Title
Dynamic Associations Between Emotion Expressions and Strategy Use in Chinese American and Mexican American Preschoolers

Journal
Emotion, 23(2)

ISSN
1528-3542

Authors
Kim, Yeunjoo
Williams, Aya Inamori
Liu, Chang
et al.

Publication Date
2023-03-01

DOI
10.1037/emo0001100

Peer reviewed

Emotion

Dynamic Associations Between Emotion Expressions and Strategy Use in Chinese American and Mexican American Preschoolers

Yeunjoo Kim, Aya Inamori Williams, Chang Liu, and Qing Zhou

Online First Publication, April 7, 2022. http://dx.doi.org/10.1037/emo0001100

AMERICAN PSYCHOLOGICAL ASSOCIATION

Emotion

ISSN: 1528-3542

https://doi.org/10.1037/emo0001100

Dynamic Associations Between Emotion Expressions and Strategy Use in Chinese American and Mexican American Preschoolers

Yeunjoo Kim[1], Aya Inamori Williams[2], Chang Liu[3], and Qing Zhou[2]

[1] Department of Psychology, The Pennsylvania State University

[2] Department of Psychology, University of California Berkeley

[3] Department of Psychological and Brain Sciences, The George Washington University

Previous studies of emotion regulation in young children commonly used between-person approaches, which limit our understanding of dynamic and temporal relations between emotion expressions and strategy use. Further, previous work has mainly focused on temperamental reactivity among White children, and it is unclear whether these findings can generalize to children of Asian and Latinx origins. In the current study, we examined the within-person temporal associations between emotion expressions and strategy use among 3- to 5-year-old children in low-income Chinese American (CA) and Mexican American (MA) families. Children's emotion expressions (positive and negative) and strategy use (gaze aversion, self-soothing, fidgeting, and language) during an unfair social interaction task were coded by 10-s epoch. Executive functions were examined as between-person level predictors of strategy use. Multilevel modeling was conducted to examine whether positive and negative emotion expressions at one epoch ($t - 1$) predicted strategy use at the following epoch (t). The results indicate that positive emotion expressions predicted an increase in fidgeting at the next epoch ($\beta = .34$, $p < .01$). Executive functions were unrelated to strategy use. Cultural group differences were found: CA children displayed lower intensity of positive emotion and fewer strategy use compared with MA children. The present findings inform theories on the dynamics of emotion regulation in young children and have implications for interventions with underrepresented immigrant populations.

Keywords: Chinese American, dynamic process, early childhood, emotion expression, Mexican American

Supplemental materials: https://doi.org/10.1037/emo0001100.supp

Extensive research has supported the links between children's emotion regulation and socioemotional adjustment (Blair et al., 2015). The development of emotion regulation emerges between the ages of 3 and 5 years (Kopp, 1989), and children use various behavioral strategies in attempt to manage emotions. While previous studies have focused on the aggregated features (i.e., mean intensity and frequency) of emotion regulation at the between-person level (e.g., Carlson & Wang, 2007; Xiao et al., 2019), such approach has limited our understanding of how these behavioral strategies interact dynamically with emotion expression at the within-person level (Cole et al., 2019). The temporal relations of moment-to-moment behaviors involved in young children's emotion regulation processes remain unclear (Diaz & Eisenberg, 2015).

The present study examined dynamics of observed emotion expressions and strategy use among preschoolers using an unfair social interaction paradigm. In a sample of preschoolers from low-income Chinese American and Mexican American families, emotion expressions (positive and negative) and strategy use (gaze aversion, self-soothing, fidgeting, and language use) were coded at 10-s epoch. Given the theorized links between executive functions (Diamond, 2013) and emotion expression (Hudson & Jacques, 2014), we also assessed children's attention shifting and inhibitory control skills. Using multilevel modeling, we tested the temporal within-person relations between emotion expressions and strategy use while controlling for between-person variations in executive functions and cultural group.

Emotion Expressions and Strategy Use in Young Children

Emotion regulation can be broadly defined as the dynamic processes in which emotional experiences, emotion-related motivational and physiological states, and other induced behaviors are modulated or maintained (Eisenberg et al., 2010). Despite children's limited

Yeunjoo Kim https://orcid.org/0000-0003-3285-3721

Aya Inamori Williams https://orcid.org/0000-0001-7087-6436

This work was supported by National Institutes of Health Grant R01HD091154 awarded to Qing Zhou and Yuuko Uchikoshi (Co-PI).

Correspondence concerning this article should be addressed to Qing Zhou, Department of Psychology, University of California Berkeley, 2121 Berkeley Way, Room 3302, Berkeley, CA 94720-1650, United States. Email: qingzhou@berkeley.edu

ability to articulate their emotion regulation, they use various behavioral strategies (hereafter labeled as *strategy use*) including gaze aversion, self-soothing, fidgeting, and verbalization. Because higher-order self-regulatory skills are still developing in this period (Kopp, 1989; Spinrad et al., 2007), some of these strategies are reactive rather than deliberate, and their regulatory functions are unclear, although children may demonstrate efforts to modulate emotions (Cole et al., 2017).

Existing research on emotion regulation in early childhood has primarily focused on behaviors during negative emotion expressions. Specifically, gaze aversion and self-soothing behaviors have been studied in relation to negative emotions such as anger and fear (Cole et al., 2004; Dennis et al., 2009; Eisenberg et al., 2010). Gaze aversion and self-soothing develop early and are viewed as children's efforts to hide and internalize negative emotions (Fox & Calkins, 2003). In contrast, other commonly observed behavioral strategies do not have clear relations to expressed emotions. For example, fidgeting has been observed not only as a sign of distress (Zahn-Waxler et al., 1994), but also as a sign of hyperactivity (Miller et al., 2004). When receiving a disappointing gift, for example, preschoolers may show fidgeting accompanied by social smiles (Hudson & Jacques, 2014). Cole et al. (1994) suggested that fidgeting may be accompanied by expressions of negative and positive emotions, and serve a regulatory function to mask negative emotions in accordance with cultural display rules.

Similarly, children may use language accompanied by negative emotion expression to communicate their needs (Cole et al., 2011) or to facilitate emotional understanding (Cole et al., 2010). Consistent with the theory that language development can promote self-regulation development (Kopp, 1989), research using between-person approaches have found that children with higher language skills are better at regulating positive emotions (Liebermann et al., 2007), and they display more positive affect and lower anger across settings and over time (Bendezú et al., 2018; Winsler et al., 2003). However, the temporal within-person relations between language and emotion expressions remain understudied.

In sum, although some behavioral strategies (i.e., gaze aversion and self-soothing) appear to be more consistently related to negative emotion expressions, whether and how other strategies (i.e., fidgeting and language use) may be related to negative and positive emotion expressions require further investigation, particularly at the within-person level. Studying within-person associations among these behaviors using a temporally lagged design can inform developmental theory on when and how various behavioral strategies used by children are related to emotion expression and, potentially, their regulatory functions.

The Dynamics of Emotion Expressions and Behavioral Strategies in Young Children

Emotion regulation is a dynamic process that can be examined from temporal assessments of the quality, intensity, timing, and modulation of emotionality (Thompson, 1994). Prior studies on emotion regulation often use the temperament framework, which focused on dispositional between-person variations in emotional, behavioral, and attentional reactivity (Rothbart & Derryberry, 1981). This approach has demonstrated the long-term implications of emotion regulation for socioemotional adjustment (e.g., Eisenberg et al., 2010; Herndon et al., 2013). However, between-person approaches commonly aggregate emotion expressions and behaviors to create global indexes, which might disguise the temporal relations of emotion regulation and strategies, therefore limiting our understanding of the dynamics of emotion regulation process (Louie et al., 2013).

Within-person approaches, on the other hand, capture temporal links between emotion expressions and strategy use based on time segments of seconds (Lougheed et al., 2019). Thus, researchers can test how emotion expression at one moment triggers strategy use in the next moment and vice versa. Only a handful of studies used within-person approaches. Buss and Goldsmith (1998) analyzed the temporal contingencies between emotion expression and strategy use. They found that although global ratings of anger and fear did not show between-person associations with strategy use (e.g., distraction), a decrease in the intensity of expressed anger following a strategy use was observed at the within-person level (5- and 10-s epochs), (Buss & Goldsmith, 1998). Similarly, Gilliom et al. (2002) found temporal contingency between expressed anger and strategy use in early childhood: behaviors related to desired targets (e.g., gaze on the object) were related to increased anger in the following epoch, whereas problem-solving behaviors (e.g., information gathering) were related to decreased anger in the next epoch. By segmenting a continuous behavioral task into one-second epochs, Cole et al. (2017) found 3-year-olds' strategy use (e.g., self-soothing) occurred when children expressed a high intensity of anger, but strategy use did not predict dampened negative emotion expression (e.g., frustration).

Together, these studies demonstrated that temporal assessments of emotion regulation processes at the within-person level can provide a nuanced picture of the relations between emotion expressions and strategy use (Chow et al., 2016; Cole et al., 2017). The present study extended this literature and tested when and how children use strategies in response to different valence of emotions. These findings can inform practices by helping caregivers and educators identify behavioral cues to young children's emotional experiences, which can facilitate supportive responses to children's emotions. For instance, a child fidgeting during circle time may signal to the teacher that he or she is experiencing excitement (positive emotion) or anxiety (negative emotion) and may need adult support in emotion regulation in the moment.

Between-Person Variations in Executive Functions

Given the theorized links between emotion regulation and executive function development (EF; Eisenberg & Zhou, 2016; Zelazo & Cunningham, 2007), we also considered between-person variations in two EF skills: attention shifting and inhibitory control. Prior studies using between-person approaches have found associations between EF and trait-level emotion expressions. For example, Ferrier et al. (2014) found reciprocal relations between emotionality (positive and negative) and EF among preschool-age children. Consistent with the theory that attention shifting is critical for emotion regulation by enabling the child to disengage from the upsetting situations (Johnson et al., 2012), attention shifting predicted higher socioemotional functioning (White et al., 2011). Moreover, several studies reported links between inhibitory control, emotion regulation, and positive emotion expressions in preschoolers (Carlson & Wang, 2007; Hudson & Jacques, 2014). Importantly, the within-person relations between EF and emotion regulation may vary by emotional reactivity: high levels of EF were observed among infants who exhibited high levels of emotional reactivity and high levels of regulation (Hoeksma et al., 2004; Ursache et al., 2013). However, the roles of EF in the within-person relations between emotion expressions and strategy use remain to be tested.

Between-Person Variations in Emotion Expressions and Regulation Across Cultural Groups

Cultural practices, norms, and values shape the meaning and function of emotionally expressive behaviors (Mauss & Butler, 2010). Accordingly, socialization practices can shape how children express and regulate emotions in various social contexts (Raver, 2004). Indeed, preschool-age children showed emotion regulation strategies, such as smiling when receiving a disappointing gift, especially when others are present (Cole et al., 1994). However, less is known about how variations in cultural contexts are associated with emotion expression and strategy use in preschool-age children, especially in non-European American cultural groups.

Both Chinese American (CA) and Mexican American (MA) groups tend to endorse relational values of prioritizing group affiliation and interpersonal harmony (Chen, 2018). Consistent with these values, CA parents tend to prohibit disruptive behaviors, discourage expressions of negative emotion (especially anger) and encourage emotional control (Chen et al., 2005; Wang et al., 2006). Moreover, researchers observed fewer positive emotions and lower activity levels in CA preschoolers compared with European American children (Garrett-Peters & Fox, 2007; Wang & Barrett, 2015). These emotion socialization practices may promote preschoolers' tendency to down-regulate positive emotions (Ng et al., 2007), which is consistent with East Asian values of dialectical thinking (i.e., balance of negative & positive emotions, Miyamoto & Ma, 2011). Consistent with the hypothesis that exposure to American culture is associated with increased emotion expressions, European American girls smiled more than Mainland Chinese and CA girls and scored higher on overall expressivity, and Chinese girls adopted by European American families had more negative expressions than Mainland Chinese girls (Camras et al., 2006). Similarly, CA parents' American orientation was positively associated with self-reported emotion expressions (Chen et al., 2015).

By contrast, values of hospitality and emphasis on positive emotion expression (while de-emphasizing negative emotion expression) are salient in Mexican cultures (Ramírez-Esparza et al., 2009; Ruby et al., 2012). Consistent with the cultural script of *simpatía*, MA preschoolers expressed more positive than negative emotions in parent–child interactions (Lindsey et al., 2013). Similar to Chinese parents, Mexican parents also value self-control and encourage behavioral inhibition and shyness and discourage open expression of negative emotions, which may be related to the cultural expectations of *respeto* and interdependence (Gudiño & Lau, 2010; Varela et al., 2004). However, empirical studies on temperamental reactivity and emotion regulation with Mexican-origin or Latinx children are very limited (Chen, 2018). There have been few studies of emotional processes that included both CA and MA groups, the two largest foreign-born populations in the United States (Radford, 2019).

Although both CA and MA cultural contexts are considered collectivistic (Markus & Kitayama, 1991), the overall levels of emotion expression might differ due to differences in specific cultural values (Campos & Kim, 2017) or spoken language (Llabre, 2021). Soto et al. (2005) found that MA college students had higher levels of expressed positive and negative emotions than CA students, with a more pronounced difference for positive emotions. Similarly, Su et al. (2015) found higher suppression of positive emotions in CA adults compared with MA adults. Consistent with the affect valuation theory (Tsai, 2007), Chinese adults preferred low arousal positive emotions (e.g., calmness) over high arousal positive emotions (e.g., excitement), whereas the opposite patterns were found for Mexican adults (Ruby et al., 2012). Cultural differences in affect valuation have behavioral consequences. For example, Chinese mothers displayed fewer positive emotions (typically defined in terms of high arousal positive states) and more soothing vocalizations with their children compared with American mothers (see Tsai, 2007, for a review). This is consistent with the East Asian cultural preference of communicating positive emotions via instrumental aids rather than direct expressions (Campos & Kim, 2017).

In sum, cultural group differences in values and displays of emotion expressions have been observed, with CA adults exhibiting higher tendencies to value and display suppression of positive emotions and MA adults exhibiting higher tendencies to value and display open expression of positive emotions. However, whether these cultural differences can be observed in preschool-age children remains a critical question, which can shed light on how early the culture-dependent socialization processes take effect. Although historically underrepresented in the United States, CA and MA children now make up nearly 40% of all children in Head Start, an early childhood education program for low-income families (U.S. Department of Health and Human Services, 2019). In the present study, the two cultural groups were matched on child age, family socioeconomic status, and geographic areas, which allowed us to investigate cultural group variations independent from other demographic and socioeconomic factors.

The Present Study

Using a sample of preschoolers from low-income CA and MA families, the present study examined within-person associations between positive and negative emotion expressions and strategy use (gaze aversion, self-soothing, fidgeting, language use) while taking into account the between-person variations in EF (inhibitory control and attention shifting) and cultural groups. The study had three aims. The first aim was to test the within-person temporal relations between emotion expressions and strategy use. Based on previous studies (Cole et al., 2004; Eisenberg et al., 2010), we expected negative emotion expression to be associated with gaze aversion and self-soothing (H1a) and be positively predicted by negative emotion expression from the previous epoch (H1b). On the other hand, based on previous findings on between-person variations in fidgeting (e.g., Cole et al., 1994; Hudson & Jacques, 2014), we hypothesized fidgeting to be positively associated with positive emotion expression across the task (H1c) while positively predicted by negative emotion expression from the previous epoch (H1d). Furthermore, based on previous research (Cole et al., 2010; Liebermann et al., 2007), we hypothesized language use to be positively associated with positive emotion expression across the task (H1e). Meanwhile, based on the research suggesting that children may use language to communicate negative emotions (Bendezú et al., 2018), we expected language use to be positively predicted by negative emotion expression from the previous epoch (H1f).

The second aim was to examine the relations of executive functions to children's strategy use. Based on Liew et al. (2004) and White et al. (2011), we hypothesized EF to be positively associated with strategy use (Hypothesis 2). The third aim was to examine cultural group differences in children's emotion expressions and strategy use. Based on previous research (Soto et al., 2005), we expected CA children to express less intense positive and negative emotions than MA children (H3a). Because emotion expressions and behavioral strategies are interrelated during social interactions, we also expected CA children to display fewer strategy use than MA children (H3b).

Method

Participants

The present study used archival data from a cross-sectional study on language and socioemotional development of preschoolers in low-income Chinese American and Mexican American families (Williams et al., 2019). The sample was recruited through partnerships with Head Start preschool centers with high concentrations of CA and MA families. For the inclusion criteria, the child must: (a) be between 36 and 71 months of age, (b) be enrolled at a center-based Head Start program for a minimum of three days per week, (c) understand and speak some English, and Cantonese, Mandarin, or Spanish (by parent report), and (d) have at least one parent who identifies as ethnically Chinese or Mexican. Children who were diagnosed with a speech or language disorder or were receiving speech and language services were excluded. The study protocol was approved by the IRB review board of the University of California, Berkeley.

A total of 90 children (44 CA children and 46 MA children, age = 38 to 70 months, $M_{age} = 54.4$, $SD = 7.1$, 59% girls) and their parents (age = 21 to 46 years, $M_{age} = 34.6$, $SD = 6.4$, 98% mothers) participated. Of the children, 18% were born outside of the United States (i.e., 1st-generation), 77% were born in the United States and had at least one foreign-born parent (i.e., 2nd-generation), and 5% were born in the United States with both U.S.-born parents (i.e., 3rd-generation). Of the parents, 91% were born outside of the US (46% China, 43% Mexico, and 2% others). The average parental education was 11 years ($SD = 3.8$). The family's average per capita income in the past year was $5,167 ($SD$ = $3,655), significantly below the national poverty threshold (U.S. Census Bureau, 2015). The CA and MA groups did not differ on child age and gender, parental education, and family income. However, the two groups differed in child generation status, with the CA children being either first (36.4%) or second generations (63.6%) and the MA children being either second (89.1%) or third generations (10.9%), $\chi^2(df=2, N=90) = 23.42$, $p < .001$.

Procedure

The parent–child dyad completed a 2.5-hour assessment and questionnaire session. All questionnaires and assessments were administered in participants' preferred language (English, Cantonese, Mandarin, or Spanish) by bilingual and bicultural CA or MA research assistants. Among the participants, 77% of MA children and 50% of CA children used Spanish/Chinese only throughout the assessment, whereas 5.1% of MA children and 16.7% of CA children used more Spanish/Chinse than English, 2.6% of MA children used equal amount of Spanish and English, and 15.4% of MA children and 33.3% of CA children used English only. The study variables did not differ in means by language of assessment ($ps > .05$). Executive function tasks were administered prior to the emotion regulation tasks to minimize the influence of emotional states on cognitive performance (Zelazo & Cunningham, 2007). About 68% of children completed the assessment at the university lab and the rest completed the assessment at their homes. There were no differences in means of study variables by assessment location except for the fidgeting variable, where children who completed the lab assessment displayed more fidgeting than children who were assessed at homes (Ms = .39 and .20 and SDs = .35 and .27 for lab and home assessment, respectively), $t(63) = 2.65$, $p = .01$, Cohen's $d = .33$.

Measures

The Not Sharing Task from the Laboratory Temperament Assessment Battery (LAB-TAB; Goldsmith et al., 1993) was used to elicit negative emotion (e.g., sadness and anger). The five-minute task was divided into three phases: fair distribution (1 minute), unfair distribution (3 minutes), and recovery (1 minute). In the fair distribution phase, the assessor shared a basket of candies equally with the child. In the unfair distribution phase, the child received fewer candies than the assessor. The assessor then removed candies from the child's cup. In the recovery phase, the assessor apologized, returned all candies, and encouraged the child to pick two new candies from the basket. Throughout the task, child was prompted to verbalize their feelings. The unfair distribution phase was segmented into 10-s epochs in ELAN (Lausberg & Sloetjes, 2009) and coded using the codebook adapted from Spinrad and Eisenberg (2007).

Emotion Expression Codes

Children's displays of anger, sadness, and positive emotions were coded by a team of two trained bilingual and bicultural research assistants. Interrater reliability was calculated in Cohen's Kappa. Each emotion expression code was rated on a 4-point scale (1 = *the absence of the particular emotion behavior*, 4 = *intense or prolonged expression of the emotion behavior*). Examples of anger included grimacing, scowling, fussing, crying, and bodily struggles such as pulling of arms, pulling forward, arching back, banging, and kicking ($k = .86$). Examples of sadness included frowning, tears, crying (i.e., sad cry has a more rhythmic quality than anger cry), whimpering, and bodily sadness such as slumping, and dropping of the head in arms or hands ($k = .81$). Examples of positive emotion expression included smiling, positive vocalization, laughter, and squealing ($k = .80$).

Behavioral Strategy Codes

Behavioral strategy codes were rated categorically as present or absent for each 10-s epoch to code a child's behavioral strategies: gaze aversion (looking away from candy, candy cup, or the assessor; $k = .87$), self-soothing (rocking, touching clothes, or body parts, such as clasping hands, sucking fingers, twirling hair, rubbing face, picking nose; $k = .89$), fidgeting (gross motor movements without sitting still in the chair; $k = .91$), and use of nonemotional language (e.g., *"Your teeth will go black if you eat all those candies"*; $k = .83$). The strategy codes were rated by the same team of coders separately from the emotion expression codes.

Executive Functions

Considering the sample's age group and because working memory develops later in development (Diamond, 2013; Karr et al., 2018), attention shifting and inhibitory control measures were used to assess executive functions. Two tasks from the Preschool Executive Functions Assessment (Willoughby et al., 2010) were used. Something's the Same (STS) task was used to measure attention shifting between different domains (e.g., sort items by color first then shape). The split-half reliability of STS items for the full sample was .70 (.75 for CA group and .65 for MA group). Silly Sounds Stroop (SSS) task was used to assess inhibitory control of socially learned prepotent responses (e.g., say "woof" when shown a picture of a cat). The split-half reliability of SSS items using the Spearman-Brown coefficient was estimated to be .85 for the full sample in the present study (.88 for CA group and .76 for MA group).

Data Reduction

Overall, relatively low levels of expressed anger and sadness were observed ($M_{anger} = 1.12$, $SD = .23$; $M_{sadness} = 1.19$, $SD = .39$), and they were positively correlated with each other, $r = .57$, $p < .001$. Thus, anger and sadness were combined into an aggregated index of negative emotion expression ($\alpha = .73$) for analysis. A few strategies coded based on Spinrad and Eisenberg (2007) had mean frequencies lower than .10 or higher than .90 (for example, disruptive behaviors, preventive block, use of emotional language, and were removed from data analyses due to the lack of variance. Thus, gaze aversion, self-soothing, fidgeting, and use of nonemotional language codes were included in the final analyses.

Plan of Data Analysis

We examined between- and within-person associations between positive or negative emotion expressions and strategy use in two cultural groups, while accounting for dependencies of repeated measures and controlling for child gender. All strategy use (presence versus absence) and emotion expressions (varying from absence to intense level of emotion) were coded as discrete variables. Specifically, to test the hypothesis that the child's emotion expressions would predict the following strategy use, we conducted 1-epoch lagged generalized multilevel models (Snijders & Bosker, 1999). All analyses were examined using Linear Mixed-Effects Models using Eigen and SE package (lme4; Bates et al., 2014) in R (Version 3.4.0; R Core Team, 2013).

Data Preparation

Of the sample, 90% of children ($N = 81$) completed the task with 99% response rate. Missing data on study variables were generally small: 1% for attention shifting, 3% for inhibitory control, and 10% for emotion expressions and strategies. Missing data were due to technical issues. Thus, missing data were treated as missing completely at random.

To prepare the data, we person-centered children's positive and negative emotion expressions to independently test between- and within-person associations with strategy use (Bolger et al., 2003). We separated a person i's mean level of positive ($M\ PE_i$) or negative emotion expressions ($M\ NE_i$) from a person i's state level of positive ($State\ PE_i$) or negative emotion expressions ($State\ NE_i$). For instance, $M\ PE_i$ was calculated as the mean of a child's positive emotion expression across the entire unfair distribution phase of the task at the between-person level, and $State\ PE_i$ at epoch t was calculated as the deviation from the mean level of positive emotion expression at epoch t at the within-person level.

Analysis 1: Child's Positive Emotion Expression Predicting Strategy Use

In Level 1 within-person analysis, we predicted children's strategy use (gaze aversion, self-soothing, fidgeting, or nonemotional language) at epoch t from their $State\ PE_i$ at epoch $t - 1$. In Level 2 between-person analysis, we tested whether there was a significant association between child's expected frequency of strategy use (average level of frequency; intercept of the model) and their $M\ PE_i$ across the task, gender, culture, and executive functions. The equation for this model is presented in a online supplement material S1.

Analysis 2: Child's Negative Emotion Expression Predicting Strategy Use

We examined the temporal relations of a child's negative emotion expression to strategy use (gaze aversion, self-soothing, fidgeting, or nonemotional language). The Level 1 within-person model predicted a child's strategy use at epoch t from their $State\ NE_i$ at epoch $t - 1$. The Level 2 between-person model tested whether there was a significant association between child's expected frequency of strategy use and their $M\ NE_i$, gender, culture, and executive functions.

Results

Between-Person Level Descriptive Statistics

Throughout the unfair distribution phase, the average intensity of positive emotion expression was 1.81 ($SD = .66$) and the average intensity of negative emotion expression observed was 1.14 ($SD = .26$) across participants, indicating that children expressed higher levels of positive emotions than negative emotions. On average, gaze aversion was displayed .19 times ($SD = .20$), self-soothing .29 times ($SD = .35$), fidgeting .33 times ($SD = .34$), and nonemotional language .26 times ($SD = .26$) across participants. As for executive function, a mean score of 77% on attention shifting and 64% on inhibitory control were obtained.

Full descriptive statistics and correlations are reported in Table 1. Pearson correlations showed that fidgeting ($r = .50$, $p < .001$) and nonemotional language usage ($r = .23$, $p = .04$) were positively associated with the expression of positive emotion. Meanwhile, gaze aversion ($r = .47$, $p < .001$) and self-soothing behaviors ($r = .25$, $p = .03$) were positively associated with the expression of negative emotion. The positive and negative emotion

Table 1
Descriptive Statistics and Correlations Among Study Variables

Variable	1	2	3	4	5	6	7	8
Emotion expressions (intensity)								
1. Negative emotion expression	—							
2. Positive emotion expression	−.11	—						
Strategy use (frequency)								
3. Gaze aversion	.47***	.09	—					
4. Self-soothing	.25*	.08	.35**	—				
5. Fidgeting	.10	.50***	.25*	.02	—			
6. Nonemotional language use	−.03	.23*	.09	−.03	−.35**	—		
7. Inhibitory control	−.10	−.04	.12	.05	.11	.003	—	
8. Attention shifting	−.08	.02	.16	−.07	.12	−.02	.29**	—
M	1.14	1.81	.19	.29	.33	.26	.64	.77
SD	0.26	0.66	.20	.35	.34	.26	.28	.16

* $p < .05$. ** $p < .01$. *** $p < .001$.

expressions were not significantly associated (p = .35). Although attention shifting and inhibitory control were significantly associated with each other (r = .29, p = .01), they were kept as separate variables in analyses because the two constructs represent different processes of executive functions and related differently to children's socioemotional behaviors (Buzzell et al., 2021).

Temporal Relations Between Emotion Expressions and Strategy Use

Although our hypotheses focused on predicting strategy use from emotion expressions, we tested both directionalities between emotion expressions and strategy use given the reciprocal nature of these processes at the epoch-to-epoch level. However, none of the strategies predicted emotion expressions in the next epoch. Thus, we only present the results for emotion expression predicting strategy use. Furthermore, child gender as a covariate was removed from the model predicting self-soothing because the model did not converge.

Between-Person Relations

The results for positive emotion expression predicting gaze aversion, self-soothing, fidgeting, and nonemotional language are shown in Table 2. First, gaze aversion (*M PE*; $\gamma_{01} = -.02$, p = .92) and self-soothing ($\gamma_{01} = -.18$, p = .48) were not associated with the between-person level positive emotion expression. Second, as expected (H1c), fidgeting showed a significant positive association with *M PE* (γ_{01} = .60, $p < .01$). That is, children exhibited more frequent fidgeting behaviors when they expressed higher mean levels of positive emotion across the task. Third, nonemotional language was not associated with any predictor, rejecting our hypothesis (ps $>$ .05; H1e).

The results for negative emotion expression predicting strategy use are shown in Table 3. Gaze aversion was positively associated with between-person level negative emotion expression as expected (*M NE*; γ_{21} = .61, $p < .01$; H1a), such that children with higher negative emotion expression exhibited more gaze aversion throughout the task. Self-soothing, on the other hand, was not associated with *M NE* (γ_{21} = .45, p = .12). Fidgeting was negatively associated with *M NE* ($\gamma_{21} = -.48$, p = .03), suggesting that children with higher negative emotion expressions exhibited lower levels of fidgeting throughout the unfair distribution phase. Again, nonemotional language was not associated with any predictor (ps $>$ .05; H1e).

Within-Person Relations

Within-person level positive emotion expression *(State PE)* at epoch $t-1$ did not predict gaze aversion at epoch t (γ_{10} = .01, p = .93 or self-soothing (γ_{10} = .04, p = .72). However, contrary to our expectation (H1d), child's *State PE* at epoch $t-1$ (γ_{10} = .34, $p <$ .01) predicted fidgeting at epoch t, indicating that children who expressed higher intensity of positive emotion displayed increased fidgeting in the following epoch. Finally, nonemotional language was not associated with any predictor, rejecting our hypothesis (ps $>$ .05; H1e).

With respect to negative emotion expressions, our hypothesis was rejected (H1b) such that negative emotion expression *(State NE)* at epoch $t-1$ did not predict gaze aversion at epoch t (γ_{30} = .02, p = .88). Although we expected gaze aversion and self-soothing would be associated with negative emotion expression similarly at both between-person and within-person levels, a child's *State PE at* epoch $t-1$ did not predict self-soothing ($\gamma_{30} = -.02$, p = .88). *State NE* at epoch $t-1$ also did not predict fidgeting at epoch t ($\gamma_{30} = -.14$, p = .36; H1d). Again, nonemotional language was not associated with any predictor (ps $>$ .05; H1f).

Results on Executive Functions

Across all models, attention shifting was not associated with strategy use at the between-person level contrary to our hypotheses (ps $>$ .05; H2). Furthermore, attention shifting also did not predict strategy use using within-person approaches (ps $>$ .05; H2). We ran the same models with inhibitory control as the predictor, and the results were consistent with the findings reported in Table 2 and Table 3.

Cultural Group Variations in Expressed Emotions and Strategy Use

Independent t tests were conducted to examine cultural group differences in the intensity of expressed emotions and frequency of strategy use between CA and MA children. In support of our hypothesis (H3a), CA children (M = 1.59, SD = .66) displayed lower intensity of positive emotions (but not negative emotions) than MA children (M = 2.00, SD = .62) throughout the task, $t(77) = -2.85$, p = .006, d = .64.

Table 2

Results of Multilevel Model Testing Whether Child's Positive Emotion Expression Predicts Strategy Use

Strategy use	Estimate (*SE*)	*p*	95% CI	Exp. (estimate)
PE predicting gaze aversion				
Fixed effects				
Intercept γ_{00}	−.93 (.77)	.23	[−2.52, .57]	.39
Mean PE γ_{01}	−.02 (.18)	.92	[−.39, .33]	.98
State PE, $t-1$ γ_{10}	.01 (.13)	.93	[−.25, .27]	1.01
Culture γ_{02}	−1.07 (.28)	<.01	[−1.65, −.52]	.34
Attention shifting γ_{03}	.16 (.73)	.83	[−1.30, 1.64]	1.17
Child gender γ_{04}	−.30 (.32)	−.35	[−.92, .34]	.74
Random effects				
SD of Intercept σ_{u2}	.59			
−2LL	−378.8			
PE predicting self-soothing				
Fixed effects				
Intercept γ_{00}	−1.05 (.82)	.20	[−2.72, .57]	.35
Mean PE γ_{01}	−.18 (.26)	.48	[−.72, .34]	.83
State PE, $t-1$ γ_{10}	.04 (.11)	.72	[−.18, .25]	1.04
Culture γ_{02}	−1.63 (.37)	<.01	[−2.43, −.93]	.20
Attention shifting γ_{03}	−.15 (1.01)	.88	[−2.21, 1.88]	.86
Random effects				
SD of intercept σ_{u2}	1.12			
−2LL	−424.6			
PE predicting fidgeting				
Fixed effects				
Intercept γ_{00}	−1.17 (.69)	.09	[−2.55, .23]	.31
Mean PE γ_{01}	.60 (.17)	<.01	[.27, .95]	1.82
State PE, $t-1$ γ_{10}	.34 (.10)	<.01	[.14, .55]	1.41
Culture γ_{02}	−1.09 (.27)	<.01	[−1.65, −.59]	.34
Attention shifting γ_{03}	.16 (.72)	.83	[−1.31, 1.57]	1.17
Child gender γ_{04}	−.01 (.29)	.98	[−.59, .57]	.99
Random effects				
SD of intercept σ_{u2}	.64			
−2LL	−461.7			
PE predicting nonemotional language				
Fixed effects				
Intercept γ_{00}	−1.89 (.88)	.03	[−3.71, −.17]	.15
Mean PE γ_{01}	.28 (.22)	.20	[−.15, .73]	1.32
State PE, $t-1$ γ_{10}	.04 (.12)	.72	[−.20, .29]	1.04
Culture γ_{02}	−.48 (.34)	.15	[−1.18, .17]	.62
Attention shifting γ_{03}	1.27 (.88)	.15	[−.46, 3.10]	3.57
Child gender γ_{04}	−.34 (.35)	.32	[−1.06, .35]	.71
Random effects				
SD of intercept σ_{u2}	.91			
−2LL	−422.9			

Note. SE = standard error; 95% CI = 95% confidence interval; Exp. (estimate) = exponentiated parameter values for ease of interpretation; σ = standard deviation of random effects; PE = positive emotion expression.

In support of our hypothesis (H3b), cultural group differences were found for all strategy use except for nonemotional language. When predicting strategy use from the positive emotion expression, gaze aversion was associated with culture group ($\gamma_{02} = -1.07$, $p < .01$), such that CA children showed a lower frequency of gaze aversion across the task compared with MA children. When testing whether positive emotion expression predicted self-soothing, culture group was associated with self-soothing ($\gamma_{02} = -1.63$, $p < .01$). That is, CA children showed fewer self-soothing behaviors across the task compared with MA children. Furthermore, fidgeting was associated with cultural group ($\gamma_{02} = -1.09$, $p < .01$), indicating that CA children showed fewer fidgeting behaviors across the task compared with MA children (see Table 2).

When predicting strategy use from negative emotion expressions, we again found that CA children showed fewer gaze aversion behaviors compared with MA children ($\gamma_{22} = -.99$, $p < .01$). When self-soothing was the outcome, cultural group was the only significant predictor ($\gamma_{22} = -1.48$, $p < .01$), such that CA children showed fewer self-soothing behaviors compared with MA children. Furthermore, CA children showed fewer fidgeting behaviors compared with MA children ($\gamma_{22} = -1.38$, $p < .01$). The results are reported in Table 3.

Discussion

The present study examined the temporal relations between observed emotion expressions and strategy use during an unfair

Table 3

Results of Multilevel Model Testing Whether Child's Negative Emotion Expression Predicts Strategy Use

Strategy use	Estimate (*SE*)	*p*	95% CI	Exp. (estimate)
NE predicting gaze aversion				
Fixed effects				
Intercept γ_{20}	−.70 (.75)	.35	[−2.23, .77]	.50
Mean NE γ_{21}	.61 (.18)	<.01	[.26, 1.00]	1.84
State NE, $t-1$ γ_{30}	.02 (.12)	.88	[−.23, .25]	1.02
Culture γ_{22}	−.99 (.27)	<.01	[−1.53, −.47]	.37
Attention shifting γ_{23}	−.44 (.72)	.54	[−1.89, 1.00]	.64
Child gender γ_{24}	−.21 (.31)	−.51	[−.82, .42]	.81
Random effects				
SD of intercept σ_{u2}	.54			
−2LL	−372.4			
NE predicting self-soothing				
Fixed effects				
Intercept γ_{20}	−.80 (1.04)	.44	[−2.91, 1.29]	.45
Mean NE γ_{21}	.45 (.29)	.12	[−.12, 1.03]	1.56
State NE, $t-1$ γ_{30}	−.02 (.11)	.88	[−.24, .19]	.98
Culture γ_{22}	−1.48 (.39)	<.01	[−2.33, −.74]	.23
Attention shifting γ_{23}	−.62 (1.05)	.59	[−2.75, 1.48]	.54
Child gender γ_{24}	.02 (.42)	.96	[−.83, .87]	1.02
Random effects				
SD of intercept σ_{u2}	1.09			
−2LL	−421.5			
NE predicting fidgeting				
Fixed effects				
Intercept γ_{20}	−1.37 (.71)	.05	[−2.79, .05]	.25
Mean NE γ_{21}	−.48 (.23)	.03	[−.95, −.04]	.61
State NE, $t-1$ γ_{30}	−.14 (.15)	.36	[−.44, .14]	.87
Culture γ_{22}	−1.38 (.28)	<.01	[−1.86, −.89]	.25
Attention shifting γ_{23}	.89 (.74)	.23	[−.61, 2.18]	2.45
Child gender γ_{24}	−.10 (.30)	.74		.91
Random effects				
SD of intercept σ_{u2}	.68			
−2LL	−470.3			
NE predicting nonemotional language				
Fixed effects				
Intercept γ_{20}	−1.96 (.88)	.03	[−3.78, −.23]	.14
Mean NE γ_{21}	−.32 (.30)	.29	[−.95, .25]	.73
State NE, $t-1$ γ_{30}	−.15 (.15)	.31	[−.47, .13]	.86
Culture γ_{22}	−.69 (.33)	.04	[−1.39, −.05]	.50
Attention shifting γ_{23}	1.59 (.91)	.08	[−.17, 3.47]	4.91
Child gender γ_{24}	−.39 (.35)	.27	[−1.11, .31]	.68
Random effects				
SD of intercept σ_{u2}	.92			
−2LL	−421.9			

Note. *SE* = standard error; 95% CI = 95% confidence interval; Exp. (estimate) = exponentiated parameter values for ease of interpretation; σ = standard deviation of random effects; NE = negative emotion expression.

social interaction among preschoolers from low-income CA and MA families. We also tested between-person associations between emotion expressions and strategy use and considered between-person variations in executive function and cultural group. In partial support of our hypotheses, at the between-person level, we found some specificity in the relations between emotion expressions and strategy use. Only gaze aversion was positively associated with negative emotion expressions during the unfair distribution phase of the task. Fidgeting, on the other hand, was positively associated with positive emotion expressions and negatively associated with negative emotion expressions.

Temporal analysis at the within-person level revealed that fidgeting was predicted by positive emotion expression. The finding is different from previous studies using between-person approaches, which showed fidgeting as a behavioral sign of anxiety or dysregulated distractedness (Miller et al., 2004; Zahn-Waxler et al., 1994). One interpretation is that our sample consisted of children in low-income immigrant families, whereas previous studies sampled predominantly White children. However, our finding is somewhat consistent with previous studies showing that children displayed positive emotion (e.g., smiling) accompanied by fidgeting in disappointing and frustrating situations (Cole et al., 1994; Garrett-Peters

& Fox, 2007; Liew et al., 2004). Because there can be various types (e.g., felt, false, and miserable smiles; Ekman & Friesen, 1982) and functions of smiles (Ansfield, 2007; Ekman, 1972), it is difficult to discern whether the positive emotions observed was the expression of genuine happiness or nervous laughter to hide distress (e.g., Liew et al., 2004). Notably, children assessed in the lab fidgeted more than those assessed at home. Thus, fidgeting may be induced by positive emotions that some children used to suppress negative emotion expression, especially in the unfamiliar context of lab assessment. Although fidgeting did not predict emotion expressions, our results suggest that fidgeting is predicted by children's effort to express positive emotion in frustrating unfair social situations. These results highlight the advantages of using the time-segmented data at the within-person level to understand how young children display and potentially regulate emotions.

Interestingly, gaze aversion was not predicted by negative emotion expressions despite their relations at the between-person level. This suggests that gaze aversion is not necessarily consequential or regulatory but may be the by-products of emotion expression. Whether a regulatory effort is effective may vary by the valence and type of emotions and whether changes are observed in emotion expressions (Gilliom et al., 2002). As examined in infant and toddler studies, gaze aversion may be more effective in regulating fear than anger elicited by the experience of unfair treatment (Cole et al., 2004). Future studies can incorporate physiological measures of emotional reactivity and regulation to investigate whether the observed strategy use was behavioral expressions or means of masking emotions (Mauss et al., 2005).

Executive Functions

Despite the theorized linkage between EF and emotion regulation (Zelazo & Cunningham, 2007), we did not find significant relations between children's EF skills and behavioral strategies. It is possible that the transference of "cool" cognitive skills in "hot" emotional settings may not ensue without sufficient self-regulatory capacity, which young children have yet to develop (Eisenberg & Zhou, 2016). Most preschoolers have not developed working memory skills, an EF component that updates and maintains information at hand supporting attention shifting and inhibitory control (Carlson et al., 2004). One possibility is that during preschool age, transference of one skill to another under emotionally taxed situations may be challenging because updating information requires higher cognitive control skills (e.g., working memory). Although EF may be an underlying mechanism supporting emotion regulation (Zelazo & Cunningham, 2007), the transference of skills still needs practicing during the preschool age. Although associations between inhibitory control and emotion regulation were found in a previous study (Carlson & Wang, 2007), inhibitory control was measured under an emotionally-taxing environment, the so-called "hot EF" (Kerr & Zelazo, 2004). By contrast, our study measured the so-called "cool EF." Moreover, the participants in Carlson and Wang (2007) were older than the current sample and had more mature self-regulatory skills. A final possibility for the lack of relation between EF and emotion variables may be due to the limitation of binary measures of strategy use. Under the current discrete coding scheme, it is difficult to gauge how deliberate the strategy use was and whether they deployed any cognitive resources. Thus, future studies could include additional measures of EF or examine children's strategy use on a continuum.

Cultural Considerations

Partly consistent with our hypothesis (H3a), CA children displayed lower intensity of positive (and not negative) emotions than MA children, paralleling the patterns found in the adult literature (Soto et al., 2005; Su et al., 2015). Similarly, in a study of college students, Chinese students preferred low arousal positive affect (calmness) whereas Mexican students preferred high arousal positive affect (excitement; Ruby et al., 2012). One explanation may be the differences in emotion socialization practices and parental reactions that influence children's emotion expressions (García Coll et al., 1984; Polo & López, 2009; Varela et al., 2009). It is possible that CA children may inhibit expression of emotions even more than MA children due to socialization practices to inhibit emotion expression (Soto et al., 2016). On the other hand, related to the cultural script of *simpatía,* MA children may be socialized to express behavioral politeness (Rodríguez-Arauz et al., 2019) that is reflected via stronger positive emotion expressions (Acevedo et al., 2020).

Consistent with our hypothesis (H3b), CA children displayed less frequent strategy use than MA children, suggesting a higher behavioral inhibition level congruent to the intensity of emotion expressed. Consistent with the cultural perspective of ideal affect (Tsai, 2007) and the study by Ruby et al. (2012), the overall lower frequency of strategy use observed in CA children may reflect the preference of low activation of affect, requiring less frequent use of behavioral strategies to react to or change the emotional states. Moreover, this interpretation is in line with the dialectical cultural script that in Far Eastern cultural contexts (Miyamoto & Ma, 2011; Peng & Nisbett, 1999), individuals attempt to maintain harmony (with self and others) by not being disruptive and balancing both negative and positive emotions (e.g., *yin* and *yang*). Thus, CA children may be less inclined to up-regulate positive emotions and down-regulate negative emotions, but instead to accept emotions as they are (Miyamoto et al., 2014). Another possibility is that the lower engagement of strategy use in CA children may be attributable to their lack of emotional reactivity and thus less observable behavioral reactions (Mauss et al., 2007). Together, these observed cultural group differences in children's emotion expressions and behaviors indicate that culturally informed display rules and regulatory goals (previously observed in adult samples) may already be learned by children during the preschool developmental period.

Limitations and Future Direction

This study has several limitations. First, we adopted the 10-s epoch length to code expressed emotions and strategy use, in contrast to a granular approach (e.g., one-second or five-second epoch) or a distanced approach (e.g., 15-s epoch length). However, some behaviors such as gaze aversion are more rapid than others and may occur precipitously after experiencing negative emotions and do not linger. Furthermore, when experiencing negative emotions, children may face difficulty maintaining strategy use (Fox & Calkins, 2003), leading to a shorter duration of gaze aversion. Thus, future studies could consider coding in shorter epochs (e.g., five-seconds) to better capture the dynamic relations between emotion expressions and strategy use.

Relatedly, the 10-s epoch length may have limited our ability to detect bidirectional relations between emotion expressions and strategy use. In the present study, only emotion expression significantly predicted strategy use and not vice versa. Given self-regulation is still developing in this age period (Kopp, 1989), it is possible that the types of strategies we examined (which are mostly reactive or not cognitively advanced) did not induce any changes in the emotion experienced and thus, was not effective at dampening the child's negative emotionality. Nonetheless, the within-person level analysis provides an initial step to understanding the rich dynamics of emotion regulation processes in early childhood (Cole et al., 2019).

Furthermore, the overall low intensity of observed emotion expressions across participants may have limited the study's statistical power to detect theorized relation between executive functions and emotion regulation. As discussed by Ursache et al. (2013), the link between the cognitive and emotional self-control can be moderated by emotional reactivity. Future studies could consider incorporating physiological measures to capture the dynamic relations among reactivity, strategy use, and trait-level executive functions. There is a dearth of information regarding these two cultural groups and further exploration is needed to employ a more sensitive approach for coding and interpreting. Moreover, longitudinal studies can reveal the age-related trajectory of changes in emotional reactivity as well as the relations between two domains of self-control.

Last, although the use of nonemotional language was not associated with emotion expressions, future studies should further examine the role of language in emotion regulation dynamics. It is purported that verbalization may serve regulatory function by interfering with initial emotional responses (Cole et al., 2010). The present study sampled dual-language learners in low-income immigrant families. Researchers found bilingual children from low-income households developed language skills more slowly than monolingual children (Hoff, 2013). Thus, it will be interesting to examine the links of bilingualism (Chen et al., 2014) or code-switching behaviors (Williams et al., 2020) to the emotion regulation dynamics in bilingual children. Language (i.e., promotion of positive emotions in Spanish language) may directly influence how emotions are expressed (Llabre, 2021). More studies are needed to understand the role of language in bilingual children's emotion expressions and regulation. Future research should use culturally sensitive coding schemes to capture more subtle changes in expressed emotions and culturally unique behavioral strategies.

By analyzing within-person associations between positive and negative emotion expressions and strategy use, the present study revealed nuanced processes of emotion regulation dynamics in preschool-aged children. These findings may inform emotion socialization practices at home and in early childhood education programs. By attending to children's behavioral strategies, parents and teachers can better recognize children's emotions and provide timely support and coaching for children's emotion regulation. This study also provided empirical evidence of cultural influences on emotion expressions and emotion regulation. Furthermore, by studying socioemotional processes in children from low-income, immigrant families, the study adds diversity to our understanding of the dynamic interplay between emotion expression and behavioral strategies.

References

Acevedo, A. M., Herrera, C., Shenhav, S., Yim, I. S., & Campos, B. (2020). Measurement of a Latino cultural value: The Simpatía scale. *Cultural Diversity & Ethnic Minority Psychology*, *26*(4), 419–425. https://doi.org/10.1037/cdp0000324

Ansfield, M. E. (2007). Smiling when distressed: When a smile is a frown turned upside down. *Personality and Social Psychology Bulletin*, *33*(6), 763–775. https://doi.org/10.1177/0146167206297398

Bates, D., Maechler, M., Bolker, B., & Walker, S. (2014). lme4: Linear mixed-effects models using Eigen and S4. *R Package Version*, *1*, 1–23.

Bendezú, J. J., Cole, P. M., Tan, P. Z., Armstrong, L. M., Reitz, E. B., & Wolf, R. M. (2018). Child language and parenting antecedents and externalizing outcomes of emotion regulation pathways across early childhood: A person-centered approach. *Development and Psychopathology*, *30*(4), 1253–1268. https://doi.org/10.1017/S0954579417001675

Blair, B. L., Perry, N. B., O'Brien, M., Calkins, S. D., Keane, S. P., & Shanahan, L. (2015). Identifying developmental cascades among differentiated dimensions of social competence and emotion regulation. *Developmental Psychology*, *51*(8), 1062–1073. https://doi.org/10.1037/a0039472

Bolger, N., Davis, A., & Rafaeli, E. (2003). Diary methods: Capturing life as it is lived. *Annual Review of Psychology*, *54*, 579–616. https://doi.org/10.1146/annurev.psych.54.101601.145030

Buss, K. A., & Goldsmith, H. H. (1998). Fear and anger regulation in infancy: Effects on the temporal dynamics of affective expression. *ChildDevelopment*, *69*(2), 359–374. https://doi.org/10.1111/j.1467-8624.1998.tb06195.x

Buzzell, G. A., Morales, S., Bowers, M. E., Troller-Renfree, S. V., Chronis-Tuscano, A., Pine, D. S., Henderson, H. A., & Fox, N. A. (2021). Inhibitory control and set shifting describe different pathways from behavioral inhibition to socially anxious behavior. *Developmental Science*, *24*(1), 1–10. https://doi.org/10.1111/desc.13040

Campos, B., & Kim, H. S. (2017). Incorporating the cultural diversity of family and close relationships into the study of health. *American Psychologist*, *72*(6), 543–554. https://doi.org/10.1037/amp0000122

Camras, L. A., Bakeman, R., Chen, Y., Norris, K., & Cain, T. R. (2006). Culture, ethnicity, and children's facial expressions: A study of European American, Mainland Chinese, Chinese American, and adopted Chinese girls. *Emotion*, *6*(1), 103–114. https://doi.org/10.1037/1528-3542.6.1.103

Carlson, S. M., Mandell, D. J., & Williams, L. (2004). Executive function and theory of mind: Stability and prediction from ages 2 to 3. *Developmental Psychology*, *40*(6), 1105–1122. https://doi.org/10.1037/0012-1649.40.6.1105

Carlson, S. M., & Wang, T. S. (2007). Inhibitory control and emotion regulation in preschool children. *Cognitive Development*, *22*(4), 489–510. https://doi.org/10.1016/j.cogdev.2007.08.002

Chen, S. H., Zhou, Q., Main, A., & Lee, E. H. (2015). Chinese American immigrant parents' emotional expression in the family: Relations with parents' cultural orientations and children's emotion-related regulation. *Cultural Diversity & Ethnic Minority Psychology*, *21*(4), 619–629. https://doi.org/10.1037/cdp0000013

Chen, S. H., Zhou, Q., Uchikoshi, Y., & Bunge, S. A. (2014). Variations on the bilingual advantage? Links of Chinese and English proficiency to Chinese American children's self-regulation. *Frontiers in Psychology*, *5*, 1069. https://doi.org/10.3389/fpsyg.2014.01069

Chen, X. (2018). Culture, temperament, and social and psychological adjustment. *Developmental Review*, *50*(Pt. A), 42–53. https://doi.org/10.1016/j.dr.2018.03.004

Chen, X., Cen, G., Li, D., & He, Y. (2005). Social functioning and adjustment in Chinese children: The imprint of historical time. *Child Development*, *76*(1), 182–195. https://doi.org/10.1111/j.1467-8624.2005.00838.x

Chow, S. M., Bendezú, J. J., Cole, P. M., & Ram, N. (2016). A comparison of two-stage approaches for fitting nonlinear ordinary differential equation models with mixed effects. *Multivariate Behavioral Research*, *51*(2-3), 154–184. https://doi.org/10.1080/00273171.2015.1123138

Cole, P. M., Armstrong, L. M., & Pemberton, C. K. (2010). The role of language in the development of emotion regulation. In S. D. Calkins & M. A. Bell (Eds.), *Human brain development. Child development at the intersection of emotion and cognition* (pp. 59–77). American Psychological Association. https://doi.org/10.1037/12059-004

Cole, P. M., Bendezú, J. J., Ram, N., & Chow, S. M. (2017). Dynamical systems modeling of early childhood self-regulation. *Emotion*, *17*(4), 684–699. https://doi.org/10.1037/emo0000268

Cole, P. M., Martin, S. E., & Dennis, T. A. (2004). Emotion regulation as a scientific construct: Methodological challenges and directions for child development research. *Child Development*, *75*(2), 317–333. https://doi.org/10.1111/j.1467-8624.2004.00673.x

Cole, P. M., Ram, N., & English, M. S. (2019). Toward a unifying model of self-regulation: A developmental approach. *Child Development Perspectives*, *13*(2), 91–96. https://doi.org/10.1111/cdep.12316

Cole, P. M., Tan, P. Z., Hall, S. E., Zhang, Y., Crnic, K. A., Blair, C. B., & Li, R. (2011). Developmental changes in anger expression and attention focus: Learning to wait. *Developmental Psychology*, *47*(4), 1078–1089. https://doi.org/10.1037/a0023813

Cole, P. M., Zahn-Waxler, C., & Smith, K. D. (1994). Expressive control during a disappointment: Variations related to preschoolers' behavior problems. *Developmental Psychology*, *30*(6), 835–846. https://doi.org/10.1037/0012-1649.30.6.835

Dennis, T. A., Cole, P. M., Wiggins, C. N., Cohen, L. H., & Zalewski, M. (2009). The functional organization of preschool-age children's emotion expressions and actions in challenging situations. *Emotion*, *9*(4), 520–530. https://doi.org/10.1037/a0016514

Diamond, A. (2013). Executive functions. *Annual Review of Psychology*, *64*(1), 135–168. https://doi.org/10.1146/annurev-psych-113011-143750

Diaz, A., & Eisenberg, N. (2015). The process of emotion regulation is different from individual differences in emotion regulation: Conceptual arguments and a focus on individual differences. *Psychological Inquiry*, *26*(1), 37–47. https://doi.org/10.1080/1047840X.2015.959094

Eisenberg, N., & Zhou, Q. (2016). Conceptions of executive function and regulation: when and to what degree do they overlap? In J. A. Griffin, P. McCardle, & L. S. Freund (Eds.), *Executive function in preschool-age children: Integrating measurement, neurodevelopment, and translational research* (pp. 115–136). American Psychological Association.

Eisenberg, N., Spinrad, T. L., & Eggum, N. D. (2010). Emotion-related self-regulation and its relation to children's maladjustment. *Annual Review of Clinical Psychology*, *6*, 495–525. https://doi.org/10.1146/annurev.clinpsy.121208.131208

Ekman, P. (1972). Universals and cultural differences in facial expressions of emotion. In J. K. Cole (Ed.), *Nebraska symposium on motivation* (pp. 207–283). University of Nebraska Press.

Ekman, P., & Friesen, W. V. (1982). Felt, false, and miserable smiles. *Journal of Nonverbal Behavior*, *6*(4), 238–252. https://doi.org/10.1007/BF00987191

Ferrier, D. E., Bassett, H. H., & Denham, S. A. (2014). Relations between executive function and emotionality in preschoolers: Exploring a transitive cognition-emotion linkage. *Frontiers in Psychology*, *5*, 487. https://doi.org/10.3389/fpsyg.2014.00487

Fox, N., & Calkins, S. (2003). The development of self-control of emotion: Intrinsic and extrinsic influences. *Motivation and Emotion*, *27*(1), 7–26. https://doi.org/10.1023/A:1023622324898

García Coll, C., Kagan, J., & Reznick, J. S. (1984). Behavioral inhibition in young children. *Child Development*, *55*(3), 1005–1019. https://doi.org/10.2307/1130152

Garrett-Peters, P. T., & Fox, N. A. (2007). Cross-cultural differences in children's emotional reactions to a disappointing situation. *International Journal of Behavioral Development*, *31*(2), 161–169. https://doi.org/10.1177/0165025407074627

Gilliom, M., Shaw, D. S., Beck, J. E., Schonberg, M. A., & Lukon, J. L. (2002). Anger regulation in disadvantaged preschool boys: Strategies, antecedents, and the development of self-control. *Developmental Psychology*, *38*(2), 222–235. https://doi.org/10.1037/0012-1649.38.2.222

Goldsmith, H. H., Reilly, J., Lemery, K. S., Longley, S., & Prescott, A. (1993). *Preschool Laboratory Temperament Assessment Battery (PS Lab-TAB; Version 1.0*). University of Wisconsin–Madison, Department of Psychology.

Gudiño, O. G., & Lau, A. S. (2010). Parental cultural orientation, shyness, and anxiety in Hispanic children: An exploratory study. *Journal of Applied Developmental Psychology*, *31*(3), 202–210. https://doi.org/10.1016/j.appdev.2009.12.003

Herndon, K. J., Bailey, C. S., Shewark, E. A., Denham, S. A., & Bassett, H. H. (2013). Preschoolers' emotion expression and regulation: Relations with school adjustment. *The Journal of Genetic Psychology*, *174*(5-6), 642–663. https://doi.org/10.1080/00221325.2012.759525

Hoeksma, J. B., Oosterlaan, J., & Schipper, E. M. (2004). Emotion regulation and the dynamics of feelings: A conceptual and methodological framework. *Child Development*, *75*(2), 354–360. https://doi.org/10.1111/j.1467-8624.2004.00677.x

Hoff, E. (2013). Interpreting the early language trajectories of children from low-SES and language minority homes: Implications for closing achievement gaps. *Developmental Psychology*, *49*(1), 4–14. https://doi.org/10.1037/a0027238

Hudson, A., & Jacques, S. (2014). Put on a happy face! Inhibitory control and socioemotional knowledge predict emotion regulation in 5- to 7-year-olds. *Journal of Experimental Child Psychology*, *123*(1), 36–52. https://doi.org/10.1016/j.jecp.2014.01.012

Johnson, K. N., Conture, E. G., & Walden, T. A. (2012). Efficacy of attention regulation in preschool-age children who stutter: A preliminary investigation. *Journal of Communication Disorders*, *45*(4), 263–278. https://doi.org/10.1016/j.jcomdis.2012.04.001

Karr, J. E., Areshenkoff, C. N., Rast, P., Hofer, S. M., Iverson, G. L., Garcia-Barrera, M. A., & Iverson, G. L. (2018). The unity and diversity of executive functions: A systematic review and re-analysis of latent variable studies. *Psychological Bulletin*, *144*(11), 1147–1185. https://doi.org/10.1037/bul0000160

Kerr, A., & Zelazo, P. D. (2004). Development of "hot" executive function: The children's gambling task. *Brain and Cognition*, *55*(1), 148–157. https://doi.org/10.1016/S0278-2626(03)00275-6

Kopp, C. B. (1989). Regulation of distress and negative emotions: A developmental view. *Developmental Psychology*, *25*(3), 343–354. https://doi.org/10.1037/0012-1649.25.3.343

Lausberg, H., & Sloetjes, H. (2009). Coding gestural behavior with the NEUROGES—ELAN system. *Behavior Research Methods, Instruments, & Computers*, *41*(3), 841–849. https://doi.org/10.3758/BRM.41.3.841

Liebermann, D., Giesbrecht, G. F., & Müller, U. (2007). Cognitive and emotional aspects of self-regulation in preschoolers. *Cognitive Development*, *22*(4), 511–529. https://doi.org/10.1016/j.cogdev.2007.08.005

Liew, J., Eisenberg, N., & Reiser, M. (2004). Preschoolers' effortful control and negative emotionality, immediate reactions to disappointment, and quality of social functioning. *Journal of Experimental Child Psychology*, *89*(4), 298–319.

Lindsey, E. W., Caldera, Y. M., & Rivera, M. (2013). Mother-child and father-child emotional expressiveness in Mexican American families and toddlers' peer interactions. *Early Child Development and Care*, *183*(3-4), 378–393. https://doi.org/10.1080/03004430.2012.711589

Llabre, M. M. (2021). Insight Into the Hispanic Paradox: The Language Hypothesis. *Perspectives on Psychological Science*, *16*(6), 1324–1336. https://doi.org/10.1177/1745691620968765

Lougheed, J. P., Benson, L., Cole, P. M., & Ram, N. (2019). Multilevel survival analysis: Studying the timing of children's recurring behaviors. *Developmental Psychology*, *55*(1), 53–65. https://doi.org/10.1037/dev0000619

Louie, J. Y., Oh, B. J., & Lau, A. S. (2013). Cultural differences in the links between parental control and children's emotional expressivity. *Cultural Diversity & Ethnic Minority Psychology*, *19*(4), 424–434. https://doi.org/10.1037/a0032820

Markus, H. R., & Kitayama, S. (1991). Culture and the self: Implications for cognition, emotion, and motivation. *Psychological Review*, *98*(2), 224–253. https://doi.org/10.1037/0033-295X.98.2.224

Mauss, I. B., & Butler, E. A. (2010). Cultural context moderates the relationship between emotion control values and cardiovascular challenge versus threat responses. *Biological Psychology*, *84*(3), 521–530. https://doi.org/10.1016/j.biopsycho.2009.09.010

Mauss, I. B., Bunge, S. A., & Gross, J. J. (2007). Automatic emotion regulation. *Social and Personality Psychology Compass*, *1*(1), 146–167. https://doi.org/10.1111/j.1751-9004.2007.00005.x

Mauss, I. B., Levenson, R. W., McCarter, L., Wilhelm, F. H., & Gross, J. J. (2005). The tie that binds? Coherence among emotion experience, behavior, and physiology. *Emotion*, *5*(2), 175–190. https://doi.org/10.1037/1528-3542.5.2.175

Miller, A. L., Gouley, K. K., Seifer, R., Dickstein, S., & Shields, A. (2004). Emotions and behaviors in the Head Start classroom: Associations among observed dysregulation, social competence, and preschool adjustment. *Early Education and Development*, *15*(2), 147–166. https://doi.org/10.1207/s15566935eed1502_2

Miyamoto, Y., & Ma, X. (2011). Dampening or savoring positive emotions: A dialectical cultural script guides emotion regulation. *Emotion*, *11*(6), 1346–1357. https://doi.org/10.1037/a0025135

Miyamoto, Y., Ma, X., & Petermann, A. G. (2014). Cultural differences in hedonic emotion regulation after a negative event. *Emotion*, *14*(4), 804–815. https://doi.org/10.1037/a0036257

Ng, F. F., Pomerantz, E. M., & Lam, S. F. (2007). European American and Chinese parents' responses to children's success and failure: Implications for children's responses. *Developmental Psychology*, *43*(5), 1239–1255. https://doi.org/10.1037/0012-1649.43.5.1239

Peng, K., & Nisbett, R. E. (1999). Culture, dialectics, and reasoning about contradiction. *American Psychologist*, *54*(9), 741–754. https://doi.org/10.1037/0003-066X.54.9.741

Polo, A. J., & López, S. R. (2009). Culture, context, and the internalizing distress of Mexican American youth. *Journal of Clinical Child and Adolescent Psychology*, *38*(2), 273–285. https://doi.org/10.1080/15374410802698370

R Core Team. (2013). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing http://www.R-project.org/

Radford, J. (2019, June 17). *Key findings about U.S. immigrants*. https://www.pewresearch.org/fact-tank/2019/06/17/key-findings-about-u-s-immigrants/

Ramírez-Esparza, N., Mehl, M. R., Álvarez-Bermúdez, J., & Pennebaker, J. W. (2009). Are Mexicans more or less sociable than Americans? Insights from a naturalistic observation study. *Journal of Research in Personality*, *43*(1), 1–7. https://doi.org/10.1016/j.jrp.2008.09.002

Raver, C. C. (2004). Placing emotional self-regulation in sociocultural and socioeconomic contexts. *Child Development*, *75*(2), 346–353. https://doi.org/10.1111/j.1467-8624.2004.00676.x

Rodríguez-Arauz, G., Ramírez-Esparza, N., García-Sierra, A., Ikizer, E. G., & Fernández-Gómez, M. J. (2019). You go before me, please: Behavioral politeness and interdependent self as markers of Simpatía in Latinas. *Cultural Diversity & Ethnic Minority Psychology*, *25*(3), 379–387. https://doi.org/10.1037/cdp0000232

Rothbart, M. K., & Derryberry, D. (1981). Development of individual differences in temperament. In M. E. Lamb & A. Brown (Eds.), *Advances in developmental psychology* (Vol. 1, pp. 37–86). Erlbaum.

Ruby, M. B., Falk, C. F., Heine, S. J., Villa, C., & Silberstein, O. (2012). Not all collectivisms are equal: Opposing preferences for ideal affect between East Asians and Mexicans. *Emotion*, *12*(6), 1206–1209. https://doi.org/10.1037/a0029118

Snijders, T., & Bosker, R. (1999). *Multilevel analysis: An introduction to basic and applied multilevel analysis*. Sage.

Soto, J. A., Lee, E. A., & Roberts, N. A. (2016). Convergence in feeling, divergence in physiology: How culture influences the consequences of disgust suppression and amplification among European Americans and Asian Americans. *Psychophysiology*, *53*(1), 41–51. https://doi.org/10.1111/psyp.12579

Soto, J. A., Levenson, R. W., & Ebling, R. (2005). Cultures of moderation and expression: Emotional experience, behavior, and physiology in Chinese Americans and Mexican Americans. *Emotion*, *5*(2), 154–165. https://doi.org/10.1037/1528-3542.5.2.154

Spinrad, T. L., & Eisenberg, N. (2007). *Toddler emotional development project measures and codebook* [Unpublished manual]. Department of Psychology, Arizona State University.

Spinrad, T. L., Eisenberg, N., & Gaertner, B. M. (2007). Measures of effortful regulation for young children. *Infant Mental Health Journal*, *28*(6), 606–626. https://doi.org/10.1002/imhj.20156

Su, J. C., Park, I. J. K., Chang, J., Kim, S. Y., Dezutter, J., Seol, K. O., Lee, R. M., Soto, J. A., Zamboanga, B. L., Ham, L. S., Hurley, E. A., & Brown, E. (2015). Differential links between expressive suppression and well-being among Chinese and Mexican American college students. *Asian American Journal of Psychology*, *6*(1), 15–24. https://doi.org/10.1037/a0036116

Thompson, R. A. (1994). Emotion regulation: A theme in search of definition. *Monographs of the Society for Research in Child Development*, *59*(2-3), 25–52. https://doi.org/10.1111/j.1540-5834.1994.tb01276.x

Tsai, J. L. (2007). Ideal affect: Cultural causes and behavioral consequences. *Perspectives on Psychological Science*, *2*(3), 242–259. https://doi.org/10.1111/j.1745-6916.2007.00043.x

U.S. Census Bureau. (2015). *Poverty thresholds for 2015 by size of family and number of related children under 18 years*. https://www2.census.gov/library/publications/2016/demo/thresh15.xls

U.S. Department of Health and Human Services. (2019). *Head Start program facts: Fiscal year 2019*. https://eclkc.ohs.acf.hhs.gov/sites/default/files/pdf/no-search/hs-program-fact-sheet-2019.pdf

Ursache, A., Blair, C., Stifter, C., & Voegtline, K., & The Family Life Project Investigators. (2013). Emotional reactivity and regulation in infancy interact to predict executive functioning in early childhood. *Developmental Psychology*, *49*(1), 127–137. https://doi.org/10.1037/a0027728

Varela, R. E., Sanchez-Sosa, J. J., Biggs, B. K., & Luis, T. M. (2009). Parenting strategies and socio-cultural influences in childhood anxiety: Mexican, Latin American descent, and European American families. *Journal of Anxiety Disorders*, *23*(5), 609–616. https://doi.org/10.1016/j.janxdis.2009.01.012

Varela, R. E., Vernberg, E. M., Sanchez-Sosa, J. J., Riveros, A., Mitchell, M., & Mashunkashey, J. (2004). Anxiety reporting and culturally associated interpretation biases and cognitive schemas: A comparison of Mexican, Mexican American, and European American families. *Journal of Clinical Child and Adolescent Psychology*, *33*(2), 237–247. https://doi.org/10.1207/s15374424jccp3302_4

Wang, J., & Barrett, K. C. (2015). Differences between American and Chinese preschoolers in emotional responses to resistance to temptation and mishap contexts. *Motivation and Emotion*, *39*(3), 420–433. https://doi.org/10.1007/s11031-014-9463-9

Wang, L., Chen, X., Chen, H., Cui, L., & Li, M. (2006). Affect and maternal parenting as predictors of adaptive and maladaptive behaviors in Chinese children. *International Journal of Behavioral Development*, *30*(2), 158–166. https://doi.org/10.1177/0165025406063631

White, L. K., McDermott, J. M., Degnan, K. A., Henderson, H. A., & Fox, N. A. (2011). Behavioral inhibition and anxiety: The moderating roles of inhibitory control and attention shifting. *Journal of Abnormal Child Psychology*, *39*(5), 735–747. https://doi.org/10.1007/s10802-011-9490-x

Williams, A., Srinivasan, M., Liu, C., Lee, P., & Zhou, Q. (2020). Why do bilinguals code-switch when emotional? Insights from immigrant parent-child interactions. *Emotion*, *20*(5), 830–841. https://doi.org/10.1037/emo0000568

Williams, A. I., Uchikoshi, Y., Bunge, S. A., & Zhou, Q. (2019). Relations of English and heritage language proficiency to response inhibition and attention shifting in dual language learners in head start, *Early Education and Development*, *30*(3), 357–374.

Willoughby, M. T., Blair, C. B., Wirth, R. J., & Greenberg, M. (2010). The measurement of executive function at age 3 years: Psychometric properties and criterion validity of a new battery of tasks. *Psychological Assessment*, *22*(2), 306–317. https://doi.org/10.1037/a0018708

Winsler, A., De León, J. R., Wallace, B. A., Carlton, M. P., & Willson-Quayle, A. (2003). Private speech in preschool children: Developmental stability and change, across-task consistency, and relations with classroom behaviour. *Journal of Child Language*, *30*(3), 583–608. https://doi.org/10.1017/S0305000903005671

Xiao, S. X., Spinrad, T. L., & Eisenberg, N. (2019). Longitudinal relations of preschoolers' dispositional and situational anger to their prosocial behavior: The moderating role of shyness. *Social Development*, *28*(2), 383–397. https://doi.org/10.1111/sode.12346

Zahn-Waxler, C., Cole, P. M., Richardson, D. T., Friedman, R. J., Michel, M. K., & Belouad, F. (1994). Social problem solving in disruptive preschool children: Reactions to hypothetical situations of conflict and distress. *Merrill-Palmer Quarterly*, *40*(1), 98–119.

Zelazo, P. D., & Cunningham, W. A. (2007). Executive function: Mechanisms underlying emotion regulation. In J. J. Gross (Ed.), *Handbook of emotion regulation* (pp. 135–158). Guilford Press.

Received January 21, 2021
Revision received January 27, 2022
Accepted January 28, 2022 ■