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“How Would You Feel? What Would You Do?” Development and Underpinnings of Preschoolers’ Social Information Processing

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Abstract

Young children’s social information processing (SIP) encompasses a series of steps by which they make sense of encounters with other persons; both cognitive and emotional aspects of SIP often predict adjustment in school settings. More attention is needed, however, to the development of preschoolers’ SIP and its potential foundations. To this end, a new preschool SIP measure, the Challenging Situations Task (CST), was utilized; preschoolers’ ($n = 316$) self-reported emotional and behavioral responses to hypothetical peer provocation situations on the CST were assessed longitudinally, along with aspects of their self-regulation and emotion knowledge. Age and developmental differences in CST responses were examined. Next, contributions of executive control and emotion knowledge to CST responses were analyzed. Age differences in emotion and behavior choices showed that younger preschoolers were more prone to choose happy responses, whereas older preschoolers chose more adaptive behavior responses. Both self-regulation and emotion knowledge were associated with emotion and behavior responses concurrently and across time. Implications of these findings and suggestions for further research are discussed.

The social information processing model (SIP; Crick & Dodge, 1994) depicts a series of processes concerning how children react to social encounters: (a) encoding social cues, (b) interpreting others’ emotions and intentions, (c) accessing possible responses to these social cues given the emotions and intentions involved, (d) making decisions about how to respond to such social information in keeping with their own goals, and (e) enacting behaviors based on these decisions. Much research has delineated how these processes contribute to skilled interactions with peers, social adjustment, and broader adjustment within the school environment (Bascoe, Davies, Sturge-Apple, & Cummings, 2009; Denham & Almeida, 1987; Lansford et al., 2006).

Children’s own expression, management, and understanding of emotions are also vital to processing information about social interactions (Lemerise & Arsenio, 2000; see also Coy, Speltz, DeKlyen, & Jones, 2001; Garner & Lemerise, 2007). Such emotion-related aspects of SIP are particularly important in determining a child’s social goals and choices of responses in social situations. Specifically, the combination of cognitive and emotional variables from all SIP processes can account for more than 50% of variance in behavioral

and social adjustment outcomes (Crick & Dodge, 1994). In sum, SIP in peer interactions includes skill with emotions, in concert with adaptive cognitive response decision-making that facilitates competent behavioral responding (Runions & Keating, 2007).

However, despite evidence that SIP patterns, and their importance, emerge before school age, recent SIP methodologies have been largely limited to those designed for use with older children and adolescents. Surprisingly few practical tools exist for *early* direct assessment of the social cognitive *and* emotional SIP processes that underlie social behavior (but see Garner & Lemerise, 2007; Runions & Keating, 2007; Schultz et al., 2010). Thus, an overarching aim of the current study was to examine a developmentally appropriate measure of preschoolers' SIP.

In the current study, we extend Lemerise and Arsenio's theoretical model downward into early childhood (i.e., ages 3 to 5 years) by considering both particular cognitive and emotional elements of preschoolers' SIP in the face of peer challenge—responses they would use, and feelings they would experience, during such situations. We examine age differences and developmental change in these aspects of SIP, as well as their relations with both executive control and emotion knowledge, which could be seen as potentially important foundations for adaptive preschool SIP.

Developmental Change and Age Differences in Early Childhood SIP

Developmental change has not often been a construct of focus in SIP literature, especially in comparison with variations in social functioning attributable to individual differences in various aspects of SIP. However, it could be important for early childhood educators to know what to expect of their students in terms of SIP. For example, several theorists have suggested possible ways in which children's SIP may become more relationship-enhancing and less aggressive with development (Crick & Dodge, 1994; Lemerise & Arsenio, 2000; Rubin & Rose-Krasnor, 1992). Greater exposure to peers and adult socialization allows older preschoolers access to more complex outcomes of social encounters across multiple contexts. Hence, SIP strategies and goals become more numerous and more socially appropriate as preschoolers age (e.g., Mayeux & Cillessen, 2003; Youngstrom et al., 2000).

Acquisition of experiential knowledge, attentional abilities, and other basic cognitive skills also may underlie change in SIP across the preschool period. In particular, developing aspects of executive control allow preschoolers to better attend to complexities of peer interaction, and formulate more adaptive SIP strategies (Rubin & Rose-Krasnor, 1992). Finally, Lemerise and Arsenio's theoretical analysis strongly suggests that emotion knowledge underlies adaptive SIP response choices. Similarly, Rubin and Rose-Krasnor note that increasing social knowledge allows children's SIP to become more other-oriented and socially competent (e.g., children choose specific behavioral responses based on their knowledge of how they and others would feel). Moreover, the very feelings children report in response to peer provocation experiences may change with age, given that emotion regulation allows them to feel less overwhelmed in peer situations.

Based on these theoretical propositions and empirical findings, we would expect that children's likelihood of choosing socially competent responses would increase with age, and

that aggressive and crying behavior response choices would decrease with age. We also conjecture that “happy” or “just ok” emotion choices in response to scenarios of peer provocation might be given by younger children with less developed emotion knowledge; we assume peer provocation is unlikely to elicit happiness. Further, we target executive control and emotion knowledge as important abilities that may support SIP.

Executive Control and Preschool SIP

Recent advances in developmental psychobiological theorizing and research, as well as neuroimaging, suggest that two types of executive control are distinguishable, both neurally and behaviorally (Willoughby, Kupersmidt, Voegler-Lee, & Bryant, 2011; Zelazo & Müller, 2002). Therefore, in this study we consider cool executive control (CEC; more affectively neutral, slow acting, and developing) and hot executive control (HEC; more reflexive, fast acting, early developing, and under stimulus control) as potential contributors to preschool SIP. CEC is dominant in tasks requiring attentional and behavioral inhibitory control, working memory, and ability to suppress prepotent responding, via prefrontal support. In contrast, HEC is ascendant in tasks additionally involving emotional and appetitive content, and requiring both orbitofrontal and limbic control (Willoughby et al., 2011).

Although little, if any, empirical research has specifically linked both executive control and preschoolers’ SIP, it would follow that children with less developed executive control might form different SIP patterns, such as more adversarial goals (Jenkins & Greenbaum, 1999). It seems unlikely that one could form adaptive SIP patterns if one cannot purposely focus on or shift attention to what is important in one’s social world (particularly others’ needs and feelings); inhibit prepotent responses while activating alternative, subdominant responses; stave off frustration; and remain composed.

Therefore, in this study we will also examine associations of young child’s executive control (i.e., “hot” and “cool” executive control) with our measure of preschool SIP, expecting that both will be correlated with SIP, even with age partialled. CEC, with its heavier prefrontal involvement, might be more often related to SIP, especially to more cognitive aspects (i.e., choosing behavior response strategies). For example, socially competent behavior often requires not choosing prepotent responses (e.g., hitting, yelling, running away), in favor of more adaptive responses (e.g., talking about the problem). However, links to HEC might be found with how one would *feel* during peer provocation; indicating that one would feel sad during peer provocation might require overcoming a more automatic angry response. Further, considering that these indices of executive control are undoubtedly correlated, their unique contributions to SIP behavior and emotion response choices are also of interest. Early childhood educators could benefit from knowing that promoting executive control has advantageous outcomes in the social arena.

Emotion Knowledge and Preschool SIP

Because identifying emotions in self and others is crucially important to preschoolers’ social interactions (Arsenio, Cooperman, & Lover, 2000; Denham, McKinley, Couchoud, & Holt, 1990; Warren & Stifter, 2008), emotion knowledge should be considered a key SIP-related database. Children with greater levels of emotion knowledge about self and others (e.g.,

recognizing expressions and experiences of specific emotions, comprehending verbal labels for emotions, and understanding reactions to emotion-eliciting situations) generate nonaggressive strategies, attribute benign intent to provocateurs, and espouse more socially competent goals when administered various SIP measures (Denham, Bouril, & Belouad, 1994; Dodge, Laird, Lochman, & Zelli, 2002). These findings highlight the importance of including emotion knowledge in understanding SIP, particularly in younger populations.

Online emotion knowledge, which could impact behavior responses made *during* SIP (Orobio de Castro, 2004), is understudied in preschoolers, but potentially very important; to our knowledge, only Schultz and colleagues (2010) have examined accurate understanding of emotions *within* SIP situations and its positive relation to adaptive functioning. Research on older children's SIP responses has also shown that these varied with their online emotion knowledge: accurately monitoring one's *own* emotions reduced aggressive children's aggressive response choices, and considering *peers'* emotions decreased aggressive response choices for nonaggressive children (Orobio de Castro, Bosch, Veerman, & Koops, 2003). Hence, in our SIP measure we ask children what they would feel during situations of peer provocation, to examine these emotion response choices along with more traditionally assessed behavior response choices.

Because we consider preschoolers' emotion knowledge database as foundational to early SIP, we also examine associations of emotion knowledge with our measure of preschool SIP. We expect that both recognition of emotional expressions and comprehension of emotion situations will be correlated with SIP, even with age partialled. Because SIP strategies are chosen during rapidly occurring social interactions, recognition of emotional expressions might be more often related to cognitive aspects of SIP (i.e., behavior response choices). Early childhood educators could benefit from knowing that boosting children's emotion knowledge also has valuable outcomes in their thinking about social situations.

Present Study

In summary, preschoolers' self-reports of emotion and behavior response choices in the context of peer provocation were used to assess young preschoolers' SIP. We examined age differences and developmental change in these self-reports. Next, we investigated the unique contributions of children's executive control and emotion knowledge to both emotion and behavior response choices, concurrently and over a three-month period. Findings will illuminate developmental trends in, and potentially important foundations of, emotional as well as cognitive aspects of preschool SIP.

Method

Participants and Procedure

Data were part of a larger investigation focused on developing a portable assessment tool for measuring social-emotional aspects of early school adjustment. Participant children were recruited from Head Start and private preschool centers in Northern Virginia, selected due to demographic variability and access to large numbers of children.

Approximately half of 316 children who were administered the Challenging Situation Tasks (CST) at the first assessment (time 1; T1) were female (51.9%), with a majority of children identified by their parent as either Caucasian or African American (44.3% Caucasian, 37.0% African American). Nearly half of the total sample (46.2%) was non-Hispanic/Latino (13.0% Hispanic/Latino, 40.8% other/not reported); average age was 49.32 months ($sd = 6.84$). Children came from a wide range of socioeconomic backgrounds. A little over half the children attended private child care (54.7%), with the remaining children attending Head Start. Median level of education for mothers across the sample was an associate's degree.

SIP, executive control, and emotion knowledge were assessed in late fall to early spring (T1) and at school year's end (time 2; T2). Children received stickers for their participation. Ninety percent of the sample ($n = 285$) was administered the CST at T2. Only T1 data on executive control and emotion knowledge were utilized in this report. Executive control assessments were completed for 298 children at T1; for emotion knowledge, the corresponding number was 304.

Measures

SIP—We used the CST, a pictorial forced choice measure, to assess children's ability to predict their own behavior decisions and their attendant emotions. Children responded to three developmentally appropriate, unambiguous peer provocation situations (Denham et al., 1994). We chose to make provocateurs' intentions unambiguous for all situations, because, although preschoolers begin to understand intention (Katsurada & Sugarwara, 1998), they often focus instead on features of acts, such as harm or unhappiness after a transgression (Zelazo, Helwig, & Lau, 1996). Further, we limited our assessment of preschoolers' SIP to situations involving peer provocation; use of a single summary SIP score is not as informative as separately examining each situation type (e.g., provocation, peer entry; Dodge et al., 2002).

These unambiguous peer provocation scenarios were presented via pictures and a short description of the transgression situation (see Appendix A, Table A1). Children were asked how they would feel about each situation, given four emotion choices using schematic drawings and verbal labels of "happy," "sad," "angry," and "just ok" (see Appendix A, Table A2). Next, they were asked what they would do, given four behavior choices (socially competent, aggressive, passive, and manipulative/crying; see Appendix A, Table A3 for an example of behavior choices from one scenario). For each of the four emotion and four behavior response choices, an aggregate scale score across the three scenarios was created, reflecting the number of endorsements of each emotion or behavior response type.

Because there were too few items in CST scales for Cronbach's alpha to be meaningful (Spiliotopoulou, 2009), internal consistency was assessed via mean inter-item correlation. According to Clark and Watson (1995), a mean inter-item correlation above .14 is considered to be acceptable. Across T1 and T2, 13 of 16 mean inter-item correlations were .14; "just ok" scales at both T1 and T2 and T1 crying scale did not meet the criterion.

Test-retest correlations (with age partialled) were significant across the T1–T2 period, except for the "just ok" scale. Other emotion response choice scales' test-retest correlations

ranged from $r(278) = .17, p < .01$, for the angry scale, to $r(278) = .36, p < .001$, for the sad scale. Behavior response choice scales test-retest correlations ranged from $r(278) = .14, p < .025$, for the crying scale, to $r(278) = .40, p < .001$, for the socially competent scale. Because of lower mean internal consistency and test-retest correlations, “just ok” and crying scales will not be considered further.

Preschool Self-Regulation Assessment (PSRA)—PSRA was utilized to capture preschooler’s strengths and weaknesses in executive control (Smith-Donald, Raver, Hayes, & Richardson, 2007). It consists of structured tasks to tap HEC and CEC. For HEC, three delay tasks (Toy Wrap, Snack Delay, and Tongue Task) were used (see Table 1). For CEC, three tasks (Pencil Tap, Balance Beam, and Tower Turn-Taking) were included. The battery was administered by 12 trained and certified research assistants who live-coded latencies or performance levels for each task. For this sample, interrater reliability for PSRA tasks (using intra-class correlation for continuous variables and Cohen’s kappa for categorical variables) was moderate to high (.57 to .97 across all tasks). PSRA constructs for this sample were also internally consistent; CEC (19 items) $\alpha = .90$, and HEC (6 items) $\alpha = .82$.

According to Smith-Donald and colleagues (2007), PSRA tasks also show good concurrent validity with previously validated measures of children’s behavior problems and competencies reported by their teachers, as well as their early academic skills (i.e., early math and verbal skills). Finally, PSRA CEC and HEC composites have been found to be related to early school adjustment (Authors, 2012).

Emotion Knowledge: Affect Knowledge Test (AKT)—We assessed preschoolers’ emotion knowledge using puppets with detachable faces depicting happy, sad, angry, and afraid expressions (Denham & Couchoud, 1990). It tests expressive and receptive recognition of emotions, and understanding of stereotypical (most people would feel similarly) and nonstereotypical (individuals’ emotions could differ) situations.

For *affective labeling*, children were asked to reference the detachable faces, and identify happy, sad, angry and afraid facial expressions by verbally naming them (expressive knowledge), and then by nonverbally pointing to them (receptive knowledge). For *situation knowledge*, 20 vignettes were enacted using the puppets. Each was accompanied by vocal and visual affective cues emitted by the puppet/experimenter. For eight vignettes, the puppet depicted the same emotion most people would feel (e.g., happiness in receiving an ice cream cone), as an index of children’s stereotypical emotion knowledge. In 12 vignettes, the puppet depicted a different emotion from what each child’s mother had reported, in a questionnaire, that their child would probably feel, as an index of children’s nonstereotypical emotion knowledge. Children affixed the face of their choice to report how the puppet felt. Children received two points for correct identification of emotion in any section of the measure, one point for identifying the correct valence but not the correct emotion (e.g., sad for afraid).

Because understanding of happiness develops earlier compared to that for negative emotions (Denham & Couchoud, 1990), skewness and kurtosis values exceeded acceptability on four happiness items (one each for expressive and receptive scales, two for stereotypical

situations). Hence, these items were excluded from further analyses. Thus, *negative recognition* and *situation knowledge* aggregates were created, including only negative emotion items.

AKT constructs for this sample were internally consistent; negative recognition (6 items) $\alpha = .66$, and situation knowledge (18 items) $\alpha = .87$. Extensive validity information suggests that AKT is related to aspects of social-emotional development (e.g., Denham, McKinley, et al., 1990).

Results

Developmental Change and Age Differences

Four MANOVAs were performed, with age (3- vs. 4-year-olds at T1) as between-subjects variable. For the first four analyses, one analysis each was performed for emotion and behavior choices, at T1 and T2, respectively (see Table 2). Three-year-olds scored higher on happy response choices and lower on angry response choices, at both time points, and lower on sad emotion response choices at T1. In terms of behavior response choices, there were age differences for socially competent behavior response choices at T1, and socially competent and passive behavior response choices at T2. Three-year-olds scored lower on socially competent and higher on passive behavior response choices.

Two mixed-model MANOVAs were performed with age as between-subjects variable Time of Measurement (T1 vs. T2) as within-subjects variable, and all T1 and T2 emotion or behavior response choices, respectively, as dependent variables. There was a Time effect for emotion response choices, $F_{\text{time}}(3, 280) = 3.40, p < .01$, partial $\omega^2 = .035$. Follow-up analyses showed that happy responses were chosen less often at T2, $F_{\text{time}}(1, 282) = 8.36, p < .01$, partial $\omega^2 = .029$. There was no change across time for behavior response choices.

Associations With Executive Control

Table 3 shows relations between CST response choices and PSRA scores, with age partialled. CEC was related to four of six T1 CST response choices in expected directions; more specifically, CEC was positively related to T1 sad and socially competent response choices, and negatively to happy and aggressive response choices. Associations with HEC were also in expected directions, but somewhat weaker than those for CEC, for T1 sad, socially competent, and aggressive response choices. Only T1 HEC (not T1 CEC) was negatively related to T1 CST angry response choices. T2 CST response choices showed similar patterns of association for CEC, with CEC predictively positively related to T2 sad and socially competent response choices, and negatively to happy and passive response choices. HEC was predictively negatively related to happy response choices.

Associations With Emotion Knowledge

Table 3 also shows relations between CST response choices and AKT scores, with age partialled. T1 happy response choices were negatively related to both aspects of emotion knowledge, whereas the opposite was true for sad response choices. Angry response choices were positively associated, and aggressive response choices negatively associated, with

recognition of negative emotional expression. Socially competent response choices were positively associated with recognition of negative emotional expressions. T2 CST response choices showed very similar patterns of association, with emotion knowledge predictively positively related to T2 sad and socially competent response choices, and negatively to happy response choices.

Relative Contributions of Executive Control and Emotion Knowledge

Finally, given significant correlations between elements of executive control and emotion knowledge and also between these constructs (Authors, in press-a), we sought to evaluate joint contributions of executive control and emotion knowledge in a series of regression equations (see Tables 4 and 5). For concurrent prediction of T1 CST emotion and behavior response choices, age was entered on step 1, CEC and HEC scores on step 2, and AKT scores on step 3. This ordering was followed because in Authors (in press-a), executive control predicted emotion knowledge, not vice versa. T2 regressions also included the CST premeasure on step 1, so that cross-time contributions of executive control and emotion knowledge could be evaluated holding the earlier CST response constant.

For CST happy emotion response choices, both CEC and negative recognition (negatively weighted) contributed to variance at T1 and T2. For CST sad emotion response choices, both CEC and HEC contributed at T1, but CEC and negative recognition contributed at T2. T1 CST anger response choices were predicted by *lack of* HEC and negative recognition, positively weighted; no variables from step 2 or 3 were significant for this SIP element at T2.

For behavior response choices, CEC contributed to variance in socially competent choices at both time points, with negative recognition predicting at T1 only. Aggressive response choices were predicted at T1 only, by negatively weighted CEC. In contrast, passive response choices were predicted at T2 only, by negatively weighted CEC.

Discussion

This investigation is among the first to examine feasibility of direct assessment including emotional and behavioral aspects of SIP in early childhood, highlighting its development and self-regulatory/emotion knowledge underpinnings. Although obtaining self-report information from preschoolers presents challenges and limitations, our findings indicate that such data are accessible, and could be important in early childhood educational contexts. We now comment upon our findings and their implications.

Developmental Change and Age Differences

Age differences and developmental change were found, with small to medium effect sizes. Older children chose sad emotion responses more often and happy emotion responses less often (angry emotion responses were chosen more often by older children at T2, perhaps because understanding of angry situations is developing during this time; Denham & Couchoud, 1990). Individual children's selection of the happy response choice also decreased across time. Saying that one is happy during peer provocation suggests not

understanding the true problematic nature of the situation; thus, it is encouraging that happy emotion response choices were less prevalent for 4-year-olds and decreased across time.

Four-year-olds' more frequent choice of sad emotion responses also can be seen as more adaptive. Older preschoolers have generally begun to understand distinctions among causes of anger and sadness (Denham & Couchoud, 1990), and may realize that sadness is a lower intensity, potentially less dysregulating emotion than anger (which they also acknowledge more readily than younger preschoolers). In this sense, sadness at difficulty experienced with peers may denote "seeing the big picture"—feeling bad, but able to deal with frustration. This interpretation resonates with Orobio de Castro's (2004) theorizing.

Regarding behavior response choices, we did not see change across our short longitudinal period, but older preschoolers did choose socially competent behavior responses more often, and passive responses less often, compared to younger preschoolers. This pattern suggests that preschoolers, like their grade school-age counterparts, become more capable of relationship-enhancing responses as they develop. For 3-year-olds, whose social behavior repertoire is not yet sophisticated enough to allow for more interactive, socially competent behavior responses passive responses may allow them to leave a situation.

These findings for both emotion and behavior choices echo the sparse existing literature on preschoolers' SIP, suggesting that age is important to consider, and that "what develops" during this period is increasingly adaptive SIP (e.g., Mayeux & Cillessen, 2003). Knowing what to expect of preschoolers' SIP at differing ages can assist early childhood educators in their efforts to individualize programming, and measures like ours can assist in evaluating effects of such training.

One must, of course, evaluate whether children are accurately self-reporting their anticipated feelings and behavior, or merely giving socially desirable responses. Although there is some merit to the argument that even knowing what is socially desirable at this young age is an accomplishment, it is also true that preschoolers can report their own emotions rather well (Durbin, 2010). Moreover, other data from our current project suggest that children's CST emotion and behavior choices are indeed related to indices of early school adjustment (Authors, in press-b). Thus, we have some safety in our conclusions here, and in considering them of import for early childhood educators.

Associations With Executive Control

Aspects of executive control, especially CEC, were often related concurrently and predictively to CST emotion and behavior response choices. As theoretically posited by Crick and Dodge (1994) and Rubin and Rose-Krasnor (1992), children's abilities to focus and inhibit prepotent responses, use working memory, and shift attention were associated with more adaptive SIP responses. These abilities may help them to inhibit prepotent revenge responses, hold in working memory the important goal of maintaining their relationship with their peer, and shift attention to enact a more adaptive response. HEC may be particularly useful when evaluating emotional content of these situations. These results are encouraging and new, suggesting that more research attention should be paid to connections between executive control and even more detailed manifestations of early

childhood SIP. Much current research suggests that executive control is important for early school adjustment (e.g., Willoughby et al., 2011); our results extend these findings to a potential indirect pathway from executive control to early school adjustment, via SIP. Confirmation of such an indirect pathway could be useful to early childhood educators—as one example, an intervention focusing on preschoolers' SIP showed salutary effects on the children's academic competence, social competence, peer acceptance, depression, and aggression (Conner & Fraser, 2011). Promotion of executive control could multiply such effects indirectly via effects on SIP.

Associations With Emotion Knowledge

Children who had a more complete, flexible, age-appropriate corpus of emotion knowledge often chose more adaptive emotion and behavior choices. Further, more significant partial correlations were between AKT and CST *emotion* response choices, confirming our thoughts that online emotion knowledge and Lemerise and Arsenio's "knowledge database" (2000) are related. Children need to understand emotion to think about how they would feel in challenging peer situations; along these lines, we found it intriguing that children who chose happy responses to such developmentally difficult situations also evidenced less sophisticated emotion knowledge overall. Access to emotion knowledge is beneficial when discerning how to get along with others; in alignment with this theorizing, we found emotion knowledge most reliably related to socially competent behavioral response choices. Knowing how peers might feel in response to their behavior could help preschoolers pick more adaptive behavior responses in the preschool classroom; promoting emotion knowledge is important in many ways to early school adjustment—be it social or pre-academic (Denham et al., 1990; Authors, in press-c), and our results again suggest that its role in early school adjustment could be indirect, via SIP.

Relative Contributions of Executive Control and Emotion Knowledge

Despite their interrelation, both foundations often contributed to aspects of SIP (for happy, sad, angry, and socially competent response choices at T1, T2, or both), amplifying our understanding of their importance. Further, it makes sense that emotion knowledge would contribute to emotion response choices. Negative recognition was more often a contributor to variance than situation knowledge, in the bustle of preschool peer interaction, clearly decoding peers' emotional expressions can be of most use to SIP.

Further, T1 angry emotion response choices were more often selected by children lower in HEC (i.e., delay of gratification) but *higher* in recognition of negative expressions. This pattern of being susceptible to frustration, yet knowing about negative emotions, makes sense as a forerunner to being able to make such a SIP choice. Children knew they would be angry, but could not see past anger to choose a more adaptive emotion.

Executive control was a sole contributor for aggressive (T1) and passive (T2) behavior response choices. Why emotion knowledge was unrelated to these choices is, however, puzzling. Perhaps for these behavior response choices, being able to refrain from impulsivity is more important, at this age, than emotion knowledge (or variance accounted for by CEC is shared by emotion knowledge). Another as yet untested possibility is that emotion

knowledge and executive control may interact in predicting emotion and behavior response choices.

In sum, across emotion and behavior response choices, either both executive control and negative recognition uniquely contributed to variance, or executive control indices were lone unique contributors. Emotion situation knowledge never emerged, perhaps in part because of its correlation with negative recognition, and CEC was more likely to be the unique executive control predictor than HEC, probably for the same reason. However, it should be noted that we predicted that both CEC and negative recognition would be the most important unique predictors of CST response choices. In sum, early childhood educators' promotion of executive control, emotion knowledge, and SIP—whether via published curricula or more informal means—could work synergistically to foster preschoolers' early school adjustment, both social and academic.

Future Research

Several aspects of this study suggest future research. First, although the CST was intentionally short, to render it easier for preschoolers and more practical for ultimate classroom use, adding items could enhance both internal consistency and other psychometric properties. Second, another potential modification of the measure would be to render the protagonist and antagonist characters more androgynous in countenance, to counter any possible bias of especially the antagonist looking like a boy. Although we can discern no pattern in our data regarding this element of the measure, it could be important to make the story characters match the gender of the child being tested; empirical testing is warranted to see whether patterns of results would differ given such a modification. Third, change across longer longitudinal periods should be undertaken to discern developmental change more discretely. Fourth, because we know that parenting behaviors, beliefs, and attitudes contribute to children's adaptive or maladaptive SIP patterns, most often for elementary-age children (e.g., Goldweber, Bradshaw, Goodman, Monahan, & Cooley-Strickland, 2011; Haskett & Willoughby, 2007), it would be useful to continue to explore how parents of preschoolers can support the development of adaptive SIP patterns and their foundations. Although we could see differences in the adaptiveness of SIP patterns by socioeconomic risk status and gender in our dataset (Authors, in press-c), we did not explore the contributions of parents in detail. Fifth, cultural norms may impact preschoolers' developing SIP. More research is needed to understand how these constructs might operate differently for children in differing cultural contexts where they develop their social skills. Finally, more exploration of the potential indirect pathways from executive control and emotion knowledge, via SIP, is warranted.

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Appendix. The Challenging Situations Task (CST)

Part A. Challenging Situation Task Scenarios and Behavioral Response Choices

Scenario	Stimuli	Behavioral choices
Taylor was building a very tall tower of blocks. Bobby knocked it down.		1a. Build another tower? 1b. Hit Bobbie or yell? 1c. Cry? 1d. Go find someone else to play with?
Taylor is having a good time playing in the sandbox when Bobbie hits her/him.		2a. Tell Bobbie it's not a nice thing to do? 2b. Hit? 2c. Cry? 2d. Go play somewhere else?
Taylor was kicking a soccer ball. Bobbie came and took the soccer ball.		3a. Ask Bobbie to play with you? 3b. Grab the ball back or yell? 3c. Cry? 3d. Go play something else?

Part B. Emotional Response Choices

“Angry”

“Just ok”

“Sad”

“Happy”

Part C. Sample Behavioral Response Choices (Block Story)

“Build another tower?”

“Hit or yell?”

“Cry?”

“Go find something else to play with.”

Table 1**Preschool Self-Regulation Assessment (PSRA) Tasks Used in This Study**

Task Title	Construct	Assessor Directions/Procedure	Measurement Method
Balance Beam (3 trials)	CEC	Ask child to walk on a short length of tape for 3 trials; reduce speed for 2nd trial and slower for 3rd trial.	Subtract first trial from mean of 2nd and 3rd trials (amount of reduction of speed)
Pencil Tap (16 trials)	CEC	Ask child to tap unsharpened pencil after assessor; assessor taps 1x, child should tap 2x; assessor taps 2x, child should tap 1x.	Percentage of correct trials
Tower Task (12 blocks)	CEC	Ask child to build a very high tower with blocks, taking turns with assessor.	Ordinal variable capturing amount of turn taking (full, partial, or none)
Toy Wrap	HEC	Ask child not to peek while assessor wraps a toy in tissue and bag for 1 minute.	Latency to first peek
Snack Delay (4 trials)	HEC	Ask child to wait before getting a candy from under a cup for 3 rounds (10 sec., 20 sec., 30 sec., 60 sec.)	Average of four trials on the level of waiting (ranging from does not touch cup or timer to eats candy)
Tongue Task (1 trial)	HEC	Ask child to hold a candy on their tongue for 40 sec. before eating it.	Latency to eat candy

Note. Adapted from Smith-Donald et al. (2007).

Table 2

Age Comparisons of CST Scales (Emotion and Behavior Choices)

	<i>F</i>	Estimated Marginal Means Age 3 <i>n</i> = 109	Estimated Marginal Means Age 4 <i>n</i> = 207	Partial η^2
T1 Emotion Choices	$F(3, 312) = 9.44^{***}$			.083
Happy	$F(1, 314) = 25.90^{***}$	0.98	0.47	.076
Sad	$F(1, 314) = 7.89^{**}$	0.90	1.23	.025
Angry	$F(1, 314) = 4.86^*$	0.79	1.02	.015
T2 Emotion Choices	$F(3, 303) = 6.56^{***}$			.061
Happy	$F(1, 305) = 18.93^{***}$	0.86	0.41	.058
Sad	$F(1, 305) = 1.80$	1.06	1.23	.006
Angry	$F(1, 305) = 5.27^*$	0.75	1.01	.017
T1 Behavior Choices	$F(3, 312) = 3.89^{**}$			.036
Socially Competent	$F(1, 305) = 9.18^{**}$	0.67	1.01	.028
Aggressive	$F(1, 305) = 0.10$	0.48	0.45	.000
Passive	$F(1, 305) = 2.47$	1.53	1.35	.008
T2 Behavior Choices	$F(3, 303) = 3.40^*$			.033
Socially Competent	$F(1, 305) = 8.65^{***}$	0.69	1.03	.028
Aggressive	$F(1, 305) = 0.03$	0.46	0.47	.000
Passive	$F(1, 305) = 5.20^*$	1.62	1.33	.017

*
p .05,

**
p .01,

p .001.

Table 3

Correlations of CST Emotion and Response Choices With PSRA and AKT Aggregates, and Among PSRA and AKT Aggregates, Controlled for Age

CST T1	PSRA		AKT	
	CEC	HEC	Neg. Recog.	Situations
Happy	-.20***	-.02	-.32***	-.19***
Sad	.25***	.21**	.16**	.18**
Angry	-.06	-.15**	.17**	.08
Socially Competent	.23***	.13*	.14*	.09
Aggressive	-.15*	-.11 ⁺	-.13*	-.08
Passive	-.02	-.02	.02	.02
CST T2				
Happy	-.21***	-.14*	-.35***	-.29***
Sad	.24***	.10 ⁺	.24***	.27***
Angry	-.01	.01	.05	.02
Socially Competent	.24***	.01	.17**	.15*
Aggressive	-.10 ⁺	.00	-.09	-.09
Passive	-.14*	-.02	-.06	-.05

⁺ p .10,

* p .05,

** p .01,

*** p .001.

Table 4

Prediction of T1 CST Emotion and Behavior Response Choices by Concurrent Executive Control and Emotion Knowledge, Given Age

	T1 CST Happy				T1 CST Sad				T1 CST Angry						
	B	SE	B	β	R ²	B	SE	B	β	R ²	B	SE	B	β	R ²
Block 1					.097***					.046***					.009
Age at T1	-.039	.007		-.312***		.032	.009		.215***		.013	.008		.096	
Block 2					.031**					.075***					.019+
CEC	-.032	.026		-.198**		.101	.030		.215***		-.010	.028		-.025	
HEC	-.079	.027		.031		.070	.032		.141*		-.060	.030		-.137*	
Block 3					.084***					.016+					.038**
Neg. Recog.	-.727	.154		-.293***		.257	.190		.087		.480	.174		.186**	
Situations	-.135	.171		-.052		.250	.211		.063		.150	.183		.058	
	T1 CST Socially Competent				T1 CST Aggressive				T1 CST Passive						
	B	SE	B	β	R ²	B	SE	B	β	R ²	B	SE	B	β	R ²
Block 1					.042***					.009					.010
Age at T1	.029	.008		.206***		-.001	.006		-.008		-.015	.009		-.102	
Block 2					.059***					.026*					.001
CEC	.110	.029		.250***		-.047	.023		-.139*		-.019	.032		-.042	
HEC	.013	.031		.027		-.024	.024		-.066		.009	.034		.019	
Block 3					.009					.009					.003
Neg. Recog.	.296	.182		.107+		-.224	.144		-.107		.038	.199		.013	
Situations	-.159	.202		-.056		.043	.160		.020		.162	.221		.054	

Note. Total R² significant, $p < .001$, through final step for all equations, except for T1 CST Aggressive and T1 CST Passive.

⁺ $p < .10$.

* $p < .05$.

** $p < .01$.

.100 > *p*

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Table 5

Prediction of T2 CST Emotion and Behavior Response Choices by T1 Executive Control and Emotion Knowledge, Given Age and CST Premeasure

	T2 CST Happy				T2 CST Sad				T2 CST Angry			
	B	SE	B	R ²	B	SE	B	R ²	B	SE	B	R ²
Block 1				.112***				.138***				.034*
Age at T1	-.014	.008		-.116 ⁺	-.005	.010		-.031	.011	.009		.076
CST T1	.256	.059		.278***	.398	.064		.378***	.178	.068		.163**
Premeasure												
Block 2				.027*				.029*				.001
CEC	-.056	.026		-.149*	.097	.034		.193**	-.014	.032		-.031
HEC	-.025	.028		-.082	-.005	.037		-.009	.006	.036		.012
Block 3				.055***				.032***				.000
Neg. Recog.	-.542	.161		-.235***	.417	.209		.135*	.057	.209		.021
Situations	-.175	.185		-.070	.355	.247		.107	.003	.243		.001
	T2 CST Socially Competent				T2 CST Aggressive				T2 CST Passive			
	B	SE	B	R ²	B	SE	B	R ²	B	SE	B	R ²
Block 1				.188***				.080***				.126***
Age at T1	.020	.008		.143*	-.002	.007		-.015	-.019	.009		-.125*
CST T1	.392	.060		.380***	.317	.068		.283***	.339	.064		.316***
Premeasure												
Block 2				.030**				.008				.023*
CEC	.091	.030		.200**	-.028	.026		-.073	-.086	.033		-.176**
HEC	-.051	.032		-.104	.030	.029		.073	.032	.036		.060
Block 3				.009				.003				.001
Neg. Recog.	.262	.188		.093	-.118	.168		-.051	-.074	.209		-.025
Situations	.081	.220		.027	-.042	.197		.017	.072	.247		.022

Note. Total R² significant, $p < .001$, through final step for all equations except T2 CST Angry, T2 CST Passive.

⁺ $p < .10$.

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

 $p < .001$.