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“You Hit Me! That’s Not Nice and it Makes Me Sad!!”: Relations of Young Children’s Social Information Processing and Early School Success

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Abstract

As part of a larger longitudinal project on the assessment of preschoolers’ social-emotional development, children’s social information processing (SIP) responses to unambiguous hypothetical situations of peer provocation were assessed for 239 preschoolers from Head Start and private childcare settings. SIP measurement focused on emotions children would feel during these situations, and their behavior response decisions. The aims of the study were to examine foundations of these SIP responses in self-regulation and emotion knowledge, as well as to consider how adaptive SIP responding predicted concurrent classroom adjustment and pre-academic preacademic literacy. Using a PLS modeling procedure, results showed that both self-regulation and emotion knowledge were associated with adaptive SIP responding. Moreover, adaptive SIP responding predicted classroom adjustment and pre-academic preacademic literacy. Discussion centers on the contribution of social-emotional competence to preacademic literacy.

Keywords

social information processing; preschoolers; school adjustment; preacademic literacy; emotion knowledge; self-regulation

Young children’s social information processing (SIP), a series of steps by which they make sense of encounters with other persons, contributes to behavioral and social adjustment. Emotion-related aspects of SIP may be particularly important in determining children’s social goals and choices of responses in social situations (Garner & Lemerise, 2007); for example, a child who feels sad that a peer destroys their Lego© creation is likely to choose a different response than another who feels angry in the same situation.

Despite evidence that early childhood SIP patterns are important, attention to such patterns only recently shifted back to early childhood (Bierman et al., 2008, 2014; Denham et al., 2013a, b, 2014a; Nix, Bierman, Domitrovich, & Gill, 2013; Schultz et al., 2010; Ziv, 2013). Further examination of the multiple components, potential underpinnings, and pathways to not only social, but preacademic, competence of early childhood SIP is warranted. In this study, we target socially competent behavioral and emotional response choices as predictive

of early classroom adjustment and preacademic literacy and examine these responses' potential underpinnings of self-regulation and emotion knowledge, in a modeling context.

Emotions trigger motivation and guide behavior (Izard, Stark, Trentacosta, & Schultz, 2008), and are an important aspect of SIP. Being sad or angry when a peer takes one's toy may matter a great deal when choosing a response – for example, the sad child may take time to think about a prosocial solution, whereas the angry child may merely lash out aggressively. Knowledge of *one's own* emotions, as well as those of others during interaction with them, works in concert with encoding, interpretation, and response decision-making steps of SIP during emotion-laden interactions (Orobio de Castro, 2004).

We expected that the emotion schemas of children who chose sad self-emotions in response to peer provocation would motivate them toward socially competent response decisions (Denham et al. 2013; Izard et al.; Schultz et al., 2010). That is, as with attributions of others' emotions, attributions of one's own emotion signals proactive, goal-directed cognitive activity (Schultz et al., 2010); children who attribute sadness to the victim of provocation, even when it is themselves, may be more prosocial in their choice of behavior responses, as well. In contrast, choosing happy emotion responses connotes lack of understanding or denial that a provocation has occurred (or perhaps social desirability in the context of assessment). Choosing angry emotion responses would seem to directly relate to deficits of social competence (Orobio de Castro, Merk, Koops, Veerman, & Bosch, 2005).

What skills buttress adaptive SIP patterns of prosocial behavioral and sad emotional responses? Developing aspects of self-regulation and emotion knowledge may allow young children to formulate more adaptive SIP strategies (Denham et al., 2014b). Surprisingly, little, if any, empirical research has linked self-regulation with SIP in young children (Denham et al., 2014a,b; see also Ellis, Weiss, & Lochman's 2009 findings with older boys). Growing self-regulatory abilities to plan and to inhibit responses could enable preschoolers to consider social goals and delays in satisfaction when interacting with others, impacting their behavior and emotion responses. Children with less developed self-regulation might form different SIP patterns, such as more adversarial goals and nonadaptive responses to provocation. Thus, we will also examine relations of young child's self-regulation with adaptive SIP.

Emotion knowledge also can support socially competent, nonaggressive SIP strategies (Denham, Bouril, & Belouad, 1994; Dodge, Laird, Lochman, Zelli, & Conduct Problems Prevention Research Group, 2002; Garner & Lemerise, 2007). Children with greater levels of emotion knowledge about self and others generate nonaggressive strategies, attribute benign intent to provocateurs, and espouse more socially competent goals when administered various SIP measures (Bierman et al., 2008). Thus, we examine associations of emotion knowledge with preschool SIP. Finally, self-regulation may support emotion knowledge (Carlson & Wang, 2007; Denham et al., 2012c; Schultz, Izard, Ackerman, & Youngstrom, 2001; von Salisch, Hänel, & Denham, 2015). Inhibiting prepotent responses could facilitate distinguishing among emotions during challenging peer interactions; we also explore this linkage in the current study.

Two outcomes of importance for this study are *classroom adjustment* and *preacademic literacy*. We consider *classroom adjustment* to be a powerful amalgam of crucial learning-related attitudes and behaviors (e.g., motivation to learn self-directedly, persistence, positive attitudes about learning tasks, and cooperative participation in classroom routines) that allow preschoolers to become immersed in their many new school tasks. Such early approaches to learning relate to positive achievement trajectories (Li-Grining, Votruba-Drzal, Maldonado-Carreño, & Haas, 2010). Young children's *preacademic literacy* skills (e.g., learning letters and numbers) help ensure success in upcoming formal schooling. Such skills – or their lack – often set children on a cycle of success or failure in both academic and social domains (McClelland, Acock, & Morrison, 2006). Given our consideration of emotion and behavior response choices in SIP, we expect children who choose socially competent behaviors as part of response decision-making, and those who acknowledge the experience of provocation with choice of sad rather than happy or angry emotions, to demonstrate greater classroom adjustment and preacademic literacy.

Why should this be true? Such adaptive SIP, in the intensely social preschool environment, could smooth social interactions so that children have personal resources to focus on positive engagement with classroom tasks – paying more attention, planning better, and devoting more resources to learning (Ziv, 2013). We predict that children's adaptive SIP supports their ability to benefit more from teachers' instructions, giving and getting academic information from peers, sharing academic resources with peers, and modeling peers' learning skills, supporting both classroom adjustment and preacademic literacy.

Prior studies that examined relations between SIP and school performance suggest that aspects of younger children's SIP may contribute to their success in school (Bascoe, Davies, Sturge-Apple, & Cummings, 2009; Bierman et al., 2008; Nix et al., 2013; Ziv, 2013). For example, Bierman and colleagues (2008) demonstrated relations between adaptive SIP (with this study's measure) and young children's school readiness, as well as literacy and learning engagement in kindergarten. However, most studies did not or could not fully examine the questions we have introduced.

The Present Study

Given these considerations, preschool SIP was assessed as part of a larger longitudinal project on the assessment of social-emotional development; preschoolers' self-reported emotional and behavioral responses to hypothetical peer provocation situations were noted. Aspects of children's self-regulation and emotion knowledge were assessed contemporaneously as potential supports for SIP. Teachers' ratings of children's classroom adjustment and preacademic literacy were obtained at a later point in time during the same school year.

We have addressed some similar questions with an independent sample around the same mean age as the children studied here (Anonymous 2013a, b, 2014b). These reports focused on SIP prediction of *kindergarten academic readiness* or *kindergarten classroom adjustment*, not prediction of emerging preschool pre-academic abilities during preschool, which we posit as important to a developmental period in which social-emotional skills have a unique

impact on school success. As such, this report constitutes a replication and extension of our earlier work.

Our goal was to examine pathways *to* SIP from self-regulation and emotion knowledge, and *from* SIP to classroom adjustment and pre-academic preacademic literacy, using a modeling technique (see Figure 1). Indirect pathways from self-regulation and emotion knowledge to both classroom adjustment and pre-academic preacademic literacy were also assessed. It is important, for a complete picture of the importance of these social-emotional skills, to examine their linkage with *emergent* classroom adjustment and preacademic literacy during preschool, themselves building blocks for later school success. In short, the current study asks a distinctive research question in its goal to completely depict a model of the underpinnings and contributions of SIP to *preschool* pre-academic literacy. As such, this study contributes to creation of a broader corroborating picture of how SIP informs early childhood competence.

Method

Participants

Data were part of a larger study ($N = 312$) focused on developing a portable assessment battery for measuring the social and emotional aspects of early school success. The study included children recruited from Head Start and private childcare centers in the MidAtlantic, selected due to variability in race, ethnicity, and income. Within these sites, participants were recruited at parent and teacher meetings and via flyers posted in classrooms. The 239 children who completed the entire SIP measure and for whom pre-academic reports from teachers were obtained (almost all also were administered the self-regulation and emotion knowledge assessments to be described) were, on average, 4½ years old ($M_{\text{age}} = 54.5$ mos, $SD = 7.84$, range 32 to 58 mos). Half of the total sample was female.

A majority of parents reporting demographic information identified their child as either Caucasian or African American (59.7% Caucasian, 30.8% African-American, and 7.2% multiracial). About 13% of the sample was parent-reported as Latino. Participants came from a wide range of socioeconomic backgrounds. Reports of maternal education indicated that, for the sample as a whole, 40% of mothers had a high school diploma or less education.

General Procedure

Children's measures were collected during February and March and preschool teacher measures were collected in June and July of school year. For each participating child, preschool teachers were paid \$15 in compensation for their time completing questionnaires. Children received stickers for their participation.

Measures

SIP.—We used the Challenging Situation Task (CST), a pictorial forced choice measure, to investigate children's qualitatively different behavioral and emotional responses to three unambiguous provocation vignettes, in which intentions of the provocateurs were clear,

within one ecologically valid context—peer provocation (Dodge et al., 2002). Forced choice answers allowed for less verbal children to show their level of competency.

The scenarios were presented via pictures and a short description of the transgression situation (e.g., “*Mary/John was building a very tall tower of blocks. But suddenly, Bobby knocked it down*”). Children were asked, “if this happened to you, how would you feel?” about each situation, given four randomly ordered emotion choices using schematic drawings and verbal labels of ‘happy,’ ‘sad,’ ‘angry,’ and ‘just ok’. Next, they were asked “what would you do?”, given four randomly ordered behavior choices (socially competent, aggressive, passive, and manipulative/crying). 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. In this study we examine sad emotion choices and socially competent behavioral choices as aspects of preschoolers’ adaptive SIP.

Because there were too few items in CST scales for Cronbach’s alpha to be meaningful, internal consistency for these scales was assessed via mean interitem correlation. A mean interitem correlation above .14 is considered to be acceptable (Clark & Watson, 1995). The mean interitem correlation for sad responses was .21, $p < .01$, and for socially competent responses it was .31, $p < .001$. Earlier work has demonstrated both test-retest reliability and validity for this measure (Anonymous, 2013b,c, 2014a).

Emotion knowledge: Affect Knowledge Test Shortened (AKT-S).—We assessed preschoolers’ emotion knowledge using puppets with detachable faces depicting happy, sad, angry, and afraid expressions (Denham & Couchoud, 1990a, 1990b). It tests expressive and receptive recognition of emotions and understanding of stereotypical (most people would feel similarly) and nonstereotypical (individuals’ emotions could differ) situations. The current measure, an adaptation of the AKT shortened to be more accessible to researchers and early childhood educators, assessed preschoolers’ understanding of emotion using puppets with detachable faces that depict happy, sad, angry, and afraid expressions (Anonymous, 2016).

For the *labeling* portion of the measure (six items), children were asked to identify sad, angry and afraid facial expressions by verbally naming them (expressive knowledge), and then by non-verbally pointing to them (receptive knowledge). For the *situation knowledge* portion, nine vignettes were enacted using the puppets, accompanied by vocal and visual affective cues emitted by the puppet/ experimenter. For three stereotypical emotion knowledge vignettes, the puppet depicted the same emotion most people would feel (e.g., fear during a nightmare). In the remaining six nonstereotypical emotion knowledge vignettes, the puppet depicted emotions different from each mother’s reports of her child’s likely feelings. Among nonstereotypical situations, three vignettes pitted positive versus negative emotion (e.g., happy or sad to come to preschool); the rest pitted negative versus negative emotion (e.g., angry at or afraid of a sibling’s aggression). Children affixed the felt face of their choice to report the puppet’s emotion.

Children received one point for correct identification in the labeling portion. In the situation knowledge portions, they received two points for correct identification of emotion and one point for identifying the correct (positive or negative) valence but not the correct emotion (e.g., sad for afraid). Scales were created for expressive recognition, receptive recognition, stereotypical situation knowledge, and nonstereotypical situation knowledge. Mean scores for each scale were used in subsequent analyses. Internal consistency, again assessed via mean interitem correlations; all correlations were significant at the $p < .01$ level or better, two-tailed, except that for expressive recognition. Thus, that scale was not included in subsequent analyses.

The AKT has demonstrated reliability and validity (Denham et al., 2003; Miller, Gouley, Seifer, et al., 2004), and is useful for assessment of status and change in emotion knowledge (Shields, Dickstein, Seifer, et al., 2001). The AKT-S has also demonstrated acceptable internal consistency and validity via relations with social competence and early classroom adjustment (Anonymous, 2013).

Preschool Self-Regulation Assessment (PSRA; Smith-Donald, Raver, Hayes, & Davidson, 2007).—Two PSRA tasks were used to capture strengths and weaknesses in preschoolers' self-regulation; choice of these two tasks was based on Anonymous' (2012) findings of lack of ceiling effect for these tasks, and their high standardized factor loadings in confirmatory factor analyses of PSRA task structure, as well as their correspondence to the major aspects of self-regulation identified by Willoughby, Kupersmidt, Voegler-Lee, & Bryant (2011).

For Pencil Tap, the child is asked to tap an unsharpened pencil after the assessor, once after the assessor taps twice, and twice after the assessor taps once; scores equal the percentage of correct trials over a total of 16 trials. For Toy Peek, the child is asked not to peek while the assessor wraps a toy in tissue paper and a gift bag, for one minute; scores equal latency in seconds to the first peek, up to a maximum of 60 seconds.

Tasks were administered by trained and certified research assistants who live-coded latencies or performance levels for each task. All assessments with consent to be videotaped were double coded (7% of the sample). Intra-class correlations for assessor reliability were good for both Pencil Tap (.97) and Toy Peek (.79), $ps < .001$. Internal consistency α for 16 trials of Pencil Tap equaled .79; for Toy Peek, across scores for presence of peeking, number of peeks, and time to peeking, Cronbach's alpha equaled .96. Scores used in analyses were the percentage of correct pencil taps across trials, and latency to peeking (up to 60 sec allotted time).

The original PSRA task battery shows good concurrent validity with measures of children's behavior problems and competencies, as well as their early math and verbal skills (Denham, Warren-Khot, Bassett, Wyatt, & Perna, 2012b; Smith-Donald et al., 2007); this shortened measure functions similarly (Anonymous, 2012).

Classroom adjustment: Preschool Learning Behaviors Scale (PLBS).—The PLBS (McDermott, Leigh, & Perry, 2002) is a 29-item teacher behavior rating instrument

assessing preschool children's approaches to learning. Teachers rated children's observable behaviors that occurred during classroom learning activities over the previous two months on a 3-point Likert scale. The instrument yields three learning behavior dimensions: Competence Motivation (i.e., "reluctant to tackle a new activity"), Attention/Persistence (i.e., "tries hard, but concentration soon fades and performance deteriorates"), and Attitudes Toward Learning (i.e., "doesn't achieve anything constructive when in a sulky mood"). In this study, the PLBS demonstrated good internal consistency (α s = .74 to .87). Multi-method, multi-source validity analyses further substantiate the PLBS dimensions for preschool children, and reliability estimates were similar for Caucasian and non-Caucasian portions of the sample (Fantuzzo, Perry, & McDermott, 2004).

Classroom adjustment: The Teacher Rating Scale of School Adjustment

(TRSSA).—This 52-item measure was designed to tap several constructs reflective of young children's behavioral and relational adjustment to classroom settings (Birch & Ladd, 1997; Ladd, Kochenderfer, & Coleman, 1997). Two scales reflective of learning behavior were used in this study. Teachers provided ratings on behaviors such as "follows teacher's directions" (Cooperative Participation) and "works independently" (Self-Directedness) on a 3-point Likert scale. In the current sample, internal consistency was high (α = .91 for cooperative participation and .87 for self-directedness). Subscales have demonstrated validity in socioeconomically-diverse and mixed-race samples (see Birch & Ladd, 1997; Ladd et al., 1997).

Pre-academic literacy, Head Start: The Phonological Awareness Literacy Screening for Preschool (PALS-PreK) was designed to assess emerging literacy skills in children prior to beginning kindergarten (Invernizzi, Sullivan, Meier, & Swank, 2004; Invernizzi, Landrum, Teichman, & Townsend, 2010). The PALS-PreK program measures several key abilities. Name Writing asks children to write their name on a self-portrait. Upper-Case Recognition asks children to identify all 26 letters. Lower-Case Recognition is administered if they get 16 or more upper case letters correct. Letter Sounds is administered if children got 9 or more lower case letters correct. Beginning Sound Awareness asks children to produce beginning sounds associated with pictures. During Print and Word Awareness children are read common nursery rhymes and are asked to identify various print concepts (e.g., pictures, words). During Rhyme Awareness, children are presented with a picture and the name of the object in the picture. They then have to point to a picture that rhymes with the initial picture. Nursery Rhyme Awareness asks children to provide the final rhyming word in common nursery rhyme. Because of the manner in which the lower-case recognition and letter sounds are scored (see above; resulting in much missing data), these scales were not included in our analyses.

Evidence of validity and reliability has been reported by Invernizzi et al. (2010). The retained scales (Name Writing, Upper-Case Recognition, Beginning Sound Awareness, Print and Word Awareness, Rhyme Awareness, and Nursery Rhyme Awareness) to be used in a total z-score aggregate for our subsequent analyses showed Cronbach alpha equal to .76, suggesting that their use together in such an aggregate would be warranted.

Pre-academic literacy, private child care: Minnieland Assessment.—The child care organization with which we partnered developed their own assessment of pre-academic literacy. Items were chosen to correspond to Virginia's Foundations Blocks for Early Childhood Education and Virginia Milestones of Child Development (Virginia Department of Education, 2013; Virginia Department of Social Services, 2008), as well to relate to the High Scope Child Observation Record (Schweinhart, Mcnair, Barnes, & Lerner, 1993). Thus, this assessment tool follows standards for early childhood education and in that sense has excellent face validity.

The Minnieland Assessment includes scales for independence, social relations, creative arts, language and literacy, mathematical relationships, and physical skills. Scales are 8 to 18 items long and rated on a 3-point Likert scale for present, emerging, and absent. For our purposes, and to parallel the PALS-PreK most closely, we omitted independence, social relations, creative arts, and physical skills scales. The retained scales used in a z-score aggregate for subsequent analyses showed Cronbach alphas equaled .94 for language and literacy.

Thus, the PALS-PreK aggregate was utilized as a marker of preacademic literacy for children in Head Start, with the Minnieland language and literacy scale, standardized, used as the marker for children in these private childcare centers.

Data Analysis Method

Partial least-squares modeling (PLS: using the Smart-PLS-3™ program, Ringle, Wende, & Becker, 2015) was utilized to answer our problem questions. In common with other modeling techniques, a measurement (outer) model as well as a structural (inner) model is specified. For the outer model, PLS estimates latent variables (LVs) based on the shared variance of the manifest variables, using principal components weights of the manifest variables. Each indicator varies in how much it contributes to the LV, resulting in the best possible combination of weights for predicting the LV while accounting for all manifest variables (Henseler et al., 2014; Tsethlikai, 2010). Thus, variance shared by the manifest measures is taken as a single index of the LV. Outer measurement models provide information on psychometric reliability of the LVs.

Next, relations among LVs (the inner model) are investigated. Inner measurement models allow for estimation of predictive validity via hypothesized direct and indirect paths among LVs (Tsethlikai, 2010); bootstrap procedures allow significance testing of each path, as well as aspects of the inner model, and estimation of the model's overall fit. Further, inner and outer measurement models together provide information on discriminant validity.

This method, increasingly used by developmentalists (e.g., Tsethlikai, 2010, 2011), also allows exploration of hypothesized relations among constructs without some of the restrictions of other structural modeling techniques. In particular, PLS is appropriate for use with relatively small groups of participants, although it does require a reasonable LV: participant ratio (Henseler, Ringle, & Sinkovics, 2009). Further advantages include lack of stringent assumptions such as those regarding observational independence and normality of

residuals, as well as error-free measurement (Tsethlikai, 2011). To reiterate, we use PLS to evaluate the model in Figure 1.

Results

Descriptive Statistics

Table 1 shows all descriptive statistics (means, standard deviations and possible range) for each scale used in the study. Means for measures administered in both Head Start and private childcare settings are shown separately for each context, with mean differences noted. For child direct assessments, a significant mean difference was found only on nonstereotypical emotion knowledge (positive vs. negative) indicating that children in Head Start had a higher mean compared to children in private childcare. In addition, Head Start children had significantly higher means compared to children on all indices of teacher-reported classroom adjustment.

PLS Analysis Overview

Using manifest variables (indicators), we first created reliable latent variable (LV) aggregates for directly assessed self-regulation, emotion knowledge, and SIP (based on the emotional and behavioral choices we have found most adaptive in our earlier research), as well as teacher-rated school adjustment and preacademic literacy. Then we conducted PLS path analyses, evaluating paths from (1) self-regulation to emotion knowledge and SIP; (2) emotion knowledge and self-regulation to SIP; (3) classroom adjustment to pre-academic preacademic literacy; and (4) SIP to classroom adjustment and preacademic literacy indices.

Evaluation of the Outer Model

We first examined acceptability of the outer measurement model for each setting. Regarding the outer model, three criteria are present for each LV: (a) the set of manifest variables represents the same underlying construct (AVE), with a reasonable total explained variance (R^2); (b) the manifest variables also form an internally consistent LV (composite reliability); and (c) each manifest variable loads sufficiently on its LV to support its retention (i.e., each manifest variable contributes to its LV and represents the construct in a similar manner as other manifest variables).

The bootstrapping procedure included in Smart-PLS-3TM allows evaluation of each of these criteria. In this procedure, the partial least squares parameters of a series of random subsamples of the total sample are iteratively tested, until significance can be estimated based on their convergent findings; we utilized a setting of 2500 subsamples.

Results from the outer model are shown in Table 2. According to the bootstrapping procedure, all outer loadings, AVEs, and composite reliabilities were significant at $p < .001$.

Initial Evaluation of the Inner Model: Convergent and Discriminant Validity

Given these results on the outer model, we can continue to an examination of the inner model. Table 3 shows the square roots of the AVEs and the correlations amongst LVs for each model. This information can be used to evaluate both convergent and discriminant

validity. First, for *convergent validity*, a LV should explain better the variance of its own indicator than that of other LVs. One way to determine this point is to compare the square root of each LV's AVE with all correlations involving that LV. If the correlation between any two LV's is less than the square root of either of their individual AVE's, this suggests that each has more internal (extracted) variance than variance shared between the LVs. Second, if these criteria are met for a target LV and all the other LV's, this suggests the *discriminant validity* of the target LV (Fornell & Larcker, 1981). Correlations with other LV's of less than .7 are also frequently accepted as evidence of discriminant validity.

The information in Table 4 shows that these criteria for both convergent and discriminant validity are met for all LV predictors. Finally, examination of cross-loadings in both models indicated that each manifest variable's loading was far higher for its assigned LV than the other LVs; by this criterion as well (not tabled), all LVs showed good discriminant validity.

LVs also must be examined with respect to hypothesized relations among them. As seen in Table 4, hypothesized foundations for SIP (i.e., self-regulation and emotion knowledge) were in fact inter-related and also related to SIP, as well as to both classroom adjustment and pre-academic preacademic literacy. SIP also was related to classroom adjustment and pre-academic preacademic literacy, which also were interrelated. LV inter-correlations thus suggested the advisability of continuing on to evaluate inner models.

Overview of Structural Path Model

Figure 2 depicts the structural model. Path coefficients in can be interpreted as standardized beta weights, each estimated after all other paths' effects have been controlled. Our structural model can be summarized by noting that all hypothesized pathways were significant. Thus, there were significant direct effects of LVs as follows: (a) self-regulation predicted emotion knowledge and SIP; (b) emotion knowledge also predicted SIP; (c) SIP predicted both classroom adjustment and pre-academic preacademic literacy; and (d) classroom adjustment also predicted pre-academic preacademic literacy. Importantly, inner model fit was good; standardized root mean residual (SRMR) equaled .061, $p < .001$. SRMR's $< .08$ indicate good fit.

The paths just described are for *direct effects*. Smart-PLS-3™ also reports indirect effects. We confirmed that contribution of self-regulation and emotion knowledge was mediated by adaptive SIP patterns (see Table 4). Emotion knowledge and self-regulation made significant indirect contributions to classroom adjustment and pre-academic preacademic literacy via SIP. Additionally, self-regulation made an indirect contribution to SIP, and SIP also made an indirect contribution to pre-academic preacademic literacy.

Discussion

This investigation adds to a small number of studies using this direct assessment to examine how SIP in early childhood is related to classroom adjustment (e.g., approaches to learning and learning behaviors) and preacademic literacy (see Bierman et al., 2008, 2014; Nix et al., 2013), and to determine potential foundations of adaptive SIP (Denham et al., 2014a,b). Our findings illustrate that robust LVs could be created for all constructs involved in the study.

Furthermore, self-regulation and emotion knowledge were contemporaneously related to SIP, and may be foundational to SIP choices. Although our design did not allow for testing directions of effect, these findings replicate and extend earlier work including longer longitudinal periods (Anonymous, 2014a, b). Further, SIP was related to both classroom adjustment and preacademic literacy, and indirect effects of emotion knowledge and self-regulation were found via SIP to both aspects of early school success. We explore our main findings as they occur in the model.

Foundational Correlates of Early Childhood SIP

Self-regulation was directly related to adaptive SIP and corroborated earlier work with another sample (Anonymous, 2014a, b). If one cannot purposely focus on or shift attention to what is important in one's social world, inhibit prepotent responses while activating alternative, subdominant responses, stave off frustration, quell impulses, and remain composed, it seems unlikely that one could form adaptive SIP patterns.

It is important to point out that self-regulation's connection with emotion knowledge was again uncovered, as it has been recently in other studies (e.g., Denham et al., 2014b, von Salisch et al., 2015); children with self-regulation difficulties may misperceive emotional expressions, miss key emotional situation information, and even provoke socializers so that they miss out on important means of acquiring normative emotion knowledge, such as via conversations. Furthermore, this connection between self-regulation and emotion knowledge was reinforced via its indirect relations with SIP; as such it may support both aspects of social cognition so important in our predictions of school success during preschool. Moreover, its indirect relations with aspects of school success expand its importance even further.

Emotion knowledge was related to adaptive SIP, and indirectly related to both aspects of school success. More specifically, the direct relation with SIP suggests that an emotion knowledge database, is indeed crucial for adaptive SIP patterns. The indirect relations found here provide more detail for earlier work denoting a classroom adjustment and/or preacademic literacy advantage for children with greater emotion knowledge (e.g., Denham et al., 2012c, 2014a; Garner & Waajid, 2007). In sum, the importance of preschoolers' emotion knowledge is again underscored; further, indirect effects of and interrelations between self-regulation and emotion knowledge reinforce that these abilities are of paramount importance for both SIP and aspects of early school success.

Associations with Classroom Adjustment and Preacademic literacy

Adaptive SIP was related to classroom adjustment and pre-academic preacademic literacy. This finding for our central prediction of the study is key in promoting indices of preschoolers' school success. Why might SIP be important to classroom adjustment and pre-academic preacademic literacy? Perhaps SIP styles (e.g., hostile attribution biases or more adaptive patterns) become mental models or schemas that inform subsequent exchanges (Burks, Laird, Dodge, Pettit, & Bates, 1999). These schemas may impact not only social interactions with peers and teachers, but also children's ability to acquire learning behaviors while participating in the classroom. For example, children who view their social world

through lenses of anger and aggressive responding have difficulty taking advantage of their learning environment, their personal resources depleted in conflict with others. Their approaches to learning could become increasingly negative as they experience more peer rejection. Therefore, their ability to take advantage of the classroom environment would be severely circumscribed (Bascoe et al., 2009).

Conversely, those who show adaptive SIP patterns would be more likely to interact successfully, enhancing their learning engagement and constructive classroom participation, both of which could set the stage for greater pre-academic preacademic literacy. More generally, adaptive SIP can motivate and facilitate important opportunities for language learning and cognitive development (Bierman et al., 2008). Thus, the direct pathways from SIP to classroom adjustment and pre-academic preacademic literacy found here could be multiply determined. Moreover, we did in fact uncover an indirect relation from SIP to pre-academic literacy via classroom adjustment, supporting our suppositions.

Considering separately the aspects of SIP that were used to create our adaptive SIP LV could also be useful. As already suggested, the child choosing sadness endorses different motivational state and action tendencies than when choosing anger. Further, perhaps preschoolers—who generally understand distinctions between anger and sadness by age 4 (Denham & Couchoud, 1990b)—realize that sadness is a lower intensity, potentially less dysregulating emotion than anger, though it still reflects a negative feeling state. In fact, Schultz and colleagues (2010) have found that appraisal of a SIP protagonist as sad is associated with adaptive behavior in Head Start classrooms. Choosing the sad emotion in the CST scenarios, then, could be key component of the benign in-line knowledge structures that can grease the cogs of classroom adjustment and hence, pre-academic preacademic literacy.

Next, the relations of socially competent behavior response choices with classroom adjustment and academic preacademic literacy are not surprising, given earlier work (e.g., Caprara, Barbaranelli, Pastorelli, Bandura, & Zimbardo, 2000) that suggests that older children's effective, socially appropriate behaviors are often related to academic achievement and school grades. Considering the possible co-action of sad and socially competent response choices, picking sadness instead of anger at being provoked, *along with* socially competent behavior, may indicate reflective processing that allows for more adaptive behavior in a range of contexts (Orobio de Castro, 2004). In fact, person-centered analyses of SIP *styles* showed that children who chose "sad" emotion responses in combination with socially competent behavior response choices demonstrated more positive school adjustment and kindergarten literacy outcomes than those who chose angry emotion and aggressive responses (Denham et al., 2013b).

In sum, these findings assert the importance not only of self-regulation and emotion knowledge to early school success, but also of adaptive SIP patterns. Given this importance, efforts at appropriately assessing and promoting these skills are appropriate and warrant continued fine-tuning (e.g., Bierman et al., 2008, 2014). Current best practice in programming for SIP skills to promote preschoolers' social-emotional competence is summarized in Bierman, Greenberg, and Abenavoli (2017). Age-appropriate assessment of such skills is reviewed in Campbell et al. (2016).

Limitations and Future Directions

No research is without limitations. In the present study, both classroom adjustment and pre-academic preacademic literacy were reported by teachers; although the constructs evaluated for each were very disparate (i.e., distinct literacy skills requiring some direct assessment for pre-academic skills versus more global ratings of classroom adjustment), mono-rater bias should be ruled out by replicating the study with other means of measurement and/or reporters. Further, the Minnieland Assessment, although showing good internal consistency, requires further validation.

Nonetheless, our findings speak to future directions. Although much has been confirmed here, we need to dig deeper into the processes by which SIP is related to classroom adjustment and pre-academic preacademic literacy, such as how adaptive SIP patterns support real time motivation and attention, as well as their relation with peer and teacher supports to learning.

It could also be productive to examine in more detail the relations among emotion knowledge/self-regulation and other steps of preschoolers' SIP, like encoding and interpreting social cues. Finally, longitudinal models evaluating *change* across paths from self-regulation and emotion knowledge, to SIP, to school success, would go a long way to pin down predictive relations among these aspects of early childhood social-emotional competence, as well as more extended effects of such competence on academic and classroom adjustment aspects of school success.

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Figure 1. Pathways of the Proposed Model

Figure 2. Inner PLS Model

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

Table 1

Descriptive Data for Each Measure

Measure/Scale	<i>M</i>		<i>SD</i>		<i>n</i>		Possible Range
Emotion Knowledge (AKT-S)	Childcare	Head Start	Childcare	Head Start	Childcare	Head Start	
Receptive/negative (3 items)	0.88	0.78	.26	0.33	145	94	0 – 1
Stereotypical Negative Situations (3 items)	1.77	1.76	0.48	0.35	145	94	0 – 2
Nonstereotypical Situations Positive vs. Negative (3items)	1.71	1.76 [*]	0.45	0.37	141	89	0 – 2
Nonstereotypical Situations Negative vs. Negative (3items)	1.64	1.61	0.46	0.38	141	89	0 – 2
SIP (CST)							
Sad Choices	1.10	1.08	0.97	1.05	145	94	0 – 3
Socially Competent Choices	1.06	0.94	1.03	1.03	145	94	0 – 3
Self-Regulation (PSRA-S)							
Pencil Tap	62.5	57.46	33.61	30.99	140	93	0 – 100
Toy Peek	43.40	46.04	23.11	19.94	139	94	0 – 60.5
Classroom Adjustment: PLBS							
Motivation to Learn	1.48	1.69 ^{**}	0.43	0.32	142	94	0 – 2
Persistent	1.40	1.61 ^{**}	0.45	0.40	142	94	0 – 2
Attitude Toward Learning	1.44	1.68 ^{**}	0.37	.36	142	94	0 – 2
Classroom Adjustment: TRSSA							
Cooperative Participation	1.44	1.74 ^{**}	0.51	0.32	142	94	0 – 2
Self-Directed	1.40	1.72 [*]	0.47	0.45	142	94	0 – 2
Pre-Academic Skills (Head Start PALS PreK)	<i>M</i>		<i>SD</i>		<i>n</i>		Possible Range
Name Writing	6.15		1.04		81		0 – 7
Upper Case Letter Recognition ^a	19.43		8.14		81		0 – 26
Beginning Sounds	7.25		3.37		81		0 – 10
Print and Word Awareness	7.26		1.75		80		0 – 10
Rhyme Awareness	6.50		2.85		80		0 – 10
Nursery Rhyme Awareness	7.09		2.53		80		0 – 10
(Minnieland Assessment)							
Oral and Written Language	2.55		0.43		157		0 – 3

^{*} $p < .05$.

^{**} $p < .001$.

^a Lower Case Recognition and Letter Sounds omitted because manner of scoring leads to missing data

Table 2Outer Model and Final R^2 s for LVs: Head Start

LV			
Manifest Variable	AVE	Composite Reliability	Manifest Loadings
Self Regulation (PSRA-S)	0.70	0.82	
Pencil Tap			0.87
Toy Peek			0.81
Emotion Knowledge (AKT-S)	0.59	0.85	
Stereotypical Situation Knowledge			0.80
Nonstereotypical Situation Knowledge P/N ^a			0.86
Nonstereotypical Situation Knowledge N/N ^b			0.73
Negative Receptive Recognition			0.68
SIP (CST)	0.55	0.70	
Sad Response Choices			0.63
Socially Competent Response Choices			0.83
Classroom Adjustment (PLBS and TRSSA)	0.70	0.92	
Motivation to Learn			0.84
Persistence			0.92
Attitude Toward Learning			0.76
Cooperative Participation			0.78
Self-Directedness			0.89

Note. All AVEs, composite reliabilities, and loadings significant, $p < .001$. For R^2 s, ⁺ $p < .10$, $*p < .01$, $**p < .001$. Shaded rows indicate manifest variables that were removed from final PLS model analysis due to low loadings in the initial model.

^aNonstereotypical items pitting positive and negative emotions.

^bNonstereotypical items pitting two negative emotions.

Table 3

Inner Model LV Correlations

Scale	1.	2.	3.	4.	5.
1. Self-Regulation	.84				
2. Emotion Knowledge	.49 ***	.77			
3. SIP	.35 ***	.30 **	.74		
4. Classroom Adjustment	.41 ***	.26 *	.24 *	.84	
5. Pre-literacy	.53 ***	.46 ***	.36 ***	.33 **	.73

Note. Square roots of AVE's appear in bold on the diagonal; LV correlations appear below the diagonal.

*
 $p < .05$.

**
 $p < .01$.

 $p < .001$.

Table 4

Indirect Mediational Pathways among Social-Emotional Competencies, Classroom Adjustment, and Academic Precademic literacy

Predictor	Criteria	Indirect Effect
Self-Regulation	SIP	$\beta = .078^{**}$
Self-Regulation	Classroom Adjustment	$\beta = .091^{**}$
Self-Regulation	Precademic literacy	$\beta = .128^{***}$
Emotion Knowledge	Classroom Adjustment	$\beta = .045^*$
Emotion Knowledge	Precademic literacy	$\beta = .063^*$
SIP	Precademic literacy	$\beta = .065^{**}$

*
 $p < .05$.

**
 $p < .01$.

 $p < .001$.