes & Coan, 2011). Therefore, children who suppress often may be more likely to perceive daily emotional situations or even minor frustrating tasks as more difficult due to (a) ego depletion (Hagger et al., 2010), and (b) the fact that they must cope with it alone. To counteract mental fatigue and meet more daily perceived challenges, their SNS may become chronically overactivated, which, over long periods of time, could take a physical toll and negatively impact health. Indeed, a couple of studies suggest that children's trait suppression is linked to negative health outcomes (Lu, Tao, Hou, Zhang, & Ren, 2016; Tsao et al., 2014). However, little is known about this topic, and so future research should assess the validity of this theory including whether increased SNS arousal due to suppression leads to negative health outcomes across development.

Although consistent with studies of adults, the finding that trait ES predicted children's SNS arousal is inconsistent with the few previous studies on children's trait ES and physiology, which almost all found no association between suppression and a range of outcomes (Borelli et al., 2017; de Veld et al., 2014; Hollenstein et al., 2012; Lanteigne et al., 2014; Shapero et al., 2016). Reasons for the inconsistent findings might be due to methodological differences. First, as mentioned previously, electrodermal activity is one of the most consistently linked measures of physiology to ES in adults (e.g., Gračanin et al., 2013; Gross, 1998; Gross & Levenson, 1993, 1997; Kunzmann et al., 2005; Roberts et

al., 2008), and yet this index had not been tested before among children; perhaps the physiological effects of suppression manifest in increased electrodermal activity, but not in other ways. Considering that ES slows physical movement (to better hide behavioral responses associated with emotional reactions), which also decreases heart rate (Gross, 2002), previous studies that measured heart rate as an outcome may have found no links because any increases in SNS arousal caused by ES were offset by the accompanying decreased physical movements. Second, almost all of the previous studies measured physiology during or after a stressful task. Perhaps these laboratory tasks are relatively intense for children, activating too much SNS arousal to detect additional effects from suppression; less stressful tasks could allow subtle influences of suppression on physiology to emerge (e.g., watching emotional movie scenes). Relatedly, these tasks typically elicited fear or anger/frustration – perhaps only suppression of sadness influences physiology (see Dennis & Kelemen, 2009; Waters & Thompson, 2014, for evidence that different emotions may benefit from different regulatory strategies in childhood).

Beyond methodological differences to explain the inconsistent finding, it is also important to acknowledge that the association between trait ES and physiology in the present study was only significant for one of the two trait ES measures, and so the significant result might be due to chance, given that no corrections for multiple comparisons were made. Additionally, this association was only apparent during, but not after, the movie scene, pointing to the possibility of a chance finding. Alternatively, the fact that association was present during but not after the movie scene suggests that the physiological toll of suppression lasts only as long as the child is actively attempting to suppress.

In summary, contrary to previous research with children, trait ES was positively related to physiological arousal during the movie scene. If suppression is indeed taxing on the sympathetic nervous system and habitual use of it negatively impacts health, as it might in adults (Gross & Levenson, 1993), then more research is needed to understand why other studies have not found similar effects in children and adolescents. For example, more studies assessing children's electrodermal activity may find that suppression increases SNS arousal. Future studies should also explore the possibility that children who suppress often perceive emotional situations as more challenging because they believe they will have to deal with it alone, leading to heightened physiological arousal and negative health outcomes. Finally, an interesting avenue for future research is to explore why trait, but not state, ES predicted children's SCL. Perhaps it is long-term inflexibility and over-reliance on a single ER strategy that is associated with physiology and suppressing in one instance does not have immediate effects. Alternatively, perhaps state ES *does* have immediate physiological effects on children, but only in contexts that were not measured by the present study (e.g., during frustrating tasks or while interacting with other people).

Hypothesis 3a: Children randomly assigned to suppress their emotional expressions will be subsequently less prosocial and less empathic toward another person relative to children assigned to not suppress. The present study was the first to examine the effects of state ES on children's prosocial behavior and empathy, and results indicated that there were no links. To better assess the range of possible prosocial or empathic behaviors that could be affected by suppression, the present study included three separate, independently coded tasks. Suppression did not affect children's observed

comforting or helping behavior toward the adult experimenter and also did not affect children's verbal empathy for characters in a movie scene. Although I used multiple assessments of observed prosocial behavior and empathy, there are other measures and other forms of prosocial behavior that may have been affected by state suppression. Recent theory and research suggest that distinct types of prosocial behavior can be differentiated in childhood using multiple taxonomies, and that these types have distinct socialization antecedents and developmental trajectories (e.g., Dunfield, 2014). Thus, it is possible that other types of prosocial behavior may relate to ES, such as sharing or volunteering.

There are a few possible reasons for the null results. First, given the lack of previous research on this topic in both children and adults, it is possible that no relation between instructed ES and prosocial behavior or empathy exists in the population, despite some evidence that state suppression reduces adults' ability to recognize emotional distress in others (which would certainly interfere with affective empathy and the ability to intervene on others' behalf; Schneider et al., 2013). The fact that children instructed to suppress did not report feeling more negative emotion rules out personal distress as a mediator; because children in the suppression condition were not sadder, they were not more likely than children in the control group to focus on reducing their own negative emotions at the expense of their ability to focus on others' needs. There were also no physiological differences between the experimental conditions, so heightened arousal or dysregulation would not contribute to differences in social behavior.

Another possibility for the null results in the present study is that too much time passed between the instructions to suppress and the opportunities to be prosocial or empathic. After the suppression task, children answered a series of questions about their emotions and spontaneous ER during the movie scene and then watched another movie scene. Given that a potential mechanism of the effects of ES is ego depletion (Gunzenhauser & von Suchodoletz, 2014), cognitive resources that had been temporarily depleted by ES could have been replenished, erasing differences between experimental conditions (Geisler & Schröder-Abé, 2015). Future studies should assess prosocial behavior and empathy while children are suppressing or immediately after to assess the possibility that suppression negatively affects social behavior in the moment.

Finally, like with Hypotheses 1a and 2a, it is also possible that the null findings are due to the fact that the control group suppressed as strongly as the suppression group in the present study's context (see the following section on future research for further discussion about the context of state ES).

In summary, as this was the first study to examine the effects of instructed suppression on children's prosocial behavior and empathy, more research is warranted. Future studies could investigate other forms of prosocial behavior that are vital to optimal social and emotional development, such as sharing (Eisenberg et al., 2006). Additionally, future research should test this link in other contexts, such as while children are attempting to suppress or after a longer period of suppression, given the limited generalizability of state ER measures.

Hypothesis 3b: Children's trait expressive suppression will be negatively related to their prosocial behavior and empathy toward another person. Consistent

with previous research (i.e., Flouri & Panourgia, 2014; Hughes et al., 2011), the present study found no association between children's trait ES and their prosocial behavior or empathy. Unlike previous studies, however, the present study used multiple observational measures, rather than self- or parent-report.

The lack of association is surprising, given the host of other social behavioral correlates of trait ES in children, such as greater aggression (Kokkinos & Voulgaridou, 2017; Smith, Hubbard, & Laurenceau, 2011; Sullivan et al., 2010), increased peer victimization and loneliness (Gardner, Betts, Stiller, & Coates, 2017; Jacob, Suveg, & Whitehead, 2014; Morelen, Southam-Gerow, & Zeman, 2016; Sharp, Cohen, Kitzmann, & Parra, 2016), and less self-perceived social competence (Sharp et al., 2016). Children who suppress often seem to struggle socially, but little is known about mechanisms through which ES affects social behavior. Future work investigating possible mechanisms, such as perceptions of relationships as inauthentic or the lack of intimacy and friendship that results from not sharing emotions (Goldman & Kernis, 2002), could uncover why ES influences (or does not influence) prosocial behavior and empathy.

One possible reason for the null findings in the present study is lack of power. For all models predicting prosocial comforting and empathy, the associations were in the predicted direction (i.e., children higher in trait suppression were less empathic and less comforting). The present study was powered to detect a medium effect size, which was estimated based on previous research with adults and other outcomes of trait ES, such as physiological or emotional outcomes. With little previous research linking trait ES to prosocial behavior or empathy, it is unknown whether the effect size would be small or medium. Future work is needed with larger samples sizes to determine whether trait ES

relates to children's prosocial behavior and empathy with a small or small-to-medium effect size.

In summary, children's observed prosocial behavior and empathy was not associated with their trait suppression, but more studies are needed with other measures and types of prosocial behavior. Additionally, uncovering why trait ES is associated with many other forms of social functioning in children could shed light on whether and how suppression could influence children's prosocial behavior and empathy.

Overall summary. Overall, only trait suppression measures were associated with outcomes. Trait measures are helpful for understanding the long-term impacts of chronic ES, so the present study's findings may suggest that a single instance of ES has no effect on children's functioning, whereas the habitual tendencies captured by trait measures do. This line of reasoning makes sense when considering that everyone suppresses emotion sometimes, and in fact, suppression is a normal and required part of living in society. For example, learning how to stifle laughter during socially inappropriate moments is a positive developmental achievement. The ability to suppress when needed or instructed may not be what is linked to negative outcomes (and indeed, may instead indicate positive development such as more mature inhibitory control; Westphal, Sievert, & Bonanno, 2010); rather, it may rigid over-use of ES that is problematic for children (Burton & Bonanno, 2016; Diamond & Aspinwall, 2003), which may be best captured by measures of trait ES.

Another interpretation for the lack of findings related to state ES in the present study, however, is that the specific context in which children were asked to suppress did not cause changes in social, emotional, or physiological functioning. Had a different

context been used (e.g., if children were not instructed to suppress, but rather were influenced to do so through a subtler manipulation), perhaps the measure of state ES would have related to some outcomes.

Limitations and Future Directions

Despite the previously mentioned strengths of the present study, there are some limitations. First, all measures were collected during a single point in time, so the present study cannot assess developmental changes. This is important because evidence indicates that the frequency and effects of suppression change over development (Fuchs & Thelen, 1988; Gullone et al., 2010; Hollenstein et al., 2012), and so these findings cannot be generalized to developmental periods outside of middle childhood. Future research should investigate these research questions in younger children and adolescents and should include multiple developmental periods within a single study, because suppression likely exerts different effects as children's cognitive and social capacities develop. For example, as children enter adolescence, peers become more important to socioemotional development, because friendships involve more intimacy and peers become attachment figures; the inability to express vulnerable or negative emotions to peers could interfere with important developmental milestones (Moreira, Fonseca, & Canavarro, 2017).

Second, the present study is unable to draw conclusions about what mediated the relations between ES and the emotional and physiological outcomes. A theoretically important mediator in the literature on adults (with some evidence in children; Gunzenhauser & von Suchodoletz, 2014) is ego depletion. However, this study did not assess ego depletion and so cannot evaluate it or other mediators. Considering the widespread importance of self-control for affective, social, and cognitive development

(Tangney, Baumeister, & Boone, 2004), ego depletion may be a common mechanism linking ES to a variety of negative outcomes. This also has implications for children's academic achievement and school readiness. If ES is shown to impair subsequent self-control in pre-adult samples, interventions targeting suppression may help efforts to improve children's grades, increase attention and focus in the classroom, and set struggling youth on positive developmental trajectories that begin with improved self-regulation. Next steps for the study of ES in children and adolescence include more complex models that can assess mechanisms through which suppression influences children's development.

Third, the present study included only one measure of physiology, whereas many studies of the effects of ES in adults include 5 or 6 measures to better understand the complexity of the physiological changes elicited by suppression (e.g., Butler et al., 2003; Dan-Glauser & Gross, 2011). Perhaps a composite of several measures of SNS arousal or measures of parasympathetic arousal (e.g., respiratory sinus arrhythmia) would reveal different results.

Finally, one of the most important limitations that applies to this and nearly every study involving state ES is that the effects of state ES can only be generalized to the limited settings or contexts in which they were measured. A common theme in all findings summarized here is that the effects of instructed suppression in the present study can only be generalized to: 1) sadness suppression; 2) the given motivation for suppressing, which was to follow the request of the researchers; 3) suppression compared to being given no instructions for how to manage emotions; 4) intentional, effortful suppression; and 5) suppression of facial and bodily expressions, rather than of language or thought. There are

other dimensions along which contexts involving suppression could meaningfully differ, but these serve as examples of the myriad ways that suppression can be measured and can manifest in the real world.

The findings related to the effects of state ES in the present study cannot, for example, generalize to the effects of suppressing frustration during a stressful task, suppressing happiness in the presence of someone else's sadness, suppressing fear when confronted with a bully, or suppressing anger toward a friend. All these instances of suppression represent distinct contexts, each associated with different ER goals, and likely each with distinct social, emotional, and physiological costs. Evidence suggests that suppression of different emotions may have different precursors (e.g., Hurrell, Hudson, & Schniering, 2015; Morelen, Zeman, Perry-Parrish, & Anderson, 2012), developmental trajectories (Zimmerman & Iwanski, 2014), and outcomes (e.g., Zeman et al., 2002). To illustrate, sadness suppression could have a different effect on physiology than fear suppression, because sadness lowers SNS arousal whereas fear increases it (Kreibig et al., 2007).

As another example, children's motivations for suppressing in the present study might have included fear of social consequences, desire to cooperate with researchers, or fear of being watched; prosocial motivations, such as hiding disappointment to avoid hurting someone's feelings, were not assessed in the present study and are often associated with more positive developmental outcomes (Gnepp & Hess, 1986). However, the present study's manipulation occurred in a social context, which is like the real-world social situations in which children suppress for the benefit of others (to avoid unwanted consequences of being vulnerable or being reprimanded; Zeman & Garber, 1996). Thus,

the findings might generalize to circumstances in which children suppress because they fear the interpersonal consequences of not doing so.

As another example, the present study asked children to hide their emotions on their face and body; however, suppression can manifest in other ways, such as through meta-linguistic features (e.g., mumbling). Little is known about the differences between bodily or facial suppression and other manifestations, but this is an interesting direction for future research. Evidence from attachment theory suggests that insecure adults and adolescents often suppress when recalling attachment-related memories from childhood using meta-linguistic features (such as inappropriate or mismatched vocal affect; Hesse, 2008).

Future studies on state ES should acknowledge the limited contexts to which their findings can generalize to contribute to a more nuanced understanding of the effects of suppression. Studies assessing both state and trait ES may find different correlates because trait measures are inherently broader, as they include multiple manifestations of suppression across multiple contexts. Additionally, future research assessing the effects of suppression in a variety of contexts is needed (e.g., assessing the effects of intentional versus automatic suppression, or suppressing fear versus pain versus happiness), because little research exists on the variety of contexts listed above and what role they might play. Future studies could also systematically vary contextual features to reveal which aspects of the situation are relevant to the effects of state suppression. For example, doing the same experimental procedure multiple times, each time varying the specific motivation for suppressing, could shed light on what role motivation plays in the effects of ES.

In addition to the future directions suggested by the limitations above, there is another important direction for future research that applies to the study of suppression in general. Generally, suppression has been conceptualized as a maladaptive ER strategy, and the literature has largely confirmed that it is associated with significant negative outcomes. However, an increasing number of studies supports the idea that behavior is best understood in its evolutionary context, and that certain behaviors considered maladaptive may instead be conceptualized as developmentally specialized toward local environmental conditions (Frankenhuis & de Weerth, 2013). Thus, rather than referring to suppression as maladaptive, it may be more accurate to say that it has certain physiological, emotional, or social costs that may or may not outweigh the benefits. An interesting avenue for future research is to explore whether the costs of suppression in various contexts (or for various groups) outweigh the benefits, and why. For example, it is evolutionarily adaptive for children to adjust their attachment behavior to maximize proximity to an attachment figure when danger arises (Bowlby, 1969/1982). Parents who are uncomfortable with emotional displays are more likely to remain close to children who learn to suppress their distress. Although these children are likely to develop insecure attachments (Ainsworth, Blehar, Waters, & Wall, 1978), which are related to negative outcomes, their behavior is adaptive in the caregiving context in which they were raised. Children who are raised in poverty or dangerous conditions may also learn that exposing vulnerability is not safe and adjust their emotional displays accordingly. Children who are bullied learn to protect themselves from physical threats by hiding sadness, fear, pain, and other emotions that may be viewed as weakness. Children who are abused may also find protection in suppressing distress, as they learn that any outburst could be met with

physical discipline. Thus, research on ES in adults could utilize developmental perspectives to better understand the conditions from which individuals' trait suppression arose, which were likely during their childhood or adolescence, and the meaning that this ER strategy had in those contexts. While frequent suppression may no longer be adaptive years later, prevention efforts to decrease ES may benefit from a deeper understanding of the important functions suppression may have served in the past (Cole et al., 1994). If frequent ES is, however, still adaptive for an individual (i.e., it outweighs the costs), then intervention efforts to discourage ES may be unhelpful. Instead, interventions to support *flexible* ER strategy use (depending on context) could be more effective (Bonanno & Burton, 2013; Diamond & Aspinwall, 2003).

Implications for Intervention

In conclusion, the growing number of studies on ES in childhood and adolescence points to some significant costs of this ER strategy early in development, and the present study lends some support to the claim that frequent suppression increases children's physiological arousal and negative emotions. Using the knowledge gained from more than a decade of research, interventions involving ES could improve developmental outcomes for children struggling with emotion dysregulation.

Drawing from the literature on precursors to ES, interventions targeting suppression should be culturally-informed, considering, for example, the role of race in children's reasons for suppressing and the potentially adaptive value of doing so (Coard, Wallace, Stevenson, & Brotman, 2004). Rather than discouraging suppression altogether, interventions could encourage flexibility in ER by teaching children a range of strategies to increase their repertoire, along with decision-making skills for deciding among them in

various contexts (Bonanno & Burton, 2013; Diamond & Aspinwall, 2003). If habitual ES is adaptive for an individual, helping the child to find safe outlets for expression (e.g., writing, confiding in a close friend or attachment figure) might offset some of the costs of suppression. Writing about their emotions in a diary was helpful for reducing anxiety symptoms among girls high in trait suppression, possibly because it helped them to process difficult emotions that they had previously avoided (Thomassin, Morelen, & Suveg, 2012).

In general, intervening during childhood and adolescence rather than adulthood could be vital for preventing negative patterns of emotion expression and regulation that are established early in life. The earlier a child begins suppressing, the more impact it may have on development, given that the emergence of new skills may be subject to negative developmental cascades initiated by suppression. Targeting when ES first emerges, when it becomes part of an individual's personality, and how it changes across development will be vital to intervention efforts to improve children's developmental outcomes and help children struggling with emotion dysregulation.

Appendices

Appendix A: Literature Review

Expressive Suppression in Childhood and Adolescence

In recent years, an increased interest in and recognition of the importance of children's ability to manage and regulate emotions in socially adaptive ways has driven much research on the development of emotion regulation (ER). ER involves processes for monitoring, evaluating, and modifying an individual's emotional reactions (Thompson, 1994) and has far-reaching implications for children's social competence, peer relations, psychological well-being, adjustment, and behavioral problems (e.g., Cole & Deater-Deckard, 2009; Cole, Michel, & Teti, 1994; for a review, see Eisenberg, Hofer, & Vaughan, 2007). In particular, poor ER (ineffective or harmful methods of controlling emotional responses) is implicated in half of the axis I and all of the axis II disorders included in the Diagnostic and Statistical Manual of Mental Disorders (Gresham & Gullone, 2012).

Despite increasing research interest in children's ER, some researchers have noted the lack of a comprehensive theoretical framework for understanding specific ER strategies (e.g., Cole, Martin, & Dennis, 2004; Gullone, Hughes, King, & Tonge, 2010). An exception has been the process model of emotion regulation (Gross, 2002), which has been widely used in research with adults to understand how specific strategies can help or hinder social and emotional functioning and is increasingly used in research examining child and adolescent ER. This model views an individual's emotional reaction as unfolding over time and categorizes different ER strategies based on the point along the timeline at which they impact the emotion-generative process. Some strategies attempt to regulate emotions before they arise or have become fully activated by, for example,

cognitively reappraising the significance of an event, thereby lessening its emotional impact (i.e., antecedent-focused strategies; Gross, 2014). Other strategies occur after the emotional response has already been activated and thus involve attempts to regulate the behavioral component of an existing emotion (i.e., response-focused strategies). Using this model may help to uncover specific ER strategies that could potentially interfere with healthy child development.

One well-characterized and commonly-used strategy that has emerged from research using this model in adults, and which may inform maladaptive patterns of ER in children, is known as *expressive suppression* (ES), in which a person attempts to conceal ongoing emotion-expressive behavior. This includes suppression of both negative and positive emotions (e.g., a wife hiding anger from her husband to avoid relationship conflict, a child stifling inappropriate laughter). Based on numerous studies in adults, evidence points to the potentially harmful effects of ES, including links to depression and anxiety, increased suicide ideation, worse relationship and social functioning, cognitive impairment, and negative health outcomes, including inflammatory markers predicting cardiovascular disease (see Gross, 2013, for a review).

Compared to research with adults, however, relatively little is known about correlates of expressive suppression in children. This is surprising, given that patterns of organizing, understanding, and expressing emotions become established early in life (Eisenberg, Hofer, Sulik, & Spinrad, 2015), and many of the processes negatively affected by suppression in adults (e.g., stress physiology, empathy) undergo critical periods of growth during childhood. Because individual differences in children's ER predict almost every domain of development, including mental health, social functioning, emotional

well-being, cognition and academic achievement, and physical health (Calkins, 1994; Campos, Frankel, & Camras, 2004; Eisenberg et al., 1995, 2004; Keane & Calkins, 2004; Saarni, Campos, Camras, & Witherington, 2006; Thompson, 1994), it is possible that over-reliance of ES in childhood has lasting consequences (e.g., by contributing to a negative developmental cascade in which ER difficulties interfere with emerging competencies that, in turn, have negative implications for development in multiple domains; Blair et al., 2015; Masten & Cicchetti, 2010). Research illuminating the developmental course, precursors, and outcomes of ES in childhood and adolescence can contribute to a deeper understanding of this ER strategy in both adults and children, as well as inform intervention efforts to improve outcomes across the lifespan.

Given the importance of understanding expressive suppression earlier in development, the goal of this review is to integrate theory and research on ES in children and adolescents. I focus on the suppression of negative emotion, because children learn from a young age that negative emotions are often responded to less favorably than positive emotions (Malatesta & Haviland, 1982), and most of the literature has focused on how individuals learn to regulate difficult, unpleasant emotions. I first present theory and data on the normative developmental course of ES in childhood and adolescence. Next, I explore correlates of individual differences in ES by describing relevant theoretical perspectives on the precursors and outcomes and presenting data that support (or do not support) theory. I conclude by discussing new directions for moving the field forward.

Normative Development of ES in Children and Adolescents

Crucial to understanding expressive suppression in children is an understanding of when and how it develops, including the normative development of some social and cognitive skills that support its emergence.

During infancy and toddlerhood, children rely heavily on caregivers to provide external emotion regulation (Thompson, 1991), but increasingly self-regulate with a limited number of strategies (e.g., averting gaze from distressing stimuli; Eisenberg et al., 2015). A recent study suggests that 1-year-olds can detect inauthentic emotions in other people (Walle & Campos, 2014); this emerging understanding that true emotions can differ from those outwardly presented may underlie children's later suppression of their own emotions.

Between ages 2 and 5, considerable developmental advances contribute to the emergence of more diverse self-regulatory strategies (Eisenberg et al., 2015). Recognition that the self differs from others leads to the development of self-conscious emotions, such as shame and pride (Lewis, Sullivan, Stanger, & Weiss, 1989), followed by the development of display rule use (culturally defined rules guiding a child's decision to alter their emotional expressions in a given context; Gnepp & Hess, 1986; Saarni, 1989). These fundamental skills underlie children's motivation for suppressing , because children begin to understand that emotions serve social functions and that others are affected by emotional displays (Hudson & Jacques, 2014). During this time, children develop more mature effortful control, including the ability to willfully suppress a dominant response in favor of a subdominant response (Rothbart & Bates, 2006), and changes in the prefrontal cortex improve emotion inhibition (Moriguchi & Hiraki, 2013). In addition, preschoolers begin to form an explicit understanding that emotional expression does not necessarily

match emotional experience (Harris, Donnelly, Guz, & Pitt-Watson, 1986), due in part to their emerging explicit theory of mind (Banerjee & Yuill, 1999; Wellman, Cross, & Watson, 2001). Preschoolers' ToM also supports their ability to alter their own outward emotion expressions (Banerjee & Yuill, 1999), perhaps because they can understand that doing so creates a false belief in others (e.g., Peterson, Wellman, & Liu, 2005).

During middle childhood, developments in children's metacognitive skills allow them to employ more sophisticated ER strategies (e.g., Terwogt & Stegge, 1995; Zimmer-Gembeck & Skinner, 2011), so suppression becomes part of a larger repertoire. In line with this developmental progress, frequency of ES becomes more trait-like, as some children rely on suppression frequently in daily life, whereas others favor different strategies from their growing repertoire (Penza-Clyve, Zeman, & Sim, 1999; Suveg, Hoffman, Zeman, & Thomassin, 2009). Around age 9, ER patterns become more stable (Cole & Kaslow, 1988; Cole et al., 1994), and thus habitual use of ES during this time may be carried forward into adolescence and adulthood. Consistent with the increasing stability of trait-like ES, children can reliably report their own ES frequency by age 9, with stability over a 12-month period (Gullone & Taffe, 2012; Penza-Clyve & Zeman, 2002; Zeman, Shipman, & Penza-Clyve, 2001).

During this period, self-presentational behaviors are driven by social-motivational factors that emerge during middle childhood, including public self-consciousness (Banerjee, 2002a) and embarrassment (Banerjee, 2002b). In addition, display rule use continues to increase throughout middle childhood (Zeman & Garber, 1996), along with public self-consciousness (Banerjee, 2002a) – factors which may explain why older children tend to suppress more than younger children (Fuchs & Thelen, 1988).

During adolescence, increasing cognitive maturity and flexibility contribute to the use of ER strategies that support long-term goals (Zimmer-Gembeck & Skinner, 2011), and improvements in metacognition facilitate adolescents' ability to attend to and reflect on their own emotional states (Eisenberg et al., 2015; Weil et al., 2013).

These trends suggest that ES should decline during adolescence. However, adolescence also brings heightened awareness of the interpersonal consequences for certain emotional displays (Shipman, Zeman, & Stegall, 2001; Zeman & Shipman, 1997), and gender socialization may increasingly encourage boys and girls to suppress specific emotions, though evidence for this notion is mixed (see Chaplin & Aldao, 2013; Klimes-Dougan et al., 2007). In addition, adolescence may be a period of heightened vulnerability for emotion dysregulation due to functional and structural changes in brain regions involved in emotion generation (Ahmed, Bittencourt-Hewitt, & Sebastian, 2015). Consistent with these conflicting influences in adolescence, evidence is mixed. Some studies found that ES decreases during adolescence (e.g., Gullone et al., 2010; Lanteigne, Flynn, Eastabrook, & Hollenstein, 2014; Larsen et al., 2012), supporting the notion that maturation gives rise to more sophisticated ER strategies. Fewer studies found that ES increases, (Hollenstein, McNeely, Eastabrook, Mackey, & Flynn, 2012; Zhao, Zhang, & Zheng, 2014), or changes non-linearly during adolescence (Zeman & Shipman, 1997). Still other studies found no age-related differences or within-person changes (e.g., Gresham & Gullone, 2012; Gullone & Taffe, 2012; Jaffe, Gullone, & Hughes, 2010; Lantrip, Isquith, Koven, Welsh, & Roth, 2016; Larsen et al., 2013; Sullivan, Helms, Kliewer, & Goodman, 2010). It may be that the inconsistencies are due to the diverging

development of specific emotions, such as sadness, anger, and fear (Zimmerman & Iwanski, 2014).

Correlates of Individual Differences in Childhood and Adolescent ES

Within the normative trajectory of developmental change, children also show individual differences in their use of specific ER strategies. Given that ES becomes more trait-like in middle childhood, two important questions for researchers are: Why do some children suppress more than others, and what impact does variation in suppression have on development? In this section, I review the evidence for precursors and outcomes of ES in childhood. Note that many of the studies reviewed are correlational and not able to make conclusions about causation; thus, the terms “precursors” and “outcomes” often reflect the theoretical models rather than evidence for the direction of effects.

Precursors of ES: Theory and Data

ER development is multiply determined by a child’s bioecological context (Bronfenbrenner, 1992), in which links among cultural, neighborhood, parenting, peer, genetic, and other influences impact each other, and influence (and are influenced by) the child’s developing ER competencies and tendencies (see Thompson, 1991). At the broadest level, culture greatly influences a child’s ES. Within a child’s microsystem, direct interactions with parents, peers, and others can encourage or discourage ES as well. At the level of the individual, neurological, genetic, and temperamental factors can also influence individual differences in ER.

Cultural Influences. Children manage their expression of emotion, in part, by learning sets of culturally defined display rules (Gnepp & Hess, 1986; Saarni, 1989). Display rules dictate which emotions are appropriate to express (or not) in various

circumstances (Barrett & Campos, 1987). Based on specific cultural rules, children learn when and how external emotional displays must differ from internal affective states.

Most research on child ER to date has focused exclusively on White middle-class children in the United States, but theory and a growing body of evidence suggests significant cultural differences in the regulation of emotion, with some evidence in the use of ES, including differences based in nationality (Cole, Bruschi, & Tamang, 2002; Morelen, Zeman, Perry-Parrish, & Anderson, 2012), urbanicity (Raval, Martini, & Raval, 2007), and socioeconomic status (Palmer, Oosterhoff, Bower, Kaplow, & Alfano, 2018). (including nationality, ethnicity, and urbanicity). For example, 8- to 12-year-old Hindu Brahman children from rural Nepal were more likely to control anger expressions than same-aged children from the U.S., despite feeling similar levels of anger (Cole et al., 2002). American children reported suppressing sadness more often than children from Ghana and Kenya, but children from Kenya reported suppressing anger more often than children from Ghana and the U.S. (Morelen et al., 2012). Within the same country, there may be cultural differences as well, such as those between urban and suburban communities (Raval et al., 2007).

Some of these differences may arise because of the different emphases placed on autonomy versus interconnectedness in various cultures. Cultures valuing individualism may be more likely to view ES as stifling expressions of individuality, whereas cultures valuing interdependence may be more likely to view ES as necessary for maintaining interpersonal harmony (Keller & Otto, 2009; Yeh, Bedford, Wu, Wang, & Yen, 2017). In support of this idea, a recent study found that Indian children were more likely to report their desire to maintain social norms as a reason for controlling emotions, whereas

American children were more likely to report their desire to communicate felt emotions as a reason to express them; accordingly, Indian children reported expressing less anger, sadness, and pain than American children (Wilson, Raval, Salvina, Raval, & Panchal, 2012).

Parenting Influences. Although display rules are generally culturally determined, they are transmitted directly from parents within the family. Within cultures, families differ in their socialization of emotions and are powerful determinants of children's ER, as they provide a context for learning about the effects of emotional displays on others (Saarni, 1979). Considering the many ways that parents can affect children's developing ER (see Bridgett, Burt, Edwards, & Deater-Deckard, 2015), there are several potential pathways through which parenting might impact ES development.

First, a large body of research suggests that parents' behavior in response to children's negative emotions (e.g., supportive versus punitive) plays an important role in shaping ER. When parents respond to emotions unsupportively, children must learn to cope with difficult emotions on their own, which can lead to heightened arousal and dysregulation because children do not have experience with successful co-regulation (see Eisenberg, Cumberland, & Spinrad, 1998). In turn, the unpleasant experiences associated with emotional expression may lead children to avoid, rather than process, their difficult emotions (Berlin & Cassidy, 2003; Eisenberg, Fabes, & Murphy, 1996). Indeed, there is a consistent relation between children's expectation of support following their emotional displays and the likelihood that children will share (or hide) their emotions with parents (Fuchs & Thelen, 1988; Shipman & Zeman, 2001; Zeman & Garber, 1996). Several studies find evidence for parents' responses to child distress as a predictor of children's

ES (Hughes & Gullone, 2010; Hurrell, Hudson, & Schniering, 2015; Larsen et al., 2012; Sharp, Cohen, Kitzmann, & Parra, 2016).

Parents vary in their responses to children's expressiveness, in part because of thoughts and feelings about emotions more generally (i.e., meta-emotion philosophy; Gottman, Katz, & Hooven, 1996). Some parents view emotional expression as harmful, and thus focus on minimizing emotions in themselves and their children. In one study, parents' own suppression was related to non-supportive responding to their children's distress (Hughes & Gullone, 2010). Research suggests that the extent to which parents suppress is associated with their children's suppression (Bariola, Hughes, & Gullone, 2012; Gunzenhauser, Fäsche, Friedlmeier, & von Suchodoletz, 2014), because children internalize parents' ER strategies, adopting them as their own (see Cole et al., 1994). Children may also learn from modeling and social referencing of their parents' ER strategies (for a review, see Morris, Silk, Steinberg, Myers, & Robinson, 2007). Thompson (1994) posited that a child's constant exposure to parents' emotion suppression may lead the child to imitate this manner of controlling their own emotions, guided by the parents' example.

An important aspect of the parent-child relationship is the quality of attachment. Attachment theory suggests that attachment insecurity (specifically insecure-avoidance) might also contribute to children's ES. Insecure-avoidant children have experienced consistent rejection from caregivers, and thus have learned to down-regulate their negative emotional expressions to ensure proximity to a caregiver who is uncomfortable with distress (Cassidy, 1994). Over repeated experiences of having their negative emotions rejected, insecure children develop representations of other people as generally not

accepting of sadness, anger, or fear, and thus feel that they cannot express authentic emotions. Already by 12 months of age, insecure-avoidant infants minimize negative emotional expressions directed toward attachment figures, despite having increased physiological indicators of distress; these infants also show more activity in the left prefrontal cortex during stressful events, which is associated with the inhibition of emotional behavior (see Gander & Buchheim, 2015). Growing evidence suggests that ES is also related to insecure attachment in older children and adolescents (Borelli et al., 2017; Gresham & Gullone, 2012; Moreira, Fonseca, & Canavarro, 2017).

Other aspects of parenting may contribute to children's ES as well, such as poor monitoring, inconsistent discipline, and use of corporal punishment (Balan, Dobrea, Roman, & Balazsi, 2017), lower perceived parental care (lack of emotional warmth, indifference, and neglect) and greater perceived overprotection (Jaffe et al., 2010), invalidating family climate (Sim, Adrian, Zeman, Cassano, & Friedrich, 2009), abuse or neglect (Ma & Li, 2014; Shipman, Edwards, Brown, Swisher, & Jennings, 2005; Shipman, Zeman, Penza-Clyve, & Champion, 2000), and conditional positive regard (i.e., giving more attention and affection when children enact desirable behaviors; Roth, Assor, Niemiec, Ryan, & Deci, 2009). However, evidence suggests that parental psychological control is not related to children's ES (Luebbe, Bump, Fussner, & Rulon, 2014).

Peer Influences. Although cultural display rules are first learned within the family, interactions with peers become an important vehicle through which these rules are maintained, as children gain increasing exposure to other agents of socialization outside of the home. Research indicates that children's expectations or perceptions of peers' responses to their emotional displays influence whether children hide emotional

expressions (Zeman & Shipman, 1996; though see Tillery, Cohen, Parra, Kitzmann, & Howard Sharp, 2015). For instance, children across a range of ages expected more negative interpersonal consequences (e.g., teasing) from friends compared to parents if they expressed negative emotions (Zeman & Shipman, 1997). Teasing is one way that peers use to reinforce conformity with emotional display norms (Brody, 2000), and some children may suppress in order to appear “cool” (Von Salisch, 2001; Shipman et al., 2001) or avoid ridicule or rejection (Zeman & Garber, 1996).

Additionally, peer victimization may encourage ES, because victimized children fear the interpersonal consequences of showing vulnerability, but the evidence for this notion is mixed (Gardner, Betts, Stiller, & Coates, 2017; Larsen et al., 2012).

As children enter adolescence, increasing autonomy may translate into the increasing influence of close peer relationships on their ER. In one study, negative aspects of adolescents’ attachment to peers predicted their suppression (Moreira et al., 2017).

Child Influences. Beyond external influences, many intrinsic mechanisms have been identified as being important for the development of children’s ER. For example, temperament influences children’s emotional expressiveness and their developing capacity to regulate emotions (Calkins, 2004; John & Gross, 2004). Specific to ES, some evidence suggests children with a lower tendency to approach novelty, respond flexibly to changes in the environment, or experience positive moods are more likely to suppress (Jaffe et al., 2010). In another study, callous, unemotional, and uncaring traits were positively related to self-reported suppression, whereas behavioral approach was not (Kokkinos & Voulgaridou, 2017).

Temperament research with adults suggests that individuals low in extraversion may suppress more often as an attempt to avoid interpersonal rejection, and individuals high in neuroticism may suppress because they experience higher than average levels of negative emotion and need a way to disengage from overwhelming negative feelings (Gross & John, 2003; John & Gross, 2004). There is some empirical support for this hypothesis in children and adolescents, as suppression was negatively associated with extraversion, agreeableness, and conscientiousness, positively associated with neuroticism, and not associated with openness among 10- to 18-year-olds (Gullone & Taffe, 2012).

Although not measures of temperament, depression and anxiety are characterized by heightened negative emotions, dysregulated affect, and maladaptive cognitive patterns, and they both may contribute to increased ES in children. In two studies, self-reported depressive symptoms in early adolescence predicted more self-reported trait suppression longitudinally (Larsen et al., 2012, 2013), a link which was mediated by decreased parental support for girls only (Larsen et al., 2012). Interestingly, depression influenced changes in suppression over time, and not the other way around. Although depression and anxiety are often conceived as outcomes of suppression, these studies suggest that they may be precursors as well.

Additionally, there may be gene variants that interact with environmental influences to predict ES in children, though evidence is limited to one study. Borelli et al. (2017) found that children's self-reported secure attachment was negatively associated with their self-reported ES, but only among children with a high-risk plasticity gene.

Several interventions have attempted to decrease suppression via intrinsic mechanisms, offering some experimental evidence. For instance, emotion management training (teaching how to identify and label, understand, and regulate emotions) reduced children's self-reported suppression compared to a social skills training group and a control group (Choi & Lee, 2015), possibly because children with low emotional awareness are more likely to suppress (Eastabrook, Flynn, & Hollenstein, 2014). In contrast, a school-based intervention to teach middle school students with behavioral problems how to engage in appropriate social self-regulation did not successfully alter ES (Smith et al., 2016). Other interventions have targeted mindfulness, the ability to pay attention to the present moment in a non-judgmental way. Mindfulness encourages openness to all thoughts and feelings, regardless of valence (Metz et al., 2013), and thus it may relate to (Pepping, Duvenage, Cronin, & Lyons, 2016) or cause (de Carvalho, Pinto, & Marôco, 2017) reduced suppression in children.

Finally, a recent study suggests that sleep problems can lead to increased suppression (Palmer et al., 2018). In a structural equation model, self-reported suppression mediated the link between sleep problems and anxiety disorders among adolescents.

Gender. Given that gender socialization begins early in life (Malatesta & Haviland, 1982) and impacts emotion expression (e.g., Chaplin, Cole, & Zahn-Waxler, 2005), gender may relate to ES from a young age. On the one hand, girls are more often socialized to consider how their emotions affect others (Keenan & Shaw, 1997), which could lead to increased suppression. On the other hand, parents emphasize the importance of emotional experience and expression more with girls (Brody & Hall, 2008), and in many cultures, masculinity is associated with stoicism. Reflecting this inconsistency,

evidence for gender differences is mixed, with some studies finding boys suppress more than girls (e.g., Borelli et al., 2017; Gresham & Gullone, 2012; Gullone & Taffe, 2012; Gullone et al., 2010; Palmer et al., 2018; Zhao et al., 2014), and other studies finding no gender differences (e.g., Penza-Clyve & Zeman, 2002; Yeh et al., 2017; Zeman, Shipman, & Suveg, 2002). The inconsistent findings may be due in part to how parents, teachers, and peers react to the expression of *specific* emotions in boys versus girls (e.g., Chaplin et al., 2005), as girls may be more discouraged from expressing anger and boys from expressing vulnerable emotions (e.g., Fuchs & Thelen, 1988; Garside & Klimes-Dougan, 2002; Morelen, Southam-Gerow, & Zeman, 2016; Saarni et al., 2006; Terwogt & Olthof, 1989; Zeman & Garber, 1996), though evidence for this notion is mixed (see Chaplin & Aldao, 2013; Klimes-Dougan et al., 2007). This research indicates that gender and type of emotion may both be key moderators of the effects of socialization on suppression, but few studies have directly tested these ideas

Summary. In summary, a growing number of studies suggest that individual differences in suppression emerge from a complex web of cultural, familial, peer, and temperamental influences. Several studies point to the variety of ways that parents can influence children's ES, such as modeling, responses to child distress, and the parent-child attachment relationship. Fewer studies, however, can speak to cultural, peer, and genetic influences on ES development. Importantly, almost none address the larger bioecological context in which various influences interact with each other and with the developing child, including gene by environment interactions. For example, little is known about how gender moderates the influences of culture or family.

Outcomes of ES: Theory and Data

A growing number of studies in recent years has investigated outcomes of ES in childhood and adolescence, which can be broadly categorized into influences on cognitive, affective, social, and physical development.

Cognitive correlates. Evidence from several studies on adults suggests that suppression is generally ineffective at achieving a desired emotional state, because it requires effortful management of an emotional response that has already been activated, a process known to deplete cognitive resources (Baumeister, 2014). According to a limited resource model of self-control (Muraven, Tice, & Baumeister, 1998), depleting cognitive resources (i.e., ego depletion) impairs subsequent efforts that require self-regulation. Thus, efforts to suppress may interfere with any process requiring self-regulation, including memory, problem-solving, maintaining successful social interactions, and a host of other processes vital to child development (e.g., Richards & Gross, 2000). Although this mechanism has primarily received support in studies with adults, there is some evidence that it operates in children as well. In the only study to measure the cognitive effects of suppression in children, children randomly assigned to suppress while watching an emotional video clip performed worse on a subsequent self-control task than children assigned to neutrally reappraise the video clip (Gunzenhauser & von Suchodoletz, 2014). Beyond a single instance of suppression, individuals high in trait suppression may experience the chronic effects of ego depletion. In the only study to measure the cognitive correlates of trait suppression in children, adolescents reporting greater trait ES also reported experiencing more difficulty with executive functioning in everyday life, including problems with working memory, maintaining an organized environment, and completing tasks on time (Lantrip et al., 2016).

In summary, almost no studies have examined the cognitive correlates of ES in children and adolescents, despite well-supported theory in the literature on adults. The single experimental study suggested that ego depletion may mediate the influence of ES on cognitive correlates, as it does among adults.

Affective correlates. Ego depletion may also explain the link between ES and children's emotional development, including their emotion dysregulation and internalizing and externalizing symptoms, as ER is a form of self-regulation. A consequence of ego depletion is heightened negative affect (Hagger, Wood, Stiff, & Chatzisarantis, 2010), which may itself serve as an additional mechanism through which suppression operates on other aspects of functioning, given the pervasive consequences of excessive negative emotionality in children (e.g., Eisenberg et al., 2009). Only one experimental study has examined the immediate effects of ES on children's affect. Children ages 7 to 9 who were instructed to suppress negative emotional expressions while watching an emotionally-evocative video reported greater subsequent negative emotion than when they were instructed to facially mimic the character's emotions (Musser et al., 2011). A few correlational studies also suggest a link between observed suppression and adolescents' affective functioning. Adolescent girls' spontaneous ES during a social stress task predicted more self-reported feelings of shame, but not depressive symptoms, social anxiety, or difficulty regulating emotions (Lanteigne et al., 2014). In another study, teens' observed suppression during a parent-child conflict task was unexpectedly related to lower maternal reports of teens' general anxiety symptoms (Turpyn, Chaplin, Cook, & Martelli, 2015). It is unclear, however, whether parents of suppressing teens reported fewer symptoms because they less often witness their outward manifestation of anxiety.

In addition to temporary increases in negative emotion induced by suppression in the moment, individuals high in trait suppression may experience chronically elevated negative affect and associated psychological symptoms. A key reason that children express negative emotions is to communicate effectively with others and to self-regulate (Campos, Campos, & Barrett, 1989). Inhibiting negative emotional expression may interfere with their ability to effectively communicate, resulting in a lack of social support for managing negative emotions and fewer opportunities for developing self-regulation skills. Over time, this could lead to feelings of helplessness in coping with negative emotions and to possible depressive symptoms.

Several studies lend support to the link between trait ES and negative emotional outcomes in children and adolescents. For instance, a growing body of evidence indicates that children and adolescents high in trait suppression are more emotionally dysregulated and have more internalizing symptoms (e.g., Zeman et al., 2002) such as anxiety (e.g., Eastabrook et al., 2014; Jacob, Suveg, & Whitehead, 2014; though see Hurrell et al., 2015, for mixed results using different measures of ES). Increased depressive symptoms also appear to be related to suppression using several different measures of trait ES (e.g., Betts, Gullone, & Allen, 2009; Hughes, Gullone, & Watson, 2011; Keenan, Hipwell, Hinze, & Babinski, 2009; Queen & Ehrenreich-May, 2014; though see Vilgis et al., 2018), and across different cultures and ages, including Chinese, Korean, and American children ages 7 through 18 (Lee, Kim, Park, & Park, 2017; Liu, Chen, & Tu, 2015; Yeh et al., 2017; Zhao & Zhao, 2015). A recent meta-analysis suggests that ES is significantly related to depressive and anxiety symptoms in youth with an average small effect size (Schäfer, Naumann, Holmes, Tuschen-Caffier, & Samson, 2017). Several studies suggest that trait

suppression is more consistently linked to internalizing, compared to externalizing symptoms, such as aggression (Aldao, Nolen-Hoeksema, & Schweizer, 2010; Kerns, Comer, & Zeman, 2014; Penza-Clyve & Zeman, 2002; Yap et al., 2011; Zeman et al., 2001; Zeman, Cassano, Suveg, & Shipman, 2010; Zeman et al., 2002). This pattern of findings is consistent with the goal of suppression, which is to internalize emotions and not show them.

Other aspects of emotional functioning have been linked to suppression, including shame (but not guilt; Hughes et al., 2011; Lanteigne et al., 2014), psychological distress and self-injury (Hasking et al., 2010; Sim et al., 2009; Voon et al., 2014a, Voon, Hasking, & Martin, 2014b, Voon, Hasking, & Martin, 2014c), self-esteem and life satisfaction (Teixeira, Silva, Tavares, & Freire, 2015), and eating disorders (Lu, Tao, Hou, Zhang, & Ren, 2016; Sim & Zeman, 2004). Suppression has also been linked to *decreased* substance use (Wills, Walker, Mendoza, & Ainette, 2006).

In contrast, some studies do not find links between trait suppression and children's affective functioning, but reasons for the inconsistencies are unclear, as these studies included a range of developmental periods and used a variety of ES measures (e.g., Borelli et al., 2017; Luebke et al., 2014; Shapero, Abramson, & Alloy, 2016; Tillery et al., 2015).

In summary, a fairly large and growing body of evidence suggests that children's trait suppression is associated with their affective functioning – most consistently with internalizing symptoms. Far fewer studies, however, have examined the immediate effects of suppression using experimental and observational measures of ES. As a result, little is known about mechanisms through which ES might influence a child's emotions in the moments during and after suppression (such as ego depletion). Additionally, the lack of

experimental studies is problematic for understanding causality, as some evidence suggests the direction of effects may be reversed (i.e., depressive symptoms precede increased suppression, but suppression does not precede increased depression; Larsen et al., 2012, 2013).

Social correlates. During childhood and adolescence, the ability to form friendships, interact competently with peers, and navigate the social world are vital tasks for healthy development (Rose-Krasnor, 1997). Suppression may interfere with social development in several ways, including robbing children of the opportunity to share emotional experiences, learn how to co-regulate difficult feelings, and practice empathy. Expressing emotions is a social experience involving sharing and communicating inner subjective states with others; children who often suppress do not share inner emotions, signaling an emotional disconnect between themselves and other people. This may lead to strained peer relationships, as suggested by the only study to link observed ES in children to social correlates. Second graders who suppressed expressions of anger (while experiencing high physiological arousal and subjective angry feelings) were considered to be more aggressive and were more disliked by their peers, compared to children with other patterns of anger management (Smith, Hubbard, & Laurenceau, 2011). Similar to the single study measuring observed ES, only a handful of studies have examined the social correlates of self- or parent-reported trait suppression, but they also generally find that ES is linked to children's social problems, including peer victimization (Morelen et al., 2016), maladaptive coping associated with peer-victimization (Gardner et al., 2017), relational (but not physical) aggression (Kokkinos & Voulgaridou, 2017; Sullivan et al., 2010),

greater loneliness (Gardner et al., 2017; Jacob et al., 2014; Sharp et al., 2016), and less self-perceived social competence (Sharp et al., 2016).

In a recent study, adults instructed to suppress facial expressions of emotion showed impairment in their ability to recognize others' emotional expressions relative to a control group (Schneider, Hempel, & Lynch, 2013). Similarly, it may be that suppression temporarily disrupts children's ability to connect with or recognize the emotions of another person, which could also disrupt empathic and prosocial behavior. However, only one study has tested whether ES is related to children's empathy or prosocial behavior: Hughes et al. (2011) found that self-reported suppression was not associated with self-reported empathy among 9- to 15-year-olds with elevated depressive symptoms.

Beyond diminished empathy, feelings of inauthenticity resulting from constant incongruence between inner feelings and outer behavior can lead to feeling that social interactions are "fake," which can ultimately interfere with relationship functioning (Goldman & Kernis, 2002). Feeling truly known and understood by another person is vital to intimacy, friendship, and the development of secure attachment relationships (Reis & Shaver, 1988), processes which may suffer because of inauthenticity and ES (English & John, 2013). Although these links are well-supported in the literature on adults, no studies of children or adolescents have examined ES in relation to inauthenticity. A few studies, however, have found that ES in pre-adult samples is related to the quality of peer and parent attachment relationships (Borelli et al., 2017; Gresham & Gullone, 2012; Moreira et al., 2017).

In summary, the few studies that have investigated the social correlates of suppression in children or adolescents find that it is related to negative developmental

outcomes such as relational aggression, loneliness, and insecure attachment. Almost all of these studies, however, assessed self-reported trait suppression, and none can speak to the social effects of ES using experimental measures. As a result, little is known about mechanisms through which suppression may influence social interactions during sensitive periods in development, despite rich theoretical ground and evidence from the adult literature.

Physiological and health correlates. In general, ER strategies contribute to an individual's ability to regulate physiological responses to stressors (e.g., Wilson, Barnes-Holmes, & Barnes-Holmes, 2014). Investigating stress responding is especially important during childhood, when physiological systems such as the HPA-axis are developing and predict stress responding later in life (Heim & Nemeroff, 2002). Given that suppression is a cognitively demanding form of ER involving ego depletion (Baumeister, 2014), it may be that suppression is physiologically arousing and activates the stress system. Ego depletion causes mental fatigue and perceptions of a task to be more difficult (see Hagger et al., 2010), which increases sympathetic nervous system (SNS) arousal to counteract fatigue and meet the perceived challenge (Wright, Stewart, & Barnett, 2008; Wright et al., 2007). Over a longer timescale, trait suppression may lead to physiological dysregulation because those who often suppress have fewer opportunities to rely on others for co-regulation and social support, leaving them with fewer strategies for coping with arousal (e.g., Shipman & Zeman, 2001). In adults, suppression has been consistently linked to increased SNS activation and higher cortisol reactivity (e.g., Butler et al., 2003; Gross, 1998; Lam, Dickerson, Zoccola, & Zaldivar, 2009; Roberts, Levenson, & Gross, 2008).

Surprisingly, however, evidence from studies of children and adolescents suggests a null association across a range of outcomes. In the few studies that have examined this, self-reported trait ES was not related to heart rate or heart period, cortisol, respiratory sinus arrhythmia, or alpha-amylase (Borelli et al., 2017; de Veld, Riksen-Walraven, & de Weerth, 2014; Hollenstein et al., 2012; Lanteigne et al., 2014; Shapero et al., 2016) during stressful laboratory tasks. Even fewer studies have included measures of suppression in the moment (rather than self-reported trait ES), but they also largely report no associations with physiology. In two experimental studies, children (some diagnosed with ADHD) instructed to suppress negative emotional expressions while watching emotional videos showed no more SNS arousal than when they were instructed to facially mimic the character's feelings (Musser et al., 2011; Musser, Galloway-Long, Frick, & Nigg, 2013). These studies also found that suppressing negative expressions increased children's respiratory sinus-arrhythmia (RSA; an index of parasympathetic nervous system activity) compared to baseline. Two other studies found that spontaneous suppression during a stressful task was unrelated to adolescent girls' heart rate (Lanteigne et al., 2014), and unexpectedly, *negatively* related to 10-year-olds' cortisol and alpha-amylase reactivity (perhaps because more stressed children are less able to suppress; de Veld, Riksen-Walraven, & de Weerth, 2012).

Researchers have long been interested in physiological stress responding, in part, because it carries implications for physical health, including immune functioning (Sapolsky, 2004). Despite the potential for informing early prevention efforts, almost no studies have examined health-related outcomes of suppression among children (and despite evidence that adults' suppression is linked to poorer immune functioning via

elevated levels of C-reactive protein, a widely used biomarker of inflammation that predicts increased risk of cardiovascular disease; Appleton et al., 2013). Two exceptions found that (a) self-reported ES predicted adolescents' emotional eating behaviors, which mediated the pathway from ES to greater intake of energy-rich food among girls (Lu et al., 2016), suggesting that suppression puts adolescents at risk for becoming overweight; and (b) self-reported ES was related to more frequent hospitalizations among youth with sickle-cell disease (Tsao, Jacob, Seidman, Lewis, & Zeltzer, 2014).

Beyond health outcomes, much evidence suggests that specific ER strategies are related to brain activity (e.g., Dörfel et al., 2014). Although links between suppression and brain activity have been studied among adults (Morawetz, Bode, Derntl, & Heekeren, 2017), only two studies have examined these in younger populations. One ERP study found that ES among 12- to 17-year-olds reduced late positive potential (LPP; Desatnik et al., 2017), which increases in response to emotional images and is thought to reflect the downstream effects of early amygdala activation (de Rover et al., 2012). The fact that ES reduced LPP suggests that it successfully downregulated emotional arousal, despite being a potentially more effortful ER strategy (and age-related LPP decreases in this study suggested that ES becomes less effortful with age). The other study examined longitudinal links between adolescent girls' self-reported suppression and prefrontal cortex (PFC) function, a region associated with emotional awareness and monitoring of emotion regulation success (Vilgis et al., 2018). The results indicated that greater PFC activity at age 16 predicted greater ES at age 17, suggesting that more mature ER capabilities facilitate suppression. Notably, ES did not longitudinally predict PFC activity in this

study, and so PFC development may be more accurately conceived as a precursor to suppression in adolescence.

In summary, childhood and adolescence bring vital periods of brain and physical development during which lifelong patterns for stress responding and health behavior habits are formed; therefore, it is surprising so few studies have investigated the potential physical effects of suppression early in life. Studies on health and brain correlates are almost non-existent, so many questions remain. For instance, if adolescents' suppression is in fact related to brain activity indicating more mature and successful ER capacities, why does it predict social problems and depressive and anxiety symptoms? Additionally, there is a small, but growing number of studies on children's and adolescents' stress responding in relation to ES. Contrary to much evidence from studies of adults, these largely find no association between suppression and physiology using a variety of measures across several age groups, but reasons for the null findings are unclear.

Future Directions

In summary, a growing body of research on expressive suppression in children and adolescents demonstrates the variety of antecedent cultural, social, and temperamental/genetic correlates, as well as several subsequent cognitive, affective, social, and physical correlates. Only in recent years, however, have these studies with pre-adult samples emerged; thus, as a new area of research, there are still many unanswered questions. In this section, I discuss some avenues for future research, summarizing the literature, noting significant gaps, and offering novel ways of thinking about ES. I end by considering some implications of this research for intervention efforts to improve developmental outcomes.

Before summarizing the literature, I note that much of the reviewed research is correlational, and so few claims can be made about the causes or effects of suppression in childhood. Although correlates are grouped into “precursors” and “outcomes” for ease of organization, I acknowledge that unidirectional main effects of one variable on another seldom reflect reality (especially the reality of something as complex as emotional development). Therefore, many of the future directions described here address alternative models of how these variables are inter-related in the real world, blurring the distinctions between precursors and outcomes.

Precursors

A growing number of studies demonstrate that individual differences in suppression emerge from several cultural, familial, peer, and temperamental influences. All these factors are inter-related, influencing each other as they influence (and are influenced by) the developing child over time (Bronfenbrenner, 1992); and yet, few studies on the precursors of ES take this complex developmental picture into account. As a next step, what is needed are studies that (a) assess multiple factors (e.g., family, peer, and genetic influences); (b) consider developmental change; and (c) model interactions among variables, such as moderating influences (e.g., gender, type of emotion) or bidirectional, cascading effects. Cross-lagged panel designs, for example, can be used to track how developmental or environmental changes precede or follow changes in trait suppression. A growing body of literature supports the differential susceptibility hypothesis, which posits that some children are more susceptible to environmental influences, for better or for worse (Belsky & Pluess, 2009). This hypothesis may apply to environmental influences on

suppression (Borelli et al., 2017), which could inform intervention efforts to target children at-risk for ER difficulties.

Additionally, more studies are needed with diverse samples to generalize findings, especially given evidence for potential cultural and racial differences (e.g., Palmer et al., 2018; Wilson et al., 2012) and evidence that the meaning or goal of suppression may differ across cultural contexts (Yeh et al., 2017), which would shift how researchers conceptualize its adaptiveness. An interesting future direction involves a new area of research on race and emotion socialization, which suggests that African American parents may take a more nuanced approach to socializing suppression. Due in part to their own experiences with discrimination and subsequent beliefs that displaying negative emotions in public can have social consequences, Black parents may be more likely to encourage suppression in certain contexts that could place their children at risk (Dunbar et al., 2017). Parents of Black boys, especially, may attempt to prepare their children for bias by encouraging suppression of anger (such as with law enforcement; Thomas & Blackmon, 2015). African American parents tend to report less encouragement of emotional expression and more unsupportive responses to distress, while also supporting and valuing children's emotions (Labella, 2018); however, given evidence that expressive encouragement (typically predictive of positive development for White children) is associated with lower social and academic competence in Black children (Nelson et al., 2013), suppression may have different adaptive value among minority groups.

This topic points to a larger issue in research on ES development in children. In general, suppression has been conceptualized as a maladaptive ER strategy, and the literature has confirmed that it is associated with significant negative outcomes. However,

an increasing number of studies support the idea that behavior is best understood in its evolutionary context, and that certain behaviors considered maladaptive may instead be conceptualized as developmentally specialized toward local environmental conditions (Frankenhuis & de Weerth, 2013). Thus, rather than referring to suppression as maladaptive, it may be more accurate to say that it has certain physiological, emotional, or social costs that may or may not outweigh the benefits. An interesting avenue for future research is to explore whether the costs of suppression in various contexts (or for various groups) outweigh the benefits, and why.

For example, it is evolutionarily adaptive for children to adjust their attachment behavior to maximize proximity to an attachment figure when danger arises (Bowlby, 1969/1982). Parents who are uncomfortable with emotional displays are more likely to remain close to children who learn to suppress their distress. Although these children are likely to develop insecure attachments (Ainsworth, Blehar, Waters, & Wall, 1978), which are related to negative outcomes, their behavior is adaptive in the caregiving context in which they were raised. Children who are raised in poverty or dangerous conditions may also learn that exposing vulnerability is not safe and adjust their emotional displays accordingly. Children who are bullied learn to protect themselves from physical threats by hiding sadness, fear, pain, and other emotions that may be viewed as weakness. Children who are abused may also find protection in suppressing distress, as they learn that any outburst could be met with physical discipline.

Thus, research on ES in adults could utilize developmental perspectives to better understand the conditions from which individuals' trait suppression arose, which were likely during their childhood or adolescence, and the meaning that this ER strategy had in

those contexts. While frequent suppression may no longer be adaptive years later, prevention efforts to decrease ES may benefit from a deeper understanding of the important functions suppression may have served in the past (Cole et al., 1994). If frequent ES is, however, still adaptive for an individual (i.e., it outweighs the costs), then intervention efforts to discourage ES may be unhelpful. Instead, interventions to support *flexible* ER strategy use (depending on context) could be more effective (Bonanno & Burton, 2013; Diamond & Aspinwall, 2003).

Outcomes

Overall, converging evidence suggests that expressive suppression is associated with multiple negative outcomes for children and adolescents, as it is with adults.

Affective correlates. Of all domains, affective functioning has been the focus of most studies to date on ES in children, and the results from these studies suggest that internalizing (but perhaps not externalizing) symptoms are associated with ES in childhood. Given the increasing prevalence of depression as children enter adolescence and the well-established negative effects of depression on development, including increased suicide risk, educational impairments, and greater rates of smoking, substance misuse, and obesity (Thapar, Collishaw, Pine, & Thapar, 2012), understanding whether and how ES contributes is important for development across the lifespan. With so few experimental studies, however, no strong claims can yet be made about whether ES causes depression or anxiety. Moreover, several alternative models remain to be tested, including the possibility that ES is simply a symptom of depression or the consequence of past depressive episodes, or more likely, that bidirectional influences lead to a continuing cycle of affective problems and emotion dysregulation. For example, depression can lead to

decreasing parental support over time, which can then encourage adolescents to more often hide their emotions because they do not expect supportive responses (Larsen et al., 2012, 2013); the hidden emotions may further isolate adolescents, perpetuating their depression. It is also possible that depression and ES are related only because they share common parenting (e.g., insensitivity; McLeod, Weisz, & Wood, 2007) or genetic (e.g., *FKBP5* genotype; Borelli et al., 2017) precursors. As with studies on developmental precursors, more diverse models of ES outcomes are needed to reflect the complexity of ER strategy use in real life. For example, latent growth curve analyses could model how changes in ES across development correspond to changes in depression or anxiety.

Compared to the research on affective outcomes, research on the cognitive, social, and physical correlates of children's ES is surprisingly sparse.

Cognitive correlates. Cognitive outcomes of ES are the most understudied of all the domains. However, understanding cognitive correlates of ES in children may shed light on why ES is associated with several other domains of development. This is because suppression involves attempts to alter emotional responses, which may deplete children's self-control resources (resulting in poorer performance on subsequent attempts to self-control; i.e., ego depletion) (Gunzenhauser & von Suchodoletz, 2014; Lantrip et al., 2016), as it does in adults. Considering the widespread importance of self-control for affective, social, and cognitive development (Tangney, Baumeister, & Boone, 2004), ego depletion may be a common mechanism linking ES to a variety of negative outcomes. This also has implications for children's academic achievement and school readiness. If ES is shown to impair subsequent self-control in pre-adult samples, interventions targeting suppression may help efforts to improve children's grades, increase attention and focus in the

classroom, and set struggling youth on positive developmental trajectories that begin with improved self-regulation.

Social correlates. Social outcomes of ES are the second most understudied, despite many intriguing studies on social correlates of ES among adults. Studies on ES in childhood could borrow the creative methods from the adult literature to uncover social correlates that are consistently related to ES across the lifespan, versus those that are specific to childhood and adolescence. For example, Butler et al. (2003) had unacquainted pairs of women discuss an upsetting topic after one member of each pair was asked to either suppress, respond naturally, or enact another ER strategy. They found that suppression disrupted communication, reduced rapport, magnified blood pressure in both partners, and inhibited relationship formation, compared to the other conditions. This procedure could be adapted for younger samples to examine how live dyad communication is affected by suppression, mirroring real world circumstances that children face, such as trying to make friends at a new school. Borrowing from another study of adults (Srivastava, Tamir, McGonigal, John, & Gross, 2009), an interesting avenue for future research is to observe developmental change during critical transitions, such as starting Kindergarten or entering high school. Understanding how suppression might inhibit relationship formation during these transitions could shed light on cascading social effects. Specifically, microgenetic analyses, which provide a clear view of change as it is happening in real time (Siegler & Crowley, 1991), could prove useful for understanding the nuanced effects of ES during developmental transitions.

Physiological and health correlates. Mounting evidence suggests that ES is not related to stress physiology in children, despite many studies demonstrating physiological

effects in adults (e.g., Butler et al., 2003; Egloff, Schmukle, Burns, & Schwerdtfeger, 2006; Gross, 1998; Gross & Levenson, 1993, 1997). If suppression is indeed taxing on the sympathetic nervous system and habitual use of it negatively impacts health (Gross & Levenson, 1993), then more research is needed to understand why studies do not find similar effects in children and adolescents. A few possibilities warrant exploration. First, perhaps links would be found among children using different indices of physiology. For example, electrodermal activity is one of the most consistently linked measures of physiology to ES in adults (e.g., Ben-Naim, Hirschberger, Ein-Dor, & Mikulincer, 2013; Butler et al., 2003; Egloff et al., 2006; Gračanin, Kardum, & Hudek-Knežević, 2013; Gross, 1998; Gross & Levenson, 1993, 1997; Kunzmann, Kupperbusch, & Levenson, 2005; Roberts et al., 2008), and yet this index has not been tested among children. Additionally, ES slows physical movement (to better hide behavioral responses associated with emotional reactions), which also decreases heart rate (Gross, 2002), so studies measuring heart rate as an outcome may find no links because any increases in SNS arousal caused by ES are offset by the accompanying decreased physical movement. Other changes in method might also uncover associations with ES. In almost all the reviewed studies, physiology was measured during or after a stressful task. Perhaps these laboratory tasks are relatively intense for children, activating too much SNS arousal to detect additional effects from suppression; less stressful tasks could allow subtle influences of suppression on physiology to emerge (e.g., watching emotional movie scenes). Relatedly, these tasks typically elicit fear or anger/frustration – perhaps only suppression of sadness or pain influences physiology (see Dennis & Kelemen, 2009; Waters & Thompson, 2014, for evidence that different emotions may benefit from

different regulatory strategies in childhood). Finally, it is also possible that the null findings reflect reality, and ES does not have the same physical effects in younger populations (e.g., due to immature physiology). For example, if ego depletion is a key mechanism linking suppression to SNS arousal in adults, perhaps this mechanism does not apply to children (considering the scarcity of evidence in pre-adult samples). If this is the case, then understanding when and how the influence of ES changes over development will be germane.

Regarding ES and health, studies on health correlates in children are practically non-existent, making it an area ripe for future research. It is interesting to consider the many ways that suppression in early life could influence long-term health outcomes. For instance, children who learn from an early age to hide their distress or pain may under-report symptoms to their parents or doctor. Serious medical conditions may be more likely to go unnoticed or untreated until it is too late. Alternatively, it may be that suppression by itself does not predict long-term health, but instead acts as moderator of the effects of adverse experiences on health, exacerbating existing risk factors. To illustrate, a child who experiences trauma or other adverse childhood experiences (ACES) is more likely to be obese, have a higher resting heart rate, suffer from alcoholism, attempt suicide, and have sexually transmitted diseases (Dong et al., 2005; Pretty, O’Leary, Cairney, & Wade, 2013); however, being able to share painful emotions with others and receive support regulating emotions could buffer that child from further stress, promoting resilience (see Dagan, Asok, Steele, Steele, & Bernard, 2017). As described earlier, children who suppress are less likely to receive these social benefits (e.g., secure attachments; Moreira et al., 2017), and thus would be at higher risk for health problems. Future longitudinal (or

retrospective) studies could test these, and other ideas, to shed light on the long-term impacts of ES on children's health.

Studies on neural correlates are also practically non-existent but represent an exciting avenue for future research. Although brain correlates were grouped with outcomes in this review, brain development is certainly also a precursor to individual differences in ER (e.g., Vilgis et al., 2018). Untangling the complex interrelations among brain activity, suppression, and psychological functioning will be important for future research on ES. Suppression is believed to be linked to poorer outcomes, in part, because it occurs late in the emotion-generative process and thus involves attempts to regulate a fully activated emotion (Gross, 2002). Evidence for this characterization of ES in childhood is limited, but methods from the field of affective neuroscience could be used to observe children's brain activity during the unfolding process of suppression with temporal precision (e.g., ERPs; Dennis, 2010), lending support to this theory as it applies to childhood and adolescence. Given the widespread changes in brain structure and connectivity that occur during childhood and adolescence (e.g., Giedd, 1999), findings from the literature on adults cannot be assumed to generalize to younger populations (similarly, findings from childhood may not generalize to adolescence and vice versa).

The Measurement of Expressive Suppression

A meta-analysis of methods used to study suppression and other ER strategies found that nuanced differences in methods could carry significant implications for results and interpretations (Webb, Miles, & Sheeran, 2012). Therefore, when evaluating findings, it is important to consider the relative advantages and disadvantages of various measurements of ES, along with what conclusions can be drawn from each.

Studies of suppression in children and adolescents vary widely in how they measure the construct, from self- and parent-report to observations. At the broadest level, these measures can be categorized into self- or parent-reported (“trait”) suppression and situation-specific (“state”) suppression. Whereas measures of trait suppression reflect somewhat stable tendencies in ER, measures of state suppression can inform the short-term effects of ES within a particular context.

Trait suppression is often measured by validated questionnaires, including the Emotion Regulation Questionnaire for Children and Adolescents (ERQ-CA; Gullone & Taffe, 2012; e.g., “I control my feelings by not showing them”), the Children’s Emotion Management Scale (CEMS; Zeman et al., 2001; e.g., “I hide my sadness/anger/worried feelings”), or the Emotion Expression Scale for Children (EESC; Penza-Clyve & Zeman, 2002; e.g., “I prefer to keep my feelings to myself”). These questionnaires have both parent-reported and child-reported versions. State suppression is often measured by inducing an emotion (e.g., social stress test, frustration task, emotional video clips) and then observing expressiveness during or interviewing participants after the task, or by experimentally manipulating ES by instructing some participants to suppress and others to do something else (e.g., use a different ER strategy, behave as usual). Other methods include interviews in which children are asked whether or how they would hide their emotions in hypothetical scenarios or how they typically have responded in past situations.

In general, evidence suggests that state and trait ER strategies are likely distinct phenomena (e.g., Egloff et al., 2006; Ehring, Tuschen-Caffier, Schnülle, Fischer, & Gross, 2010; Eisenberg et al., 2015; Gračanin, Kardum, & Hudek- Knežević, 2016), possibly supported by different neural circuits (Goodkind, Gyurak, McCarthy, Miller, & Levenson,

2010). The broader nature of the trait measure is inherent in its assessment of multi-context, real-world suppression (which spans multiple instances), compared to the state measure that necessarily assesses a single context. Indeed, there is evidence that trait and state ES can be uncorrelated, and can independently relate to development (e.g., Lanteigne et al., 2014); thus, researchers cannot assume high trait suppression will translate into observable suppression in the laboratory, and findings about one type of ES may not generalize to the other.

However, a common pattern across all categories of studies reviewed is that many fewer have assessed state suppression in children. The information gleaned from both constructs together can provide a more complete picture of the nature of suppression in childhood and adolescence, as each offers a complementary perspective (individual differences versus contextual). Trait ES measures cannot answer questions about causality and are subject to the methodological limitations of self- or parent-report. If children report, variable skills in reading or expressive language could bias results (see Zeman, Klimes-Dougan, Cassano, & Adrian, 2007). If parents report, individual differences in the extent to which parents are accurate in reporting child ES may introduce systematic bias (e.g., perhaps inaccurate parents tend to have children who suppress more; see Hourigan, Goodman, & Southam-Gerow, 2011). Suppression that is done outside of the child's awareness is also more difficult to report. However, trait measures are helpful for understanding the long-term impacts of chronic ES, especially if there are multiple reporters. For instance, perhaps a single instance of ES has no effect on a particular domain of functioning, whereas the habitual tendencies captured by trait measures do. This line of reasoning makes sense when considering that everyone suppresses emotion

sometimes, and in fact, suppression is a normal and required part of living in society. For example, learning how to stifle laughter during socially inappropriate moments is a positive developmental achievement. The *ability* to suppress when needed or instructed may not be what is linked to negative outcomes (and indeed, may instead indicate positive development such as more mature inhibitory control; Westphal, Seivert, & Bonanno, 2010); rather, it may be rigid over-use of ES that is problematic for children (Burton & Bonanno, 2016), which may be best captured by measures of trait ES.

State ES can further be broken down into instructed versus spontaneous, which also have methodological advantages and disadvantages. Experimental studies, although vital for making causal claims, typically involve instructing a randomly selected group to suppress when they might not do so naturally (limiting ecological validity). In this artificial context, children's motivations for suppressing may include desire to comply with the researcher rather than typical motivations that give rise to suppression, such as wanting to manage overwhelming emotions, fear of being ridiculed or rejected, or self-consciousness (Zeman & Garber, 1996). In fact, suppression motivated by prosocial, rather than self-protective goals predicts more positive outcomes (Gnepp & Hess, 1986). Given that individuals' motivations and goals are key when it comes to the adaptiveness of ER (English, Lee, John, & Gross, 2017), studies of state ES should carefully consider the contexts in which it is being measured. Spontaneous suppression is more likely to be characteristic of the child (see Gračanin et al., 2016), and thus more likely to reflect real-life motivations (such as fear of being judged by others during a social stress task) but cannot assess causality.

Thus, studies integrating information across both types of suppression will be essential to untangling the distinct and shared causes and effects of suppression. Even if state and trait suppression influence the same outcomes, they may do so through different means and under different circumstances (e.g., perhaps trait suppression leads to feelings of shame during a stressful task because of increased feelings of inauthenticity, and state suppression leads to feelings of shame during the task via heightened negative affectivity caused by ego depletion). Examination of the *interactions* between state and trait ES may reveal new ways to conceptualize how ES operates in the real world. For example, children high in trait ES may feel more comfortable suppressing during an interaction, and thus not show as strong a physiological or emotional reaction as children low in trait ES. Latent factor models could distinguish how much variation in spontaneous ES can be attributed to dispositional versus contextual factors. In addition, it may be that state ES mediates the link between trait ES and development (either fully or partially), a possibility that can only be explored by measuring both within a single model.

Implications for Intervention

In conclusion, the growing number of studies on ES in childhood and adolescence points to some significant costs of this ER strategy early in development. Using the knowledge gained from more than a decade of research, interventions involving ES could improve developmental outcomes for children struggling with emotion dysregulation.

Drawing from the literature on precursors to ES, interventions targeting suppression should be culturally-informed, considering, for example, the role of race in children's reasons for suppressing and the potentially adaptive value of doing so (Coard, Wallace, Stevenson, & Brotman, 2004). Rather than discouraging suppression altogether,

interventions could encourage flexibility in ER by teaching children a range of strategies to increase their repertoire, along with decision-making skills for deciding among them in various contexts. If habitual ES is adaptive for an individual, helping the child to find safe outlets for expression (e.g., writing, confiding in a close friend or attachment figure) might offset some of the costs of suppression. Writing about their emotions in a diary was helpful for reducing anxiety symptoms among girls high in trait suppression, possibly because it helped them to process difficult emotions that they had previously avoided (Thomassin, Morelen, & Suveg, 2012).

In general, intervening during childhood and adolescence rather than adulthood could be vital for preventing negative patterns of emotion expression and regulation that are established early in life. The earlier a child begins suppressing, the more impact it may have on development, given that the emergence of new skills may be subject to negative developmental cascades initiated by suppression. Targeting when ES first emerges, when it becomes part of an individual's personality, and how it changes across development will be vital to intervention.

Appendix B: Recruitment Flyer

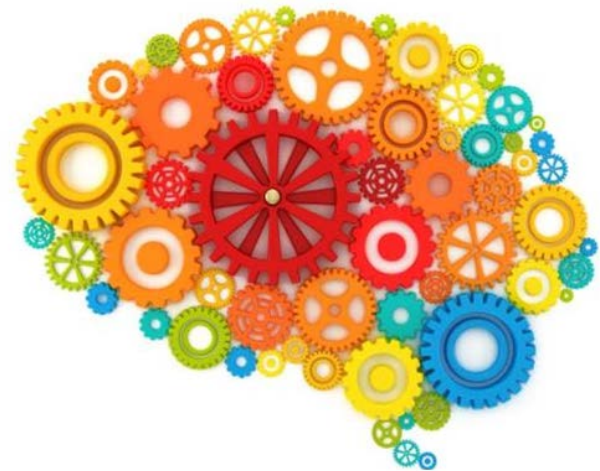


Do you have a 9- or 10-year-old child?

The University of Maryland Child & Family Development Lab is doing a research study about children's emotions and reactions to movie scenes.

Join us for a [single visit](#) to our lab:

- very flexible scheduling
- free parking right next to the playroom
- childcare during the visit for siblings.



Your child will receive \$10 and a UMD “Junior Scientist” certificate for participating!

This research is being done by Dr. Jude Cassidy,
at the University of Maryland, College Park.
Email mdchildfamilylab@gmail.com or call (301) 405-0009
for more information.

Appendix C: Consent and Assent Forms

Project Title	Children's Reactions to Movie Scenes
Purpose of the Study	This research is being conducted by Dr. Jude Cassidy at the University of Maryland, College Park. We are inviting you to participate in this research project because you have a child who is 9-10 years old. The purpose of this research project is to explore children's reactions to movie scenes.
Procedures	The procedures will take place in two parts. Part 1. We sent your child a brief questionnaire to complete before you came here. Your child has already completed this. Part 2: Today, you are visiting our playroom at the Maryland Child and Family Development Lab in the Department of Psychology. You will go into a separate room while your child goes with the research assistant. You will be asked to complete some questionnaires about your child, your relationship with your child, and your thoughts, feelings, and behaviors. You will also be asked to complete a short visualization task and to play a word sorting game. If time permits, you will be asked to watch four short videos of infants and answer questions about your thoughts and feelings about the videos. Your child will watch some short movie scenes while we record their skin conductance ("skin sweatiness") by attaching small Velcro straps to their fingers. They should not experience any physical discomfort during the recording. Before and/or after the movie scenes, your child will be asked about their thoughts and feelings, and about their relationship with you. These movie scenes are brief clips (about 3 minutes) from popular G- or PG-rated films. They have been used in other research studies with children this age. These scenes were selected because children often feel emotions, including negative emotions, when they watch them. During this time, your child will be videotaped and audio recorded. The recordings are being made so we can watch them later. Only the research staff will see or hear these recordings unless you give additional permission for them to be shown for educational purposes. We are unable to provide families with copies of these videos. The entire visit will last about 60 minutes. Your child will receive a Junior Scientist certificate and \$10 for participating.
Potential Risks and Discomforts	In this study, there are no known significant risks to you or your child. Like all research projects, there is the risk that someone who should not see the things you tell us might see them. This will probably not happen. We have many ways to make sure this does not happen. See the Confidentiality section below to see how we will keep the things you tell

	us private. Some questions you will answer are about personal things or your moods and feelings. Sometimes, thinking or talking about personal things causes people to feel sad or angry. If you are feeling this way, you can skip any question that you do not want to answer. You or your child will be able to terminate any or all of the procedure for any reason. The tasks and games that will be done with your child have been done by researchers many times before with no serious risks. However, these scenes from popular G- or PG-rated films may cause some children to feel emotional. Your child may choose to end any part of the study at any time. We will also try to make sure your child leaves the playroom in a good mood. The small Velcro straps that will go on your child's fingers will have some gel on them to help measure the skin sweatiness. There is a small risk of allergic reaction to this gel, although it is non-toxic, non-irritating, and hypoallergenic. If your child experiences skin irritation, we will stop the study. In addition, your child will be away from you for part of the time. This sometimes causes children to become upset. If your child is upset during the visit, he/she can ask us to stop any activity; in addition, the researchers will use judgment to decide to end portions of the study if necessary.
Potential Benefits	This research is not designed to help you or your child personally, but the results will help the investigator learn more about children's reactions to movie scenes, and about child development. We hope that, in the future, other people might benefit from this study through improved understanding of these aspects of children's development.
Confidentiality	Any potential loss of confidentiality will be minimized by storing data, including questionnaires, physiological recordings, audio, and video in a locked office on password-protected computers and/or locked filing cabinets. Your names will never be used, and any identifying information will be removed from the data. We will assign a number code to identify the research data of you and your child. If we write a report about this research project, you and your child's identity will be protected to the maximum extent possible. You and your child's information may be shared with representatives of the University

	of Maryland, College Park or governmental authorities if you or someone else is in danger or if we are required to do so by law. We plan to retain the video data at the PI's laboratory and do not have plans to destroy them. However, you may request that we destroy this data at any time.
Medical Treatment	The University of Maryland does not provide any medical, hospitalization or other insurance for participants in this research study, nor will the University of Maryland provide any medical treatment or compensation for any injury sustained as a result of participation in this research study, except as required by law.
Compensation	You will receive \$10. You will be responsible for any taxes assessed on the compensation. If you do not earn over \$100 only your name and address will be collected to receive compensation.
Right to Withdraw and Questions	You and your child's participation in this research is completely voluntary. You and your child may choose not to take part at all. If you and your child decide to participate in this research, either of you may stop participating at any time. If you or your child decide not to participate in this study or if you or your child stop participating at any time, you or your child will not be penalized or lose any benefits to which you otherwise qualify. If you and your child decide to stop taking part in the study, if you or your child have questions, concerns, or complaints, or if you or your child need to report an injury related to the research, please contact Jude Cassidy at: Department of Psychology, University of Maryland, College Park, MD 20742, 301-405-4973, jcassidy@umd.edu.
Participant Rights	If you or your child have questions about your rights as research participants or wish to report a research-related injury, please contact: University of Maryland College Park Institutional Review Board Office 1204 Marie Mount Hall

	College Park, Maryland, 20742 E-mail: irb@umd.edu Telephone: 301-405-0678 This research has been reviewed according to the University of Maryland, College Park IRB procedures for research involving human subjects.	
Consent for Future Contact	We request permission to contact you in the future. We may contact you about other research studies. _____ I agree to be contacted in the future _____ I <u>do not</u> agree to be contacted in the future.	
Statement of Consent	Your signature indicates that you are at least 18 years of age; you have read this consent form or have had it read to you; your questions have been answered to your satisfaction and you voluntarily agree to participate in this research study. You will receive a copy of this signed consent form. If you agree to participate, please sign your name below.	
Signature and Date	NAME OF CHILD [Parent: Please Print]	
	NAME OF PARENT [Parent: Please Print]	
	SIGNATURE OF PARENT	
	DATE	

Child Assent Script

- Hi [child's name], I'm [your name]. I'm going to tell you what we'll do today, ok?
- First, you and I will go into that room over there [point] where you'll watch some short movie scenes on the computer.
- I'll put some small pieces of Velcro on your fingers to measure the sweat on your skin. They don't hurt and won't be uncomfortable.
- Sometimes I'll ask you to say how you're feeling or what you're thinking. There are no right or wrong answers – I just want to learn about children. You're being a very big help to us – helping us learn about children.
- There is a video camera in the room so we can look at the visit later. Only people who work here will see the video, unless your mom/dad says it's OK to show to others who also are learning about children.
- I also won't tell your mom/dad what you said during the visit, but you can tell her/him later if you want to. That's fine.
- Some children may feel emotional while they watch the movie scenes. If you want to, you can stop or take a break anytime you feel like it.
- You'll be away from your mom/dad for a little bit, but you can take a break to go see her/him anytime.
- By being here today, you'll help us understand more about how children react to movie scenes. Parts of the visit are also fun for some children!
- The whole visit will take about an hour.
- As a thank you for all your help, you'll get \$10 and a Junior Scientist certificate at the end of the visit.
- If you don't want to be in the study, you don't have to. If you want to be in the study now but change your mind later, that's OK too.
- If there's anything you don't understand, let me know and I'm happy to explain it to you. Do you have any questions for me now?
- So, is it OK with you to do these activities with us today?

NOTES TO RESEARCHER: The child should answer "Yes" or "No." Only a definite "Yes" may be taken as assent to participate.

Name of Child: _____ **Parental Permission on File:** ☐ Yes ☐ No

(If "No," do not proceed with assent or research procedures.)

Child's Voluntary Response to Participation: ☐ Yes ☐ No

Signature of Researcher: _____ **Date:** _____

Appendix D: Random Allocation, Stratification, and Blindness Procedures

Random Allocation and Stratification Procedures

Each child was randomly assigned to 1 of 2 study conditions: suppression condition (A) or control condition (B). To assign condition, a random letter sequence was created with an online random number generator using a 1:1 overall allocation ratio (i.e., an equal number of children in each condition). Before a child visited the laboratory, he or she was assigned the next letter on the randomly generated list by an independent research assistant (not an experimenter or coder).

In addition, conditions were stratified by child gender and race/ethnicity to ensure equivalence on these dimensions. Specifically, there was a 1:1 allocation ratio for boys (i.e., the same number of boys in condition A and condition B), a 1:1 allocation ratio for girls, a 1:1 allocation ratio for racial/ethnic minority children, and a 1:1 allocation ratio for racial/ethnic majority children. To do this, random assignment was done separately for each of the four combination groups (i.e., minority male children, minority female children, majority male children, majority female children), using separate random letter sequences. For example, when a female racial-majority child visited the laboratory, she was assigned the next letter on the randomly generated list for female racial-majority children. This ensured a 1:1 allocation for both gender and race/ethnicity.

Because recruitment and data collection was ongoing, the total sample sizes of each gender-race combination group was unknown when the four random lists were generated. This could potentially interfere with the 1:1 allocation ratio, because, for example, if 25 letters were generated for male racial-minority children, but only 15 such children were recruited in total, more children may be assigned to one condition than the

other based on the distribution of the first 15 letters. To solve this problem, all random letter sequences were made using random block sizes of 2, 4, and 6. This means that, instead of the entire sequence being randomized at once (with the potential of having many “As” in a row followed by many “Bs” in a row), randomization occurred in smaller blocks of 2, 4, or 6. Thus, the 1:1 allocation was roughly maintained throughout the period of data collection for each gender-race combination group. Furthermore, the block sizes varied randomly so that the experimenter could remain blind to the child’s probable condition (Kim & Shin, 2014).

Blindness Procedures

Child condition was assigned before the family’s arrival by a non-blind research assistant (not an experimenter or coder). There were two experimenters. Experimenter 1 always remained blind to children’s experimental condition. Experimenter 2 remained blind until giving the experimental instructions (which differ for the suppression and control conditions). Experimenter 1 (always blind) did the intake procedures, familiarized the child with the physiology equipment, and collected baseline physiology. Then Experimenter 2 (blind at this point) trained the child on rating subjective emotions and had him or her rate baseline emotions on the computer. When it was time to begin the experimental procedure, Experimenter 2 looked at a hidden note from the non-blind research assistant about which condition the child was randomized to. Based on condition, Experimenter 2 then gave the condition instructions and showed the child the movie scene. After showing the movie scene, Experimenter 2 asked the child to again rate his or her emotions (because emotions were rated on the computer and the child was already trained to use the scale, the experimenter did not directly administer this task). After the

movie scene and subjective emotion ratings, Experimenter 2 left the room and Experimenter 1 returned to administer the empathy and prosocial behavior tasks, and to finish the remainder of the visit (still blind to child's experimental condition).

Appendix E: Suppression Task Instructions

Instructions given to all children:

We'll now show you a scene from a movie. There are some parts in this movie that might be emotional. Please watch and listen to the movie scene carefully. Do you see the camera here? Just so you know, you'll be videotaped by that camera while you watch the scene [point to camera]. Some other people will watch the videotape later, so they can learn more about children.

Then children in the suppression condition only will get additional instructions:

[look at child while saying this and speak slowly and clearly – let them fully process this information]. For this part, while you're watching the movie scene, we don't want you to show how you're feeling with your face or your body. Nobody should be able to see what you're feeling by looking at you. So, as you watch, try your best to not show the camera how you really feel.

Comprehension for both conditions:

So what are you going to do while you watch? (If answers correctly, say, "that's right!" If answers incorrectly or doesn't know, repeat the instructions and ask again).

To answer correctly, the control group children must say something about watching and listening carefully. The suppression group children must say something about not showing how they feel (and to watch and listen carefully – if they don't include this part, E should prompt it).

"This is a scene about a father who gets very injured." [Immediately press PLAY]

Appendix F: University of Maryland Institutional Review Board (IRB) Approval Letter



1204 Marie Mount Hall
College Park, MD 20742-5125
TEL 301.405.4212
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irb@umd.edu
www.umresearch.umd.edu/IRB

DATE: December 21, 2017

TO: Jude Cassidy, PhD
FROM: University of Maryland College Park (UMCP) IRB

PROJECT TITLE: [1048473-5] Children's Reactions to Movie Scenes
REFERENCE #:
SUBMISSION TYPE: Amendment/Modification

ACTION: APPROVED
APPROVAL DATE: December 21, 2017
EXPIRATION DATE: June 19, 2018
REVIEW TYPE: Expedited Review

REVIEW CATEGORY: Expedited review category # 4 and 7

Thank you for your submission of Amendment/Modification materials for this project. The University of Maryland College Park (UMCP) IRB has APPROVED your submission. This approval is based on an appropriate risk/benefit ratio and a project design wherein the risks have been minimized. All research must be conducted in accordance with this approved submission.

Prior to submission to the IRB Office, this project received scientific review from the departmental IRB Liaison.

This submission has received Expedited Review based on the applicable federal regulations.

This project has been determined to be a Minimal Risk project. Based on the risks, this project requires continuing review by this committee on an annual basis. Please use the appropriate forms for this procedure. Your documentation for continuing review must be received with sufficient time for review and continued approval before the expiration date of June 19, 2018.

Please remember that informed consent is a process beginning with a description of the project and insurance of participant understanding followed by a signed consent form. Informed consent must continue throughout the project via a dialogue between the researcher and research participant. Unless a consent waiver or alteration has been approved, Federal regulations require that each participant receives a copy of the consent document.

Please note that any revision to previously approved materials must be approved by this committee prior to initiation. Please use the appropriate revision forms for this procedure.

All UNANTICIPATED PROBLEMS involving risks to subjects or others (UPIRSOs) and SERIOUS and UNEXPECTED adverse events must be reported promptly to this office. Please use the appropriate reporting forms for this procedure. All FDA and sponsor reporting requirements should also be followed.

All NON-COMPLIANCE issues or COMPLAINTS regarding this project must be reported promptly to this office.

Please note that all research records must be retained for a minimum of seven years after the completion of the project.

If you have any questions, please contact the IRB Office at 301-405-4212 or irb@umd.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within University of Maryland College Park (UMCP) IRB's records.

Appendix G: Complete Laboratory Visit Procedure and Script

Child and Parent Together			
Task		Time Expected	
*^Consent and study overview		5 min	
Child and Parent Separate			
Child Tasks		Parent Tasks	
Task	Time Expected	Task	Time Expected
*Familiarization of physio equipment	7 min	^Questionnaires: - Demographics - Child caffeine intake - Other measures	45 min
*Baseline physio: resting and neutral pictures	4 min		
^Training on emotion scales, rating emotions	2 min		
^Suppression task	7 min	^Priming Task	10 min
^Rating emotions and state suppression	1 min		
*Empathy task	5 min	*Experimenter 1 ^Experimenter 2	
*Transition (sandbox)	5 min		
*Prosocial behavior task	5 min		
*Rating emotions	1 min		
*Security Scale	10 min		
*Happy videos and Rating emotions	5 min		
Child and Parent Together			
Task		Time Expected	
*^Goodbye / Certificate / Compensation		3 min	
TOTAL:		60 min	

Children's Reactions to Movie Scenes Visit Script

GO TO PARKING GARAGE TO MEET FAMILY 20 MINUTES BEFORE THE VISIT STARTS (See Parking Procedures Document).

SET-UP 20 MINUTES BEFORE GOING OUT TO PARKING GARAGE (see pre-lab checklist).

WHILE WALKING IN WITH THE MOM, ASK HER WHERE SHE HEARD ABOUT THE STUDY.

NOTE: Try to avoid referring to this as a “study” with the children (ok for parents), because it may connote school or performance-based stuff. Use “activities” or something else, unless it’s weird to do so.

NOTE: E1 and E2 switch off being in the child room. Whoever is NOT in the child room is in charge of overseeing the whole “operation” is going smoothly and handling things if they come up (e.g., the lab phone rings, someone knocks on the lab door, childcare needs something....)

Specifically, this includes:

1. Monitoring that the cameras are still being imported by imovie and the camera picture is clear and not wobbly.
 - a. Firmly push in the yellow connectors in the back of the black box to get a clearer picture. If imovie stops importing, you can try to RESTART the cameras. Press the small down-arrow button (or anything that says Import). Make sure the two cameras are rolling with clear picture, then press “import” at the bottom right.
 - b. If you can’t fix the cameras or get them to record, and nothing is being recorded, immediately turn on the back up camera and put it on the tripod. Find a way to let E1 know that this happened, so she can avoid turning off the Biopac Logitech camera (this is the only way to get sound from the room).
 - c. *****Always check the camera a minute before a task is coming up (the prosocial behavior, empathy, or sticks tasks), and monitor the screen frequently during these tasks, ready to grab the back-up camera if needed. If you use the back-up camera, turn up the sound on the laptop so it can capture some audio. In between these 3 tasks, it isn’t vital to be checking the camera/laptop screen frequently.
2. Checking on childcare
3. Checking on parent’s progress

How to answer questions from parents and children:

MOM QUESTIONS AND ANSWERS

If mom asks about the movies:

- They are from popular G- and PG-rated films and have been used in previous studies with children this age.

If she continues to ask about the movies (wants to know more specifics), and you've already told her that they are G- and PG-rated:

- One example is Finding Nemo. But it's important for the study that the kids don't know the names of the movies ahead of time.

If she wants to know the names of all the movies:

- The Champ, Finding Nemo, and Penguins of Madagascar. But it's important for the study that the kids don't know the names of the movies ahead of time.

If she asks if the movies are scary:

- There are no horror movie clips, and most kids don't feel scared when they watch these. In previous research, if the clips made children feel a negative emotion, it was almost always sadness, and not fear. And of course, we let your child know that they don't have to watch any clips or parts they don't want to. They can stop at any time.

CHILD QUESTIONS AND ANSWERS

Are the movies scary?

- There are no horror movie clips, and most kids don't feel scared when they watch them.

What is this movie called?

- You'll see what it is. If it's important to you to know the name, we can tell you at the end. [this means at the end of the whole VISIT. Only tell the child if they ask again, because this means it really was important to them to know. And if you do tell them, also say that it's important they don't tell anyone else.]

Is that a two-way mirror?

- Yes! Remember I told you we had a video camera in here? There's one back there. But only people who work here will ever see it, so it's kept private.

I thought the dad died! Is this movie scene [referring to the happy beach scene] before or after the sad one?

- We use these clips to tell the story that the dad was seriously injured and then he got better. In our narrative, this movie scene is AFTER the other one, when he was feeling better.

Consenting and study overview (5 minutes) – both experimenters:

20 minutes before visit, someone goes out to parking garage (can be anyone – but preferably, it's the childcare provider if childcare is needed, so that siblings will be more likely to separate from parent). **See the Parking procedures.** Escort the family to the lab, talking to both the study child and any siblings to make them feel comfortable. **WALK BY THE BATHROOM FIRST.**

RA: *The visit is about an hour long and it's possible – but difficult – to stop for bathroom breaks once we start. [to the parent]: I can walk you all to the bathroom before we start, if you'd like.*

RA: If there is a sibling under age 6, ask the parent: *If your child has to use the bathroom while you are not with him/her, would you like us to come get you, or is he/she alright to go by him/herself?*

The RA bringing in the family should radio the lab while they walk in, so another RA can turn on the video camera(s) and hold up a sign with the Participant ID#, date, and time.

Once they arrive at the lab:

Experimenter (E1): *Hi! Welcome to the child and family lab! Thank you so much for being with us today! [Say the parent's name and shake her hand]. And you must be [child's name]. I'm very happy to meet you, my name is [xxxxx].*

If childcare is needed:

Make sure that there is space available for childcare! If it's in the NSF space after 4:30 pm, make sure you have swipe access to that room. If it's in the shared space with the Redcay lab, make sure we ask permission first.

E1: *I will be working and playing with [child], [E2] will be with [parent name], and [childcare provider] will be playing with everyone else! We have that room over there set up for [siblings], with some games/activities/toys.*

Childcare provider (CP) will have been instructed ahead of time to escort other children into the shared space at this point (or wherever childcare will be provided).

If siblings have trouble separating:

CP: *Ok, we can wait here while [E], mom, and [child's name] talk, and then we can walk to the playroom together!*

Then, CP should warm up with the siblings for a bit longer, maybe read a book to them in the room that parent is in while she consents, and then try to bring sibling(s) into other room slowly. Using stickers, other toys, showing or describing what's in the other room, etc. can help. Only if the sibling refuses to leave parent even after the consenting process if over can he/she stay in the room with parent while she fills out questionnaires. Siblings are NOT allowed in the room with the 4th grade child, though.

Consent:

E1: *Before we go in, we'll just remind y'all what you'll be doing today and have you sign the consent form. I'll sit with [child's name] and tell her/him what we'll be doing,*

E2: *...And [mom/dad], you can sit with me at the table so that we can go over the consent form, ok?*

Consent and Assent must be done in a private room, with only the 2 experimenters and the family.

Child Assent (done by E1):

Get the clipboard with the child assent form on it. Say the bullet points in plain English, conversationally. Speak slowly so child has time to process the information. Pause and be sure to ask if child has any questions. Answer any questions the child has about the study, but don't provide too much information about the purpose of the study. Any information not already on the assent form, ask Jackie before telling it to the child. If the child agrees to participate, fill out the bottom portion of the form. Then:

E1: *Are you ready to go into the playroom?* [to parent]: *Ok, we're going to the playroom, we'll be just down the hall on the right.*

Parent Consent (done by E2):

Get the clipboard with the parent consent forms on it, and hand the parent one while you hold the other. Show the parent the extra copy in the clipboard – tell her that this is her copy her to keep, which we'll give her at the end of the visit. Go through the consent form, explaining the highlights in plain English, conversationally. Tell the parent that you're just covering the highlights, but she is welcome to read through it herself and ask questions. Answer any questions the parent has about the study, but don't provide too much information about the purpose of the study. Any information not already on the consent for, ask Jackie before saying it to the parent. Have the parent sign our copy of the form.

NOTE: If parent asks about watching the video of the child, say “we can't make copies of the videos for families, so that all videos and information stay safe here inside the building//we keep everything under lock and key. However, we can arrange a time for you or family member to view the video inside the lab at a later date, if you want. Just remind me at the end and we can arrange that.”

NOTE: If the parent is a man, the child will be answering questions about their relationship with a female primary caregiver. During the PROCEDURE section, ask whether there's a female guardian that lives with the child (mother, grandmother, step-mother?) Make a note of this on the Security Scale when you go into the child room, because this will be who the child answers the Security Scale about. If there is no female guardian that lives with the child, the child will be answering it about the father.

Parent Portion of Visit

E2: *Now we're going to go into the other room where you'll do the surveys.*

E2: *MOST of the questionnaires are on the computer, so you can have a seat in the black chair by the computer.*

Pull up the questionnaire. Have a seat next to parent, don't hover over her. Have the example sheet available to use for explanation.

Have you done questionnaires like this before?

If parent says yes: *Great. I will just go over the basics really quickly. As the pages go on, the questions will have different scales. This one goes from "disagree to agree", but some may ask about "how often" or "how likely" you or your child are to do certain things. So, just make sure to pay attention to the different scales as you go through the questions.*

If parent says no: *Go through 1 or more example: Each questionnaire will have some instructions at the top, like this. Be sure to read all the instructions because they'll be different. Some ask you to think only about the last month, for example, or to think about a specific person when you answer. This one says [read instructions]. So you'll read each of these sentences and then decide how [likely or unlikely/ much it describes you / much you agree or disagree]. Every questionnaire has a different scale, so be sure to look at the scale before you start answering. Sometimes low numbers mean xxxx, sometimes low numbers mean xxxx.*

If need be, show them the example sheet for more examples.

E2: *I also want to remind you that your answers are private, your name will never be connected with this information, just an #ID. So please answer as honestly as possible – we want to learn about real parents and children.*

Also, some questions ask about "your child". In every case, this refers to [4th grader's name]. Since parents often do things differently with different kids, it is important that you just think about this ONE child when you are filling these out.

If you have any questions about the wording or anything else, please let us know! I or [E1] will be in the room next door – please don't hesitate to let me know if you have questions or need something.

If you want to know how much longer to go with the survey, there is a progress bar at the top of the page that tracks how much more. When the progress bar gets to about 60% (point to the progress bar), a page with instructions will pop up asking you to come get a survey that is done on paper. At that point, please come find me or [E1] in the room next door when you get there. Then you can come fill out the paper survey with the pen on the desk. Once that is done, you can finish up on the computer.

And finally, I hate to ask this, but it would help us if you didn't use your cell phone while doing the surveys. For the research, it's important that all parents have similar experiences. Is that ok? [parent responds]. If you do get a text or call you need to talk, of course that's fine, we just ask that you pause answering the questions, so your attention isn't divided.

Whoever is in the dark room when the parent gets to that point, give them their paper survey. Tell them that when they complete it, they can return to the computer survey.

When you leave the room, ALWAYS CLOSE THE DOOR! If the parent asks why the door is to be closed, or asks to leave it open, tell her we close it because the lab can get noisy and we also want her to have privacy. If she wants it open, that's ok. Just make her feel comfortable.

After leaving the parent room, E2 sets up all the forms (i.e. certificate, etc.) in the clipboards for after the visit in the consent room.

Once parent says she is done, look at the screen to make sure it's on the last page (where it says, Thank you for taking this survey). Then, if she finished before her child, offer her the choice to stay in the main room or the room she is already in, or to come into the observation room to see her child. Only if she asks to see her child, then you can bring her into the small recording room – MAKE SURE TO ASK THAT SHE KINDLY NOT TALK OR MAKE NOISE, AND KEEP THE DOOR CLOSED SO THE ROOM IS DARK. IF SHE ASKS ABOUT TAKING PICS OR VIDEOS OF HER CHILD, SHE CAN TAKE 1 OR 2 PICTURES, BUT NO VIDEOS PLEASE.

After the child watches the happy videos, while filling out the final emotion questions, both E2 and the parent must leave the observation room and go to the main room, so the child doesn't wonder why they were in the dark room.

Child Portion of Visit

Note for working with child: Always try to keep at the child's level – squat or sit down next to child when explaining things; try not to hover over. Also, speak slowly when giving any type of instructions so the child has time to process. Don't be too excited or happy during the visit (have a calm, friendly presence), due to the emotional nature of this study. Related to this, after a child finishes a portion, you can say "thank you" or "great job," but not every single time (every other time), so as not to be too enthusiastic, especially after the emotional scenes.

If child has difficulty separating from parent, parent can go into the room with child while things are set up, but must leave before any measurements begin (e.g., baseline physio or emotions).

Always keep the door closed.

If the child asks what it means when the physio lines go up/down: "It just is your natural body rhythms – sometimes it goes up, sometimes it goes down. When you breathe in, it usually goes up."

If the child asks anything about their own physio in terms of whether it's good or bad: "It's not good or bad, it's just your natural body rhythms – everyone is different."

Familiarization of Physio Equipment

For more detailed instructions about Biopac, **see the Biopac procedures.**

E1: *You can have a seat here, and I'll set you up with the Velcro. This is so we can measure your skin conductance.*

Talk to the child throughout this part:

1. [put gel in the holes] *I just put a little bit of lotion in here...this is so the Velcro can stick to your finger better.*

2. [ask child to raise the hand they use to work a mouse] *Which hand do you work a mouse with? Ok – then I’ll put the Velcro on your OTHER hand, so you can have your [right/left] hand free for the computer.*
3. [ask child to give me their pointer finger on their OTHER hand, then wrap the strap around it snugly. – MAKE SURE THE STRAP IS THE ONE ON THE LEFT, SO THE WIRES DON’T CROSS! Ask child if it’s too tight or loose. Do the same for middle finger.] *Can you give me your pointer finger? Ok I’m just going to wrap it around here...nice and snug so it doesn’t fall off, but not too tight that it’s uncomfortable. How does that feel? And now your middle finger...if you feel like these start to slip off, just let me know and I’ll tighten them. Or if they feel too tight, let me know and I’ll loosen them, ok?*
4. [ask child to put hand palm-side down on the table. This usually requires scooting their chair up a bit so they can put their elbow comfortably on the table. Put a cloth over it, and say it’s to remind her/him not to move hand. Make sure the cords are not touching anything else]. *Now can you put your palm flat on the table, like this? I will scoot you in a bit so that your elbow can rest on the table. [If child doesn’t put elbow on table, ask them to. This is important so the child doesn’t swing around in the chair, and so their arm doesn’t get tired.] See these wires here? If these wires move, like if you move your hand and the wires move, it can mess up the measurements. So it’s important to try to keep your hand nice and still while you’re sitting here, ok? And just to remind you, I’ll put a cloth over it...cuz it’s easy to forget while you’re doing other things, this will just help to remind you.*
5. [Look at clock to see what time it is....you want to wait to collect measurements for about 3 minutes so gel can sink in.] *Ok! Now I will start the measurements!*

NOTE: If the child coughs or sneezes or something else disrupts the measurement, **Press F9 and then type what happened. Whatever you type after pressing the F key will be tied to that flag. You don’t need to press enter or anything – typing it into the white space at the top of the program after pressing the F key will label that flag.**

E1: [turn computer monitor so child can see what’s on the screen]. *See, this is the measurements it’s getting from your hand. It’s a nice steady line. When you wiggle your fingers, it gets mess it up a little. Want to try it and see what happens? [after child does it]. See how the line changed? That’s why it’s important to keep your hand still, it’ll help us get good measurements. Also, if you kick your legs it can wiggle the wires, or bounce in your chair. So try to not kick your legs to bounce too much. [can talk to the child for a few moments about the lines, how they go up and down...then turn screen back around].*

E1: *Take a deep breath for me, and hold your breath for a second.* [make sure GSR goes up, or it’s not calibrated.] *Thanks!*

Wait for about 1 more minute, pretending to type things and open up programs etc. on the computer, while chatting with the child to make them feel comfortable. Summer plans, hobbies, siblings, pets, etc.

E1: *Now I’m going to play something for you to listen to. This is to test out of the volume of the headphones. Some kids like it a little louder, some like it softer.*

Have child practice putting the ear buds in, then play the sound-testing file. Adjust volume as needed. Tell the child that when they put the ear buds in, the one with the silver tape goes on THIS side (the right ear). Have child take out earphones again.

E1: *And also, here is the computer mouse. If you do something on the computer, be sure to press THIS side of the mouse (on the left). If you press in the middle or on the right, it might not click.*

Baseline Physio: resting and neutral pictures

E1: *Ok, now I just have to set up the program for a couple minutes. Can you wait for a minute or two while I finish? Remember to keep your hand still. Thank you!*

Press F1, then type START RESTING BASELINE. Start the timer and record for exactly 2 minutes. During this time, put on your headphones, and pretend to be setting something up on the computer. Minimize conversation with the child during this time. After 2 minutes, **Press F1 again and type STOP RBL.**

E1: *Now I have some pictures to show you. Please watch the pictures and pay attention to them.*

Open the IAPS neutral pictures and maximize the screen. When the slideshow starts, **Press F2 and type START NEUTRAL PICTURES.** Put on headphones and pretend to work on something. When the slideshow ends, **Press F2 again and type STOP NEUTRAL,** and then take headphones off.

E1: *All done? I'm going to bring your mom/dad something to do, but [E2] will come in here to do the next activity with you, ok?*

Open door and call E2 into the room, E2 comes immediately and they switch positions.

Training Emotion Scales, Baseline Emotional Rating

E2: [greet child, small talk before starting].

Today you'll be doing lots of activities, and sometimes we'll ask you to answer questions on the computer about what you're thinking and feeling. When we ask you these questions, there are no right or wrong answers – it's whatever you think or feel!

Hold the Emotion Practice Scales page and show to the child.

E2: *You will be doing these questions on the computer, but before we get started, I want to show you what it will look like and do some practice on this paper.*

E2: *This is what it will look like, and there may be a question at the top that says something like "how happy do you feel right now?" You would then think for a second about how happy you feel. If you are not feeling so happy, then you would click "Not Really" [point to the shortest bar]; because you're not very happy right now. Of if you're feeling a little more happy than that, but not much – you're just a little bit happy, you would click "A little" [point to the next shortest bar]. Or if you're even more happy than that; if you're pretty happy, you would click "Pretty Much" [point to the next highest bar]. Or if you're feeling the MOST happy – really happy, you would click "Very" [point to highest bar].*

The same thing goes for how sad or angry or scared you feel.

Now, Let's practice a few. If the question asked, "How sad do you feel?" and you did not feel sad at all, which one would you click? What if you felt a bit more sad than that, but still just a bit sad? What if the question asked, "How angry do you feel?" and you felt super angry? What if you felt a little less angry than that, not super angry, but still pretty angry? What if the question asked, "How scared do you feel?" and you felt kind of scared?

[You can tailor this to each child based on how much you think they're understanding...you can give more examples or less].

NOTE: If children point to an incorrect answer, or express confusion about what to do, repeat the instructions (and practice trials) until children answer three correct in a row.

Pull up the questions on the computer.

E2: Now you can tell the computer how you're feeling RIGHT NOW. When you finish each question, you will click on this right arrow [point to the arrow] to get to the next question, until you see a STOP SIGN. Then let me know that you're all done.

While child is answering these questions, look at the post-it note folded on the table by the non-blind RA, in order to see the child's experimental condition.

Suppression Task

E2: We'll now show you a scene from a movie.

Open the Suppression Task movie scene and press pause – ALWAYS MAXIMIZE VIDEO TO FULL SCREEN SO THE CHILD CAN'T SEE HOW MUCH LONGER IS LEFT ON THE VIDEO. IF THE CHILD CAN SEE THE BAR AT THE BOTTOM THAT SHOWS HOW MUCH TIME IS LEFT, THEN IT'S NOT FULLY MAXIMIZED.

There are some parts in this movie that might be emotional. Please watch and listen to the movie scene carefully. Do you see the camera here? Just so you know, you'll be videotaped by that camera while you watch the scene [point to camera]. Some other people will watch the videotape later, so they can learn more about children.

Then children in the suppression condition only will get additional instructions:

[look at child while saying this and speak slowly and clearly – let them fully process this information]. *For this part, while you're watching the movie scene, we don't want you to show how you're feeling with your face or your body. Nobody should be able to see what you're feeling by looking at you. So, as you watch, try your best to not show the camera how you really feel.*

You can now go ahead and put your ear buds in. Let me know when you're ready.

Comprehension for both conditions:

So what are you going to do while you watch? (If answers correctly, say, "that's right!". If answers incorrectly or doesn't know, repeat the instructions and ask again).

To answer correctly, the control group children must say something about watching and listening carefully. The suppression group children must say something about not showing how they feel (and to watch and listen carefully – if they don't include this part, E2 should prompt it).

"This is a scene about a father who gets very injured." [Immediately press PLAY]

Press F3 on the physio files just as the sad video starts, and type Start S Task. When the sad video ends, Press F3 again and type End S Task.

NOTE: If a child sneezes or coughs, press the F9 key and type in what happened (just press it once).

While child watches the movies, E2 will monitor the physio and pretend to be working on other things. If there are disruptions to the physio, discreetly fix and return to doing your own thing.

Afterward, if the child asks, "is he dead?" just say, "he's very injured" (don't say "no" explicitly).

Rating Current & Retrospective Emotions & State Suppression (& seen movie before)

Open the Emotion Rating #2.

E2: To Suppression condition only: *Now that the movie scene is over, you don't have to think about the instructions I gave you anymore, ok?*

E2: To Both conditions: *That part of the study is done. This camera won't be recording you anymore [take off and set down behind the computer] – I'm going to put it back here now.*

E2: To Suppression condition only: *So those instructions I gave you for watching that movie scene are done.*

If kids ask about the other video camera in the room, affirm that that camera is still recording. *That camera is always on, though; it's different. It's for the research.*

E2: *Now, you can again tell the computer your feelings. This time, I want you to think about how you FELT DURING the movie scene. Don't say how you feel NOW, but say how you WERE FEELING as you watched the movie scene, ok? Keep going until you see the STOP SIGN.*

When child finishes:

E2: *Thank you. Now, please do it one more time, but this time think about how you feel RIGHT NOW, ok?*

When child finishes:

E2: *You're doing great. I have a few more questions for you. For these questions, we want you to think about what you were doing while you watched the movie scene.*

[Read the instructions off the screen as it's written, so that the child isn't confused by listening to you say one thing, while reading another thing. Just follow along on the screen, explaining the instructions.

E2: *Ok, you can go ahead and answer the questions just like that. Keep going until it says STOP.*

When child finishes:

E2: *This next set of questions is really similar to the ones you just did, but this time you will think about how much you agree or disagree with each sentence.*

[Read instruction off the screen]

When you get to the example about liking purple, let the child choose their answer, and then give one more example so they can see another answer. Say, *“For me, I [love/kind of like/don’t like/hate] purple. Which one should I pick?”* This will be another check that the child understands the instructions].

E2: *Ok, you can go ahead and answer the questions just like that. Keep going until it says STOP.*

E2: [when child finishes] *great, now [E1] should be ready to come back in and do the next activities with you. I’ll go get her, and she’ll be right in!*

Empathy Task

E1: *Hi! I’m back! How are you? How’s your hand feeling? Why don’t I put the cloth UNDER your hand now – how’s that? We can air it out a little bit! Now I’m going to show you another movie scene and ask you some questions about it. I’m interested to know what the movie makes you think and feel. OK? If you’ve seen this movie before, that’s ok; it’s not a problem. We’re just interested in how this scene makes you feel and what emotions you experience. So, here it is – please tell me when it’s over.*

Open the Finding Nemo movie scene. MAXIMIZE VIDEO TO FULL SCREEN. As soon as it starts playing, **Press F4 and type Start E Task**. While the child watches the movie, E will monitor the physio and pretend to work on other things. If there are disruptions to the physio, discreetly fix and return to doing your own thing. After it’s over, **Press F4 again and type End E Task**.

E1: [not too peppy, keep emotion level neutral so as not to influence the child’s responding. Sit on the couch next to the child. Be fully seated and looking at the child before you start talking.]

1. *So...Can you give me your reaction to what you just saw? What did the movie scene make you THINK when you saw it? What were your thoughts?* [Do not make any suggestions to the child about what he/she may be thinking or what s/he means. Let him/her explain.]
2. *What did the movie scene make you FEEL when you saw it? What were your emotions or feelings?*
3. *Can you tell me a little more? Like, why did you think that, and why did you feel that?*
4. [When you think the child is done] *Anything else you want to add about this movie scene?*

E1: [If the child gives an emotion that is directed at someone, but the target is not clear (e.g., “angry at him”, “sorry for them” etc.) ask for clarification:] *“Angry at whom?” “Sorry for whom?”*

E1: *Okay, we’re done with that part now. You did a good job!*

At the end of this task, press the Stop button, and save the file. Gently remove the electrodes.

E1: *I'm going to take these off now. You might have a little lotion on your skin, but you can rub your hands together to get it off.* Give the child a Kleenex tissue from the table.

E1: *Are you ready for a break? from answering all those questions? Let's take a short break and come sit at the table behind you.*

Transition

E1: *I have something cool I want to show you. Come sit over here with me!*

Move the child over to the other table facing the camera(s).

E1: *Under this table is a surprise...wanna see? [lift cover off to reveal sand table]. It's a sand table! Cool, right? This isn't part of the movie scene stuff, we just like to give kids a little break from answering all those questions. You can touch it, play with it...And actually I have some toys we can play with too – I'll be right back.* [Leave to get toys from other room].

E1: [as you are coming back into the room with the toys, drop the sticks:] Oops!

Set the toys down and bend down to pick up the sticks – start with the sticks closest to you, so the sticks closer to the child are left on the floor. If the child helps, say “thanks” neutrally and just once. Don't talk during this task, unless child talks to you and it's weird not to. But even then, don't say much.

E1: *So this isn't part of the movie scene stuff – this is just so you can have a little break between watching the movies. We like to give kids a little break from all those questions we ask!*

[Be sure to turn off Biopac recording and grab cell phone and put it nearby. The sound should be turned on. Engage child in the sand toys, showing some things they can do, maybe start building a sandcastle or something.]

After about 3 minutes of playing (it has to be long enough for child to get engaged and to establish this as a shared activity), E1 can begin the prosocial task (below).

Prosocial Behavior Task

E2 will begin a timer for 3 minutes from the time that E1 first puts her hands into the sand. At 3 minutes, E2 sends a text to E1.

NOTE: E2 should send the text a few seconds before 3 minutes so that the text is received by the time it is 3 minutes.

[E1 looks at her phone and looks surprised.]

E1: *Oh, I got a text!* [to the child:] *Sorry, I've got to check this.*

After a moment of “reading” the text...E1’s face slowly gets more worried looking.

E1: *Oh no...*[strongly worried]

[look at the child briefly, then look away for about 5 seconds, displaying visible signs of upset: sighing, rubbing face, looking worried]

E1: [Then, looking up at the child:] *It’s about my dog – he’s been really sick lately. The veterinarian’s office said they’re going to text me [pointing at the phone] and let me know if he’s going to be OK.*

[For the next 60 seconds, E1 will look worried/sad, sighing, with the following looking schedule:]

1. at the child for 5 seconds
2. then, still holding phone, looking at phone and not playing in sand for 10 seconds, then: “This just makes me really sad....”
3. sets phone down and rubs hands together/wrings hands for 10 seconds, then: “I’m really worried about him...” ****LOOK AT CHILD WHEN YOU SAY THIS.****
4. Continues to fidget for another 10 seconds. Face grimace, then:
5. Cover face with hands and say, “I’ve had him since he was a puppy...” Sniffle once, rub under eyes, like wiping away tears. Sniffle again once. [this should take 10 seconds].
6. Shake head then look at child, “I hope he’s ok...” **LOOK AT CHILD WHEN YOU SAY THIS.** Wipe at eyes again. Wringing hands. Do this for 15 seconds.

During this time, if the child asks anything about the dog, say “*I don’t know yet. They’re going to text me.*”

If child presses, or asks why dog was at the vet, say “*He’s just been really sick, we don’t know why.*”

E2 should send another text exactly 15 seconds after E1 says, “I hope he’s ok...”

E1: *Oh! Maybe this is them.* [after a few seconds of “reading” it: sigh loudly and relievedly] *He’s going to be ok. Everything is fine!* [showing visible signs of relief/happiness, then going back to the activity like normal.]. *I feel much better now* [smiling, then jump back into sand table play with more energy than before].

Play in sandtable for another 2 minutes, then say:

E1: *Ok, how about we play here for another minute or so, and then you can go back to the computer for the next thing?*

After another minute or so, bring child back to computer

BACK-UP PLAN FOR IF THE TEXT DOESN’T GO THROUGH:

After E2 sends the initial text, if E1 hasn’t received it 20 seconds later, proceed to the backup plan.

E2 will walk over to the playroom and open the door.

E2: “Jackie – sorry to interrupt, but you got a text on your other phone....and it looks important.”

[E2 hands her own phone to E1. E1 looks at the phone, and waits for E2 to leave the room and close the door. Then E1 can begin the task: “Oh no!”]

At the end of the task, E1 will do her own timing. 10 seconds after half-heartedly playing with a sandtoy, she will check her second phone for messages, and discover that she did indeed get one: “Oh! They texted me....”

Rating Emotions

Open the Emotion Rating #4.

E1: *Now, I think you answered questions like these already...but you'll think about how you're feeling right now, and tell the computer. Tell me when you get to the stop sign.*

Security Scale and Math Questions

E1: *There are a few more questions to answer, and then we're all done. This one is on paper, but it's the same as the computer ones. Your answers are all private (your name isn't on this sheet, so we won't know whose it is), and there are no right or wrong answers.*

Bring over a paper copy of Security Scale. KNOW AHEAD OF TIME WHETHER CHILD HAS A MOTHER – THIS WILL HAVE BEEN ASKED AHEAD OF TIME [during consent process]. IF NOT, REFER TO THE ALTERNATE FEMALE FIGURE (STEP-MOTHER OR GRANDMOTHER). IF NO ALTERNATE FEMALE FIGURE, USE FATHER.

E1: *This questionnaire asks about what you are like with your mother – like how you act and feel around her. When you answer these questions, there's no right or wrong answer – it's whatever you think or feel! Before we get to those, let's try a practice one. Each sentence talks about two kinds of kids, and we want to know which kids are most like you. Decide first whether you are more like the kids on the left side or more like the kids on the right side, then decide whether that is sort of true for you, or really true for you, and circle that answer. For each sentence you will only circle one answer. Let's try one!*

Walk child through the two-step process.

Some kids would rather play sports in their spare time.

BUT

Other kids would rather watch T.V.

Really true
for me

Sort of
true for me

Sort of
true for me

Really true
for me

If it seems like they need more explanation, give more – you can tailor the amount you explain it based on the child's understanding. Give a second example, but this time have the child do it him/herself so you can see if they really do understand it. After they circle an answer, ask why they chose that one.

E1: *Great. Try one more by yourself.*

Some kids like to eat vegetables.

BUT

Other kids don't like to eat vegetables.

Really true
for me

Sort of
true for me

Sort of
true for me

Really true
for me

E1: *Which one is most like you?* [let kid say out loud]. *And is it really true for you, or only sort of true for you? Like, do you REALLY like/don't like to eat vegetables? Or do you kinda like/not like to eat vegetables?* [let kid say out loud, and then let kid circle the correct answer that corresponds to the one he said out loud. If he picked the corresponding answer he said out loud, good. If he doesn't know which one to circle or circles a different one than he said out loud, then repeat the instructions and try the examples again.]

E1: [Once child understand how to do the questionnaire] *Ok, now you can get started! Remember, this questionnaire asks about what you are like with your mother – like how you act and feel around her. There are a few pages here, so just let me know when you're all done. Remember, there are no right or wrong answers and your name isn't on this, so it's all private. And your mom won't see it either.* [Flip through to show them the multiple pages, and have it open to the first page for them].

Happy Videos

E1: *Great job! I can take that for you.* [move away the security scale to another table.] *Now I have two last movie scenes to show you. Remember the scene with the boy's father who was hurt and lying on the table? Well, this is a scene of the father and son when he was feeling better. The other is about some penguins.*

Open Happy Movie Scenes. MAXIMIZE VIDEOS TO FULL SCREEN.

Rating Emotions

Open the Emotions Rating #5.

E1: *This is the very last thing. One last time, think about how you're feeling RIGHT NOW. Let me know when you finish.*

E1: *We're all done! Thank you very much for your help today!*

For End of Visit:

E2 can prepare these things while waiting for parent to finish questionnaires

1. Print the Junior Scientist certificate with the child's first and last name (or write child's name in).
2. Prepare the receipt and payment for the end of the visit.
3. Put the receipt, payment, Educational Consent Form, and parent's copy of the consent form on a clipboard with a pen. Also, Kelsey's flyer if child is white.
4. Prepare a small stack of black and white flyers for the mom to take and share with friends.

Once both parent and child are finished, bring them back to the main room. Checklist for session end:

1. Pay child \$10 and have PARENT sign receipt
2. Give child certificate.
3. Ask if parent would like to sign the Educational Consent form
4. Ask if either child or parent has any questions we can answer today.
5. IF CHILD IS WHITE, Give them Kelsey's flyer and say:

E: If you and [child] are interested, we have a sister study happening in this same building for 9 to 11 year olds. It's about children's memory for faces and only takes 30 minutes.

6. THANK YOU FOR COMING! BE SURE TO STRESS THAT WE REALLY APPRECIATE THEM COMING IN, IT'S A HUGE HELP TO US, AND WE'RE GRATEFUL.
7. Escort them to childcare room to pick up siblings, if needed.
8. Escort everyone back to the parking garage and tell them how to get out. Make sure they have no parking tickets! Thank them for coming.
9. Turn off the camera(s), first holding up the participant info with END written on it. Immediately save the visit to a secure location (**see the Data Storage procedures**). Save all data files and paper data to appropriate location (**see the Data Storage Procedures**).
10. SEE POST-LAB CHECKLIST FOR OTHER THINGS TO WRAP UP.

Appendix H: Demographic Questionnaire

1. Your Age (Years)
2. What month was your child born in? _____ What year was he/she born in?

3. What is your relationship to this child (e.g., mother, father, grandmother)?
4. Your gender (Male/Female) Your child's gender (Male/Female)
5. Race / ethnicity – How do you describe yourself and your child? (please check one):

Your race/ethnicity:

Your child's race/ethnicity:

- ___ American Indian or Alaska Native
- ___ Hawaiian or Other Pacific Islander
- ___ Asian or Asian American
- ___ Black or African American
- ___ Hispanic or Latino
- ___ Non-Hispanic White
- ___ Other: _____
- ___ American Indian or Alaska Native
- ___ Hawaiian or Other Pacific Islander
- ___ Asian or Asian American
- ___ Black or African American
- ___ Hispanic or Latino
- ___ Non-Hispanic White
- ___ Other: _____

6. What language is mostly spoken in your home on a regular basis?
7. How many children live in your home? _____ What are their ages? _____
8. What is your marital status?
Single ☐ Married ☐ Separated ☐ Divorced ☐ Widowed ☐
9. What is your annual household income?
Less than \$30,000 ☐ \$30,001 to \$40,000 ☐ \$40,001 to \$50,000 ☐
\$50,001 to \$60,000 ☐ \$60,001 to \$70,000 ☐ \$70,001 to \$80,000 ☐
\$80,001 to \$90,000 ☐ \$90,001 to \$100,000 ☐ Greater than \$100,000 ☐

10. What is the highest grade you completed in school?
___ Some middle school
___ Some high school
___ High school degree / GED
___ Some college
___ Associate's degree
___ 4-year degree
___ Advanced degree
___ Don't know

Appendix I: Trait Suppression Questionnaires with Filler Items

Emotion Regulation Questionnaire for Children and Adolescents (ERQ-CA)

Rated on a 5-point Likert scale (1=*strongly disagree*, 5=*strongly agree*).

I control my feelings by not showing them.

When I'm feeling bad, I'm careful not to show it.

When I'm feeling happy, I am careful not to show it.

I keep my feelings to myself.

When I'm feeling sad, I'm careful not to show it.

When I'm feeling angry, I'm careful not to show it.

When I'm feeling worried, I'm careful not to show it.

Children's Sadness Management Scale (CSMS)

Rated 3-point Likert scale (1= *hardly ever*, 2=*sometimes*, 3=*often*).

I hold my sad feelings in.

I hide my sad feelings.

I get sad inside but don't show it.

I'm afraid to show my sad feelings.

Filler items (Asher, Hymel, & Renshaw, 1984)

Rated on a 5-point Likert scale (1=*strongly disagree*, 5=*strongly agree*).

I like to read.

I watch TV a lot.

I like school.

I play sports a lot.

I like science.

I like music.

I like to paint and draw.

I like playing board games a lot.

Rated on 3-point scale (Hardly ever, sometimes, Often)

- I go swimming in a pool or ocean.
- I eat dessert or other sweet things.
- I wear brightly colored clothes (like orange, yellow, or green).
- I brush my teeth with an electric toothbrush.

Appendix J: Subjective Emotion Scales

How SAD do you feel right now?

How SCARED do you feel right now?

How ANGRY do you feel right now?

How HAPPY do you feel right now?



Appendix K: Biopac Manual

Analysing EDA Data

Using Biopac AcqKnowledge Software

Getting Started

Setting up:

1. Set up on a separate computer - NOT the physio computer
2. Open the U: drive
3. Open "MCFDLB" folder -> "Movie Scene Study" folder -> "Physio" folder
4. Open the Excel sheet titled "EPP EDA Analysis Data - Other RAs"

Post lab notes:

1. Get the post lab notes from the filing cabinet to the left of the computer in the kids room
2. Find the post lab notes for the participant number(s) you are analysing
3. Read over the post lab notes for the participant before you open the data to find out if there is anything you need to know while analysing the data (e.g. if the markers for the time periods are off, etc.)

Lab notes for physio:

1. Open the U: drive
2. Open "MCFDLB" folder -> "Movie Scene Study" folder -> "Physio" folder
3. Open the Excel sheet titled "Lab notes for physio-B"
4. Find the row for the participant number(s) you are analysing
5. Read the information provided for the participant before you open the data to find out if there is anything you need to know while analysing the data (e.g. if the markers for the time periods are off, etc.)

Opening the data:

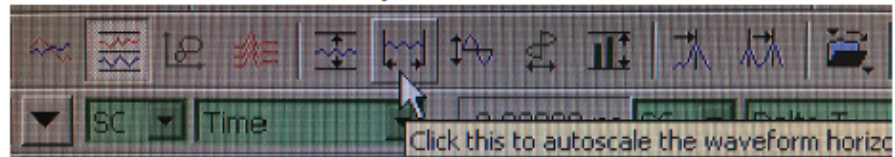
1. Log on to the physio computer (jastern / PW: 47Sagehen*)
2. Click on "Supp" folder and open folder titled "GSR"
3. Double click to open the data for the next participant number on the spreadsheet
4. Press "Ok" when the box pops up
5. Immediately "Save as" and rename the file as "50XX date time - analysed2" in the "EDA Analysis" folder, located in the "Supp" folder

Preparing Data for Analysis

There are many issues that may arise in the collection of EDA data. Some of the most common issues are electrical noise (50Hz to 60Hz), rapid transients (which can occur if a participant knocks the electrode), large artifacts, and low resolution data (data appears fuzzy and non-cohesive). The majority of these issues can be accounted for by smoothing and filtering the data with a low pass filter.

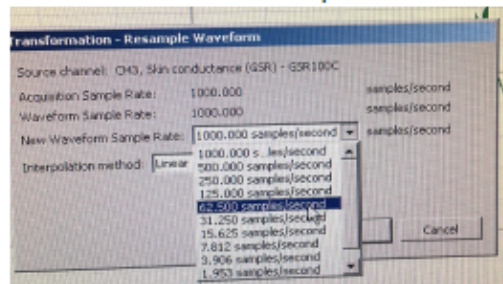
Rescale the waveform:

1. After opening and re-saving the data, click on the icon on the toolbar (below) to autoscale the waveform horizontally and view the entire waveform



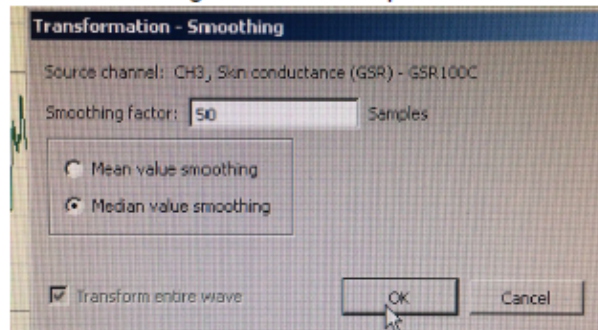
Resampling the data:

1. At the top of the window, click on "Transform" and then select "Resample Waveform" from the dropdown menu
2. Set the "New Waveform Sample Rate" at 62.500 samples/second, click "Ok"



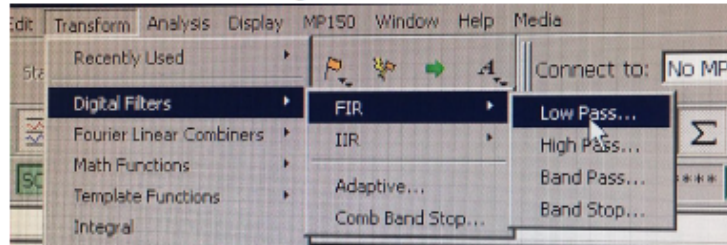
Smoothing:

1. Click on "Transform" and then select "Smoothing" from the dropdown menu
2. Select "Median value smoothing"
3. Set the smoothing factor at 50 Samples

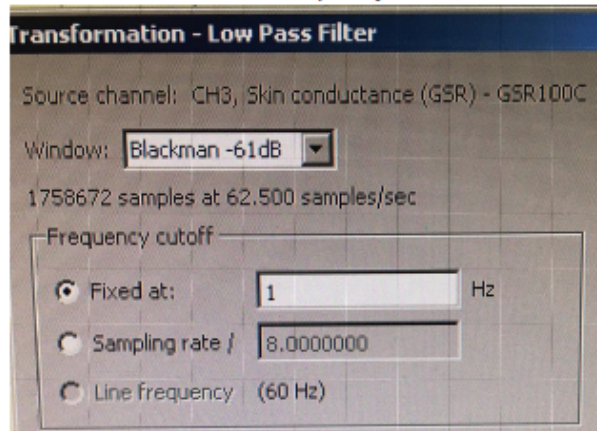


Filtering:

1. Click on "Transform" → "Digital Filters" → "FIR" → "Low Pass..."

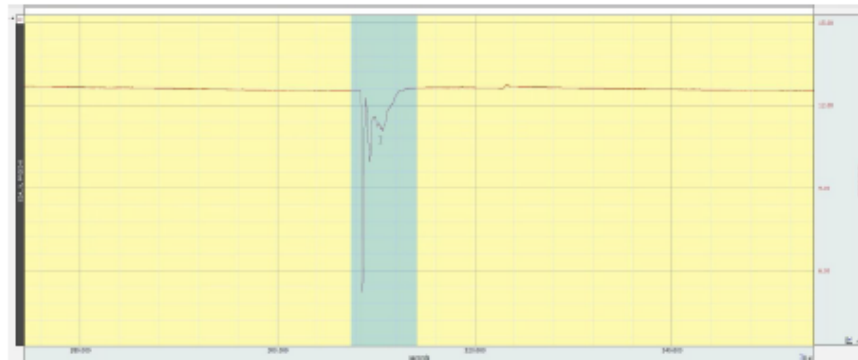


2. Select "Fixed at:" under "Frequency cutoff" and set the filter at 1 Hz then click "Ok"



Removing Artifacts

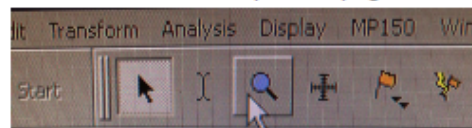
Before collecting the averages of the waveforms, it is essential to check the data for any non-physiological artifacts. These artifacts can be caused by malfunctions with the electrodes or the gel. They could also be caused by a number of participant activities such as irregular breathing and gross body movements. While smoothing and filtering the data accounts for many of the issues that could be present it is necessary to manually check for large artifacts that may have made it through the filter. Below is an example of what a large artifact may look like:



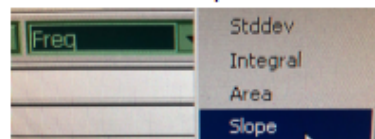
How to know if it is an artifact:

Skin conductance data rises much faster than it drops. Physiological peaks take place over 1-3 seconds while 50% decay may take anywhere from 2-10 seconds. To look for artifacts, you'll want to focus only on the decays of the drops, not the rises. You'll have to select the area of the artifact and check to see how many seconds the wavelength at question lasts.

1. On the toolbar at the top of the page, click on the magnifying glass



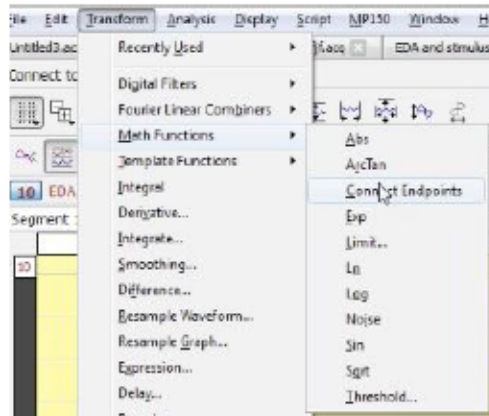
2. Zoom in on the data to get a better view of the waveform by clicking and dragging the magnifying glass to highlight the waveform from the peak to the bottom of the drop
3. Zoom in until you have a scale of 20 second intervals
4. Start at the beginning and pan through the waveform. If you see a drop that looks abnormal compared to the others, check to see if it is an artifact
5. Switch from the magnifying glass back to the text cursor. Select the entire area of the artifact using the cursor. You'll know you've done this once it is highlighted in blue (as pictured above)
6. On the taskbar, click on the arrow next to the box labeled "Freq" and use the dropdown menu to select "Slope"



7. If the value of the slope is greater than or equal to 0.5 $\mu\text{S}/\text{sec}$, it is an artifact that needs to be removed

How to remove artifacts:

1. Select the entire area of the artifact, from peak to peak, using the cursor. You'll know you've done this once it is highlighted in blue
2. Click "Transform" → "Math Functions" → "Connect Endpoints"

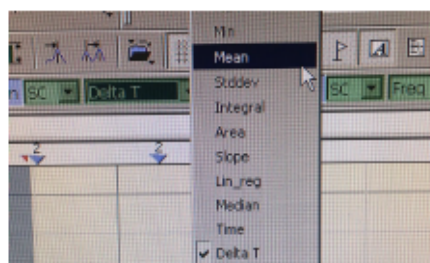


Finding the Means

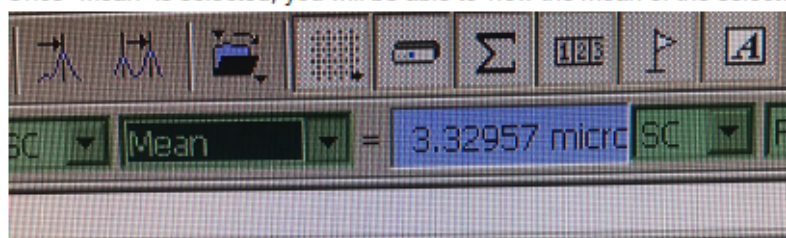
Once the data is smoothed, filtered, and cleaned, it is time to finally collect the data. The goal of this analysis is to compare the average SCL of each participant during four different time periods: resting baseline (1), neutral baseline(2), sad movie scene(3), and empathy inducing movie scene(4). On the screen, you will see markers indicating the beginning and end of each time period (there will be two "1" markers, two "2" markers, and so on). In order to collect the data we need, you will need to find the average SCL within each set of markers. If there are missing markers, check below to see what to do.



1. Once you are ready to find the mean, click the autoscale button again to rescale the waveform horizontally
2. Select the EDA data between the two "1" markers by holding down "Ctrl" button on the keyboard while clicking both the first and second markers. You will know this was successful when the data is highlighted blue
3. Go to the taskbar above the data, click on the arrow next to the box labeled "Delta T" and use the dropdown menu to select "Mean"



4. Once "Mean" is selected, you will be able to view the mean of the selected region.



Transferring the Data to the Spreadsheet

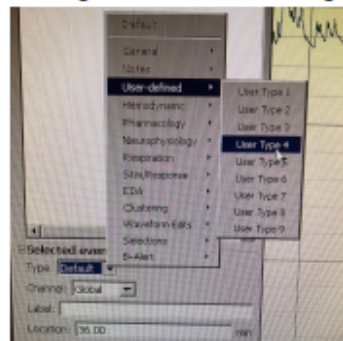
This is when you'll need the Excel spreadsheet pulled up and ready to be filled in. If you do not have access to the spreadsheet at this time, you may write down the value manually and enter it at a later time. Because this is a manual transfer of data, it is important that the work be done twice over by two separate people in order to catch any mistakes that may have been made, hence the two separate spreadsheets. Because the average SCL will differ from participant to participant, it would not be accurate to simply report the raw data. Subtracting the averages for regions 2, 3, and 4 from the baseline will account for the individual differences in resting SCL. The differences are what will be used in the statistical analysis. When you enter the data into the spreadsheet, Excel will automatically calculate the difference.

1. Once you have found the mean for the region, type the average into the designated cell on the spreadsheet; include the entire number (do not round)
2. Repeat steps 2 and 4 of "Finding the Means" and then transfer the data to the spreadsheet for regions 2, 3, and 4
3. As you enter the values, the differences between values will appear in their respective cells

SAVE YOUR WORK BEFORE CLOSING!

What to do if there are missing markers

1. Double check the "Lab notes for physio" excel sheet and the post lab notes
2. If these do not help you, open Isalon and find the logitech video for the participant number you are working on. The video and the physio begin at the same time so they should already be synchronized. Use this to figure out if the marker provided denotes the beginning or end of the time period
3. You can add the missing marker by right clicking on the bar, next to the corresponding marker (i.e. if the "end e task" marker is missing, right click to the right of the "start e task" marker) and selecting "Insert new event"
4. Right click on the new marker and select "Edit event." An "Events list" will come up on the screen, and will show the exact time for the existing corresponding marker. Once you see the time for the existing marker, add or subtract the appropriate amount of time, using the guide below, and enter this time in "Location" (i.e. if the "end e task" marker is missing, and the "start e task" marker is at 15:00, enter "18:00" in the location box) then press enter
5. Now, change the type of the marker by using the dropdown menu, shown below, to select "User-defined" and then select "User Type X" (depending on which marker is missing; if marker 4 is missing, select "User Type 4")



6. Lastly, label the new marker accordingly (i.e. "end e task"), and then close the list

<u>Markers</u>	<u>Length of Time</u>
1	2:00 minutes
2	2:09 minutes
3	2:35 minutes

Resources

Biopac Webinars:

<https://www.biopac.com/events/eda-tips-and-tricks/>
<https://www.biopac.com/events/acqknowledge-webinar/>
<https://www.biopac.com/events/acqknowledge-qa/>
<https://www.biopac.com/events/eda-webinar-part-1-recording-great-data/>
<https://www.biopac.com/events/eda-webinar-part-2-analysis-essentials/>
<https://www.biopac.com/events/eda-webinar-analysis-scripting/>

Biopac Pages

<https://www.biopac.com/webinars/eda-faq/>
<https://www.biopac.com/knowledge-base/guidelines-eda-edr-gsr-scl-and-scr/>
<https://www.biopac.com/eda-faq-recording/>

Other Articles

<https://www.biopac.com/wp-content/uploads/EDA-SCR-Analysis.pdf>
<https://imotions.com/blog/galvanic-skin-response/>
<http://onlinelibrary.wiley.com/doi/10.1111/j.1469-8986.2012.01384.x/epdf>

Appendix L: Empathy Task Scoring Manual

Preparing to view the videos

1. Identify what range of videos you will be watching and grab the corresponding postlab notes from the desk in the playroom (bottom left drawer)
2. Videos for this task can be found in My Computer → Isalon → Movie Scene Study → GSR and Logitech vids → Videos.
3. The task begins once Jackie asks the 4 questions (what did the scene make you think, etc.). This comes after a long pause while the child is watching the movie scene and is typically around 80% (earlier trials) or 50% (later trials) through the video – the 20-25 min mark in general.

FAQs:

The child is starting to mumble and I can't hear his/her response.

Try turning up the volume of the computer (right next to the time in the bottom right-hand corner) and turn up the volume of the video itself in the media player. If you are wearing headphones and this is not enough, take out the headphones and turn up the speakers right next to the computer monitors. Use the Post Lab Notes to help you, and open other videos (e.g., darkroom) and listen to the audio on those videos. If you still can't understand, have someone else in the lab listen to it.

The child said something at level 3 and immediately followed it up with a level 1 statement. Which do I code?

Always code the highest level of empathy expressed, even if lower levels fall before or after the highest level statement.

What if the child starts talking about another movie? Do these responses count if they display empathy?

NO, we are measuring empathy toward the characters in the movie they just watched.

What if the child talks about how they felt the FIRST time they watched the movie (or another time they watched it)?

This can count toward the score.

Coding the videos

In coding for this task, we will be following Vinik et al. (2011), responses will be rated for levels of empathy toward either character on a 6-point scale. When deciding on a code, start by identifying which type of statement was made (see categories below). If the statement criticizes the character for their actions (ie: Nemo deserved what he got because he was disobedient), then they receive a code of -1. If the child provides a statement that fits none of the categories below, then they receive a score of 0. If the child makes a statement that fits a category with no star, the child gets a code of 1 or 2. If the child provides a statement that fits one star category, then they receive a code of 3. Finally, if the child provides statements that fit more than one star category, then the child receives a code of 4. Remember, code the HIGHEST level achieved (a child could, for example, say something qualifying as a 1, 2, and 3, so their score would be a 3).

1. Identifies character's positive or negative emotions (e.g., Nemo was sad because he got lost). – SCORE 1
2. Child remembers something similar happening to her/himself or someone they know (something difficult), or [something DIFFICULT in the plot] reminds them of something personal or anecdotal that was also difficult (e.g., reminds me of the time I lost my brother at the mall.) – SCORE 1
3. "I don't like it when [something bad related to the plot]." (e.g., I don't like when people get kidnapped). – SCORE 1
4. Child provides own emotions/hopes BECAUSE OF negative events related to the plot (e.g., I was sad cuz Nemo's dad lost him). (e.g., I hope they find each other) – SCORE 2 (if the child is very vague with the plot that made them feel something, such as "I felt sad at the sad parts," then give the child a SCORE 1).
5. If [see below], I'd feel [emotions]
 - a. ***Positive or negative plot event happened to me (or I was him) (e.g., If I was Nemo, I'd be scared; If my family member got lost, that would be sad). This also includes "I'm glad I'm not him" IF the child also explains why (i.e., mentions that what happened to him was sad or hard, or because it would make the child feel a certain way).
6. ***Child feels positive or negative emotions FOR a character (e.g., I was sad for Nemo)
 - a. ***[adds elaboration immediately after] Because of positive or negative event related to the plot (e.g., I was sad for Marlin because he lost Nemo)
 - b. ***[adds elaboration immediately after] Because general statement of what is emotional/difficult (e.g., I was sad for him because it's always sad to lose someone)
7. ***General statements of what is emotional/difficult (related to the plot in some way) (When you have a family and the son isn't there, that's hard.)

AFTER RECORDING THE GLOBAL SCORE, ALSO RECORD 2 MORE VARIABLES – IF THEY GOT A CATEGORY 4 OR 6, GIVE A SCORE OF 1 FOR EMOTIONAL EMPATHY (IF NOT, GIVE A SCORE OF 0). IF THEY GOT A CATEGORY 5 OR 7, GIVE A SCORE OF 1 FOR COGNITIVE EMPATHY (IF NOT, GIVE A SCORE OF 0). CHILDREN CAN GET TWO 0s, TWO 1s, OR ANY COMBO FOR THESE 2 VARIABLES.

Appendix M: Prosocial Comforting Task Scoring Manual and Coding Sheet

Prosocial Behavior (Comforting) in Middle Childhood: Coding Manual

The University of Maryland

Jacquelyn Gross

Unpublished Coding Manual



General Coding Notes

THIS MANUAL CODES THE VARIETY OF BEHAVIORS SHOWN BY 9-10 YEAR OLD CHILDREN IN A TASK MEASURING CHILDREN'S COMFORTING/PROSOCIAL BEHAVIOR TOWARD AN ADULT EXPERIMENTER'S EMOTIONAL DISTRESS.

BEFORE YOU BEGIN CODING, PLEASE UNDERSTAND THAT CAPTURING CHILDREN'S NUANCED BEHAVIOR FROM VIDEOTAPE IS DIFFICULT TO DO WITH A SERIES OF STRICT RULES. WE HAVE DEVELOPED THESE CODING RULES TO HELP CAPTURE THE "SPIRIT" OF THE CHILDREN'S INTENTIONS AND ATTITUDES, BUT THERE WILL ALWAYS BE CASES THAT AREN'T COVERED BY THE EXISTING RULES. SOMETIMES, WE WILL NEED TO MAKE EXCEPTIONS TO THE RULES OR CREATE **NEW** RULES THAT MORE ACCURATELY REFLECT REALITY. AS A CODER, PART OF YOUR JOB IS TO RECOGNIZE WHEN THE EXISTING RULES NEED TO BE CHANGED OR ADDED TO IN ORDER TO BETTER REFLECT REALITY. THESE RULES ARE NO SUBSTITUTE FOR HUMAN REASON. THEREFORE, ALWAYS KEEP IN MIND THE SPIRIT OF **WHAT** EXACTLY YOU ARE CODING AND THE UNDERLYING REASONS FOR **WHY**. ALWAYS BE ALERT AND ASK YOURSELF WHAT YOU THINK IS REALLY HAPPENING IN THE TASK, AND WHETHER THE CODES YOU ENTER ARE ACCURATE REFLECTIONS OF REALITY. IN OTHER WORDS, TAKE INTO CONSIDERATION BOTH THE "SPIRIT" AND THE "LETTER" OF THE LAW.

THROUGHOUT THIS MANUAL, WE HAVE INCLUDED EXPLANATIONS FOR WHAT THE CODE IS AND WHY YOU ARE CODING IT, BUT IF YOU EVER FEEL LIKE YOU DON'T FULLY UNDERSTAND THE CODES OR THEIR REASONS, PLEASE ASK A CODING SUPERVISOR. IT IS IMPORTANT THAT YOU ARE FULLY INFORMED ABOUT THE CONSTRUCT YOU ARE CODING.

SOMETIMES, THE MANUAL WILL SPECIFY HOW MANY TIMES TO WATCH A TASK. IF, HOWEVER, YOU NEED TO WATCH A TASK OR A PORTION OF A TASK MORE TIMES TO FULLY UNDERSTAND WHAT IS HAPPENING OR TO HEAR SOMETHING MORE CLEARLY, PLEASE WATCH IT AS **MANY TIMES AS NEEDED**. NEVER GUESS AT WHAT YOU SEE OR HEAR. TAKE THE TIME TO REPLAY THE SEGMENT OR TASK UNTIL YOU FULLY UNDERSTAND. IT IS BETTER TO BE ACCURATE THAN QUICK.

IT ALSO MAY SEEM AS THOUGH YOU ARE WATCHING THE TASK TOO MANY TIMES, AND IT'S BECOMING REPETITIVE AND BORING. HOWEVER, THE MORE YOU WATCH THE TASK, THE BETTER YOU "GET TO KNOW" THE CHILD AND CODING BECOMES EASIER. IT IS ALSO VERY EASY TO MISS SOME SUBTLE BEHAVIOR, ESPECIALLY IF YOU DON'T WATCH IT AS MANY TIMES AS THE MANUAL SPECIFIES!

Basic Coding Rules

- ❖ Don't use Quicktime to watch videos, because the quality is reduced
- ❖ When coding, don't only pay attention to what is said, but also to actions. Nonverbal behavior and body language are also codeable responses.
- ❖ Watch the video as many times as needed to determine what was said/what is happening. If you can't understand the child, keep watching as many times as needed. Do not guess at what the child said! If you still cannot understand what is happening or what was said, then do the following (in this order):
 - 1) Check the transcript.**
 - 2) Open the file in VLC media player and turn up the volume all the way. Wear headphones, as this may also make it louder and clearer-sounding.**
 - 3) Ask other people in the lab to come in and listen. Ask other RAs and graduate students, whoever is around.**
 - 4) If no one can understand, then put a large star at the top of the coding sheet, with a note about which part you could not understand. Bring it to the next coding meeting and we will all listen.**
- ❖ When in doubt of the subjective meaning or intent behind a child's response, then go with the literal wording. We cannot guess at child's intent when it is unclear.
- ❖ As a general rule, never have any blank spaces on your coding sheet. If a certain blank space on the coding sheet is not applicable, then mark it with an X or NA.
- ❖ **IF A CHILD SAYS PART OF A SENTENCE AND THEN STOPS, CODE WHATEVER INFORMATION YOU HAVE FROM WHAT WAS SAID. WE CANNOT GUESS AT WHAT THE CHILD WOULD HAVE SAID, BUT WE CAN GO AHEAD AND CODE WHAT WAS SAID. IN ADDITION, WE CANNOT GIVE A CHILD CREDIT FOR SOMETHING THEY SAY THEY WILL DO (BUT NEVER FOLLOW THROUGH WITH), OR WITH WHAT WE ARE CERTAIN THEY WOULD HAVE DONE (BUT NEVER ACTUALLY DID).**
- ❖ **NEVER CODE WITH ANOTHER CODER IN THE ROOM. IT IS VERY IMPORTANT THAT YOUR ACTIONS NOT INFLUENCE ANY OTHER CODER. THIS INCLUDES YOU BOTH CODING SILENTLY BUT TOGETHER. ONLY DURING GROUP MEETINGS MAY YOU SHARE ANY INFORMATION ABOUT CODING (OTHER THAN ASKING FOR HELP WITH UNDERSTANDING A CHILD'S UTTERANCES).**
- ❖ **IF YOU CANT UNDERSTAND WHAT A CHILD IS SAYING IN THE DARK ROOM VIDEOS, CHECK THE WEBCAM VIDEO FOR BETTER AUDIO. SOME OF THE VIDEOS ALSO HAVE A THIRD TAPE FROM THE BACKUP CAMERA FOR BETTER QUALITY VIDEO, WHICH WILL ENABLE YOU TO SEE A CHILD'S FACE BETTER. USE ALL VIDEOS AVAILABLE TO YOU TO BEST UNDERSTAND WHAT WAS SAID OR DONE.**
- ❖ **IF THE CHILD IS IN THE MIDDLE OF SAYING OR DOING SOMETHING WHEN THE TASK ENDS, ALLOW THE CHILD TO FINISH (AND CONTINUE TO CODE THE END OF THE ACTION/THOUGHT). IF THE CHILD WAS IN THE MIDDLE OF SAYING OR DOING SOMETHING WHEN THE TASK BEGINS, ALLOW THE CHILD TO FINISH BEFORE YOU START CODING.**
- ❖ If a child says 2 statements that seem like part of the same thought/story/sentence, they may get credit for more than 1 thing if different pieces of the statement, standing alone, could be coded as different types.
 - For example, a child says "It's OK, I had a dog too and he died," she would get credit for "it's OK" as verbal soothing (supportive response) and "I had a dog too and he died" as verbal CA-reflecting on personal experience.

- **ANOTHER EXAMPLE: “DON’T WORRY, YOUR DOG COULD GET SOME MEDICINE” WOULD GET CREDIT FOR 2 SUPPORTIVE RESPONSES. “DON’T WORRY” IS REFRAMING THE SITUATION AND “YOUR DOG COULD GET SOME MEDICINE” AS PROBLEM-FOCUSED RESPONSE.**
- **ANOTHER EXAMPLE: “MY FRIEND’S DOG GOT SICK AND WENT TO THE DOCTOR. COULD YOUR DOG GO TO THE DOCTOR TOO?” WOULD GET CREDIT FOR CA-PERSONAL EXPERIENCE AND PROBLEM-FOCUSED SUPPORTIVE RESPONSE.**
- **HOWEVER, KEEP IN MIND THAT TO GET CREDIT FOR MORE THAN 1 THING, BOTH STATEMENTS HAVE TO BE CODEABLE STANDING ON THEIR OWN. “MY DOG DIED TOO, NOW HE’S IN HEAVEN” WOULD BE 1 THING: PERSONAL EXPERIENCE THAT ENDED WELL. THE SECOND PART “NOW HE’S IN HEAVEN” ONLY MAKES SENSE IN CONTEXT WITH THE FIRST PART OF THE SENTENCE, AND SO THEY ARE A SINGLE THING.**
- ❖ If a child says 2 statements that seems like they could be part of the same thought/story/sentence, but there is a pause between them, they may get credit for 1 or 2 things:
 - If the pause is less than 5 seconds, it’s 1 thing. If this single thing is CA, it will be long/med/short based on the length of time it took to say the words (i.e., don’t include the pause in the timing).
 - If the pause is 5 or more seconds, you may count it as 2 things IF: Both halves/pieces can independently be coded as something (CA or Supportive), standing alone
 - However, if one or both of the pieces could not be coded as anything without the other half, then consider them a single thing. If this single thing is CA, it will be long/med/short based on the length of time it took to say the words (i.e., don’t include the pause in the timing).

Types of Responses

There are a variety of ways that someone can respond when another person is in need of comfort. The goal of coding these tasks is to capture the diversity of responses that a child can display, as well as to capture the frequency and duration of responses. To do this, we have divided all possible responses into 3 categories: (1) supportive responses, (2) concerned attention, and (3) ignoring distress.

EVERY MOMENT of a comforting task can be classified into ONE AND ONLY ONE of these categories. Some responses may seem to fit into more than one category or none of them at all. To determine which category a response is, you will use a decision hierarchy.

- First, consider whether the response is supportive.
- If it is not, then consider whether the response is concerned attention.
- If it not concerned attention either, then it will be coded as ignoring E's distress (by default).

Use the following guidelines to decide which category a response fits into:

1. **Supportive responses**: In general, these responses are intended to make the other person feel better. These include any response oriented towards feelings/emotions/mood and with the goal of improving these things, and any response oriented towards solving or taking action to fix the underlying problem. Use the following examples as a guide to classify the response in question:

- Physical Soothing (e.g., hugging, patting, rubbing, leaning against E, handshaking). TYPICALLY THIS CATEGORY IS HIGH QUALITY. This is the only code that may happen at the same time as another codeable response. For example, if the child says, "it's OK" while hugging, this would get credit for 2 supportive responses. Or if the child is giving verbal CA while patting E, this would get credit for 1 supportive and 1 CA.
- Verbal Soothing (e.g., "I'm sorry about your dog", "are you ok?", "it happens sometimes", "It's not your fault"). TYPICALLY THIS CATEGORY IS MID QUALITY (NOT ALWAYS).
- Reframing the situation as though it's not so bad, in order to make E feel better (e.g., "it's ok", "you'll be ok", "don't be sad - it's not so bad", "I'm sure your dog will be fine").
- Sympathizing with E. These include responses that connect the child's own potential ("would" statements) or past sadness with E's sadness (e.g., "I would be sad too", "if my dog was sick I'd be sad", "when my dog was sick I was also really sad").
 - If they are connecting E's current sadness with their own feelings in the present situation (e.g., I'm sad too), then see mirroring.
 - This also includes empathizing with E (e.g., "I know how you feel") – typically empathizing is higher quality (mid or mid/high or high), and is not often seen (but always take context into account when deciding on quality).
 - This category can be very similar to the CA category "reflecting on a previous experience that ended neutrally/badly". However, the child can get credit for sympathizing rather than CA if they meet ONE of these two requirements:

- 1. Either the child tells about their previous experience with a VERY sympathetic tone of voice/facial expression
 - 2. OR the child mentions feelings/emotions/inner states (e.g., “my dog died and it was sad” would be empathizing, but “my dog died” would be CA).
 - This type of sympathizing is typically lower or mid quality, but can vary widely depending on tone and context.
- Mirroring E's sadness ("awwwwww", "I feel bad", "oh nooooo"). TYPICALLY THIS CATEGORY IS LOW QUALITY (NOT ALWAYS).
 - Usually these statements have a similar emotional tone to E's distress, or include a verbal or non-verbal DISPLAY that the child feels the same way as E about the situation.
 - Either the words are drawn out (awwwwww; oooooohhhhhhhh) or have an inflection going up or down to indicate sadness (ohh, nOOoo)....
 - Or, if the tone isn't clearly drawn out or exaggerated, there must be other very clear aspects of the interaction that indicate the child is showing E she is also upset; for example, an exaggerated facial expression like widened eyes or frowny face, or stopping play abruptly/altogether and turning toward E, or clear body language showing distress like hands over mouth or eyes.
 - Or, if nothing is exaggerated in tone or face or body, then the words themselves must be explicitly stating that the child is feeling the same way as E in this moment (e.g., “I feel so bad for you”).
 - Or, use the context clues to decide whether a shorter verbalization (e.g., “aww”) is said toward E in a way intended to show sympathy (e.g., if child immediately afterward touches E or does something nice).
 - This differs from the empathizing/sympathizing category because the child is showing that he/she is currently feeling similarly to E (not recalling past feelings, or mentioning potential feelings).
- Reflection of personal experience with this same problem in which the personal experience ended positively (e.g., "My grandmas dog was sick once...but he got better"). TYPICALLY THIS CATEGORY IS MID OR HIGH QUALITY. If the reflection of personal experience ended neutrally (e.g., "My grandma's dog got sick once.") or negatively (e.g., “My grandma's dog got sick once, and he died”), then see the empathizing/sympathizing section OR see the concerned attention section (concerned attention requirements would still apply).
- Expressing hope/wish/desire that the present or future is/will be OK (e.g., “I hope it's not deadly.”, “I hope he's OK.”) TYPICALLY THIS CATEGORY IS LOW OR MID QUALITY.
- Attempts to distract E from her distress by introducing a new toy or activity to E with the intention of cheering her up. “Here, lets play with this sand, it'll make you feel better.” This could include attempts to bring E back to play. TYPICALLY THIS CATEGORY IS MID OR HIGH QUALITY.
 - Don't confuse attempts to distract with ignoring E's distress. Attempts to distract must include overt efforts to include E in the play, such as looking at her for more than a moment when talking about or showing the play, or holding something up or

doing something for HER BENEFIT (e.g., hey, look what I made!), rather than just commenting on the child's own play (e.g., this rope is too long..." while looking down). One way you can tell the difference between something done for E's benefit and ignoring E is whether the child looks at E when saying it. Attempts to distract are always Experimenter-focused, and not child-focused.

- Check the post lab notes for any evidence of distraction, and also use that to code distraction (i.e., if the notes say the child distracted or tried to distract E).
- Friendly invitations to play (e.g., looking at E, smiling, switching to a new toy, phrasing the invitation as a suggestion for what E could do like "you can still..."). The key component here is that the child is trying to be nice to E while suggesting new play activities.
 - A good way to tell if this happened or not is to see if the child waited for E to respond to their suggestions.
- Problem-focused responses (TYPICALLY THIS CATEGORY IS MID OR HIGH QUALITY), such as:
 - Verbal instrumental helping. This category includes all suggestions for fixing the problem, advice, (e.g., "you should watch out for what he eats"), or anything intended to be helpful toward making the problem go away, (e.g., "When I'm sad, I pray", "You could wrap him up in some blankets", "you can go to the doctor or get some medicine").
 - This includes even if the response is not reasonable or logical for the situation (e.g., "You could wrap your dog up in some blankets to make him feel better"). While it might seem like nonsense, if the child is oriented to the situation and trying to help, then it would be counted as PF. We are not coding how much sense a child makes but whether they are trying to solve the problem or not.
 - If the child says something about how someone else could help, including the child him or herself, without specifying what the "help" would be, we will code these as supportive.

Note: Consider the child's tone of voice, facial expression, and context when deciding if a suggestion or statement is actually supportive, or if it was meant to be callous, demanding, or controlling. For example, the phrase "you should be more careful" could be considered a negative response if it's taunting, callous, or if the child is ordering E. It could also be considered supportive if delivered in the right way.

***If you see a response that you think is supportive and is not included on this list, please tell a coding supervisor and it may be added to the manual. ***

2. **Concerned attention (CA):** Only if a response cannot be classified as a supportive response, then it may be considered for concerned attention. Please understand what CA is before attempting to code it. This is because often, you will just have to use your best intuitive judgment in deciding whether the child is showing CA "in spirit". We think of CA as an outward sign that the child is concerned about E: the child's thoughts are tuned into E's distress and the child has entered E's mental world. The child is allowing him/herself to enter E's "zone of distress" by

acknowledging the situation. The child could express this concern in two ways: verbally or non-verbally.

What is NOT considered CA?

- NODDING HEAD OR SAYING YES OR OH OR OK IN RESPONSE TO E'S STATEMENT.
- If the child is in the midst of a codable supportive response, child cannot also get credit for CA. Be sure to watch out for non-verbal supportive responses because that whole block of time cannot be considered CA.
- If the sentence child says qualifies for verbal CA (below) but is also part of a supportive response, then it is not CA (because it's already considered part of the comforting).

Verbal CA: If a child says something that does not qualify as supportive, yet shows that he/she is acknowledging the situation or that something bad happened, then it's verbal CA. This could include something showing that they are thinking about E's plight, but without explicitly offering a solution or comfort. Examples include:

- Conversation that is relevant to E's situation but does not count as supportive. (e.g., "I don't like vets.." "being sick is bad...", "My mom is a veterinarian.") Again, consider tone of voice and facial expression. Relevant convo is anything about dogs or anything directly in response to what E says during the task. HOWEVER, if the conversation is about the child's own experience or the experience of someone they know or an animal they/someone else knows (either past or present), and the experience involved something bad happening or something similar to E's situation, then see "Reflecting on a personal experience" below.
- Seeking more information about the situation (e.g., "what happened?", "Is he gonna be okay?", "How old is your dog?", "What is his/her name?"). This can include seeking information about the problem in question form and in statement form (e.g., "did he throw up?" "maybe it's because he ate something bad..."). This is different from problem-focused comforting because the child is not offering a solution or advice or suggestions (the child is only asking/thinking about what happened/what might have happened).
 - But, getting more information about E's emotional state is considered comforting. And example of this would be "are you sad right now?" or "you okay?"
- Reflecting on a personal experience similar to E's problem, in which the ending was neutral, negative, or doesn't have an end (e.g., "My dog died"). Basically, this includes any ending that is not positive, because a positive ending implies that it will also turn out OK for E (in which case, this is EF comforting). This category is different from relevant conversation because it describes something bad or something similar to E's situation that happened to either the child or someone they know or a pet they/someone else knows.
- Sympathetic restatement of what happened (e.g., "Your dog is sick...") We include these types of statements into CA because it is a way of connecting sympathetically with E's

plight, entering her zone of distress, and acknowledging that something bad has happened to her, but it does not qualify as comforting.

- Acknowledging what the experimenter says (more than just YES or YEA or OH or OK or nodding). E.g., “woah”, “really?”, “wow”, “I know it”, “I get that.” These can also include acknowledgements of the difficulty of the situation (“so sad...”, “that’s not good...”, “you must be so sad”, “that sucks” or “that’s sad”, “uh oh”).
- If you’re not sure what child says, but child is clearly oriented to the situation (and you can't give them credit for any other code), then code as CA (see nonverbal CA section below).

Non-verbal CA: Even though the child is not saying or doing anything, we can tell that he/she is concerned about the situation or about E. We can tell because the child becomes focused on the scene, often stops playing and talking, and stares at E with a concerned expression. Sometimes, the child shows momentary gaze aversions from E (1 second or less), because the situation is hard to look at, and so the child quickly glances away and looks back again.

To be coded as concerned attention, the child must be doing **BOTH** the following things **simultaneously for at least 3 continuous seconds**:

- MUST be oriented toward the scene, which includes EITHER looking at E or the phone she’s holding (i.e., paying attention to what is happening with her) OR being physically oriented toward her (i.e., body is turned toward E) and it wasn’t that way when the task began. If, during this time, the child momentarily looks away from E (i.e., 1 second or less) and then looks back again, that is ok. This is simply a gaze aversion, and can happen during CA. But the total amount of looking time must be at least 3 seconds.
- MUST have a neutral/concerned face (i.e., not smiling)

AND CANNOT:

- Cannot be talking about their own play or irrelevant conversation (anything not E-focused)
- Cannot overlap with words or actions that have already been classified as comforting

Note: The child could be listening to something E is saying or listening to E respond to him/her as part of an ongoing conversation. If the child is having a conversation with E, they MAY get codes for CA while listening to E, as long as they otherwise meet all the criteria for CA.

3. Ignoring E's Distress: This code will capture any response that cannot be coded into any of the above 5 categories. As a result, this code will not reflect the child ignoring E or the entire situation, but rather it should reflect the child ignoring SPECIFICALLY E's distress. Examples include:

- Keeping attention focused on activity
- Smiling at E (i.e., not concerned attention because not neutral/concerned)
- Making irrelevant conversation (e.g., "my birthday is tomorrow")
- Staring at the floor
- Statements about the child's play or activity that he/she has been occupied with (e.g., "look, I buried Barbie in the sand!")
- Any response that cannot be classified

Coding Procedure

1. Before you begin, have the child's Post Lab Notes (PLN) in front of you, and read over the bottom portion, noting anything about deviations from typical procedure.
- ~~2. Before beginning coding, first transcribe the entire task. See Transcribing Instructions.~~
3. ~~Once you've finished transcribing,~~ Before beginning coding, watch the entire task from start to finish without pausing or writing anything down. Just make a mental note of what global score you think the child would get, just based on this. Then, get a blank coding sheet, and fill out the top portion, including the start and stop times of the task.
 - ❖ Duration of the Task:
 - START coding after E says "he's been really sick lately"
 - * Do not code anything the child says before E makes this statement, unless it is something unusual or noteworthy that you may have a question about *
 - STOP coding when E says "they said he's OK!" (unless a child is finishing up a response that was happening previously)
4. Watch the video, while taking notes on the coding sheet about all of the child's supportive responses and CA during the task itself. Use these bullet points to help you code the global score.
5. After watching the video again, have the child's Post Lab Notes (PLN) in front of you, and read the over notes about the prosocial task or any other notes about the visit to make sure you didn't miss anything.

How to Select the Global Score

This global score will capture the quality, frequency, and diversity of child's attempts to comfort. Code the behavior only during the task time itself (i.e., in between the official START and STOP times).

Quality: Think about, how much is this child trying to help? Are they giving half-hearted attempts (e.g., "that's bad..."), saying things monotone without feeling? Mid or high quality responses include:

- ❖ Said in an especially warm or friendly or sympathetic tone
- ❖ Facing E, oriented toward her, attention in play is reduced, trying to engage E
- ❖ If it's something creative and different (i.e., something you've never heard or rarely hear), then the child is putting more thought into the comforting rather than just stating platitudes or giving automatic responses.
- ❖ If a child said something supportive but it's only in agreement with what E said, it's low quality (e.g., "hopefully"), in response to E saying ("I hope he's OK.").
- ❖ If it's the second or third time the child has tried to same thing, it might be a bit higher quality because it shows the child is persistent and doesn't give up on a strategy when it doesn't immediately work. Also, if the child follows up on an attempt to comfort or show concern (e.g., asks a subsequent question, elaborates on a suggestion, probes further), this will be higher quality. A persistent attempt will be scored higher than an attempt made just once briefly and then dropped.

Frequency: Out of the entire length of time of the task, **how much** time was spent attempting to comfort E, or engaged in concerned attention? How many total supportive responses were given (regardless of whether they were distinct from each other or not), and how much total time was spent showing CA?

- Short CA lasts for less than 5 seconds
- Medium length CA lasts for 5 – 14 seconds
- Long CA lasts for 15 or more seconds

Diversity: Consider the number of DISTINCT attempts, including the creativity seen in the diversity of responses (e.g., different types of comforting, not simply asking question after question about E's sick dog). A child who suggests the same thing over and over will not be coded the same as a child who suggests the same number of things but which are all distinct.

DECIDING BETWEEN TWO SCORES: If you cannot decide between 2 scores and are on the fence, use the following guidelines to help you choose a score:

1. Consider which bullet point your child is CLOSEST TO. They won't always fit exactly into a single bullet point. Also consider what some of your codes equate to. For example, if you have 2 medium CAs this could equate to 4 short CAs (and this might help you fit into a bullet point that calls for at least 3 CAs of any length). Another example: If you have 2 really low supportive responses, this equates to 1 low supportive response.

2. Consider distinct types of supportive responses or CA, even if that isn't part of the bullet points you're considering. If there are several distinct responses, go with the higher score. If the child mostly used the same few strategies, go with the lower score.
3. Consider whether the child showed any negativity or blatant ignoring (e.g., "when is this break over?") For example, was the child's mood totally out of sync with E's mood (e.g., being strangely cheerful or silly while playing//disregarding the mood of the room?) Did they child say anything a little insensitive? Did the child ask to end this part of the visit (or ask when it would be over?) Did the child spend virtually the entire time turned away from E, like they were purposefully going out of their way to ignore E's distress? If there was evidence of negativity or blatant ignoring, go with the lower score. If not, go with the higher score.

Rating	Description	Example
1	No display of prosocial/empathetic responding	To get this score, a child may: • Show no CA or supportive responses (or say nothing at all). • Show 1-2 short CAs but no supportive responses • Show 1 brief, low quality supportive with no CA
2	Mild display of prosocial/empathetic responding	In between a 1 and 3 (e.g., plenty of CA but no supportive responses, 1 brief and low-quality supportive response and a little CA).
3	Average display of prosocial/empathetic responding	To get this score, a child may: • Attempt 1 low-quality supportive response, with at least 4 CAs of any length • Attempt 1 mid-quality supportive response, with at least 3 CAs of any length. • Attempt 2 supportive responses of low to mid quality, with at least 2 CAs • Attempt 3 low-quality supportive responses with little or no CA
4	Moderate display of prosocial/empathetic responding	In between a 3 and 5 (e.g., 1 high quality supportive and at least 1 other supportive response with no or very little CA, 3 supportive response with at least 2 CA). Typically, if they have a clearly high quality supportive response, they get at least a 4. But to get a 4 must have at least 1 CLEARLY mid quality supportive (i.e., if only low quality supportive, max score is a 3).
5	High display of prosocial/empathetic responding	To get this score, a child may: • Attempt 4 supportive responses (at least 1 is high-mid or high quality) with at least 2 distinct CA • Attempt 3 distinct supportive responses (at least one is mid/high quality) with at least 2 CA • Attempt 2 high-quality supportive responses • Attempt at least 5 supportive responses (at least 1 is high-mid or high quality)

Prosocial Behavior Coding Sheet

What did the child say or do ?	Supportive or CA?	Type of Supportive response (Which bullet point?)	Quality (for Supportive) <u>or</u> Length (for CA)?

Total # of high quality supportive:

Total # of mid quality supportive:

Total # of low quality supportive:

How many distinct types?

Total # of long CA (15 + seconds) :

Total # of mid CA: (5-14 seconds)

Total # of short CA: (< 5 seconds):

How many distinct types?

Global Score Chart

Rating	Description	Example
1	No display of prosocial/empathetic responding	To get this score, a child may: • Show no CA or supportive responses (or say nothing at all). • Show 1-2 short CAs but no supportive responses • Show 1 brief, low quality supportive with no CA
2	Mild display of prosocial/empathetic responding	In between a 1 and 3 (e.g., plenty of CA but no supportive responses, 1 brief and low-quality supportive response and a little CA).
3	Average display of prosocial/empathetic responding	To get this score, a child may: • Attempt 1 low-quality supportive response, with at least 4 CAs of any length • Attempt 1 mid-quality supportive response, with at least 3 CAs of any length. • Attempt 2 supportive responses of low to mid quality, with at least 2 CAs • Attempt 3 low-quality supportive responses with little or no CA
4	Moderate display of prosocial/empathetic responding	In between a 3 and 5 (e.g., 1 high quality supportive and at least 1 other supportive response with no or very little CA, 3 supportive response with at least 2 CA). Typically, if they have a clearly high quality supportive response, they get at least a 4. But to get a 4 must have at least 1 CLEARLY mid quality supportive (i.e., if only low quality supportive, max score is a 3).
5	High display of prosocial/empathetic responding	To get this score, a child may: • Attempt 4 supportive responses (at least 1 is high-mid or high quality) with at least 2 distinct CA • Attempt 3 distinct supportive responses (at least one is mid/high quality) with at least 2 CA • Attempt 2 high-quality supportive responses • Attempt at least 5 supportive responses (at least 1 is high-mid or high quality)

Any other notes?

Appendix N: Facial Expressions Scoring Manual and Coding Sheet

Facial Expression Coding Manual

Adapted from The Facial Expression Coding System (FACES; Kring & Sloan, 2007)

Overview

The Facial Expression Coding System (FACES) was developed as a less time-consuming alternative to measuring facial expression that is aligned with dimensional models of emotion. FACES was initially developed to measure facial expressions in response to five minute

film clips. Generally speaking, the system allows for the examination of a participant's entire record of expressive behavior. When participants' expressiveness during emotional films is rated, the soundtrack from the movie is not listened to by the coders. Thus, coders view participants' facial reactions to the films with the volume off. Reliability for FACES has routinely been very high ($ICC = .7$ to $.99$; Kring & Sloan, 2007).

The system provides information about the frequency, intensity, valence, and duration of facial expressions. The selection of the variables included in the system was based on theory and previous empirical studies. Adopting the descriptive style of Ekman and similar to the work of Notarius and Levenson (1979), an expression is defined as any change in the face from a neutral display (i.e., no expression) to a non-neutral display and back to a neutral display. When this activity occurs, a frequency count of expressions is initiated. Next, coders rate the valence (positive or negative) and the intensity of each expression detected, as well as the duration. **In our adaptation, we will not rate the expression as positive or negative, because we are interested only in overall expressiveness and not the valence (this is because in our study, the children are asked to “not show with their face or body how they are feeling” without specifying what type of emotion is being asked to be suppressed). We will also not rate the duration of each expression explicitly, but will take overall duration of all expressions into account when selecting a global score. The global expressiveness rating takes into account the intensity and duration of all expressions during the video.**

Therefore, each child will receive 1 global expressiveness score from 1 (low expression) to 5 (high expression).

How to Code

Always watch the video on silent so the condition of the child remains blind. Skip to the portion of the video where the child watches the sad video (just after putting on headphones). You may also rewind to watch the portion of the video where the child watches neutral pictures, to get a sense of the child's baseline expressiveness (e.g., if you are not sure whether an expression is a tic, to get a sense of the level of fidgetiness at rest).

Detecting an Expression

An expression is detected if the face changes from a neutral display to a non-neutral display and then back to a neutral display. It is important to note, however, that a facial display may not always return to the original neutral display but may instead return to a display that, although neutral, does not exactly resemble the prior neutral expression. Additionally, if after a participant displays a shift from a neutral to nonneutral display and, instead of returning to a neutral display, shows a clear change in affective expression, this change is counted as an additional expression. For example, if while smiling, a participant then raises his or her eyebrows and stops smiling, indicating more of a surprised look, two expressions will be coded.

A coder should write down ALL expressions and facial/body movements that are included in the facial action chart into the coding sheet (see page 6 of the manual). Next to each movement, write the time stamp associated with that movement. In general, expressions that are NOT in this chart will not be considered because they may not be associated with emotional expression. The movements in the facial action chart have been established by the FACES system. Our adaptation also includes some body movements that are not part of the FACES system, but that are associated with emotional expression, because the instructions given to the children in this study include both suppression of facial expressions and body movements.

In addition, do not code an expression that the child had before the task started that carried over into the task. If a child is talking when the task begins, wait until she is actually watching/paying attention to the movie before you begin coding.

Level of Expressiveness

After writing down all movements and associated numbers, select a global level of expressiveness for each child. If needed, watch one of the example videos that establishes what each global score looks like, for comparison.

This rating is the coder's global assessment of expressiveness during a segment. Before making this assessment, the coder should look at all the individual expressions written down. This is a holistic assessment of expressiveness, but to help coders decide which rating to give, they can use the guide below (however, this is only a guide, and the ultimate code is a holistic one).

This rating requires consideration of individual ratings of frequency, duration, and intensity. The global rating of expressiveness ranges from one to five (1=low, 2=fairly low, 3=moderate, 4=fairly high, 5=high).

A (1) low rating would be given to a participant who had:

- none or just one expression of low intensity/duration.
- 1-2 very subtle expressions that you're not 100% sure qualify as expressions in reaction to the video

- These children are easy to identify because they often have no movement of the face at all, or very subtle changes that are not clear expressions, or they simply move/fidget without showing identifiable expressions.

A (2) fairly low rating would be given to a participant who had:

- at least 1 expression that was clearly an emotional reaction to the video (e.g., included more than one part of the face and was not barely detectable or very subtle) OR
- who had 3-4 subtle expressions of low intensity/duration that only used 1 part of the face OR
- who had 1-2 clear expressions of low intensity (affecting 1 part of the face) but longer duration (more than 3 sec) **and very clearly fits a category in the chart**
- Consider combinations of these possibilities as well: e.g., a child with 2 subtle expressions of low intensity/duration using only 1 part of the face PLUS 1 subtle expression of low intensity and longer duration, would be a (2).

A (3) moderate rating would be given to a participant who had slightly more than the criteria for a (2), such as:

- 2 clear/full face/not very subtle expressions, or
- 5-7 subtle expressions* of low intensity/duration using only 1 part of the face, or
- 3-4 subtle expressions** of low intensity but longer duration (more than 3 sec) **and very clearly fits a category in the chart.**
- Combination of these possibilities include: 1 clear/full face/not very subtle expression plus 2-3 subtle, short expressions using only 1 part of the face OR 1 clear/full face plus 1 low intensity/longer duration plus 1 subtle, short expression using only 1 part of the face.

* Note: if it's only 5 subtle expressions and nothing else, the expressions must include a mix of upper and lower face movements (e.g., not all mouth movements only) to qualify for a 3.

** Same here. If it's only 3 subtle but longer duration expressions, they must have a mix of upper and lower face movements to qualify for a 3.

A (4) fairly high rating would be given to a participant who had:

- at least 3 clear/full face/not low intensity or subtle expressions, or
- 2 clear/full face expressions plus 3-4 subtle expression of low intensity/duration OR 2 clear/full face plus 1-2 expressions of longer duration (more than 3 sec) **and very clearly fits a category in the chart.**
- 1 clear/full face expression plus 5-7 subtle expressions of low intensity/duration OR 1 clear/full face plus 3-4 low intensity/longer duration (more than 3 sec) **and very clearly fits a category in the chart.**
- They must have AT LEAST 1 clear/full face/not subtle expression to get a 4.

A (5) high rating would be given to a participant who had:

- At least 4 clear/full face/not low intensity or subtle expressions, or

- At least 3 clear/full face expressions plus 3-4 subtle expression of low intensity/duration OR 2 clear/full face plus 1-2 expressions of longer duration (more than 3 sec) **and very clearly fits a category in the chart.**
- At least 2 clear/full face expressions plus 5-7 subtle expressions of low intensity/duration OR 1 clear/full face plus 3-4 low intensity/longer duration (more than 3 sec) **and very clearly fits a category in the chart.**
- They must have AT LEAST 2 clear/full face/not subtle expressions to get 5, PLUS a combination of other, more subtle expressions that exceed the criteria for a 4

Things to Watch out for

Experience with the coding system tells us that there are a number of things that can be problematic for coders if they are not discussed ahead of time. Below, we provide a list of the most common problems. These suggestions are offered as guides, not absolute solutions, for coders.

Shifting Body Positions

A coder may sometimes mistake a change of body position for a change from a neutral to non-neutral facial display. Coders must take special care to ensure that the face changes in addition to the body posture shift in order to record that an expression has occurred.

Not paying attention

The coder should not code any expressions if the participant does not appear to be paying attention to the stimuli. Although this can be difficult to determine, if the participant is looking down or away from the stimulus that is being presented, it is likely that he or she is not attending. We have also employed separate ratings of attention in order to assess this more systematically. Depending on the application and participant population, this may be advisable.

Hand covering part of face

If a participant's hand is covering part of the face, the coder may unfortunately need to rely on the other parts of the face to detect the occurrence of facial expressions. For example, if the participant is covering the mouth area, the coder will need to pay special attention to the eye, nose, forehead, and cheek areas to code expressions.

Eye glasses

If the participant is wearing eye glasses, the coder may find it difficult to examine the participant's eyes during facial expressions. In this situation, the coder is encouraged to examine as best as possible eye movements (e.g., eyebrows raised above the eyeglass frame) as well as other areas of the face when determining whether or not an expression has occurred.

Contact lenses

If the participant is a contact lens wearer, chances are good that he or she may have eye movements related to the lenses and not to facial expressions per se. If possible, determine ahead of time if the participant wears and/or experiences any problems with contact lenses. If repetitive movements (e.g., blinking) occur that do not appear to be tied to the stimulus presentation, these should not be coded as facial expressions. Determination of this can be difficult and is best established by observing several occurrences of such movements across stimulus presentations.

Gum chewing

Participants chewing gum can present a sticky problem for coders. Gum chewing may actually inhibit natural expressive displays. The best solution here is to make sure a participant removes gum prior to the beginning of stimulus presentation. Do not count movements that happen as a result of gum chewing.

Talking

Talking during a study can be problematic if more than one participant is being run through a study or if an experimenter is in the room. The best advice is to strongly encourage participants to refrain from talking during the experiment. In the event that coders are faced with rating a segment in which a participant is talking, attempts should be made to identify an expression independent of the talking. For example, if a participant smiles and then begins talking, the smile should be recorded as an expression. If on the other hand, the participant begins talking and has clearly diverted attention from the stimulus presentation, and smiles, it should not be recorded as an expression.

Facial tics

Occasionally, a participant may repeatedly display facial movements that do not appear to be expressions of emotion and are instead facial tics. As cited above, contact lens wearers may have eye movements that are related only to the lenses. Other people may have other repetitive facial movements. These may not be obvious initially, but after viewing several minutes of a participant's record, they may become more prominent. If unsure, coders may watch the participants' facial expressions while watching the neutral pictures earlier in the study.

If the participant does something you are PRETTY SURE is a facial tic or twitch, but only does it once, watch the face during neutral pictures – if they do that same tic even once, you can consider it a twitch/tic and not code it. As a guide, twitches/tics are often very quick with an immediate return to baseline. If you see this, check the neutral pictures footage.

Fidgetyness

Overall, we only want to capture clear, established facial expressions and not neutral movements or fidgeting. This is why we will use a system of established facial movements that have previously been identified as being tied to emotional expression (see the chart on the next page). In addition, if you are ever unsure about whether a movement was fidgeting (versus nervousness), watch the participants' movements during the neutral pictures portion of the study, and see "things to watch out for" above. Examples of fidgeting:

- face twitches
- scratching nose
- adjusting glasses
- resting head on hand

<u>AU</u>	<u>Description of Muscle Movement</u>	<u>Example</u>	
1	Inner corner of eyebrow raised		
2	Outer corner of eyebrow raised		
4	Eyebrows drawn medially and down		
5	Eyes widened. THIS USUALLY HAPPENS WHILE PUPILS STAY FIXED ON VIDEO (I.E., NOT WHEN LOOKING UP OR DOWN, WHICH COULD BE A FACE TWITCH)		
6	Cheeks raised; eyes narrowed		
7	Lower eyelid raised and drawn medially		

- 9 Nose wrinkled; upper lip raised and inverted;
Superior part of the nasolabial furrow deepened;
Nostril dilated by medial slip of the muscle



- 10 Upper lip raised; nasolabial furrow deepened
producing square-like furrows around nostrils



- 11 Nasolabial furrow deepener; lower to medial
part of the nasolabial furrow deepened



- 12 Lip corners pulled up and laterally



- 13 Cheek puffer ; angle of mouth elevated; only
muscle in the deep layer of muscles that opens
the lips



- 14 Dimpler; lip corners tightened, cheeks
compressed against teeth



- 15 Corner of mouth pulled downward/inward

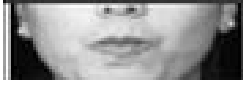


- 16 Lower lip pulled down and laterally



- 17 Skin of chin elevated

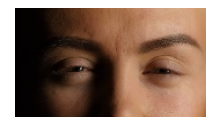
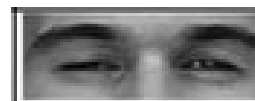


18	Lips pursed		
20	Lip corners pulled laterally		
22	Lips everted (funneled)		
23	Lips tightened		
24	Lips pressed together		
25	Lips parted		
26	Jaw dropped		
27	Mouth stretched open		
28	Lips sucked		
41	Upper eyelid droop		
42	Eyelid slit		

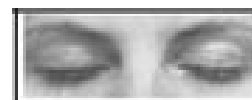
43 Eyes closed



44 Eyes squinted



45 Blink; brief eye closure
THIS MUST BE A "LONG BLINK", NOT
JUST FREQUENT BLINKING



46 Wink



Miscellaneous

8 Lips toward

19 Tongue show

21 Neck tighten

29 Jaw thrust

30 Jaw sideways

31 Jaw clench

32 Bite lip

33 Blow

34 Puff

35 Cheek suck

36 Tongue bulge

37 Lip wipe

38 Nostril dilate

39 Nostril compress

Body Movement to Include/Code: - CAREFUL NOT TO CONFUSE THESE WITH FIDGETING. These must be a definite reaction to the video (e.g., the child is not simply resting face on hand). Again, you may have to check the neutral video to see if the child was doing these same things earlier (e.g., biting nails).

47	Covering mouth
48	Covering eyes
49	Biting nails
50	Covering ears
51	Touching neck
52	Shaking head
53	Tilting head

Do not Include/Code:

- Resting head on hand
- Fidgeting
- Scratching
- Repositioning self in chair
- Adjusting headphones
- Looking away
- Anything that occurs while the child's attention is not on the video clip

Facial Expression Coding Sheet

ID# _____
time _____

Coder _____

Date _____

Start

<i>Description:</i>
<i>Time Stamp:</i>
<i>Description:</i>
<i>Time Stamp:</i>
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Summary - ID#_____

What is the overall level of expressiveness for this person for this film? (Circle)

Low (1) Fairly Low (2) Medium (3) Fairly High (4) High (5)

Notes:

Appendix O: The Security Scale – Mother-Child Attachment

Instructions to Child:

This questionnaire asks about what you are like with your mother – like how you act and feel around her. Before we get to those questions, let's try a practice question. Each question talks about two kinds of kids, and we want to know which kids are most like you. Decide first whether you are more like the kids on the left side or more like the kids on the right side, then decide whether that is sort of true for you, or really true for you, and circle that phrase. For each question you will only circle one answer.

Practice Question:

Some kids would rather play sports in
their spare time.

BUT

Other kids would rather watch T.V.

Really true
for me

Sort of
true for me

Sort of
true for me

Really true
for me

I am filling this out about my (circle one): mother step-mother grandmother
other: _____

- | | | | |
|----|---|------------|--|
| 1. | Some kids find it easy to trust their mom | BUT | Other kids are not sure if they can trust their mom. |
| | Really true for me Sort of true for me | | Sort of true for me Really true for me |
| 2. | Some kids feel like their mom butts in a lot when they are trying to do things | BUT | Other kids feel like their mom lets them do things on their own. |
| | Really true for me Sort of true for me | | Sort of true for me Really true for me |
| 3. | Some kids find it easy to count on their mom for help | BUT | Other kids think it's hard to count on their mom. |
| | Really true for me Sort of true for me | | Sort of true for me Really true for me |
| 4. | Some kids think their mom spends enough time with them. | BUT | Other kids think their mom does not spend enough time with them. |
| | Really true for me Sort of true for me | | Sort of true for me Really true for me |
| 5. | Some kids feel more confident trying new things after talking to their mom about it | BUT | Other kids do not feel more confident trying new things after talking to their mom about it. |
| | Really true for me Sort of true for me | | Sort of true for me Really true for me |
| 6. | Some kids do not really like telling their mom what they are thinking or feeling | BUT | Other kids do like telling their mom what they are thinking or feeling. |
| | Really true for me Sort of true for me | | Sort of true for me Really true for me |
| 7. | Some kids do not really need their mom for much | BUT | Other kids need their mom for a lot of things. |
| | Really true for me Sort of true for me | | Sort of true for me Really true for me |
| 8. | Some kids are sure their mom wants to hear what they think, even when they disagree with their mom. | BUT | Other kids are not sure if their mom wants to hear what they think. |
| | Really true for me Sort of true for me | | Sort of true for me Really true for me |

- | | | | |
|-----|---|------------|---|
| 9. | Some kids wish they were closer to their mom | BUT | Other kids are happy with how close they are to their mom. |
| | Really true
for me Sort of
true for me | | Sort of
true for me Really true
for me |
| 10. | Some kids worry that their mom does not really love them | BUT | Other kids are <u>really</u> sure that their mom loves them. |
| | Really true
for me Sort of
true for me | | Sort of
true for me Really true
for me |
| 11. | Some kids do not feel like their mom encourages them when they try new things | BUT | Other kids do feel like their mom encourages them when they try new things. |
| | Really true
for me Sort of
true for me | | Sort of
true for me Really true
for me |
| 12. | Some kids feel like their mom really understands them | BUT | Other kids feel like their mom does not really understand them. |
| | Really true
for me Sort of
true for me | | Sort of
true for me Really true
for me |
| 13. | Some kids are really sure their mom would not leave them | BUT | Other kids sometimes wonder if their mom might leave them. |
| | Really true
for me Sort of
true for me | | Sort of
true for me Really true
for me |
| 14. | Some kids feel like their mom lets them decide enough things by themselves | BUT | Other kids feel like their mom does not let them make enough decisions by themselves. |
| | Really true
for me Sort of
true for me | | Sort of
true for me Really true
for me |
| 15. | Some kids worry that their mom might not be there when they need her | BUT | Other kids are sure their mom will be there when they need her. |
| | Really true
for me Sort of
true for me | | Sort of
true for me Really true
for me |

16.	Some kids think their mom does not listen to them	BUT	Other kids do think their mom listens to them.
	Really true for me Sort of true for me		Sort of true for me Really true for me
17.	Some kids think their mom encourages them to be themselves	BUT	Other kids do not think their mom encourages them to be themselves.
	Really true for me Sort of true for me		Sort of true for me Really true for me
18.	Some kids go to their mom when they are upset	BUT	Other kids do not go to their mom when they are upset.
	Really true for me Sort of true for me		Sort of true for me Really true for me
19.	Some kids wish their mom would help them more with their problems	BUT	Other kids think their mom helps them enough.
	Really true for me Sort of true for me		Sort of true for me Really true for me
20.	Some kids are really sure their mom is proud of them	BUT	Other kids are not sure if their mom is proud of them.
	Really true for me Sort of true for me		Sort of true for me Really true for me
21.	Some kids feel better when their mom is around	BUT	Other kids do not feel better when their mom is around.
	Really true for me Sort of true for me		Sort of true for me Really true for me
22.	Some kids think their mom doesn't let them have enough say in choosing what activities they want to do outside school	BUT	Other kids think their mom usually lets them choose their activities outside school.
	Really true for me Sort of true for me		Sort of true for me Really true for me
23.	Some kids feel like their mom always encourages them to follow their interests	BUT	Other kids feel like their mom does not always encourage them to follow their interests.
	Really true for me Sort of true for me		Sort of true for me Really true for me

24.	Some kids practice with their mom when they are trying to get better at something	BUT	Other kids don't practice with their mom much.
	Really true for me Sort of true for me		Sort of true for me Really true for me

**Appendix P: Coping with Children's Negative Emotions Scale (CCNES) – Parental
response to child distress**

Instructions: In the following items, please indicate on a scale from 1 (very unlikely) to 7 (very likely) the likelihood that you would respond in the ways listed for each item. Please read each item carefully and respond as honestly and sincerely as you can. For each response, please circle a number from 1-7.

Response Scale: 1 2 3 4 5 6 7
Very Unlikely Medium Very Likely

1. If my child becomes angry because he/she is sick or hurt and can't go to his/her friend's birthday party, I would:

- a. send my child to his/her room to cool off 1 2 3 4 5 6 7
- b. get angry at my child 1 2 3 4 5 6 7
- c. help my child think about ways that he/she can still be with friends (e.g., invite some friends over after the party) 1 2 3 4 5 6 7
- d. tell my child not to make a big deal out of missing the party 1 2 3 4 5 6 7
- e. encourage my child to express his/her feelings of anger and frustration 1 2 3 4 5 6 7
- f. soothe my child and do something fun with him/her to make him/her feel better about missing the party 1 2 3 4 5 6 7

2. If my child falls off his/her bike and breaks it, and then gets upset and cries, I would:

- a. remain calm and not let myself get anxious 1 2 3 4 5 6 7
- b. comfort my child and try to get him/her to forget about the accident 1 2 3 4 5 6 7
- c. tell my child that he/she is over-reacting 1 2 3 4 5 6 7
- d. help my child figure out how to get the bike fixed 1 2 3 4 5 6 7
- e. tell my child it's OK to cry 1 2 3 4 5 6 7
- f. tell my child to stop crying or he/she won't be allowed to ride his/her bike anytime soon 1 2 3 4 5 6 7

3. If my child loses some prized possession and reacts with tears, I would:

- a. get upset with him/her for being so careless and then crying about it 1 2 3 4 5 6 7
- b. tell my child that he/she is over-reacting 1 2 3 4 5 6 7
- c. help my child think of places he/she hasn't looked yet 1 2 3 4 5 6 7
- d. distract my child by talking about happy things 1 2 3 4 5 6 7
- e. tell him/her it's OK to cry when you feel unhappy 1 2 3 4 5 6 7
- f. tell him/her that's what happens when you're not careful 1 2 3 4 5 6 7

4. If my child is afraid of injections and becomes quite shaky and teary while waiting for his/her turn to get a shot, I would:

- a. tell him/her to shape up or he/she won't be allowed to do something he/she likes to do (e.g., watch TV) 1 2 3 4 5 6 7
- b. encourage my child to talk about his/her fears 1 2 3 4 5 6 7
- c. tell my child not to make big deal of the shot 1 2 3 4 5 6 7

- d. tell him/her not to embarrass us by crying 1 2 3 4 5 6 7
 - e. comfort him/her before and after the shot 1 2 3 4 5 6 7
 - f. talk to my child about ways to make it hurt less
(such as relaxing so it won't hurt or taking deep breaths). 1 2 3 4 5 6 7
-

Response Scale: 1 2 3 4 5 6 7
Very Unlikely Medium Very Likely

-
5. If my child is going over to spend the afternoon at a friend's house and becomes nervous and upset because I can't stay there with him/her, I would:
- a. distract my child by talking about all the fun he/she will have with his/her friend 1 2 3 4 5 6 7
 - b. help my child think of things that he/she could do so that being at the friend's house without me wasn't scary (e.g., take a favorite book or toy with him/her) 1 2 3 4 5 6 7
 - c. tell my child to quit over-reacting and being a baby 1 2 3 4 5 6 7
 - d. tell the child that if he/she doesn't stop that he/she won't be allowed to go out anymore 1 2 3 4 5 6 7
 - e. feel upset and uncomfortable because of my child's reactions 1 2 3 4 5 6 7
 - f. encourage my child to talk about his/her nervous feelings 1 2 3 4 5 6 7
6. If my child is participating in some group activity with his/her friends and proceeds to make a mistake and then looks embarrassed and on the verge of tears, I would:
- a. comfort my child and try to make him/her feel better 1 2 3 4 5 6 7
 - b. tell my child that he/she is over-reacting 1 2 3 4 5 6 7
 - c. feel uncomfortable and embarrassed myself 1 2 3 4 5 6 7
 - d. tell my child to straighten up or we'll go home right away 1 2 3 4 5 6 7
 - e. encourage my child to talk about his/her feelings of embarrassment 1 2 3 4 5 6 7
 - f. tell my child that I'll help him/her practice so that he/she can do better next time 1 2 3 4 5 6 7
7. If my child is about to appear in a recital or sports activity and becomes visibly nervous about people watching him/her, I would:
- a. help my child think of things that he/she could do to get ready for his/her turn (e.g., to do some warm-ups and not to look at the audience) 1 2 3 4 5 6 7
 - b. suggest that my child think about something relaxing so that his/her nervousness will go away 1 2 3 4 5 6 7
 - c. remain calm and not get nervous myself 1 2 3 4 5 6 7
 - d. tell my child that he/she is being a baby about it 1 2 3 4 5 6 7
 - e. tell my child that if he/she doesn't calm down, we'll have to leave and go home right away 1 2 3 4 5 6 7
 - f. encourage my child to talk about his/her nervous feelings 1 2 3 4 5 6 7
8. If my child receives an undesirable birthday gift from a friend and looks obviously disappointed, even annoyed, after opening it in the presence of the friend, I would:
- a. encourage my child to express his/her disappointed feelings 1 2 3 4 5 6 7

- b. tell my child that the present can be exchanged for something the child wants 1 2 3 4 5 6 7
 - c. NOT be annoyed with my child for being rude 1 2 3 4 5 6 7
 - d. tell my child that he/she is over-reacting 1 2 3 4 5 6 7
 - e. scold my child for being insensitive to the friend's feelings 1 2 3 4 5 6 7
 - f. try to get my child to feel better by doing something fun 1 2 3 4 5 6 7
-

Response Scale: 1 2 3 4 5 6 7
Very Unlikely Medium Very Likely

9. If my child is panicky and can't go to sleep after watching a scary TV show, I would:
- a. encourage my child to talk about what scared him/her 1 2 3 4 5 6 7
 - b. get upset with him/her for being silly 1 2 3 4 5 6 7
 - c. tell my child that he/she is over-reacting 1 2 3 4 5 6 7
 - d. help my child think of something to do so that he/she can get to sleep (e.g., take a toy to bed, leave the lights on) 1 2 3 4 5 6 7
 - e. tell him/her to go to bed or he/she won't be allowed to watch any more TV 1 2 3 4 5 6 7
 - f. do something fun with my child to help him/her forget about what scared him/her 1 2 3 4 5 6 7
10. If my child is at a park and appears on the verge of tears because the other children are mean to him/her and won't let him/her play with them, I would:
- a. NOT get upset myself 1 2 3 4 5 6 7
 - b. tell my child that if he/she starts crying then we'll have to go home right away 1 2 3 4 5 6 7
 - c. tell my child it's OK to cry when he/she feels bad 1 2 3 4 5 6 7
 - d. comfort my child and try to get him/her to think about something happy 1 2 3 4 5 6 7
 - e. help my child think of something else to do 1 2 3 4 5 6 7
 - f. tell my child that he/she will feel better soon 1 2 3 4 5 6 7
11. If my child is playing with other children and one of them calls him/her names, and my child then begins to tremble and become tearful, I would:
- a. tell my child not to make a big deal out of it 1 2 3 4 5 6 7
 - b. feel upset myself 1 2 3 4 5 6 7
 - c. tell my child to behave or we'll have to go home right away 1 2 3 4 5 6 7
 - d. help my child think of constructive things to do when other children tease him/her (e.g., find other things to do) 1 2 3 4 5 6 7
 - e. comfort him/her and play a game to take his/her mind off the upsetting event 1 2 3 4 5 6 7
 - f. encourage him/her to talk about how it hurts to be teased 1 2 3 4 5 6 7
12. If my child is shy and scared around strangers and consistently becomes teary and wants to stay in his/her bedroom whenever family friends come to visit, I would:
- a. help my child think of things to do that would make meeting my friends less scary (e.g., to take a favorite toy with him/her when meeting my friends) 1 2 3 4 5 6 7

- b. tell my child that it is OK to feel nervous 1 2 3 4 5 6 7
- c. try to make my child happy by talking about the fun things we can do with our friends 1 2 3 4 5 6 7
- d. feel upset and uncomfortable because of my child's reactions 1 2 3 4 5 6 7
- e. tell my child that he/she must stay in the living room and visit with our friends 1 2 3 4 5 6 7
- f. tell my child that he/she is being a baby 1 2 3 4 5 6 7

Appendix Q: The Interpersonal Reactivity Index – Parental Empathy

The following statements inquire about your thoughts and feelings in a variety of situations. For each item, indicate how well it describes you by choosing the appropriate letter on the scale at the top of the page: 1, 2, 3, 4, or 5. When you have decided on your answer, fill in the letter next to the item number. Please read each item carefully before responding. Answer as honestly as you can.

	Does not describe me well			Describes me very well	
<i>Empathic Concern</i>					
1. I often have tender, concerned feelings for my child when (s)he is going through a rough time.	1	2	3	4	5
2. *Sometimes I don't feel very sorry for my child when (s)he is having problems.	1	2	3	4	5
3. When I see my child being taken advantage of, I feel protective towards him/her.	1	2	3	4	5
4. *My child's misfortunes do not usually disturb me a great deal.	1	2	3	4	5
5. *When I see my child being treated unfairly, I sometimes don't feel very much pity for him/her.	1	2	3	4	5
6. I am often quite touched by things that I see my child do.	1	2	3	4	5
7. I would describe myself as a pretty soft-hearted mother/father.	1	2	3	4	5
<i>Perspective Taking</i>					
1. *I sometimes find it difficult to see things from my child's point of view.	1	2	3	4	5
2. I try to look at my child's side of a disagreement before I make a decision.	1	2	3	4	5
3. I sometimes try to understand my child better by imagining how things look from his/her perspective.	1	2	3	4	5
4. *If I'm sure I'm right about something, I don't waste much time listening to my child's arguments.	1	2	3	4	5
5. I believe that there are two sides to every question and try to look at my child's side.	1	2	3	4	5
6. When I'm upset at my child, I usually try to "put myself in his/her shoes" for a while.	1	2	3	4	5
7. Before criticizing my child, I try to imagine how I would feel if I were in his/her place.	1	2	3	4	5

	Does not describe me well			Describes me very well	
<i>Personal Distress</i>					
1. In emergency situations with my child, I feel apprehensive and ill-at-ease.	1	2	3	4	5
2. I sometimes feel helpless when I am in the middle of a very emotional situation with my child.	1	2	3	4	5
3. *When I see my child get hurt, I tend to remain calm.	1	2	3	4	5
4. Being in a tense emotional situation with my child scares me.	1	2	3	4	5
5. *I am usually pretty effective in dealing with emergencies with my child.	1	2	3	4	5
6. I tend to lose control during emergencies with my child.	1	2	3	4	5
7. If I saw that my child badly needed help in an emergency, I would go to pieces.	1	2	3	4	5

**Reverse-scored*

Appendix R: The Emotion Regulation Checklist (ERC) – Child Emotion Regulation

Emotion Regulation Checklist (ERC) Emotion Regulation subscale

4-point Likert scale (1 rarely/never, 2 sometimes, 3 often, and 4 almost always)

The Emotion Regulation subscale measures children's adaptive emotional control, sociability, and self-awareness

1. Can say when s/he is feeling sad, angry or mad, fearful or afraid.
2. Displays appropriate negative emotions (anger, fear, frustration, distress) in response to hostile, aggressive, or intrusive acts by peers.
3. Responds positively to neutral or friendly overtures by adults.
4. Is a cheerful child.
5. Responds positively to neutral or friendly overtures by peers.
6. Is empathic towards others; shows concern when others are upset or distressed.
7. Seems sad or listless.
8. Displays flat affect (expression is vacant and inexpressive; child seems emotionally absent).

The Lability/Negativity subscale measures lack of emotional flexibility and negative emotionality/dysregulation.

1. Exhibits wide mood swings (child's emotional state is difficult to anticipate because she/he moves quickly from positive to negative moods).
2. Transitions well from one activity to another; does not become anxious, angry, distressed or overly excited when moving from one activity to another.
3. Can recover quickly from episodes of distress (for example, does not pout or remain sullen, anxious, or sad after emotionally distressing events).
4. Is easily frustrated.
5. Is prone to angry outbursts/tantrums easily.
6. Is able to delay gratification.
7. Takes pleasure in the distress of others (for example, laughs when another person gets hurt or punished; enjoys teasing others).
8. Can modulate excitement in emotionally arousing situations (for example, does not get 'carried away' in high-energy play situations, or overly excited in inappropriate contexts).
9. Is prone to disruptive outbursts of energy and exuberance.
10. Responds angrily to limit-setting by adults.
11. Is overly exuberant when attempting to engage others in play.
12. Responds negatively to neutral or friendly overtures by peers (for example may speak in an angry tone of voice or respond fearfully).
13. Is impulsive.
14. Displays exuberance that others find intrusive or disruptive.
15. Displays negative emotions when attempting to engage others in play.

Appendix S: The Early Adolescent Temperament Questionnaire – Child

Temperament

EARLY ADOLESCENT TEMPERAMENT QUESTIONNAIRE—REVISED Parent Report

Directions

On the following pages you will find a series of statements that people might use to describe their child. The statements refer to a wide number of activities and attitudes.

For each statement, please circle the answer which best describes how true each statement is for your child. There are no best answers. People are very different

in how they feel about these statements. Please circle the first answer that comes to you.

You will use the following scale to describe how true or false a statement is about your child:

Circle number: If the statement is:

- 1** Almost always untrue of your child
- 2** Usually untrue of your child
- 3** Sometimes true, sometimes untrue of your child
- 4** Usually true of your child
- 5** Almost always true of your child

Your son or daughter:

Almost
always
untrue

Usually
untrue

Sometimes
true,
sometimes
untrue

Usually
true

Almost
always
true

1) Worries about getting into trouble.	1	2	3	4	5
2) When angry at someone, says thing s/he knows will hurt that person's feelings.	1	2	3	4	5
3) Has a hard time finishing things on time.	1	2	3	4	5
4) Thinks traveling to Africa or India would be exciting and fun.	1	2	3	4	5
5) If having a problem with someone, usually tries to deal with it right away.	1	2	3	4	5
6) Has a hard time waiting his/her turn to speak when excited.	1	2	3	4	5
7) Often does not seem to enjoy things as much as his/her friends.	1	2	3	4	5
8) Opens presents before s/he is supposed to.	1	2	3	4	5
9) Would be frightened by the thought of skiing fast down a steep slope.	1	2	3	4	5
10) Feels like crying over very little on some days.	1	2	3	4	5
11) If very angry, might hit someone.	1	2	3	4	5
12) Likes taking care of other people.	1	2	3	4	5
13) Likes to be able to share his/her private thoughts with someone else.	1	2	3	4	5
14) Usually does something fun for awhile before starting her/his homework, even though s/he is not supposed to.	1	2	3	4	5
15) Finds it easy to really concentrate on a problem.	1	2	3	4	5
16) Thinks it would be exciting to move to a new city.	1	2	3	4	5
17) When asked to do something, does it right away, even if s/he doesn't want to.	1	2	3	4	5
18) Would like to be able to spend time with a good friend every day.	1	2	3	4	5
19) Tends to be rude to people s/he doesn't like.	1	2	3	4	5
20) Is annoyed by little things other kids do.	1	2	3	4	5
21) Gets very irritated when someone criticizes her/him.	1	2	3	4	5
22) When interrupted or distracted, forgets what s/he was about to say.	1	2	3	4	5
23) Is more likely to do something s/he shouldn't do the more s/he tries to stop her/himself.	1	2	3	4	5
24) Enjoys exchanging hugs with people s/he likes.	1	2	3	4	5
25) Tends to try to blame mistakes on someone else.	1	2	3	4	5
26) Is sad more often than other people realize.	1	2	3	4	5
27) Can generally think of something to say, even with strangers.	1	2	3	4	5

28) Wouldn't be afraid to try a risky sport like deep sea diving.	1	2	3	4	5
29) Expresses a desire to travel to exotic places when s/he hears about them.	1	2	3	4	5
30) Worries about our family when s/he is not with us.	1	2	3	4	5
31) Gets irritated when I will not take her/him someplace s/he wants to go.	1	2	3	4	5
32) Slams doors when angry.	1	2	3	4	5
33) Is hardly ever sad, even when lots of things are going wrong.	1	2	3	4	5
34) Would like driving a racing car.	1	2	3	4	5
35) Has a difficult time tuning out background noise and concentrating when trying to study.	1	2	3	4	5
36) Usually finishes her/his homework before it's due.	1	2	3	4	5
37) Likes it when something exciting and different happens at school.	1	2	3	4	5
38) Usually gets started right away on difficult assignments.	1	2	3	4	5
39) Is good at keeping track of several different things that are happening around her/him.	1	2	3	4	5
40) Is energized by being in large crowds of people.	1	2	3	4	5
41) Makes fun of how other people look.	1	2	3	4	5
42) Doesn't criticize others.	1	2	3	4	5
43) Wants to have close relationships with other people.	1	2	3	4	5
44) Is shy.	1	2	3	4	5
45) Gets irritated when s/he has to stop doing something s/he is enjoying.	1	2	3	4	5
46) Usually puts off working on a project until it is due.	1	2	3	4	5
47) Is able to stop him/herself from laughing at inappropriate times.	1	2	3	4	5
48) Is afraid of the idea of me dying or leaving her/him.	1	2	3	4	5
49) Is often in the middle of doing one thing and then goes off to do something else without finishing it.	1	2	3	4	5
50) Is not shy.	1	2	3	4	5
51) Is quite a warm and friendly person.	1	2	3	4	5
52) Sometimes seems sad even when s/he should be enjoying her/himself like at Christmas, or on a trip.	1	2	3	4	5
53) Doesn't enjoy playing softball or baseball because s/he is afraid of the ball.	1	2	3	4	5
54) Likes meeting new people.	1	2	3	4	5
55) Feels scared when entering a darkened room at night.	1	2	3	4	5

56) Wouldn't want to go on the frightening rides at the fair.	1	2	3	4	5
57) Hates it when people don't agree with him/her.	1	2	3	4	5
58) Gets very frustrated when s/he makes a mistake in her/his school work.	1	2	3	4	5
59) Is usually able to stick with his/her plans and goals.	1	2	3	4	5
60) Pays close attention when someone tells her/him how to do something.	1	2	3	4	5
61) Is nervous being home alone.	1	2	3	4	5
62) Feels shy about meeting new people.	1	2	3	4	5

**Appendix T: The Experiences in Close Relationships Scale -- Parents' Adult
Attachment Style**

Likert-type scale 1 to 7 (Disagree Strongly to Agree Strongly)

These sentences are about how you feel in close relationships (with your partner, close friends, or family members). We want to know how you usually feel in relationships, not just how you feel about your relationships right now. Read each sentence. Circle the number that shows how much you agree or disagree with it.

1. I prefer not to show others how I feel deep down.
2. I worry about being rejected or abandoned.
3. I am very comfortable being close to other people.
4. I worry a lot about my relationships.
5. Just when someone starts to get close to me I find myself pulling away.
6. I worry that others won't care about me as much as I care about them.
7. I get uncomfortable when someone wants to be very close to me.
8. I worry a fair amount about losing my close relationship partners.
9. I don't feel comfortable opening up to others.
10. I often wish that close relationship partners' feelings for me were as strong as my feelings for them.
11. I want to get close to others, but I keep pulling back.
12. I want to get very close to others, and this sometimes scares them away.
13. I am nervous when another person gets too close to me.
14. I worry about being alone.
15. I feel comfortable sharing my private thoughts and feelings with others.
16. My desire to be very close sometimes scares people away.
17. I try to avoid getting too close to others.
18. I need a lot of reassurance that close relationship partners really care about me.
19. I find it relatively easy to get close to others.

20. Sometimes I feel that I force others to show more feeling, more commitment to our relationship than they otherwise would.
21. I find it difficult to allow myself to depend on close relationship partners.
22. I do not often worry about being abandoned.
23. I prefer not to be too close to others.
24. If I can't get a relationship partner to show interest in me, I get upset or angry.
25. I tell my close relationship partners just about everything.
26. I find that my partners don't want to get as close as I would like.
27. I usually discuss my problems and concerns with close others.
28. When I don't have close others around, I feel somewhat anxious and insecure.
29. I feel comfortable depending on others.
30. I get frustrated when my close relationship partners are not around as much as I would like.
31. I don't mind asking close others for comfort, advice, or help.
32. I get frustrated if relationship partners are not available when I need them.
33. It helps to turn to close others in times of need.
34. When other people disapprove of me, I feel really bad about myself.
35. I turn to close relationship partners for many things, including comfort and reassurance.
36. I resent it when my relationship partners spend time away from me.

Appendix U: Coding Training and Reliability Plan

I. General Info

There will be three coding teams: one for the empathy task, one for the prosocial behavior task, and one for children's facial expressions. Each team will have at least 3 coders (in case one of them is unable to complete coding, there are still 2), in addition to the coding supervisor (Jackie).

PSB coders = Megan, Nikitha, Kayla

Empathy coders = Kelly, Mickey, Tamara

Facial coders = Kelly, Mickey, Nikitha

II. Training period

During the training period, everyone codes the same 15 tapes in order to learn (randomly selected). These 15 videos will be replaced back into the pool to be coded in later weeks, but they will not contribute toward the reliability calculations. In addition, all notes about the training cases' final scores will be taken and held by the coding supervisor in a secure location so that coders cannot refer back to them to re-code. Before beginning official coding, all coders must be reliable (at .70) and fully ready to code. Keep practicing until they are ready, and use more tapes as practice if needed. Steps:

1. Code several random examples all together and discuss them (as many as needed to understand how to use the manual).
2. Let coders code additional tapes independently, and then meet to discuss them, correct errors, and find consensus codes.
3. Repeat #2 until 15 have been coded. If each person is reliable with Jackie and with each other, then real coding can begin. If not, continue until this happens.

Near the end of the training period, have coders begin to track how long it takes them to code each child. This will be informative for assigning how many to code each week (add 10 min to allow flexibility). It's also possible for one coder to be assigned more than another based on hours (e.g., 25%, 50%).

III. Who will code what?

Coders will be assigned videos each week, some of which overlap with at least one of the other coders' assigned videos for that week. Overlapping codes will be compared each week, and identical scores will be retained as final data, whereas discrepant scores will be discussed during a weekly meeting in order to determine the score to be used as data. For each task, at least 50% of videos will be double-coded.

- There will be around 140 children to code, so minus the training tapes, this leaves about 125 tapes left to code.

- Each week, HALF of the total number of (unique) ID#s being coded will be double-assigned, and half the number of (unique) ID#s will be coded by only 1 person. For example, if 32 unique videos are being coded, 16 will be single-coded and 16 will be double-coded ($16+16=32$ total scores). In addition, 3-6 tapes per week will also be coded the coding supervisor to assess continuing reliability with the supervisor and with each other (i.e., the supervisor will share 1-2 codes with EACH coder each week). Plus, ONCE per week (i.e., for one tape only), all 3 coders AND the coding supervisor will code the same one. This is to ensure everyone is on the same page.
- Don't tell coders which of their codes will be done by only them, and which will be double-coded, and which will be coded by everyone. They will be asked not to share this information with each other, either.
- Coders may not code more than 2 hours in a single sitting to avoid fatigue (with at least 2 hours between each sitting).
- Each week, reliability will be assessed across all 4 coders AND between every pair of coders. If reliability falls below .7, coders will return to training until it's again sufficient.

IV. Inter-rater Reliability

Inter-rater reliability for all variables will be calculated using an SPSS macro called KALPHA, which uses Krippendorff's alpha (Hayes & Krippendorff, 2007), an estimate of reliability for subjective judgments made at any level of measurement, with any number of judges, and with or without missing data. Reliability greater than or equal to .70, otherwise with a percent agreement greater than 90%, is considered sufficiently reliable (Lombard, Snyder-Duch, & Bracken, 2002). After training, reliability will continued to be assessed each week.

KALPHA can be calculated between 2 people (eg, the coder and Jackie) or among everyone as a unit. During training, reliability will be assessed for each individual against the supervisor's scores and against the other coders' scores, to ensure that each coder is reliable on their own. After training, reliability will be calculated among all coders as a unit and with each other coder. Each week, both the cumulative and the weekly reliability will be calculated.

V. Weekly meetings

- Jackie and all coders on a given team will meet once per week to discuss questions that arose that week or ongoing issues. They will also review the overlapping cases that were discrepant, discuss why the discrepancy occurred, and create additional guidelines for the coding manual as needed. This serves 3 purposes:
 - o 1) to highlight systematic errors that certain coders are making and make them aware of these errors so that they become more reliable,
 - o 2) to prevent coder drift by keeping their coding skills "sharp", and
 - o 3) to create the FINAL CODES through consensus.
- If we are not able to get a consensus, discrepancies will be resolved by the coding supervisor.
- If a coder discovers during a meeting that she has been systematically coding something incorrectly in the current or past weeks, she needs to go back and recode those instances to

be correct. This is ok and their corrected codes can still be used in the final reliability numbers because coders won't have conferences on those SPECIFIC instances, only the general rule. As long as conferencing about a specific code doesn't occur, then it's ok (according to Jon Mohr).

- Coders will bring the paper coding sheets with them to all meetings, with their notes and questions. For double-coded discrepant cases, a 3rd coding sheet will be used (marked CONSENSUS) and filled out during the meeting. This will serve as the consensus score.
- ALL ID#s that were coded (single or double) that week will be mentioned during the meeting, even if just to ask if there were any questions.

VI. Coding Media (SPSS and hard copies)

- Coders will enter the codes on a paper coding sheet. They must finish all codes at least 24 hours before the meeting to allow time for meeting preparation.
- Immediately after finishing all assigned codes for the week, they will email 2 coding assistants (Emilia and Hannah?) to confirm they have finished, and leave their paper coding sheets in a secure location. The coding assistants will separately (independently) take the coding sheets and enter them into 2 separate SPSS documents (i.e., double-entered to avoid entry errors). These documents will be saved on the U drive in a protected folder.
- The SPSS documents will look like this:

ID	Task1Name__1stVar__Coder1Name	Task1Name__1stVar__Coder2Name	Task1Name__1stVar__FinalScore	Task1Name__2ndVar__Coder1Name	Task1Name__2ndVar__Coder2Name	Task1Name__2ndVar__FinalScore
5001						
5002						
5003						
5004						
5005						
...etc						

- There will be 1 SPSS document that looks like this for EACH task (3 sheets total). But they can eventually be combined into a single data analysis document with only the final scores.
- Before each weekly meeting, in addition to entering the codes into SPSS, the coding assistants will separately do the following and send all their results to Jackie (who will check that their results match):
 - For double-coded videos without discrepancies, the agreed upon final code will be transferred into the FinalScore column for each variable. In addition, single-coded

videos will be transferred into the FinalScore column. These are considered final data.

- o Double-coded videos with discrepancies (i.e., Kelly said 5005 was a 3 and Tamara said 5005 was a 2), will be noted and put into a Word document, to be reviewed during the weekly meeting. During the meeting, a consensus code will be determined for this video, which will be entered into the FinalScore column for each variable after the meeting by Jackie.
- o Calculate reliabilities across all 4 coders as a unit, and within all pairs, to confirm that reliability remains above .7 (both cumulative and weekly).
- o Print coding sheets each week and monitor that there are always enough.
- o Before each meeting, get all the post lab notes for the relevant ID#s that week and put them in a secure location for Jackie to use during the meeting.
- Hannah and Emilia will each do all of these steps independently and send Jackie their results (so she can make sure they sent the exact same thing and therefore verify it's correct). If there is something not exactly the same, Jackie will personally check the discrepancy and fix it.

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Footnotes

¹ This variable was included as a potential covariate in all analyses, but it was not significantly associated with any of the outcome variables and so was not included as a covariate in any of the final models.

Table 1

Demographic Information of Participants by Experimental Condition

	Suppression Condition (<i>n</i> = 58)			Control Condition (<i>n</i> = 59)		
	<i>n</i> (%)	<i>M</i> (<i>SD</i>)	Range	<i>n</i> (%)	<i>M</i> (<i>SD</i>)	Range
Parents						
Age (years)		41.54 (4.75)	30.00 – 53.00		41.95 (5.32)	27.00 – 48.00
Sex						
Female	45 (78%)			49 (83%)		
Male	13 (22%)			10 (17%)		
Education						
Some HS	2 (3%)			1 (2%)		
HS Graduate	5 (9%)			3 (5%)		
Some College	7 (12%)			8 (14%)		
College Graduate	18 (31%)			10 (17%)		
Advanced Degree	25 (43%)			36 (61%)		
Annual Income						
Less than \$50k	10 (17%)			8 (14%)		
\$50k – \$75k	7 (12%)			5 (9%)		
\$75k – \$100k	11 (19%)			9 (15%)		
More than \$100k	27 (47%)			33 (56%)		
Race/Ethnicity						
African-American	16 (28%)			15 (25%)		
White	31 (54%)			29 (49%)		
Hispanic/Latino	6 (10%)			5 (9%)		
Asian American	2 (3%)			7 (12%)		
Other	3 (5%)			3 (5%)		
Marital Status						
Single	14 (24%)			10 (17%)		
Married	43 (74%)			49 (83%)		

Children				
Age (years)		9.80 (.46)	8.98 – 11.07	9.84 (.45) 8.99 – 11.04
Sex				
Female	26 (45%)		28 (48%)	
Male	32 (55%)		31 (52%)	
Race/Ethnicity				
African-American	18 (31%)		14 (24%)	
White	26 (45%)		26 (44%)	
Hispanic/Latino	5 (9%)		7 (12%)	
Asian American	3 (5%)		5 (8%)	
Other	6 (10%)		7 (12%)	
Number of children in home		2.32 (.95)	1 – 5	2.15 (.83) 1 – 5

Note. HS = high school; For some variables, percentages do not total 100% due to missing data: for parental education, $n = 2$; for income, $n = 7$; for marital status, $n = 1$; for number of children in home, $n = 1$.

Table 2

Baseline Variables and Covariates by Experimental Condition

	Suppression Condition		Control Condition			
	(n = 58)		(n = 59)			
Variable	M	SD	M	SD	Range	p
Child-reported						
Trait sadness suppression (CSMS)	1.85	.52	1.81	.47	1.00 – 3.00	.664
Trait suppression (ERQ)	2.56	.76	2.46	.77	1.00 – 4.29	.452
Baseline emotions						
Sad	1.09	.34	1.07	.25	1 – 3	.740
Happy	3.24	.68	3.24	.65	2 – 4	.974
Scared	1.34	.61	1.31	.46	1 – 4	.692
Angry	1.02	.13	1.03	.18	1 – 2	.573
Attachment security	3.26	.49	3.37	.39	1.73 – 4.00	.194
Physiology						
SCL during neutral stimuli	6.43	3.39	6.92	3.06	1.36 – 18.51	.421
Parent-reported						
Child temperament						
Neg Emotionality	2.63	.47	2.62	.50	1.31 – 3.88	.859
Pos Emotionality	3.68	.45	3.60	.63	1.65 – 4.81	.466
Effortful Control	3.34	.68	3.38	.56	1.68 – 4.68	.770
Child ER						
Lability/Negativity	1.80	.44	1.69	.43	1.00 – 3.27	.170
Emotion Regulation	3.34	.43	3.45	.38	1.88 – 4.00	.143
Child caffeine intake						
How recent?	4.63	1.23	4.63	1.23	1 – 6	.993
How often?	2.67	1.39	2.72	1.27	1 – 7	.817
Parent attachment style						
Anxiety	3.09	1.00	2.88	1.00	1.00 – 5.44	.257
Avoidance	2.88	.81	2.88	1.10	1.06 – 5.67	.995

PRD						
Supportive	5.47	.67	5.37	.70	3.69 – 6.86	.420
Unsupportive	2.65	.61	2.72	.67	1.22 – 4.17	.606
Parent empathy						
Empathic Concern	4.35	.49	4.51	.42	3.14 – 5.00	.058 [†]
Perspective Taking	3.69	.75	3.65	.73	1.71 – 5.00	.753
Personal Distress	2.16	.70	2.00	.62	1.00 – 4.00	.207

Note. [†] $p < .10$ * $p < .05$ ** $p < .01$; CSMS = Children's Sadness Management Scale; ERQ = Emotion Regulation Questionnaire; SCL = Skin Conductance Level; Neg = Negative; Pos = Positive; ER = Emotion Regulation; PRD = Parental Response to Distress. Missing data: Attachment security, $n = 3$; Physiology variables, $n = 1$; Child temperament variables, $n = 1$; Caffeine intake recent, $n = 6$; Caffeine intake often, $n = 2$.

Table 3

Continuous Outcome Variables by Experimental Condition

Variable	Suppression Condition (<i>n</i> = 58)				Control Condition (<i>n</i> = 59)				Range	<i>p</i>
	<i>M</i>	<i>SD</i>	Skew (<i>SE</i>)	Kurtosis (<i>SE</i>)	<i>M</i>	<i>SD</i>	Skew (<i>SE</i>)	Kurtosis (<i>SE</i>)		
Child-reported										
Sadness during movie	2.72	.84	.16 (.33)	-.86 (.64)	2.69	.86	-.02 (.31)	-.70 (.62)	1 – 4	.881
Sadness after movie	1.43	.63	1.10 (.33)	.26 (.64)	1.55	.54	.14 (.31)	-1.24 (.62)	1 – 3	.339
Physiology										
SCL during suppression task (movie scene)	8.15	3.69	.67 (.33)	.34 (.64)	8.25	3.48	.79 (.31)	.38 (.62)	2.15 – 20.85	.887
SCL during empathy task (movie scene)	8.23	3.52	.42 (.33)	-.12 (.64)	8.66	3.59	.68 (.31)	.06 (.62)	2.90 – 23.99	.506
Observed										
Prosocial comforting	2.70	1.27	.35 (.33)	-.68 (.64)	2.64	1.41	.30 (.31)	-1.19 (.62)	1 – 5	.835
Empathy	1.47	1.31	-.10 (.33)	-.89 (.64)	1.80	1.21	-.24 (.31)	-.38 (.62)	-1 – 4	.160

Note. **p* < .05 ***p* < .01; SCL = Skin Conductance Level. Missing data: Sadness during movie, *n* = 1; Sadness after movie, *n* = 1; SCL during suppression Task, *n* = 2; Prosocial comforting, *n* = 2.

Table 4

Correlation Matrix for Child-reported and Outcome Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Trait suppression (ERQ)	-												
2. Trait sadness suppression (CSMS)	.72**	-											
3. Spontaneous suppression (ERQ)	.11	.01	-										
4. Spontaneous sadness suppression (CSMS)	.03	.01	.66**	-									
5. Neutral stimuli SCL	-.04	.09	-.02	.07	-								
6. SCL during suppression task	.02	.12	.04	.11	.93**	-							
7. SCL during empathy task	-.02	.13	.02	.05	.91**	.95**	-						
8. PSB-Comforting	-.11	-.07	-.01	.03	.02	-.06	-.07	-					
9. PSB-Helping	.08	.07	-.00	-.13	.07	.04	-.01	.23*	-				
10. Empathy	-.12	-.10	-.01	.07	.10	.06	.06	-.03	-.02	-			
11. Attachment security to mother	-.16	-.04	-.10	.03	-.01	-.07	-.06	.20*	.11	-.00	-		
12. Sadness during movie scene	-.04	-.12	.24*	.34**	-.10	-.12	-.11	.17	-.01	.29**	.05	-	
13. Sadness after movie scene (log transformed)	-.07	-.13	.15	.23*	-.04	-.01	-.02	.14	.10	.35**	.13	.54**	-

Note. * $p < .05$ ** $p < .01$; ERQ = Emotion Regulation Questionnaire (suppression subscale); CSMS = Children's Sadness Management Scale (inhibition subscale); SCL = Skin conductance level; PSB = Prosocial behavior; BL = Baseline.

Table 5

Correlation Matrix for Parent-reported Covariates

	1	2	3	4	5	6	7	8	9	10	11	12
1. CCNES - Supportive	-											
2. CCNES - Unsupportive	-.38**	-										
3. ECR Anxiety	-.17	.37**	-									
4. ECR Avoidance	-.24*	.35**	.26**	-								
5. ERC – ER	.27**	-.26**	-.21*	-.14	-							
6. ERC – LN	-.25**	.35**	.25**	.23*	-.35**	-						
7. EATQ – NE	-.27**	.50**	.45**	.22*	-.40**	.71**	-					
8. EATQ – PE	.18*	-.27**	-.13	-.14	.41**	-.15	-.32**	-				
9. EATQ – EC	.13	-.18	-.14	-.21*	.18	-.63**	-.46**	.10	-			
10. IRI – PT	.37**	-.44**	-.30**	-.11	.18*	-.32**	-.38**	.21*	.25**	-		
11. IRI – EC	.47**	-.29**	-.04	-.25**	.30**	-.22*	-.13	.05	.11	.27**	-	
12. IRI – PD	.002	.27**	.34**	.28**	-.22*	.30**	.24**	.10	-.18	-.02	-.13	-

Note. * $p < .05$ ** $p < .01$; CCNES = Children's Coping with Negative Emotions Scale; ECR = Experiences in Close Relationships Scale (adult attachment); ERC = Emotion Regulation Checklist; ER = Emotion Regulation subscale; LN = Lability/Negativity subscale; EATQ = Early Adolescent Temperament Questionnaire; NE = Negative Emotionality subscale; PE = Positive Emotionality subscale; EC = Effortful Control subscale; IRI = Interpersonal Reactivity Index (parental empathy); PT = Perspective-taking subscale; EC = Empathic Concern subscale; PD = Personal Distress subscale.

Table 6

Correlation Matrix for Outcome, Child-reported, and Parent-reported Variables ^a

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Trait suppression (ERQ)	-																
2. Trait sadness suppression (CSMS)	.72**	-															
3. Sadness during movie scene	-.04	-.12	-														
4. SCL during suppression task	.02	.12	-.12	-													
5. SCL during empathy task	-.02	.13	-.11	.95**	-												
6. PSB-Comforting	-.11	-.07	.17	-.06	-.07	-											
7. Attachment security to mother	-.16	-.04	.05	-.07	-.06	.20*	-										
8. ECR Avoidance	.04	.02	.21*	-.23*	-.23*	.08	-.03	-									
9. IRI – PT	.06	.02	.15	.12	.12	.19*	.26**	-.11	-								
10. IRI – PD	-.07	-.14	.23*	-.18	-.23*	.09	.03	.28**	.02	-							
11. CCNES – Supportive	.09	.18*	-.20*	.22*	.20*	.10	.05	-.24*	.37**	.00	-						
12. CCNES – Unsupportive	.12	.06	.06	-.24*	-.25**	.11	-.14	.35**	-.44**	.27**	-.38**	-					
13. ERC – ER	-.04	.04	-.09	.20*	.22*	.08	.07	-.14	.18*	-.22*	.27**	-.26**	-				
14. ERC – LN	-.01	-.15	.13	-.18	-.23*	.11	-.33**	.23*	-.32**	.30**	-.25**	.35**	-.35**	-			

15. EATQ – NE	.02	-.05	.04	-.09	-.15	-.03	-.36**	.22*	-.38**	.24**	-.27**	.50**	-.40**	.71**	-		
16. EATQ – PE	-.23*	-.09	.11	-.16	-.13	.28**	.23*	-.14	.21*	.10	.18*	-.27**	.41**	-.15	-.32**	-	
17. EATQ – EC	.08	.17	.03	.17	.19*	-.03	.26**	-.21*	.25**	-.18	.13	-.18	.18	-.63**	-.46**	.10	-

Note. * $p < .05$ ** $p < .01$; ERQ = child-reported Emotion Regulation Questionnaire (suppression subscale); CSMS = child-reported Children's Sadness Management Scale (inhibition subscale); SCL = Skin conductance level; PSB = Prosocial behavior; ECR = Experiences in Close Relationships Scale (adult attachment); IRI = Interpersonal Reactivity Index (parental empathy); PT = Perspective-taking subscale; PD = Personal Distress subscale; CCNES = Children's Coping with Negative Emotions Scale; ERC = Emotion Regulation Checklist; ER = Emotion Regulation subscale; LN = Lability/Negativity subscale; EATQ = Early Adolescent Temperament Questionnaire; NE = Negative Emotionality subscale; PE = Positive Emotionality subscale; EC = Effortful Control subscale.

^a Table includes only the key study variables that were significantly associated with at least one other variable type due to space (i.e., parent-reported covariates not appearing in this table were uncorrelated with all outcomes and child-reported variables, and outcome or child-reported variables not appearing in this table were uncorrelated with all parent-reported covariates).

Table 7

Summary of Multiple Regression Analyses

Variable	<i>B</i>	<i>b</i>	<i>SE_b</i>	<i>p</i>
Model 1 DV: Sadness during movie scene				
Experimental condition	.01	.01	.15	.955
Trait suppression (composite)	-.05	-.04	.08	.605
Baseline sadness	.04	.12	.27	.654
Parent-reported				
Attachment avoidance (ECR)	.12	.10	.08	.224
Personal distress (IRI)	.19	.25	.12	.041*
Supportive PRD (CCNES)	-.16	-.20	.11	.075 [†]
Model 2 DV: Sadness after movie scene				
Experimental condition	-.11	-.04	.03	.225
Trait suppression (composite)	-.11	-.02	.02	.248
Baseline sadness	.08	.04	.05	.408
Model 3 DV: Sadness during movie scene				
Trait suppression (ERQ)	-.02	-.02	.10	.825
Experimental condition	.00	.01	.15	.971
Baseline sadness	.04	.11	.27	.673
Parent-reported				
Attachment avoidance (ECR)	.11	.10	.08	.238
Personal distress (IRI)	.20	.25	.12	.035*
Supportive PRD (CCNES)	-.17	-.21	.11	.062 [†]
Model 4 DV: Sadness after movie scene				
Trait suppression (ERQ)	-.06	-.01	.02	.497
Experimental condition	-.11	-.04	.03	.217
Baseline sadness	.07	.04	.05	.456
Model 5 DV: Sadness during movie scene				
Trait sadness suppression (CSMS)	-.10	-.17	.16	.273
Experimental condition	-.00	-.01	.15	.968
Baseline sadness	.05	.13	.27	.617
Parent-reported				
Attachment avoidance (ECR)	.16	.14	.08	.085 [†]
Personal distress (IRI)	.17	.22	.12	.069 [†]

Model 6 DV: Sadness after movie scene

Trait sadness suppression (CSMS)	-.13	-.04	.03	.141
Experimental condition	-.11	-.04	.03	.221
Baseline sadness	.09	.05	.05	.349

Model 7 DV: SCL during movie scene

Experimental condition	.03	.18	.20	.370
Trait suppression (composite)	.06	.22	.11	.042*
Baseline SCL	.93	1.03	.04	.000**

Parent-reported

Frequency of caffeine consumption	-.08	-.18	.08	.017*
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Model 8 DV: SCL after movie scene

Experimental condition	.04	.23	.23	.318
Trait suppression (composite)	.03	.11	.12	.379
Baseline SCL	.90	.92	.04	.000**

Parent-reported

Frequency of caffeine consumption	-.04	-.09	.09	.312
Personal distress (IRI)	-.07	-.34	.18	.061 [†]

Model 9 DV: SCL during movie scene

Trait suppression (ERQ)	.08	.33	.13	.013*
Experimental condition	.03	.17	.20	.386
Baseline SCL	.93	1.04	.03	.000**

Parent-reported

Frequency of caffeine consumption	-.08	-.19	.07	.014*
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Model 10 DV: SCL after movie scene

Trait suppression (ERQ)	.02	.06	.15	.697
Experimental condition	.04	.24	.23	.293
Baseline SCL	.90	.92	.04	.000**

Parent-reported

Frequency of caffeine consumption	-.04	-.09	.09	.308
Personal distress (IRI)	-.08	-.36	.18	.049*

Model 11 DV: SCL during movie scene

Trait sadness suppression (CSMS)	.04	.27	.20	.196
Experimental condition	.03	.20	.20	.332
Baseline SCL	.93	1.03	.04	.000**

Parent-reported

Frequency of caffeine consumption	-.08	-.18	.08	.020*
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Model 12 DV: SCL after movie scene

Trait sadness suppression (CSMS)	.05	.29	.23	.210
Experimental condition	.04	.22	.23	.331
Baseline SCL	.89	.92	.04	.000**
Parent-reported				
Frequency of caffeine consumption	-.04	-.08	.09	.328
Personal distress (IRI)	-.07	-.33	.18	.071 [†]

Model 13 DV: Prosocial comforting

Experimental condition	-.03	-.09	.23	.699
Trait suppression (composite)	-.07	-.10	.13	.452
Child sex	.13	.35	.24	.142
Parent education level	-.20	-.19	.09	.023*
Parent-reported				
Perspective-taking (IRI)	.14	.26	.16	.107
Child positive emotionality (EATQ)	.22	.52	.22	.014*

Model 14 DV: Prosocial helping

Experimental condition	-.02	-.08	.48	.861
Trait suppression (composite)	.04	.09	.27	.740
Parent marital status (dichotomous)	-.51	-2.99	1.08	.000**
Parent education level	-.16	-.27	.21	.173

Model 15 DV: Empathy

Experimental condition	-.13	-.33	.23	.150
Trait suppression (composite)	-.12	-.17	.12	.166
Baseline fear	.20	.49	.22	.023*

Model 16 DV: Prosocial comforting

Trait suppression (ERQ)	-.09	-.16	.16	.293
Experimental condition	.03	.07	.24	.757
Child sex	.22	.59	.24	.012*
Parent-reported				
Perspective-taking (IRI)	.22	.39	.16	.013*

Model 17 DV: Prosocial helping

Trait suppression (ERQ)	.03	.10	.33	.762
Experimental condition	-.03	-.14	.46	.756
Parent marital status (dichotomous)	-.57	-3.24	1.06	.000**

Model 18 DV: Empathy

Trait suppression (ERQ)	-.12	-.20	.15	.181
Experimental condition	-.13	-.32	.23	.153
Baseline fear	.20	.49	.22	.025*

Model 19 DV: Prosocial comforting

Trait sadness suppression (CSMS)	-.04	-.09	.24	.690
Experimental condition	-.04	-.10	.23	.680
Child sex	.14	.36	.24	.125
Parent education level	-.19	-.18	.09	.029*
Parent-reported				
Perspective-taking (IRI)	.14	.25	.16	.118
Child positive emotionality (EATQ)	.23	.55	.22	.010*

Model 20 DV: Prosocial helping

Trait sadness suppression (CSMS)	.05	.24	.51	.634
Experimental condition	-.02	-.10	.48	.840
Parent marital status (dichotomous)	-.51	-3.00	1.08	.000**
Parent education level	-.16	-.28	.21	.164

Model 21 DV: Empathy

Trait sadness suppression (CSMS)	-.11	-.28	.23	.222
Experimental condition	-.13	-.33	.23	.142
Baseline fear	.20	.49	.22	.023*

Note. † $p < .10$ * $p < .05$ ** $p < .01$; B = standardized coefficient; b = unstandardized coefficient; SE = standard error of the coefficient; DV = dependent variable; ECR = Experiences in Close Relationships Scale; IRI = Interpersonal Reactivity Index; PRD = parental response to distress; CCNES = Coping with Children's Negative Emotions Scale; ERQ = Emotion Regulation Questionnaire (suppression subscale); CSMS = Children's Sadness Management Scale (inhibition subscale); SCL = skin conductance level; EATQ = Early Adolescent Temperament Questionnaire.

Table 8

Summary of Study Hypotheses and Results

Hypothesis	Model	Primary predictor	Significant predictors
Hypothesis 1a: Children randomly assigned to suppress their emotional expressions will experience greater increases in subjective negative emotion during and after exposure to a distressing stimulus relative to children assigned to not suppress.	1	Condition	Parental personal distress (IRI)
	2	Condition	--
Hypothesis 1b: Children's trait expressive suppression will be positively related to increases in their subjective negative emotion during and after exposure to a distressing stimulus.	3	ERQ	Parental personal distress (IRI)
	4	ERQ	--
	5	CSMS	--
	6	CSMS	--
Hypothesis 2a: Children randomly assigned to suppress their emotional expressions will be more physiologically aroused during and after exposure to a distressing stimulus relative to children assigned to not suppress.	7	Condition	Trait suppression (composite) Baseline SCL Frequency of caffeine consumption
	8	Condition	Baseline SCL
Hypothesis 2b: Children's trait expressive suppression will be positively related to physiological arousal during and after exposure to a distressing stimulus.	9	ERQ	Trait suppression (ERQ) Baseline SCL Frequency of caffeine consumption
	10	ERQ	Baseline SCL Parental personal distress (IRI)

	11	CSMS	Baseline SCL Frequency of caffeine consumption
	12	CSMS	Baseline SCL
Hypothesis 3a: Children randomly assigned to suppress their emotional expressions will be subsequently less prosocial and less empathic toward another person relative to children assigned to not suppress.	13	Condition	Parent education level Child positive emotionality (EATQ)
	14	Condition	Parent marital status
	15	Condition	Baseline fear
Hypothesis 3b: Children's trait expressive suppression will be negatively related to their prosocial behavior and empathy toward another person.	16	ERQ	Child sex Parental perspective- taking (IRI)
	17	ERQ	Parent marital status
	18	ERQ	Baseline fear
	19	CSMS	Parent education level Child positive emotionality (EATQ)
	20	CSMS	Parent marital status
	21	CSMS	Baseline fear

Note. † $p < .10$ * $p < .05$ ** $p < .01$; IRI = Interpersonal Reactivity Index; ERQ = Emotion Regulation Questionnaire (suppression subscale); CSMS = Children's Sadness Management Scale (inhibition subscale); SCL = skin conductance level; EATQ = Early Adolescent Temperament Questionnaire.

Table 9

Summary of Exploratory Hypotheses and Results

Hypothesis	Primary predictor	Outcomes	Results
Exploratory Hypothesis 1: Children's state and trait expressive suppression will interact to predict their subjective negative emotion, physiological arousal, and prosocial behavior and empathy.	Condition X Trait suppression (composite)	Sadness during	All models ns
		Sadness after	
		SCL during	
		SCL after	
		Comforting	
		Helping	
Exploratory Hypothesis 2: Spontaneous (state) expressive suppression of children in the control group will be related to subjective negative emotion, physiological arousal, and prosocial behavior and empathy.	ERQ (spontaneous)	Sadness during	Spontaneous ERQ positively predicted sadness during and after the movie scene (but no other outcomes).
		Sadness after	
		SCL during	
		SCL after	
		Comforting	
		Helping	
	CSMS (spontaneous)	Empathy	
		Sadness during	Spontaneous CSMS positively predicted sadness during and after the movie scene (but no other outcomes).
		Sadness after	
		SCL during	
		SCL after	
		Comforting	
		Helping	
		Empathy	
Exploratory Hypothesis 3: Using multi-level models in which emotion ratings are nested within persons, children's state and trait expressive suppression will predict their subjective negative emotion.	Condition	Sadness ratings	All models ns
	ERQ (trait)	Sadness ratings	All models ns
	CSMS (trait)	Sadness ratings	Trait CSMS moderated how sadness changed from baseline to during the movie scene (but not how it changed in any other way across the visit). Children with higher trait CSMS reported less of an increase in sadness from baseline to during the movie scene.

Note. ns = not significant; SCL = skin conductance level; ERQ = Emotion Regulation Questionnaire (suppression subscale); CSMS = Children's Sadness Management Scale (inhibition subscale).

Flow Diagram

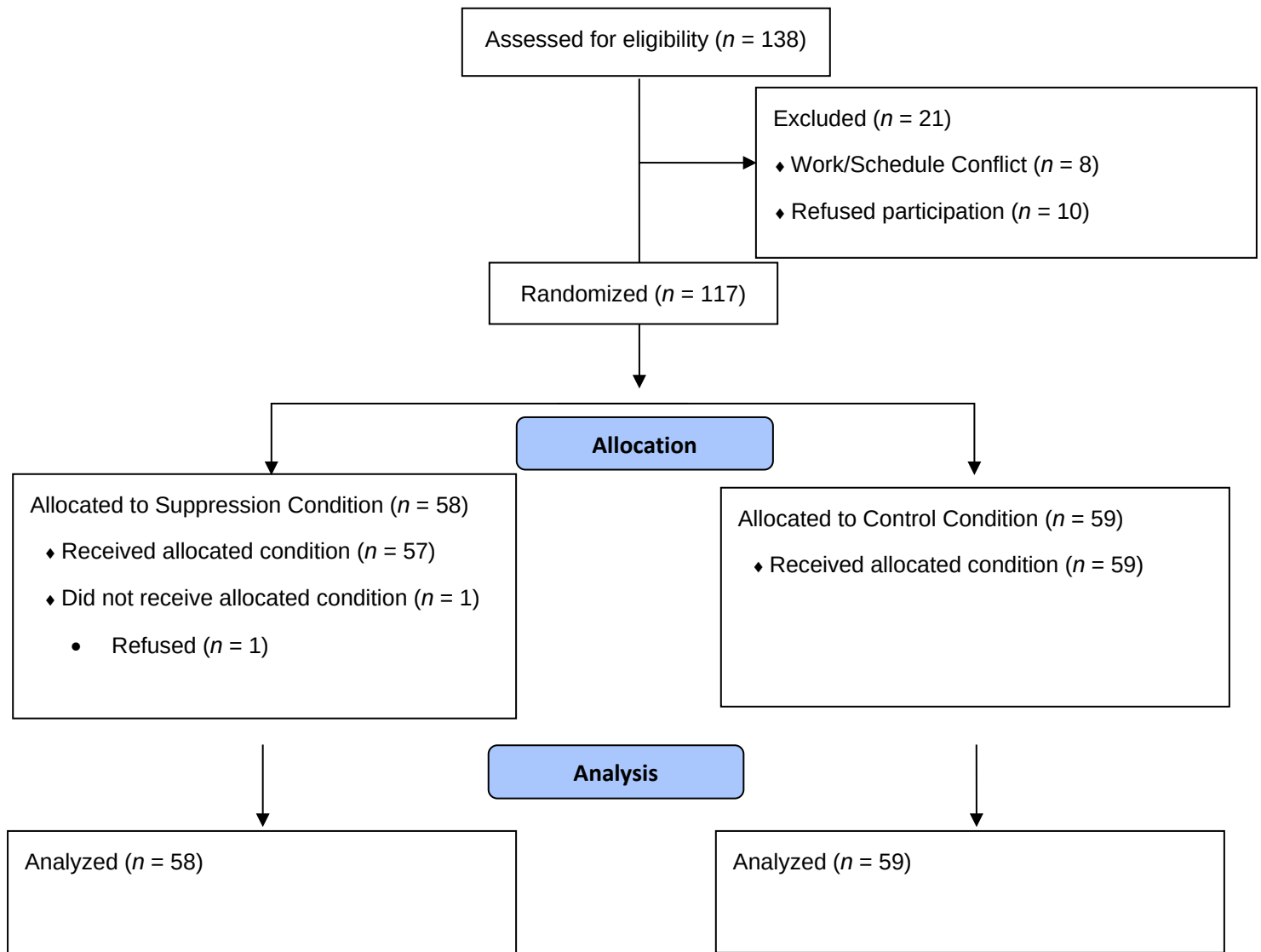


Figure 1. Flowchart detailing enrollment and experimentation processes.