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Developmental change in emotion expression in frustrating situations: The roles of context and gender

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Abstract

Emotion expression is a central aspect of social–emotional functioning. Theorists assert that emotion expression undergoes significant changes in the preschool period. There is, however, limited observational evidence of those changes, which may vary by interpersonal context and gender. The present longitudinal study examined developmental changes in emotion expressions from ages 3 to 5 years in 120 children from rural economically strained families. Children’s facial, vocal, and postural sadness, anger, and happiness expressions were observed in frustrating tasks in 3 social contexts (a perfect circles task with an experimenter, a toy wait task with mother, a locked box task when alone). Findings indicated that sadness expressions decreased with age in all 3 contexts. Anger expressions increased with age in the frustrating task with the experimenter and when alone but not with the mother. From age 4 to 5 years, happiness expressions decreased in the task with experimenter but increased when alone and increased marginally with mother. In terms of gender, girls expressed greater happiness (and lower sadness) than boys but only in the task with the experimenter. Findings suggest that sadness expressions decrease over the preschool years. Developmental changes in happiness and anger expressions (and gender differences) likely depend on context.

Keywords

context; emotion; emotion expression; gender differences; preschoolers

1 | INTRODUCTION

Emotion expression is a critical feature of children’s social–emotional development. All models of socioemotional competence refer to the capacity to express the full range of emotions and to do so in a measured way that is appropriate to situational context (Denham, 2007; Halberstadt, Denham, & Dunsmore, 2001; Raver, 2003; Saarni, 1999). For example, emotion expressions that are well modulated have been associated with school readiness (Blair, 2002; Raver, 2012), competent peer relations (Fabes, Hanish, Martin, & Eisenberg, 2002), and family adjustment (Gottman, Katz, & Hooven, 1996), whereas atypical patterns of emotion expression are related to risk for psychological and health problems (e.g.,

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Chaplin & Cole, 2005; Cole, Zahn-Waxler, & Smith, 1994; Keenan, 2000). For example, dysregulated anger expressions are associated with risk for externalizing behavior problems in young children (Cole et al., 1994; Gilliom, Shaw, Beck, Schonberg, & Lukon, 2002), and heightened sadness expressions in challenging contexts are associated with greater stress in infants (Lewis, Ramsay, & Sullivan, 2006) and greater risk for depression and other disorders in adolescence (Keenan & Hipwell, 2005; Nolen-Hoeksema, Larson, & Grayson, 1999). Emotion expression is so central a component of adaptive development that emotion expression and regulation are specifically targeted in interventions to promote emotional competence and prevent psychosocial problems in children (Greenberg, Kusché, Cook, & Quamma, 1995; Izard, Trentacosta, King, & Mostow, 2004).

The preschool years are particularly critical for emotion expression because they form a foundation for emotional competence as children begin to enter more complex worlds in which they are expected to conform to rules (e.g., classroom rules), cope with day-to-day challenges without their parents present, and are exposed to a greater range of peers. During the preschool period, which ranges from ages 3 to 5 years, children begin to show an ability to modulate emotion expressions to meet the demand of particular contexts (e.g., Cole, 1986), a skill that is believed to develop throughout childhood (Saarni, 1984). However, there are few longitudinal studies examining the typical development of emotion expression in different contexts during the preschool years. Longitudinal observational studies of emotion expression are necessary to inform our understanding of typical development and inform interventions to promote emotional competence. In addition to developmental differences, emotion expressions are affected by social context. For example, children may express greater positive emotion when with a parent than when alone in order to promote this important relationship. Further, emotion expressions are affected by the larger sociocultural context and thus may differ by socioeconomic group and setting. The present longitudinal study examined the development of three basic emotion expressions (sadness, anger, and happiness) from ages 3 through 5 years in three specific contexts in economically strained rural children. The three contexts involved children completing frustrating tasks (each involved blocking a child's goals) in three different interpersonal settings (with experimenter, with mother, and alone) to understand how the expression of emotion develops over time in different contexts.

1.1 | Sadness expression

Like all emotions, sadness is adaptive. Sadness functions to help one let go of unattainable goals, to elicit help from others, and to bring people together in difficult times (Barrett & Campos, 1987; Izard & Ackerman, 2000). In terms of the developmental trajectory of sadness expressions over the preschool years, theories of emotion regulation development suggest that, as children develop more mastery, autonomy, and better verbal skills over the preschool years (Kopp, 1989), and as children internalize display rules for sadness expressions (such as "big kids don't cry"; Saarni, 1999), they may decrease in sadness expressions in certain contexts. For example, in frustrating contexts, children might increasingly express anger to promote persistence towards goals and decreasingly express sadness. However, this decrease may depend on social context. Children might show stronger decreases in sadness expressions in frustrating tasks when with an unfamiliar

person (such as an experimenter) than when with a parent, due to increased socialization pressure to suppress sadness and/or less of an expectation for comforting responses from unfamiliar others.

In terms of empirical findings, cross-sectional evidence from school age children finds decreasing self-reported sadness expression in both peer and parent contexts between first and fifth grade, although with higher sadness expressions overall in parent than peer contexts (Zeman & Garber, 1996; Zeman & Shipman, 1997). There is very little work addressing developmental changes in observed sadness expressions in early childhood. One longitudinal study found a trend for decreases in observed facial or vocal or postural sadness and anxiety expressions from age 4 to 6 years in middle-income children while playing a frustrating game with parents (Chaplin, Cole, & Zahn-Waxler, 2005). Also, Cummings, Zahn-Waxler, and Radke-Yarrow (1984) found longitudinal decreases in observed vocal or behavioral or verbal distress expressions (including sadness) from age 1–2 to 6–7 years in middle-income children while observing interparent angry interactions. Thus, the literature suggests a decrease in observed sadness expressions over the preschool years, at least with parents. It would be important to study the development of sadness expressions in different interpersonal contexts.

1.2 | Anger expression

Anger is elicited in situations in which one's goals are blocked and it readies one to act to overcome obstacles and persist to achieve goals (Barrett & Campos, 1987; Frijda, 1986). Anger expressions are functionally related to the development of a sense of efficacy and autonomy. In infants, for example, anger expressions are associated with persistence at getting a lever to work, whereas sadness expressions are not (Lewis et al., 2006) and as infants gain experience with autonomous behavior, such as self-locomotion, they express more anger (Campos et al., 2000; Roben et al., 2012). Most children experience rapid gains in autonomy, ability, and efficacy during the preschool years and become better able to use emotions (such as anger) to achieve goals in particular contexts (Thompson, 1994). Thus, anger expressions may increase during the preschool years in frustrating situations in which persistence towards a goal is important. However, expressions of anger in situations in which persistence is not the only important goal (e.g., when sharing a desired toy with a friend to maintain the friendship) may decrease with development as children are better able to regulate anger expressions to meet situational demands (Barry & Kochanska, 2010; Cole, 1986). Thus, in this study of frustrating situations, we might expect increases in anger expression with age overall, but less so in the frustrating task with the mother, due to a demand in that context to maintain the relationship.

Support for a developmental increase in anger expressions in frustrating situations with nonfamilial others has been shown in studies of peer interactions. Miller and Olson (2000), in a longitudinal study of low-income preschool boys, found increases in observed anger expressions (facial, vocal, behavioral, and verbal) from age 4–5 to 5–6 years in response to conflicts with peers. Fabes and Eisenberg (1992), in a cross-sectional study of middle-income 3–5-year-olds, found that older girls expressed greater facial, vocal, behavioral, and verbal anger than younger girls in response to peer rejection, which may elicit anger and/or

other negative emotions. However, Fabes and Eisenberg (1992) also found that older boys expressed less anger than younger boys in various peer and teacher situations. Zahn-Waxler et al. (2008), in a longitudinal study of middle-income children, found that observed facial and vocal anger expressions increased from age 5 to 7 years for boys with stable behavior problems in response to a hypothetical conflict dilemma with a peer and a distress dilemma with a parent (with greater increases in the parent distress dilemma). Taken together, this suggests that in challenging situations with nonfamilial others (e.g., peers), and possibly in distress situations with parents, anger expressions may increase over the preschool years, with some studies finding gender differences. One study with peers (Fabes & Eisenberg, 1992), however, found decreases in anger expressions with age for boys, possibly because that peer context elicited pressure to minimize anger to maintain the peer relationship. It would be of interest to examine changes in anger expressions in interpersonal settings without an existing relationship, such as with an unfamiliar adult experimenter, and this study did this.

As noted above, increases in anger expressions in frustrating contexts may be attenuated with parents, due to a demand to maintain the parent–child relationship. Consistent with this, in a longitudinal study of rural economically strained families, Cole et al. (2011) found that children's latency to facial and vocal anger expressions increased from age 2 to 4 years and duration of anger expressions decreased from 1.5 to 4 years during a frustrating toy wait task with the mother. In addition, Barry and Kochanska (2010) found decreases in observed strong anger expressions (vocal, behavioral) from 15 to 67 months in discipline contexts with parents in families with diverse incomes. In addition, Cummings et al. (1984) found decreases in anger expressions (vocal, behavioral, and verbal) longitudinally in middle-income children from age 1–2 to 6–7 years during interparent angry interactions. In sum, preschoolers may increase in anger expressions over time when with nonfamilial others, such as experimenters and possibly peers, but perhaps not when with parents.

1.3 | Happiness expressions

Happy emotions motivate humans to approach their environment in order to promote growth, learning, and/or harmony within interpersonal relationships (Izard & Ackerman, 2000). In terms of the development of happiness expressions during the preschool period, happiness displays likely decrease in most frustrating situations. Over time, preschoolers become more discriminating with happiness displays and only show them to show accomplishment and not when goals are not accomplished, such as in a failure task (Sallquist et al., 2010). Consistent with this, Denham et al. (2014), in a study of low- and middle-income children, found that 4-year-olds reported choosing happy emotion responses less often than 3-year-olds in response to peer provocation situations, likely due to increasing understanding that happiness is not an appropriate emotion to express in that situation. However, although happiness expressions may decrease over time in most frustrating situations, this may not extend to frustrating situations with a parent. Preschoolers may increase in happy expressions when with a parent as they learn that displays of positive emotion are useful in eliciting help from others and in facilitating important social relationships (Denham, 1986; Sallquist et al., 2009). Consistent with this, one longitudinal study found that observed happiness expressions increased from age 40 to

67 months in positive and negative tasks with parents in families with diverse incomes (Barry & Kochanska, 2010). Thus, overall, in frustrating tasks, we might expect a decrease in happiness expressions over the preschool years. However, this decrease may be attenuated or reversed in frustrating tasks with a parent.

1.4 | Gender differences in emotion expression

In understanding the development of emotion expression in preschool, it is important to consider child gender, given past evidence of gender differences in emotion expressions in childhood and adulthood (Brody, 1999; Chaplin & Aldao, 2013; Kring & Gordon, 1998). Meta-analytic reviews have found small but significant gender differences, with girls higher in happiness expressions and internalizing emotion expressions (including sadness) than boys, and boys higher in externalizing emotion expressions (including anger) than girls starting in early childhood (Chaplin & Aldao, 2013; Else-Quest, Hyde, Goldsmith, & Van Hulle, 2006; Hall & Halberstadt, 1986; LaFrance, Hecht, & Paluck, 2003). These gender differences may be stronger in interpersonal contexts with unfamiliar others (such as an unfamiliar adult experimenter) than in contexts when with a familiar person (such as a parent) or when alone, given that children are more likely to adhere to gender roles when someone unfamiliar is watching, including gender roles that girls should show cheeriness and sadness more than boys, but should limit anger (Chaplin & Aldao, 2013; LaFrance et al., 2003). This may be particularly true for happiness expressions, as girls may express particularly high levels of happiness when with an unfamiliar adult because of their tendency to relieve social tension in novel interpersonal situations (Hall & Halberstadt, 1986; Hochschild, 1983; LaFrance et al., 2003). Indeed Chaplin and Aldao (2013) in a meta-analysis found that gender differences in happiness and internalizing expressions (girls greater than boys) were stronger in studies measuring emotion expressions with an unfamiliar adult than in studies of children alone or, for happiness, in studies of children with parents. However, most comparisons of gender differences in emotion expressions between contexts have been done between studies and not within one study incorporating several contexts. Thus, this study examined gender differences in three interpersonal contexts.

1.5 | Present study and hypotheses

Despite initial progress in understanding the development of emotion expression over the preschool years, there are several limitations to the literature. First, several studies examining age differences in emotion expression use cross-sectional samples comparing children of different ages at one time point, which confounds developmental differences with other child differences (e.g., temperament). Second, many studies use child or parent reports of child emotion expression, which may not be as accurate as observational measures. Third, many studies examine emotion expressions in only one context, despite contextual influences on emotion. This study addressed these limits by examining the development of the observed expression of sadness, anger, and happiness longitudinally in children from age 3 to 5 years in three contexts.

1.5.1 | Economic strain—This study was conducted with economically strained rural Caucasian families. This is an understudied group that may be important to consider for

several reasons. First, economic strain can put stress on families and, possibly as a result of this, children from low-income families are more likely to show difficulties in emotion knowledge, emotion regulation, and impulse control (e.g., Ackerman, Brown, & Izard, 2004; Izard et al., 2008; Raver, 2004; Takeuchi, Williams, & Adair, 1991) and greater levels of psychological disorders (Brooks-Gunn & Duncan, 1997; Dodge, Pettit, & Bates, 1994; Linares et al., 2001; Qi & Kaiser, 2003). Second, most research on emotion expression has been limited to middle-class children and research on low-income children has focused on urban ethnic minority children. It is important to examine rural economically strained children to provide a more complete understanding of child emotional development in low-income children. Third, there may be unique cultural norms for emotion expression in low-income groups that might lead to slightly different findings for the development of emotion expression or for gender differences in emotion expression. In terms of gender, working class and low-income families have been found to be more accepting of anger in girls, which may lead to an attenuation of the gender difference in anger expressions in these youth (Brown, 1998). Consistent with this, one study found a lack of gender differences in facial, vocal, and postural anger expressions (and also in sadness expressions) in low-income mostly African-American urban toddlers (Chaplin, Casey, Sinha, & Mayes, 2010). Thus, we will predict gender differences in emotion expressions but attenuated gender differences for anger and possibly sadness. In terms of emotion expression development, research suggests that low-income children and parents show similar patterns of emotion regulation and emotion socialization as middle-income families (Garner, Jones, & Miner, 1994; Raver, 2004). And the two studies on anger expression development with low-income children described above (Cole et al., 2011; Miller & Olson, 2000) had similar findings to the studies of middle-income children. Thus, our hypotheses will follow from the current literature on developmental change in emotion in mostly middle-income children. However, we will discuss any findings that differ from the literature on middle-income youth. Also, the implications of developmental patterns of emotion expression for rural low-income children may be unique and we will discuss this.

This study observed children's emotion expressions in three standardized widely used frustrating tasks, each of which blocks a child's goals. Although these tasks do not specifically elicit sadness or happiness, prior work finds that frustrating tasks do elicit a wide range of emotion expressions (Cole, Teti, & Zahn-Waxler, 2003; Dennis, Cole, Wiggins, Cohen, & Zalewski, 2009). For example, during frustrating tasks, happiness expressions may occur as a way to cope with or mask feelings of anger and sadness expressions may occur to elicit help or comfort from others.

This study involved three frustrating tasks: (a) A perfect circles or mazes task with an experimenter in which the child is asked to draw a "perfect" circle or maze, but the experimenter judges the child's circles or mazes as not perfect enough, (b) A toy wait task with the mother in which the child waits for 8 min to open a desirable present. (c) A locked box or knotted sack task while alone in which a desirable toy is locked in a box or sack, which is impossible to open. These tasks were intended to elicit frustration and to differ only by interpersonal context. However, there are slight differences in the task that are not related to interpersonal context. For example, the perfect circles or mazes task may not only elicit frustration but also self-consciousness and sadness due to criticism, the lock box task may

not only elicit frustration but also happiness upon seeing the toy, and the toy wait task may elicit less frustration due to the less structured nature of the task. Thus, we will interpret findings based on the interpersonal nature of the context and also other task differences. Despite this limitation, this study significantly adds to the literature in examining observed emotion expressions longitudinally over development in the preschool period in three ecologically valid emotion-eliciting social contexts.

The study had two sets of hypotheses:

1. First, we hypothesized age X context interaction effects on emotion expressions. (1a) For sadness, we hypothesized decreases in sadness expressions over age, with possibly greater decreases in the experimenter than the mother context. (1b) For anger, we hypothesized increases in anger expressions over age in the experimenter context and the alone context but not in the mother context. (1c) For happiness, we hypothesized decreases in happiness expressions over age in the experimenter and alone contexts but not in the mother context.
2. Second, we tested gender and gender X context effects on emotion expressions. (2a) We hypothesized a main effect of gender, with girls showing greater happiness expressions than boys. For sadness and anger, we explored whether there would be gender differences or not, given attenuation of sadness and anger gender differences found in other low-income samples. (2b) We hypothesized gender by context interactions for happiness and sadness expressions, with stronger gender role consistent gender differences in the experimenter context than in the mother or alone contexts.

2 | METHOD

2.1 | Participants

Participants in this study were 120 typically developing children (65 boys and 55 girls) followed from the age of 3 through 5 years. The data presented here are part of a larger longitudinal study on the development of anger regulation in early childhood. The larger study recruited children at age 18 months with families who were economically strained, with household incomes that were just above the poverty line defined by the United States government but less than the national median income for their family's size. The families lived in rural and semirural areas in central Pennsylvania.

Of the 120 children, 113 (94%) were White, and 7 (5.8%) were African American, Asian, or Hispanic. At the time of the first interview, the average age of the children's mothers was 30.45 years ($SD = 5.29$). The average household income for the families was \$40,655.70 ($SD = \$14,996.57$). Fifty-four of participants were first born (45%), 45 were second born (38%), 15 were third born (12%), and 6 were fourth or later born (5%). Study inclusion or exclusion criteria were that children were from economically strained families (as described above), children were 18 months old at the first study visit (± 2 weeks), children had lived with their primary caregiver from at least 3 months of age, and had no disability that would interfere with the child's ability to perform the tasks in the study.

Children and their parents were recruited through a multistep process. Trained research assistants examined census tract data to find where a large percentage of families in the income eligibility would live. Rural and semirural communities were identified and thoroughly researched. Educational, political, medical, and religious leaders in the towns were contacted to further understand the community. Research assistants examined newspapers, birth records, and mailed letters about the study to families that met inclusion criteria. In addition, flyers were posted in daycares, preschools, and community events in the targeted communities.

Children and their parents were first seen when the child was 18 months (± 2 weeks) and again every 6 months until age 4 years and for one final visit at age 5 years. The data for this study focused on the preschool-aged laboratory visits, which were conducted when the child was 3, 4, and 5 years old. At each of these three time points, families attended a lab visit, during which the child and parents completed several tasks and questionnaires to assess child emotion regulation and family factors.

2.2 | Procedure

Three tasks from the lab visits at age 3, 4, and 5 years were used in this study. Each task was selected because it had been used in studies to investigate observed emotional responses in young children by frustrating (blocking) children's goals. At each age, there was one task with an unfamiliar adult experimenter, one task with the mother, and one task alone.

The order of tasks was alone task, experimenter task, and mother task. The tasks were separated by relief tasks (e.g., snack and free play) of at least 5 min in length. Staff were trained to delay starting the next frustrating task until the child had returned to a relatively content state. Generally, staff were able to move back and forth between relief and challenging tasks as scheduled.

2.2.1 | Unfamiliar adult experimenter task—The impossible perfect circle task (Laboratory Temperament Assessment Battery; Goldsmith & Rothbart, 1996), a standardized and widely used task designed to elicit child frustration or negative emotion by attempts to complete an impossible task, was administered at ages 3 and 4 to measure emotion expression in a frustrating task with an unfamiliar adult experimenter. For this task, the experimenter was seated at a table with the child. The experimenter asked the child to draw a perfect green circle. After the child drew a circle, the experimenter criticized the circle (e.g., it is too small, the line is broken, and it is too flat) and asked the child to draw another circle. Thus, the task was impossible; the child was never able to draw a circle that was "perfect." When the child was 3 years old, after 3.5 min, the experimenter said, "That circle looks pretty good. Circles are hard to draw, aren't they?" At 4 years, after 3.5 min, the experimenter arose, said, "I have to go do something. You try to draw the perfect green circle while I'm gone" and left the room for 1 min while the child continued to work on the circle. This time was added to make the task more difficult, appropriate for the older age of the children. The experimenter returned after 1 min and chose the best circle. Child emotion expressions were coded for the full 3.5 min at age 3 and 4.5 min at age 4.

At 5 years old, to minimize the likelihood the child would recall the task and to minimize practice effects, the impossible maze task was used in place of the impossible perfect circle task. The impossible maze task was designed to exactly replicate the conditions of the impossible perfect circle task, but changed enough to minimize practice effects, boredom, and/or reduced emotional responses. For the impossible maze task, the child was given a page of simple mazes and asked to draw a line to complete the maze. Each time after the child completed a maze, the experimenter criticized the line (e.g., you got too close to the line there and you didn't keep your marker straight) and the child was asked to complete another maze. Thus, the task was impossible; the child was never able to draw a maze that was adequate. After 3.5 min, the experimenter gave the child a new sheet of mazes and said, "I have to go do something. You try to get through the mazes while I'm gone and I'll be right back." The experimenter returned after 1 min and chose the best maze. Child emotion expressions were coded for the full 4.5 min.

2.2.2 | Parent task—The toy wait task (Cole et al., 2003; Vaughn, Kopp, & Krakow, 1984), a widely used, standardized 8-min task designed to elicit negative emotional arousal in young children, was used to observe emotion expression in a frustrating situation with the mother at ages 3, 4, and 5 years. In this task, the child and mother are in a room together. Biological mothers participated in this task for almost all children. One father participated instead of the mother for a 3-year visit (the mother was pregnant and ordered to bed rest) and one father participated with mother at the 3-year visit because child would not come into the lab room without the father. For the task, the experimenter gave the mother questionnaires to complete and gave the child a broken toy. No other toys were in the room. Then, the experimenter placed an attractively wrapped gift on the child's table and left the room. The mother, who was coached in advance, then said, "This is a surprise for you but you have to wait until I finish my work to open it." The mother was told to "do whatever you usually do when you have work to do and you need your child to wait for you." Most mothers in this study stayed focused on the work and did not actively engage the child. After 8 min, the experimenter returned and the mother allowed the child to open the present. Child emotion was coded during the full 8 min of the toy wait task.

2.2.3 | Alone task—The transparent box task (Laboratory Temperament Assessment Battery; Goldsmith & Rothbart, 1996), a widely used standardized task designed to elicit frustration or negative emotion, was used to observe emotion expression when the child was alone. In this procedure, the experimenter offered the child a choice between two toys. The child picked a preferred toy, and the experimenter locked the toy in a transparent box. The experimenter then taught the child how to use the key to open the box. Next, the experimenter gave the child keys and left the room. However, unknown to the child, the experimenter gave the child the wrong keys. The experimenter returned after 2.5 min, asked the child if they got the toy yet, and then apologized and showed the child that they gave them the wrong key. At the age 3 visit, this was the end of the task. At the age 4 visit, the child tried the box for 3 min and then the experimenter returned to the room and said, "Oh, you didn't open it? OK, take a few more minutes" and left again for 2 additional minutes. Child emotion expressions were coded for the full 2.5 min at age 3 and 5 min at age 4.

When the child was 5 years old, the knotted sack task was used in place of the transparent box task to minimize the chance that the child would recall the task and to minimize practice effects or attenuation of emotional responses over time. The knotted sack task was designed to exactly replicate the conditions of the transparent box task (e.g., impossible task to open an object with a toy inside) but changed slightly to minimize practice effects. Children were shown a knotted sack and the research assistant demonstrated how to untie the sack, but the sack was empty. The child was then given a tightly knotted sack with a prize inside and told to open the sack to retrieve the prize. The child was left alone to try to open the sack for 3 min. It was not possible to unknot the sack, although children did not realize this; no child succeeded in this task. After 3 min, the experimenter returned to the room and said, “Oh, you didn’t open it? OK, take a few more minutes” and left again for 2 additional minutes. Child emotion expressions were coded for the full 5 min.

2.3 | Measures

Children’s emotion expressions during the three tasks (with experimenter, with mother, and alone) were coded by trained research assistants using an established microanalytic emotion expression coding system (Cole et al., 1994), which was developed based on theoretical and empirical research on emotion expression (e.g., Banse & Scherer, 1996; Ekman & Friesen, 1975; Izard & Buechler, 1979). The coders analyzed children’s facial, vocal, and (to a lesser degree) gestural and postural behaviors for “cues” of emotions during every second of the tasks. The cues used to judge the presence of sadness, anger, and happiness are presented in Table 1. Coders also coded anxiety expressions. However, there were very few anxiety expressions, so this study did not include anxiety expressions. An emotion was coded in that second if at least one cue of that emotion was present at that second. If cues from two or more emotions occurred simultaneously, all emotions were coded. All coders were trained on the coding system until they were 85% accurate with master-coded tapes. Once they began independent coding, 10% of their coding was double assigned to allow random checks of interrater reliability. Average interrater reliability for classifying emotion expressions (collapsed across ages, tasks, and emotions) was excellent, $\kappa = .86$ (κ range = .82–.91).

For analyses, we examined the number of bouts of sadness, anger, and happiness expressions in each of the tasks. A bout was defined as an emotion expression that lasted for 1 or more second and was separated from the next bout by at least 2 s. Thus, bouts were essentially a measure of frequency of emotion expression. We took the number of bouts and divided those by the duration of each task in minutes, to control for the slightly different task lengths across tasks and time points within tasks. We also measured the average duration of the bouts. Analyses were conducted for average duration, but findings were similar and the duration variable was highly skewed, so we presented the results below for bouts.

2.4 | Data analysis plan

For hypothesis 1, we proposed age X context interaction effects on emotion expressions. To test this, three repeated measures analyses of variance (ANOVAs) were conducted, one for each emotion expression type (sadness, anger, and happiness). In each ANOVA, the frequency of emotion expression was the dependent variable. Child age (3, 4, 5 years) and context (with adult, with mother, alone) were the within-subject factors and gender was

included as a between-subjects factor. If the age X context interaction was significant for an emotion type, follow-up *t* tests were conducted examining differences between age 3 and 4 and 4 and 5 years in that emotion type in each of the three contexts, with a Bonferroni corrected alpha level, corrected for the six comparisons. Cohen's *d* effect sizes are provided for these *t* tests. Following conventions by Hyde (2005), we considered Cohen's *d* effect sizes of 0.11 to 0.34 as "small," 0.35 to 0.64 as "medium," 0.65 to 0.99 as "large," and over 1.00 as "very large."

For hypothesis 2, we proposed gender main effects and gender X context interaction effects on emotion expressions. To test this, nine mixed-design repeated measures ANOVAs were conducted, one for each emotion type (happiness, sadness, and anger) at each age (age 3, 4, and 5). For these ANOVAs, frequency of emotion expression was the dependent variable. Context (with adult, with mother, and alone) was the within-subjects factor and child gender (boy and girl) was the between subjects factor. If the Gender X Context interaction was significant in an analysis, follow-up *t* tests were conducted examining gender differences in each of the three contexts for that emotion, with a Bonferroni corrected alpha level, corrected for the three comparisons. For all analyses, if sphericity was violated, we used the Greenhouse Geisser epsilon value to correct the degrees of freedom and *p* value. For all analyses, follow-up *t* tests for significant main effects were also Bonferroni corrected.

3 | RESULTS

3.1 | Data inspection and transformations

Data were examined for normality. All emotion expression variables were skewed and so log10 transformations were performed on these, with a constant added to bring the values above 1 ($\log_{10}[\text{emotion expression score} + 1]$). This transformation brought skewness levels to <2 and kurtosis to <7 , indicating adequate distributions (West, Finch, & Curran, 1995). Transformed scores were used in analyses, but untransformed scores are presented in figures for ease of interpretation.

3.2 | Missing data analysis and multiple imputation

A small portion of data was missing on emotion expression variables. At age 3, one child missed the lab visit, nine children had no data for the adult task (six children were unable to separate from the parent, one child's hood obscured his face, one child refused to draw a circle, and for one child, the experimenter forgot to administer the task), and four children had no data for the alone task (one child's hood obscured his face and three children were unable to separate from the parent). At age 4, one child arrived too late to complete the adult and alone tasks, but completed the mother task. In addition, three children did not complete the adult task, and one did not complete the alone task. The age 5 year visit was not part of the original study plan. For this reason, 22 families who had been in the longitudinal study chose not to participate in a 5-year visit. Children with missing data did not differ from children with complete data on any demographic variable (including income, race, and child sex).

Little's test for missing completely at random was conducted to examine the nature of the missing data and results indicated that there was no missing data pattern, suggesting that the data is compatible with a missing completely at random pattern ($\chi^2 [128] = 110.78, p = .86$). Multiple imputation (MI) was used to handle missing data given that MI is considered more efficient than listwise or pairwise deletion and results in fewer issues with loss of statistical power (Enders, 2001; Little & Rubin, 2002). Thus, we used multiple imputation for all study analyses presented below. Following recommendations from Graham, Olchowski, and Gilreath (2007), 20 data sets were imputed based on the proportion of missing data. Multiple imputation was conducted using Amelia II (Honaker, King, & Blackwell, 2009). All of the following analyses were conducted separately for each data set and were pooled across estimates. Pooled values are shown in the text. Results from imputed data analyses are presented in the text. Raw (unimputed) data are presented in the figures to give the most accurate picture of the data.

3.3 | Hypothesis 1: age X context interactions predicting emotion expression

3.3.1 | Sadness expressions—The age X context interaction was significant, $F(3.32, 385.58) = 2.55, p < .05$. In all contexts, sadness expressions decreased with age (see Figure 1). However, in the adult and alone contexts, this decrease was not significant from age 3 to 4 but was significant from age 4 to 5 (with adult: $t(117) = -4.38, p < .001$, Cohen's $d = -0.52$; alone: $t(117) = -3.64, p < .01$, Cohen's $d = -0.38$). In contrast, in the mother context, the decrease was significant from age 3 to 4 ($t(117) = -4.08, p < .001$, Cohen's $d = -0.52$) and again from age 4 to 5 ($t(117) = -3.90, p < .001$, Cohen's $d = -0.37$). There was a significant main effect of age, $F(1.66, 192.00) = 32.41, p < .001$, with sadness expressions decreasing over age from age 3 to 4 ($t(117) = -2.93, p < .05$, Cohen's $d = -0.36$) and from age 4 to 5 ($t(117) = -6.15, p < .001$, Cohen's $d = -0.64$). There was also a main effect of context, $F(2, 232) = 4.68, p < .05$; there were more sadness expressions in the mother than adult contexts, $t(117) = -2.76, p < .01$, Cohen's $d = -0.36$, but no differences between the other contexts.

3.3.2 | Anger expressions—The age X context interaction for anger expressions was significant, $F(4, 464) = 31.55, p < .001$ (see Figure 2). In the adult and alone contexts, anger expressions significantly increased with age from age 3 to 4 (with adult: $t(117) = 9.32, p < .001$, Cohen's $d = 0.74$; alone: $t(117) = 6.88, p < .001$, Cohen's $d = 0.88$). Anger expressions also increased from age 4 to 5 in the alone context ($t(117) = 4.21, p < .001$, Cohen's $d = 0.54$). In the mother context, there was not a significant change in anger expressions over time. There was also a significant main effect of age, $F(2, 232) = 76.29, p < .001$, with anger expressions increasing over age from age 3 to 4 ($t(117) = 7.69, p < .001$, Cohen's $d = 1.09$) and from age 4 to 5 ($t(117) = 3.23, p < .01$, Cohen's $d = 0.40$). There was also a main effect of context, $F(2, 232) = 34.43, p < .001$, with follow-ups indicating higher anger expressions in the alone than adult context ($t(117) = -5.07, p < .001$, Cohen's $d = -0.66$) and higher anger expressions in the adult context than mother context ($t(117) = 3.12, p < .01$, Cohen's $d = 0.35$).

3.3.3 | Happiness expressions—The age X context interaction for happiness expressions was significant, $F(3.44, 398.76) = 15.57, p < .001$ (see Figure 3). Follow-ups

showed no significant changes from age 3 to 4 in any context. However, there were changes from age 4 to 5 in happiness expressions, depending on the context. In the adult context, happiness expressions significantly decreased from age 4 to 5 ($t[117] = -4.06, p < .01$, Cohen's $d = -0.46$). In the mother context, happiness expressions increased from age 4 to 5 at a level of marginal statistical significance ($t[117] = 2.67, p = .05$, Cohen's $d = 0.28$). Happiness expressions increased in the alone context from age 4 to 5 ($t[117] = 3.80, p < .01$, Cohen's $d = 0.43$). There was also a significant main effect of context, $F(1.64, 189.94) = 171.72, p < .001$, with follow-ups indicating higher happiness expressions in the adult than the mother context ($t[117] = 7.56, p < .001$, Cohen's $d = 0.81$) and higher happiness expressions in the mother than alone context ($t[117] = 13.39, p < .001$, Cohen's $d = 1.40$). There was not a significant main effect of age.

3.4 | Hypothesis 2: gender X context interactions predicting emotion expression

3.4.1 | Sadness expressions—Gender X context interactions were examined at each age. At 5 years, the gender X context interaction for sadness expressions was significant, $F(2, 232) = 4.84, p < .01$ (see Figure 4). There was a significant gender difference, with girls showing *fewer* sadness expressions than boys, in the adult context ($t[117] = 2.60, p < .05$, Cohen's $d = 0.50$), but not in the mother or alone contexts. There were significant main effects of context at ages 3, $F(2, 232) = 4.43, p < .05$, and 5, $F(2, 232) = 5.79, p < .01$. There were no significant main effects of gender.

3.4.2 | Anger expressions—There were no significant gender X context interactions at any age. There were significant main effects of context at ages 3 years, $F(2, 232) = 14.47, p < .001$; 4 years, $F(2, 232) = 17.58, p < .001$; and 5 years $F(2, 232) = 75.56, p < .001$. There were no significant main effects of gender.

3.4.3 | Happiness expressions—Gender X context interactions were examined at each age. At age 4 years, the gender X context interaction for happiness expressions was significant, $F(2, 232) = 4.65, p < .05$ (see Figure 5). There was a significant gender difference, with girls showing greater happiness expressions than boys, in the adult context ($t[117] = -3.26, p < .01$, Cohen's $d = -0.60$) but not in the mother or alone contexts. There were also significant main effects of context at ages 3 years, $F(1.60, 185.79) = 73.52, p < .001$; 4 years, $F(1.85, 214.60) = 161.46, p < .001$; and 5 years, $F(2, 232) = 32.59, p < .001$. There were no significant main effects of gender.

4 | DISCUSSION

This study contributed to the literature by examining the developmental progression of observed expressions of sadness, anger, and happiness in three frustrating interpersonal contexts. Children from economically strained rural communities, a group at risk for problems in emotion expression and regulation, were observed annually across the preschool years from ages 3 to 5 years. Findings indicated developmental changes in the frequency of sadness, anger, and happiness expressions. Overall, sadness expressions decreased over time, particularly from age 4 to 5 years, with small to medium effect sizes. Anger increased and happiness also changed, but these changes depended on the context. Anger expressions

increased with age when completing frustrating tasks with the experimenter and when alone with small to very large effect sizes but did not increase in a toy wait task with the mother. From age 4 to 5 years, happiness expressions decreased in a frustrating perfect circles or mazes task with the experimenter with a medium effect size but increased marginally in a toy wait task with the mother and increased in a locked box or knotted sack task when alone, with small to medium effect sizes.

As predicted, gender differences in observed happiness (with girls greater than boys) were more pronounced when with the unfamiliar adult experimenter than when with the mother or alone, with a medium gender difference effect size in the experimenter context. However, this gender by context interaction was only found at age 4 and was not found at all for anger. For sadness, counter to traditional gender roles and to findings in prior research, boys showed greater sadness expressions than girls when with the experimenter at age 5 with a medium effect size. The context effects that interact with developmental and gender differences are discussed below.

4.1 | Developmental changes

4.1.1 | Sadness expressions—Preschoolers' displays of sadness decreased from ages 4 to 5 years in all interpersonal contexts. Sadness expressions also decreased from ages 3 to 4 years, but this drop was only significant for the frustrating context with the mother. The significant drop in sadness expressions from 3 to 4 years in the mother task may suggest that sadness declines more in toy wait contexts with the mother or may be due to the higher initial levels of sadness in the mother task than the other contexts at age 3, which allowed more room for movement (see Figure 1). Overall, the developmental decline in sadness expressions in the preschool years is consistent with past research finding decreases in observed sadness expressions over the preschool years in frustrating settings with parents (Chaplin et al., 2005; Cummings et al., 1984) and extends this to frustrating contexts with unfamiliar adult experimenters and alone. The decrease may be due to increasing ability to limit sadness in frustrating situations where anger may be more appropriate or may be due to increasing socialization pressures to minimize sadness displays (Saarni, 1999; Thompson, 1994).

In addition to the age effect, we also found a main effect of context, with more sadness expressions in the frustrating task with mother than with the experimenter or alone, even though the task with the experimenter (perfect circles) might be expected to elicit greater self-consciousness or sadness than the mother (toy wait) task. This greater expression of sadness when with mother may be due to less pressure to conform to display rules to limit sadness or to greater expectation of comfort from mother than from experimenter or when alone. This is consistent with attachment perspectives, which theorize that children are more likely to show signals of distress to attachment figures (Thompson, Laible, & Ontai, 2004). Consistent with this framework, children in middle childhood report that they are more likely to minimize their expressions of sadness when with a peer than when with their parents (Zeman & Garber, 1996).

4.1.2 | Anger expressions—At the same time as children rely less on sadness expressions when faced with frustrating situations as they mature into the preschool years, our findings also indicate that they increased in anger expressions in frustrating tasks with an adult experimenter from age 3 to 4 years and when alone from age 3 to 4 and 4 to 5 years. However, notably, this increase in anger was not found in frustrating tasks with the mother. In most frustrating situations, preschoolers may express increasing amounts of anger with age as they gain in autonomy and self-efficacy and are better able to summon anger functionally to persist in difficult tasks and try to overcome obstacles (Campos et al., 2000). This is consistent with past research finding increases in observed anger expressions over the preschool years in response to conflicts with peers (e.g., Miller & Olson, 2000; but see Fabes & Eisenberg, 1992 for mixed findings). It is notable that anger expressions in this study were not excessively high—on average, children expressed .5 to 2 anger expressions per minute in the experimenter and alone tasks. Thus, the increase in anger expressions likely reflects development of modulated (and likely functional) expressions of anger in response to frustration rather than increases in unregulated anger expressions. However, we did not assess regulation of anger as part of this report and so the interplay between anger expression and regulation would be useful to examine in future research.

Notably, however, although anger expressions increased in two of the frustrating contexts, anger expressions did not change over time in the toy wait task with the mother. Also, as we discuss in detail below, happiness expressions increased marginally from 4 to 5 years in the mother task. This may be due to the nature of the toy wait task or to the fact that the mother was present. The toy wait task requires children to wait for a desirable toy while their mother is in the room doing paperwork. This task is less structured or demanding than the perfect circles and mazes tasks with adult or the lock box or knotted sack task when alone. Thus, it may allow children space to soothe themselves or distract from frustration, leading to less anger. Alternatively, the presence of the mother in this task may have had a soothing effect and/or children may have limited displays of anger so as not to disrupt the relationship with mother. Consistent with this interpersonal interpretation, there was a main effect of context on anger expressions, with fewer anger expressions in the mother task than in the experimenter or alone tasks. And prior research has found decreases in anger expression with age in other challenging contexts with parents (e.g., Cummings et al., 1984).

4.1.3 | Happiness expressions—As predicted, happiness expressions decreased over time from age 4 to 5 in the perfect circles and mazes tasks with the experimenter but increased in the toy wait task with the mother. Unexpectedly, happiness expressions also increased from age 4–5 years in the locked box or knotted sack task when alone. The decrease in happiness expressions when doing the perfect circles or mazes task with the experimenter is consistent with prior theory and findings that preschoolers become more discriminating with happiness displays over time, expressing happiness when it is warranted, but not when in a frustrating or impossible situation (Denham et al., 2014; Sallquist et al., 2010). The increase in happiness expressions in the toy wait task with the mother may reflect that the child increased over time in their ability to effectively utilize happiness expressions to facilitate their relationship with the mother (Denham, 1986) and is consistent with past findings of developmental increases in happiness expressions when with parents

(e.g., Barry & Kochanska, 2010). Alternately, children may have increased in happiness expressions in the toy wait task due to the fact that the toy wait task was the only task to stay the same from age 4 to 5, leading it to feel more pleasurable.

Unexpectedly, happiness significantly *increased* from age 4–5 in the locked box or knotted sack task when alone. We originally hypothesized a decrease in happiness displays over time in this context, given that the child was completing an impossible task and was alone (so there was no interpersonal reason to increase happiness expressions). However, as the task changed from the lock box to the knotted sack task from ages 4 to 5 years, children may have increased in happiness as they may have believed that they could unknot the sack more easily than open the box. Notably, however, the main effect of context found that happiness was lower when alone than with the mother and lower with the mother than with the experimenter, suggesting that the knotted sack did not make children overly happy. The pattern of highest happiness expressions in the frustrating task with experimenter may reflect greater pressure to conform to display rules to appear cheery (even when frustrated) when with unfamiliar adults than with familiar adults or alone.

4.2 | Gender

In terms of gender, consistent with hypotheses, gender differences in happiness expressions, with girls showing greater happiness than boys, were strongest in the perfect circles task with the unfamiliar adult experimenter, at least at age 4 years. Gender differences in happiness expressions may be more apparent in situations with unfamiliar others, such as unfamiliar adult experimenters, than when with family or when alone (Deaux & Major, 1987; LaFrance et al., 2003) for two reasons. First, children are more likely to behave in socially desirable ways and to conform to gender roles (including the gender role that girls should smile and be polite) when they are with an unfamiliar person than when with family members or alone. Second, gender differences in happiness expressions with girls greater than boys may be particularly seen in challenging situations (and the perfect circles task may have been more demanding or competitive than the other tasks), as girls may express happiness to relieve social tension in difficult interpersonal situations (Hall & Halberstadt, 1986; Hochschild, 1983; LaFrance et al., 2003). Our finding is consistent with Chaplin and Aldao's (2013) meta-analytic finding of stronger gender differences (girls greater than boys) in happiness expressions in youth aged 0–17 years in studies observing emotions with an unfamiliar adult than in studies observing emotions with parents or alone. Our study adds to this by demonstrating this within one sample of children exposed to various contexts within one study. One limitation of our study is that this was only significant for one of the three time points: age 4. Perhaps this is an age when children are aware of gender roles and expectations but not when they are so old that they restrict happiness expressions (due to their failure in the task) regardless of gender. Additional research examining the development of gender differences across the preschool years would be helpful.

For sadness expressions, we also found a context by gender interaction effect. However, follow-up analyses indicated that boys actually showed more sadness expressions than girls in the perfect mazes task with the experimenter at age 5. This is counter to gender roles and previous findings, mostly on middle-income children, that boys show less sadness than girls,

especially in contexts with unfamiliar adults (Brody, 1999; Chaplin & Aldao, 2013). Perhaps this reflects preschool girls' greater ability to regulate negative emotion when in front of an unfamiliar adult, including down-regulating sadness or disappointment expressions or perhaps this is due to the nature of the perfect mazes task, which may elicit particularly high self-consciousness or sadness for both boys and girls. Notably, there was a nonsignificant pattern in the toy wait task with mother for girls to show greater sadness than boys (see Figure 4). This is consistent with Chaplin and Aldao's (2013) finding that gender differences (with girls greater than boys) in internalizing emotion expressions were also strong in studies observing children when with parents. In terms of anger expressions, there were no gender by context interactions or main effects of gender. This is inconsistent with previous findings from studies of middle income children, although notably gender differences in anger expressions in these samples do tend to be small (Chaplin & Aldao, 2013). Some past research suggests that working and lower income communities are more accepting of anger expressions in girls (e.g., Brown, 1998), which may have attenuated the gender difference in anger displays in this sample.

4.3 | Economic strain

It should be noted that these findings are based on a sample of children from mostly White families that are economically strained and residing in rural and semirural areas. Overall, findings for the development of sadness, anger, and happiness over time in this sample were similar to what is expected by theory and empirical evidence based mainly on White middle-income families. Thus, the basic progress of emotion expression development may be similar in the situation of economic strain, a conclusion that is consistent with findings that low income preschoolers' emotion knowledge, emotion regulation, and emotion socialization patterns are similar to more advantaged children's (Garner et al., 1994; Raver, 2004), although low-income youth may show greater emotion regulation difficulty and emotion-related behavioral problems (Qi & Kaiser, 2003). However, our findings may have different implications in the context of low-income settings. Our finding of increased anger expressions over time when alone and with the experimenter might lead to risk for acting out behaviors at school, which may contribute to the higher rates of externalizing disorders in low-income children. Also, second, our findings differed from research with middle-income children in terms of gender differences. For these children from economically strained homes, boys displayed more sadness than girls in the experimenter context, and no gender differences in anger were found in any context. These findings are inconsistent with gender roles in majority U.S. culture. As noted above, this may reflect a subcultural difference, with economically strained rural families perhaps being less gendered in socialization of anger and sadness expressions. There is a notable lack of theory or research on the emotional lives of children living above the poverty threshold but in economic strain in White rural and semirural communities. The present findings, including the unexpected gender effects, highlight the need for research on a variety of families in different U.S. subcultures.

4.4 | Limitations

The present longitudinal study found developmental changes over the preschool years in emotion expression, which differed by context and gender. There were a few study limitations. First, we altered two of the three tasks (the experimenter and alone tasks)

slightly from age 4 to 5. This was necessary to make the tasks developmentally appropriate and to prevent practice effects, but it may have accounted for some of our developmental changes from age 4–5 years, as noted above. However, this concern is mitigated somewhat when considering that there were also developmental changes from age 3–4 (when the tasks did not change). Second, the study focused on emotion expression only in frustrating contexts and future research should additionally examine happy and sadness-eliciting contexts. Third, although all tasks were frustrating, the tasks were not the same in the experimenter, mother, and alone conditions. We selected the tasks from widely used and standardized frustration tasks and attempted to make them as uniform as possible. However, they were not the same and emotion expression levels might have differed by task not due to the interpersonal nature but due to an element of the task, as discussed above. Fourth, this study focused on emotion expression and future research should also include measures of internal emotion experience. Despite these limits, our study still contributes to the literature by examining the development of observed sadness, anger, and happiness expressions in varied interpersonal contexts.

4.5 | Conclusions and implications

In sum, this study found important developmental changes in emotion expressions in preschoolers from economically strained families, an important group to study. Sadness expressions decreased over time in the preschool years across several contexts. Anger expressions increased and happiness expressions decreased (from age 4–5) in frustrating situations with an experimenter, potentially reflecting children's increasing effort and persistence and ability to express happiness in a discriminating manner. Anger expressions remained the same and happiness expressions increased (from age 4–5) in the frustrating toy wait task with the mother, suggesting that the presence of the mother was more soothing over time, that children limited anger and expressed happiness to nurture the relationship increasingly over time, or that the task was perceived more positively by children over time. Anger expressions increased in the frustrating task when alone, consistent with increasing persistence and effort, however, happiness expressions also increased from age 4–5 when alone. We also found gender differences, with girls showing greater happiness, but less sadness than boys in the perfect circles and mazes tasks with the unfamiliar adult experimenter.

These findings are important in that they suggest that there is development occurring in the preschool years with children showing less of “softer” negative emotions (sadness) over time in many contexts and showing more of goal-directed negative emotions (anger) and less of happiness, in some frustrating contexts, which is appropriate to the frustrating nature of the context. This may prepare children to enter school settings where they need to be serious and persist in tasks to achieve goals and may need to minimize sadness in front of peer playmates to avoid teasing and rejection. This implies that programs designed to improve emotional competence should encourage children to harness anger in appropriate ways to help them persist in difficult tasks. Interventions may also need to attend to the decrease in sadness expressions, for while these make sense in the context of decreasing acceptance of crying and sadness displays, minimization of sadness if it is strongly felt may not be adaptive. Emotion coaching interventions (e.g., Havighurst, Wilson, Harley, Prior, & Kehoe,

2010) do address sadness and our findings suggest that these interventions may be useful. Finally, in terms of gender, in the setting with the unfamiliar adult, girls showed greater happiness and less sadness than boys, potentially reflecting a very high regulation of emotion in girls, which might contribute to girls' ratings by teachers and parents as being well behaved (Herndon, Bailey, Shewark, Denham, & Bassett, 2013) but which may also reflect an overregulation of negative emotion, which could contribute to later problems in girls (e.g., depression) who are trying too hard to be "good" (Keenan & Hipwell, 2005). Future studies should observe developmental trends in girls' and boys' emotion expressions and how those are linked to children's behavioral adjustment over time.

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Highlights

- The study examined developmental changes and gender differences in emotion expression from age 3–5 years in three frustrating interpersonal contexts.
- Sadness decreased, anger increased with the experimenter and alone (but not with mother), and happiness decreased with the experimenter.
- Findings suggest declines in sadness expressions, but that anger and happiness expressions are selectively expressed to fit contextual demands.

FIGURE 1.

Mean frequency of sadness expressions per minute by age and context. Error bars represent standard errors. W is an abbreviation for with. *Significant difference between two means in follow-up analyses at $p < .05$

FIGURE 2.

Mean frequency of anger expressions per minute by age and context. Error bars represent standard errors. W is an abbreviation for with. *Significant difference between two means in follow-up analyses at $p < .05$

FIGURE 3.

Mean frequency of happiness expressions per minute by age and context. Error bars represent one standard error. W is an abbreviation for with. *Significant difference between two means in follow-up analyses at $p < .05$, $^{\dagger}p < .10$

FIGURE 4.

Mean frequency of sadness expressions per minute at age 5 by gender and context. Error bars represent one standard error. W is an abbreviation for with. *Significant difference between two means in follow-up analyses at $p < .05$

FIGURE 5.

Mean frequency of happiness expressions per minute at age 4 by gender and context. Error bars represent one standard error. W is an abbreviation for with. *Significant difference between two means in follow-up analyses at $p < .05$

TABLE 1

Cues for coding emotion expression

	Facial	Vocal	Postural
Anger	Brow may be furrowed, eyes can be narrowed, jaw clenched or set, mouth squared off if open, lips pressed or tightened if mouth closed	Voice becomes harsh, conveys protest, irritation, frustration, hostility, pitch is often louder and deeper, utterances have a plosive quality	Arms akimbo, finger wagging or jabbing
Happiness	Smiling, cheek area rounds up, eye crinkling, eye brightness, brows raised	Light, lilting, higher pitch, louder	Little tension, jump up, raise arms, clap
Sadness	Lip corners pull down, bottom lip loose as in a pout, eyes drop, brow forms oblique shape	Crying, fussing, voices/vocalization low, drops off at end	Child's head drops down and to side, shoulders and/or body slump or slacken, eye rubbing to catch or hide tears