Starting on positive trajectories at school entry is important for children’s later academic success. Using partial least squares, we sought to specify interrelations among all theory-based components of social–emotional learning (SEL), and their ability to predict later classroom adjustment and academic readiness in a modeling context. Consequently, self-regulation, emotion knowledge, social problem solving, and social–emotional behaviour were assessed via direct assessment and observation for 101 preschoolers; teachers provided information on classroom adjustment through kindergarten and academic readiness in kindergarten. Our final outer (measurement) model showed robust latent variables for SEL components. Regarding the inner (structural) model, latent variables showed expected predictive relations among SEL components, and with later classroom adjustment and academic readiness: preschoolers’ executive control predicted aspects of their social cognition (i.e., emotion knowledge and social problem solving) and emotionally negative/aggressive behaviour, and emotion knowledge predicted their emotionally regulated/prosocial behaviour. Further, most SEL components directly and/or indirectly predicted teachers’ evaluations of later classroom adjustment and kindergarten academic readiness. Our findings extend our understanding of SEL during preschool, suggesting that early assessment and monitoring is possible using these instruments, and potentially aiding the development of programmes to maximize children’s SEL in the service of early school success. Copyright © 2014 John Wiley & Sons, Ltd.
Even young students learn alongside and in collaboration with teachers and peers, and use their emotions to facilitate learning. Fueled by these circumstances, there is an increasing focus on not only cognitive but also social-emotional learning (SEL) as crucial for preschoolers’ concurrent and later well-being, mental health, and school success (Denham, 2006). In fact, social-emotional competencies are identified as among the most important abilities supporting early school success and the growth of academic competence during elementary school (Denham, et al., 2012a; Jennings & DiPrete, 2010; Romano, Babchishin, Pagani, & Kohen, 2010).

Educators and parents are becoming ever more aware of the importance of SEL. For example, Head Start programmes cite emotional-behavioural issues among their top needs for training and technical assistance (Buscemi, Bennett, Thomas, & Deluca, 1996). Teachers also view children’s ‘readiness to learn’ and ‘teachability’ as marked by positive emotional expressiveness and ability to regulate emotions and behaviours (Rimm-Kaufman, Pianta, & Cox, 2000). Parents’ and teachers’ beliefs about the advantages of SEL can be summarized as follows: when ‘...children can interact meaningfully with each other and adults, follow simple rules and directions, and demonstrate...independence in the classroom...then kindergarten teachers could teach them the other academic skills and knowledge...’ (Wesley & Buysse, 2003, p. 357).

Further, a content analysis of early learning standards has revealed that more and more states have standards for SEL starting at early childhood, albeit less systematically and with fewer indicators than cognitive skills (Scott-Little, Kagan, & Frelow, 2006). National legislation has also been introduced, authorizing allocation of funds for technical assistance, training, and programming on SEL (Collaborative for Academic, Social and Emotional Learning, 2012).

A Theory of Social-Emotional Learning

Because academicians, early childhood educators, parents, and even political bodies are viewing early childhood SEL as so important, consideration of this multi-faceted construct would benefit from grounding in a theoretical perspective. We view SEL through an organizational, bio-ecological lens, in which specific developmental tasks are central to each age, undergirded by maturing neurological structures and influenced by multiple environmental elements (Waters & Sroufe, 1983; Weissberg & Greenberg, 1998). This perspective organizes developmental stability and change via reference to key tasks. SEL tasks specific to early childhood centre on (1) maintaining positive engagement in the physical and social environment, and (2) managing emotional arousal and cognitive demands, while (3) maintaining positive social interaction with peers and adults (Howes, 1987; Parker & Gottman, 1989). We view these developmental tasks as benchmarks against which to evaluate a preschooler’s SEL success.

Next, to theoretically explain, describe, and evaluate such wide-ranging developmental tasks, a broadband approach is necessary—over-reliance on any one behaviour or set of behaviours can lead to misleading conclusions. To this end, our prism model of SEL can be seen in Figure 1 (from Rose-Krasnor, 1997, and Payton et al., 2000). SEL, at the model’s topmost level, can be defined as results in effectiveness in interaction, the result of organized behaviours that meet short-term and long-term
developmental needs. This overarching definition is then differentiated in lower levels of the prism. For example, such effectiveness can be evaluated by the self, others, and/or the social group as a whole, across contexts (see the model’s depth dimension for contexts in which SEL is played out). Finally, at the prism’s lowest level, fine-grained, primarily individual, elements of SEL meet the developmental tasks of early childhood. All are vital contributors to successful, effective interaction. At this level, we enumerate four core components of SEL: self-regulation, social awareness, responsible decision making, and relationship/social skills (Payton et al., 2000; Zins, Bloodworth, Weissberg, & Walberg, 2007).

Given a clear theoretical perspective, we can move on to consideration of evidence for contributions of each core component. Each has its own theoretical traditions and voluminous empirical literatures. Thus, we now briefly define each component based on current theoretical viewpoints and provide empirical evidence for their associations with early school success, defined here as classroom adjustment and academic readiness.

Social–Emotional Learning and Early School Success

All components in our prism model work together to grease the cogs of a successful school experience (Denham, Brown, & Domitrovich, 2010; Wesley & Buysse, 2003). But SEL success may not be easy for children just entering often-taxing academic settings, where they are required to sit still, attend, follow directions, and approach and enter group play—all of which may challenge their nascent abilities.

We must also consider how the components of SEL support each other and may come together synergistically in their effects on early school success. Moreover, ‘what’s measured gets treasured’—if we assess early childhood SEL well, we can make better decisions about how to facilitate children’s functioning (Denham, 2006).
That is, SEL assessment should be undertaken to effectively highlight specific needs of children and classrooms in terms of programming, and show overall effects of programming (Denham, Ji, & Hamre, 2010; Denham, Wyatt, Bassett, Echeverria, & Knox, 2009). Based on these ideas, there are dual goals for this study. First, we aim to demonstrate how SEL components directly and indirectly contribute to early school success through kindergarten, adding to both theoretical and practical knowledge. Second, we aim to examine the efficacy of a battery of direct assessment and observational measures of preschoolers’ social–emotional competencies in making such predictions, to begin to establish the measures’ usability.

Given these goals, it is also important to define early school success for the purposes of this study. In our view, early school success includes both classroom adjustment and academic readiness as crucial outcomes for successful introduction to schooling. Classroom adjustment can be defined as young children’s behaviours and attitudes associated with learning in the classroom environment, such as showing motivation to learn, persisting and paying attention, participating positively in classroom activities, and enjoying school. Young children’s academic readiness is defined as the mastery of certain basic skills, such as literacy, numeracy, and general knowledge, which help ensure success in the new formal learning environment (we use the term academic success when referring to outcomes later in schooling). We now further describe the SEL domains tapped by each of our measures, as well as (1) supportive evidence of their importance to early school success and (2) hypothesized pathways amongst them.

**Self-regulation: Emotional, Cognitive, and Behavioural**

Young children’s self-regulation—their abilities to regulate emotion, attention, and behaviour—has together been found to be related to their classroom adjustment and academic readiness (Bierman, Nix, Greenberg, Blair, & Domitrovich, 2008; McClelland et al., 2007). In particular, children who have difficulties dealing with negative emotions may not have the personal resources to focus on learning, whereas those who can maintain a positive emotional tone might remain more positively engaged with classroom tasks (Graziano, Reavis, Keane, & Calkins, 2007; Miller, Seifer, Stroud, Sheinkopf, & Dickstein, 2006; Shields et al., 2001; Trentacosta & Izard, 2007). More cognitive and behavioural forms of regulation are also related to young children’s academic success. For example, first grade inhibitory control (i.e., walking on a line) predicted third grade reading scores (Liew, McTigue, Barrois, & Hughes, 2008; see also Ponitz, McClelland, Matthews, & Morrison, 2009). Thus, self-regulation enhances children’s early classroom adjustment and academic success both predictively and concurrently, often with many demographic covariates and earlier social/academic success and/or SEL held constant.

**Social Awareness: Emotion Knowledge**

Within social awareness, we focus on the ability to understand emotions. Emotions convey crucial interpersonal information and guide interaction. Inability to interpret emotions can make the classroom a confusing, overwhelming place, hindering classroom adjustment. Further, children’s emotion knowledge is also related to their academic readiness. For example, emotion knowledge is related to preschoolers’ academic readiness (Garner & Waajid, 2008; Leerkes, Paradise, O’Brien, Calkins, & Lange, 2008; Shields et al., 2001). Similarly, Izard et al. (2001) found that 5-year-olds’ emotion knowledge predicted their age 9 academic competence. Thus, children’s
ability to understand emotions is important to their concurrent and later success in school, often after accounting for many important covariates.

**Responsible Decision Making/Social Problem Solving**

As preschoolers’ social interactions increase in frequency and complexity, they must comprehend even emotionally difficult social situations, set prosocial goals, and determine effective ways to solve differences with peers. When asked to respond to hypothetical peer dilemmas like having one’s toy taken or one’s creation destroyed, they become able to indicate different emotions such problems would arouse and possible behaviours (e.g., aggressive, socially competent, passive, and dysregulated) they would choose as solutions. Such responses are related to teachers’ concurrent and later assessments of classroom adjustment and academic readiness, even with age, gender, and earlier school adjustment covaried (Bascoe, Davies, Sturge-Apple, & Cummings, 2009; Bierman, Domitrovich, et al., 2008; Denham, et al., 2013b; Denham, Way, Kalb, Warren-Khot, & Zinsser, in press-b). Thus, there is multi-faceted evidence that young children’s social problem-solving processes are implicated in their early school success.

**Relationship Skills**

The goal in this aspect of SEL is positive exchanges with others and, ultimately, satisfying relationships that last over time. Numerous component skills are crucial during early childhood, including joining others in play, initiating and maintaining conversation, cooperating, listening, and taking turns. Children with poorer relationship skills are more likely to have difficulties with cooperative and independent participation in and liking of school, which are important aspects of classroom adjustment (e.g., Buhs & Ladd, 2001).

In terms of relations with academic readiness and achievement, Normandeau and Guay (1998) found that kindergarten prosocial behaviour indirectly predicted first grade achievement via first grade cognitive self-control. Others have shown that relationship skills are related to early academic success (e.g., Welsh, Nix, Blair, Bierman, & Nelson, 2010), albeit often with slightly older children than studied here (e.g., Caprara, Barbaranelli, Pastorelli, Bandura, & Zimbardo, 2000; Elias & Haynes, 2008). Finally, relationship skills predict promotion and retention after first grade (Agostin & Bain, 1997). Relationship skills form a solid foundation for children’s school success.

**Pathways among Components of Social–Emotional Learning**

As important as these relations are between each component of SEL and early school successes, these SEL components also should support one another as an interrelated network in which some abilities can be considered more foundational than others (Eisenberg, Sadovsky, & Spinrad, 2005). Thus, we posit a complex model with pathways among key components of SEL, based on earlier work (see Figure 2). We consider aspects of self-regulation and social awareness to be foundational to more directly applied social behaviours and cognitions, and all of these aspects of SEL promote classroom adjustment and academic readiness.

Thus, regarding the more cognitive aspects of self-regulation, ‘cool’ executive control (CEC; inhibitory control, more affectively neutral, slow acting, and developing),
being more heavily influenced by the prefrontal cortex, predicts more emotional/motivational self-regulation, termed ‘hot’ executive control (HEC; delay of gratification, more reflexive, fast acting, early developing, and under stimulus control) (Brock, Rimm-Kaufman, Nathanson, & Grimm, 2009; Willoughby, Kupersmidt, Voegler-Lee, & Bryant, 2011). Next, we consider that HEC and CEC may underlie social cognition, such as emotion knowledge and social problem solving (Carlson & Wang, 2007; Denham et al., 2012d; Schultz, Izard, Ackerman, & Youngstrom, 2001). Further, these aspects of self-regulation often relate to emotionally regulated, positive, productive, and nonaggressive social behaviour (Carlson & Wang, 2007; Ramani, Brownell, & Campbell, 2010).

Emotion knowledge also may facilitate social problem solving (Garner & Lemerise, 2007; Schultz et al., 2010), as well as supporting positive and regulated emotions and productive, prosocial behaviour (Denham et al., 2012b; Denham, 1986; Schultz et al., 2010) and buffering against aggression (Denham, Caverly et al., 2002). As already suggested, we would hypothesize that all of these aspects of SEL, both more foundational and more applied, are independently related to classroom adjustment and academic readiness.

Indirect, mediational pathways will also be explored; we would expect that the social–emotional competencies we consider more foundational might have, along with direct effects, indirect contributions to classroom adjustment and academic readiness via more clearly ‘applied skills’ (see Figure 2), but little or no research has explored such linkages. In one of the few studies examining how aspects of SEL enumerated here may mediate one another in contributing to early school success, Denham et al. (2012b) found that emotionally negative/aggressive behaviour mediated relations between aspects of emotion knowledge, as well as HEC, and both concurrent and later school adjustment (see also Denham, Bassett, Brown, Way, & Steed, in press-a, for the indirect contribution of executive control to social competence via emotion knowledge).

Figure 2. Theoretical model of interrelations among social–emotional learning skills and prediction of early school success. Note. Shading denote as overarching construct: dark blue = self-regulation, red = social awareness, violet = responsible decision making, green = social–emotional behaviour, and light blue = school success.
The Present Study

Classroom adjustment and academic readiness in kindergarten are associated with early achievement—starting children off on positive trajectories at school entry is important for later academic success (Romano et al., 2010; Murray & Harrison, 2011). Increasing empirical evidence examining relations among social–emotional competencies cited here suggests that knowing even more about how aspects of SEL contribute to each other, and seeing the full picture of how all contribute to classroom adjustment and academic readiness, could add to our theoretical understanding, expand our ability to assess social–emotional competencies during preschool, and aid in the development and evaluation of SEL programming.

Thus, we sought in this study to specify interrelations among a fuller complement of social–emotional competencies and their ability to predict later classroom adjustment and academic readiness, in a modelling context. We utilized partial least-squares (PLS) modelling to accomplish the following: (1) create reliable latent variable (LV) aggregates for directly assessed hot and cool self-regulation, emotion knowledge, and social problem solving, as well as observed relationship skills and emotion regulation, and teacher-rated classroom adjustment and academic readiness; and (2) conduct path analyses from these aspects of SEL to classroom and academic readiness. We evaluated paths from (1) self-regulation to emotion knowledge, social problem solving, observed relationship skills and emotion regulation, and early school success, (2) emotion knowledge to social problem solving, observed relationship skills and emotion regulation, and early school success, and (3) social problem solving and observed social–emotional behaviour to early school success.

METHOD

Participants and Procedure

The present report is a part of a larger study focused on developing a portable assessment tool for measuring the social and emotional aspects of early school success. One hundred and one preschoolers in the greater Northern Virginia area participated in this segment of the study when they were 3 and 4 years old, and were evaluated by teachers during preschool and also in kindergarten; approximately three-quarters were 4-year-olds at the onset of the study, and half were boys. About 56% of the children were enrolled in area Head Start programmes at study’s onset, with the remaining enrolled at several centres belonging to a single private child care chain. The majority of participating children were Caucasian or African-American (44% Caucasian, 42% African-American); about 8% of families self-identified as Hispanic.

Data regarding children’s social–emotional competencies were collected from late fall to early spring of their preschool year: trained graduate and undergraduate research assistants performed direct assessments of children’s self-regulation, emotion knowledge, and social problem solving, and observed their relationship skills and emotion regulation. Teachers rated children’s classroom adjustment; kindergarten teachers also completed these questionnaires, along with academic readiness reports for each child. Preschool teacher measures were completed at the end of the children’s preschool year (about 3 months after direct assessments were complete), with kindergarten teacher measures collected in the spring of the kindergarten year. For each participating child in their classroom, preschool teachers were compensated $15 per child; because they completed more
questionnaires (most of which are not the focus of this report), kindergarten teachers were compensated $25 per child. Children received a sticker each time they participated.

**Social–Emotional Learning Measures**

*Emotion knowledge: the Affect Knowledge Test (AKT)*

With this measure, we assessed young children’s understanding of emotion using puppets with detachable faces that depict happy, sad, angry, and afraid expressions. For each section of the measure, children received two points for correct identification of emotion and one point for identifying the correct valence but not the correct emotion (e.g., sad for afraid).

For the *labelling* portion (eight items), children were asked to identify happy, 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, 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., fear when awakening from a nightmare), as an index of children’s stereotypical emotion knowledge. In the remaining 12 vignettes, as an index of children’s nonstereotypical emotion knowledge, the puppet depicted different emotions from what each child’s mother had reported that their child would probably feel. Among nonstereotypical situations, six vignettes were positive versus negative emotion (e.g., happy or sad to come to preschool), with the remaining pitting negative against negative emotion (e.g., angry at or afraid of sibling aggression). Stereotypical situation knowledge is considered to require less inference than nonstereotypical situation knowledge, and develops earlier (Denham & Couchoud, 1990a, 1990b); both are included here as attainments during preschool. For each situational vignette, children affixed the felt face of their choice to report the puppet’s emotion.

The AKT has demonstrated reliability and validity (Denham et al., 2003; Denham & Couchoud, 1990a, 1990b), and is useful to document change in emotion knowledge (Domitrovich, Cortes, & Greenberg, 2007). Scores on the AKT are related to other indices of social–emotional competence (e.g., Miller, Gouley, Seifer, Dickstein, & Shields, 2004).

Prior to planned analyses, AKT data were checked for univariate normality. Because understanding of happiness develops earlier compared with some negative emotions (Denham & Couchoud, 1990b), ≥88% of participants correctly identified this emotion’s items in expressive, receptive, and stereotypical situation scales, with attendant problematic values for kurtosis and skewness. Hence, these happiness items were excluded from further analyses. *Negative expressive and receptive recognition* (i.e., of sadness, anger, and fear; *α* = .43 and .69, respectively, for three-item scales) and *stereotypical and nonstereotypical situation knowledge* (i.e., for sad, angry, and fearful stereotypical and all nonstereotypical situations; *α* = .76 and .84, for 6 and 12 items, respectively) aggregates were created for the emotion knowledge LV (see Denham et al., 2012d). However, because there were too few items in recognition scales for Cronbach’s alpha to necessarily be meaningful (Spiliotopoulou, 2009), the mean inter-item correlation for negative expressive recognition was examined as an indicator of internal consistency, because of its low alpha. According to Clark and Watson (1995), a mean inter-item correlation above .14 is considered to be acceptable, but for negative expressive
recognition $r_{\text{interitem}}(103) = .11$, ns. Thus, this measure was excluded from the creation of the emotion knowledge LV.

**Preschool Self-Regulation Assessment (PSRA; Smith-Donald, Raver, Hayes, & Richardson, 2007)**

The original PSRA consisted of 10 structured, age-appropriate tasks that assess three aspects of preschoolers’ self-regulation: CEC, HEC, and Compliance (not used in this report because of our focus on CEC and HEC); see Table 1 for more details on the specific tasks and scoring. CEC and HEC as measured by the PSRA have been shown to differentially contribute to variance in classroom adjustment and academic readiness across several laboratories (Brock et al., 2009; Bassett, Denham, Wyatt, & Warren-Khot, 2012; Willoughby et al., 2011).

This theory-based factor structure (CEC and HEC) of the PSRA was confirmed in our previous study (Denham, Warren-Khot, Bassett, Wyatt, & Perna, 2012c) and is the basis of LVs for this study. For CEC, Balance Beam and Pencil Tap tasks were retained for these analyses based on Bassett et al. (2012) earlier reports of ceiling effects with the Tower Turn Taking ($\alpha$s = .88 and .93, for 3 and 16 items, for Balance Beam and Pencil Tap, respectively); for HEC, Snack Delay and Toy Wait Peek tasks were retained because of ceiling effects with the Tongue Task ($\alpha$s = .84 and .90, for four and two items, for Snack Delay and Toy Wait Peek, respectively).

**Minnesota Preschool Affect Checklist—Revised/Shortened (MPAC-R/S; see Denham et al., 2012b; Herndon, Bailey, Shewark, Denham, & Bassett, 2013; see also Denham & Burton, 1996; Denham, Zahn-Waxler, Cummings, & Iannotti, 1991; Sroufe, Schork, Motti, Lawroski, & LaFreniere, 1984, for earlier versions)**

The MPAC-R/S is an observational measure for the assessment of children’s emotional expression, regulation, and relationship skills. The MPAC-R/S includes 18 items organized into scales for positive and negative emotion (e.g., ‘the child displays positive/negative emotion in any manner’ (i.e., facial, vocal, or bodily)), reactions to frustration (e.g., ‘the child promptly verbally expresses feelings arising from a problem situation, then moves on to the same or a new activity’), productive/unproductive involvement (e.g., ‘the child is engrossed and emotionally invested in creative, productive, thematically organized, activity that has a positive emotional function’), peer skills (e.g., ‘the child smoothly approaches an already ongoing activity and gets actively involved’), and prosocial behaviours (e.g., taking turns and sharing).

Each child was observed for four 5-min epochs across the data collection period of approximately 8 weeks; observation was restricted to contexts where children are free to interact with their peers (e.g., free play time, centre time, and recess). Each child’s social–emotional behaviours were captured in varying contexts, as far as possible given classroom logistical constraints. Item scores equal the mean of occurrences across all four epochs. MPAC-R/S scales show good inter-observer reliability, with a mean intraclass correlation for individual scales of .93, $p < .001$. Based on earlier structural analyses (Denham et al., 2012b), items were compiled to create emotionally positive/productive, emotionally negative/aggressive, and emotionally regulated/prosocial LVs ($\alpha$s = .58, .65, and .70, for five, five, and seven items, respectively).

Both the MPAC-R and MPAC-R/S have been shown to be valid. Previous research has shown older preschoolers are observed to demonstrate more positive emotion expression, emotion regulation, productive involvement in the classroom, and peer skills, and that children of non-depressed mothers were more prosocial (Denham et al., 1991). Denham et al. (2012b; see also Herndon et al., 2013) also found associations between MPAC-R/S components and measures of classroom adjustment.
Table 1. Tasks of the Preschool Self-Regulation Assessment (PSRA)

<table>
<thead>
<tr>
<th>Factor</th>
<th>Task Title</th>
<th>Assessor Directions/Procedure</th>
<th>Scoring Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cool Executive Control</td>
<td>Balance Beam (3 trials)</td>
<td>Ask child to walk on a short length of tape for three trials; reduce speed for second trial and slower for third trial.</td>
<td>Subtract first trial from mean of second and third trials (amount of reduction of speed)</td>
</tr>
<tr>
<td></td>
<td>Pencil Tap (16 trials)</td>
<td>Ask child to tap unsharpened pencil after assessor, assessor taps 1× child should tap 2×; assessor taps 2× child should tap 1×.</td>
<td>Percentage of correct trials</td>
</tr>
<tr>
<td></td>
<td>Tower Turns (12 blocks)b</td>
<td>Ask child to build a very high tower with blocks taking turns with assessor.</td>
<td>Ordinal variable capturing amount of turn taking (full, partial or none)</td>
</tr>
<tr>
<td>Hot Executive Control</td>
<td>Toy Wrap</td>
<td>Ask child not to peek while assessor wraps a toy in tissue/and bag for 1 min.</td>
<td>Latency to first peck</td>
</tr>
<tr>
<td></td>
<td>Snack Delay (4 trials)</td>
<td>Ask child to wait before getting a candy from under a cup for three rounds (10, 20, 30, 60 s)</td>
<td>Average of four trials on the level of waiting (ranging from does not touch cup or timer to eats candy)</td>
</tr>
<tr>
<td></td>
<td>Tongue Task (1 trial)b</td>
<td>Ask child to hold a candy on their tongue for 40 s before eating it.</td>
<td>Latency to eat candy</td>
</tr>
<tr>
<td>Compliance (items excluded from analyses)</td>
<td>Tower Cleanup</td>
<td>Ask child to put blocks back into container from tower task, give child 2 min to complete.</td>
<td>Latency to start clean up; latency to complete clean up</td>
</tr>
<tr>
<td></td>
<td>Toy Sort</td>
<td>Ask child to sort a set of intricate small objects (cars, beads, dinosaurs, and bugs) into different containers.</td>
<td>Latency to start sort; latency to complete sort</td>
</tr>
<tr>
<td></td>
<td>Toy Return</td>
<td>Ask child to return toy back to assessor after playing with it for 1 min (after opening).</td>
<td>Latency to return toy</td>
</tr>
</tbody>
</table>

Note. Adapted from Smith-Donald et al. (2007); factor structure from confirmatory analyses Authors (2012). Shaded rows indicate constructs not addressed in this study.

aPSRA task scores were checked for excessive skew and truncated range denoting limited variability. Because of these problems, the original Toy Wait task was excluded from further analysis.

bCeiling effect found in Basset et al. (2012).
Challenging Situations Task (CST; Denham, Bouril, & Beloud, 1994)

Children’s choices of their own behaviours and emotions in response to three problematic peer provocation situations were assessed using the CST, a pictorial forced choice measure. Three unambiguous hypothetical peer-oriented scenarios were presented to the child via a picture and a short description of the transgression situation. Children were then asked how they would feel about the situation given four emotion choices using schematic drawings and verbal labels of ‘happy’, ‘sad’, ‘angry’, and ‘just okay’. Children were then asked what they would do, given four behavioural response choices (socially competent, aggressive, passive, and dysregulated/crying). Previous studies have utilized adaptations of this measure with preschoolers, demonstrating its validity in understanding social cognitive processes underlying behavioural disorders (Coy, Speltz, DeKlyen, & Jones, 2001; Zahn-Waxler et al., 1994), cross-cultural comparisons (Cole & Tamang, 1998), and examinations of Head Start intervention effects (Bierman, Domitrovich et al., 2008).

For the LV in this study, we chose to focus on sad and socially competent responses, based on earlier results with the CST in which these response choices often related to concurrent and later school success (e.g., Denham et al. in press-b; Denham et al., 1994). Further, we chose these responses as reflective of SEL first because we consider that children’s acknowledging the negativity of the situations by selecting sadness is more adaptive than either the more inflammatory emotion of anger or, given the nature of provocation, the unrealistic emotions of happiness or ‘just ok’ \( \alpha = .50 \) across three items. We also consider ‘socially competent’ behaviour responses the most adaptive of the behavioural choices \( \alpha = .39 \) across three items, \( r_{\text{item}(103)} = .18, p < .05 \), in the acceptable range. Scores equalled the number of times sadness, and socially competent behaviour, respectively, was chosen across the three scenarios.

School Success Measures

Classroom adjustment can be exemplified by attributes such as positive approaches to learning and participating positively in classroom activities. Young children’s academic readiness can be exemplified by mastery of certain basic skills. As already specified, both are aspects of the broader construct of early school success in the new learning environment of formal schooling. For these constructs, we chose the following measures.

Classroom adjustment: Preschool Learning Behaviors Scale (PLBS)

The PLBS is a 29-item measure that teachers complete to rate children’s approaches to learning (Fantuzzo, Perry, & McDermott, 2004). The PLBS is reliable in three dimensions: competence motivation (11 items focusing on children’s interest in and approach to learning-related activities, e.g., reluctant to tackle a new activity; \( \alpha = .88 \) for both preschool and kindergarten), attention/persistence (nine items on the child’s skill in focusing and maintaining attention, e.g., tries hard, but concentration soon fades and performance deteriorates; \( \alpha = .92 \) and .82 for preschool and kindergarten, respectively), and attitude toward learning (seven items on the child’s propensity to cooperate, accept help, and express hostility when frustrated, e.g., does not achieve anything constructive when in a sulky mood; \( \alpha = .81 \) and .77 for preschool and kindergarten, respectively). Multi-method, multi-source analyses validate the PLBS dimensions for use with this population (Fantuzzo et al., 2004).
Early school adjustment: Teacher Rating Scale of School Adjustment (TRSSA)

This measure taps several constructs reflective of young children’s behavioural and relational adjustment to the classroom (Ladd, Kochenderfer, & Coleman, 1997). Teachers provided ratings on 3-point scales for 52 items, for behaviours such as ‘follows teacher’s directions’ (cooperative participation; eight items, \( \alpha = .90 \) and .93 for preschool and kindergarten, respectively), ‘works independently’ (self-directedness; nine items, Cronbach’s \( \alpha = .86 \) and .90), ‘likes going to school’ (school liking; five items, Cronbach’s \( \alpha = .81 \) and .75), or ‘initiates conversations with the teacher’ (comfort with teacher; five items, Cronbach’s \( \alpha = .76 \) and .62). Preschool to kindergarten stability in this sample was significant for all subscales. Subscales have demonstrated validity in socioeconomically diverse and mixed race samples (Ladd et al., 1997).

Thus, both the PLBS and TRSSA have excellent psychometric properties and were used to form one LV for classroom adjustment, in both preschool and kindergarten, in our analyses.

Kindergarten academic readiness: ECLS-K Academic Rating Scale

Kindergarten teachers completed the Academic Rating ECLS-K (U.S. Department of Education, National Center for Education Statistics, 2002–2005), which includes the following aspects of kindergarten academic readiness: (1) Language and Literacy (nine items, e.g., ‘reads simple books independently’; \( \alpha = .92 \)); (2) General Knowledge (five items, e.g., ‘forms explanations based on observations and explorations’; \( \alpha = .84 \)), and (3) Mathematical Thinking (seven items, e.g., ‘shows an understanding of the relationship between quantities’; \( \alpha = .90 \)). Teachers compared each child to their same-age peers on 5-point scales. Scales formed one LV (\( \alpha = .92 \)).

Planned Analyses

Partial least-squares modelling (Falk & Miller, 1982; Ringle, Wende, & Will, 2005) was utilized to answer our major problem questions. In common with other modelling techniques, a measurement (outer) model as well as a structural (inner) model is specified. For the outer model, PLS estimates LVs based on the shared variance of the manifest variables, using principal components weights of the manifest variables. As such, 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, a distinct advantage of the method (Tsethlikai, 2010). Thus, the variance shared by the manifest measures is taken as a single index of the LV. Next, the relations among this set of theoretically derived LVs (the inner model) can be investigated without sacrificing information from the larger group of manifest variables. The method specifically also offers a second important advantage of being able to model both direct and indirect pathways (Tsethlikai, 2010).

This method, which is becoming more widely known by developmentalists (e.g., Brody, Stoneman, & McCoy, 1994; Bronstein, Ginsburg, & Herrera, 2005; Cowan, Cohn, Cowan, & Pearson, 1996; Davies & Cummings, 1998; Denham et al., 2003; Denham, Blair et al., 2002; Isley, O’Neil, Clatfelter, & Parke, 1999; Marjoribanks, 1997; Tsethlikai, 2010, 2011), also allows exploration of hypothesized relations among constructs without some of the restrictions of LISREL structural modelling techniques. In particular, PLS is appropriate for use with relatively small groups of participants, although it does require a reasonable LV: participant ratio (e.g., 10 times the number of manifest variables for the LV with the largest number of manifest variables, or 10 times the largest number of paths directed at an LV; Henseler, Ringle, & Sinkovics, 2009).
Further advantages include its lack of stringent assumptions such as those regarding observational independence and normality of residuals (Marjoribanks, 1997), as well as error-free measurement (Tsethlikai, 2011).

Outer measurement models provide information on the psychometric reliability of our constructs’ LVs. Inner measurement models allow for the estimation of predictive validity via the relations among LVs and significant, hypothesized paths; bootstrap procedures allow for significance testing of each path. Further, both inner and outer measurement models provide information on discriminant validity, when LV correlations are compared with the square root of the LV’s average variance extracted (AVE).

Manifest variables (indicators) were hypothesized to form LVs as noted earlier. Using Smart-PLS™ (Ringle et al., 2005) and guidelines enunciated in Henseler et al. (2009), we evaluated the outer and inner models, as follows: (1) specified the manifest variables that met criteria for inclusion as indicators of LVs across two iterations and (2) calculated pathways in the inner model using these final LVs, to discern significant pathways. To better discern our findings’ generalizability, we added socioeconomic risk based on private child care or Head Start attendance (0 = low risk; 1 = at risk) as an exogenous variable so that its contribution would be partialled, as well as to specify its contributions to SEL and early school success.

RESULTS

Initial Model

In our first model, all hypothesized paths were estimated (see Figure 2); as well, risk was added to the model to estimate and partial its effects. We first examined acceptability of the outer measurement model. Regarding the outer model, three criteria are present: (1) the set of manifest variables represents the same underlying construct (AVE), with a reasonable total explained variance ($R^2$); (2) the manifest variables also form an internally consistent LV (composite reliability); and (3) 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). According to Henseler et al., composite reliabilities for all LVs formed by the hypothesized collection of manifest variables should be $\geq .60$, and AVE should be $\geq .50$. Finally, each manifest variable’s outer model loading should be $\geq .70$.

Findings for our first model suggested the following: (1) AVEs for all three MPAC-R/S LVs were $< .50$, and (2) the composite reliability for MPAC-R/S emotionally positive/productive LV was $< .60$. Manifest variable loadings $< .70$ were found for the following: receptive negative emotion knowledge, PSRA balance beam and snack delay, all MPAC-R/S emotionally positive/productive indicators, MPAC-R/S manifest indicators of object aggression, unprovoked physical aggression, and negative affect baseline, using words for emotion regulation and remaining neutral or positive while doing so, sharing, smoothly joining peer activity, comfort with teacher in preschool and kindergarten, and school liking in preschool.

Evaluation of the Reduced Outer Model

Consequently, the model was rerun without these manifest variables. As seen in Table 2, LVs for CEC, HEC, emotion knowledge, social problem solving, emotionally negative/aggressive behaviour, emotionally regulated/prosocial behaviour, classroom adjustment in preschool and kindergarten, and kindergarten academic readiness were created, based on their adequate outer loading, AVEs, and
Table 2. Outer model and final $R^2$s for latent variables (LVs): age 3 to kindergarten classroom adjustment and academic readiness

<table>
<thead>
<tr>
<th>LV</th>
<th>Manifest Variable</th>
<th>AVE</th>
<th>$R^2$</th>
<th>Composite Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Executive Function</td>
<td>Cool Executive Function</td>
<td>1.00</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>Pencil Tap</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Balance Beam</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Hot Executive Function</td>
<td>1.00</td>
<td>---</td>
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</tr>
<tr>
<td></td>
<td>Toy Peek</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Snack Delay</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge</td>
<td>Emotion Knowledge</td>
<td>.77</td>
<td>.19</td>
<td>.91</td>
</tr>
<tr>
<td></td>
<td>Stereotypical Situation Knowledge</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nonstereotypical Situation Knowledge P/N</td>
<td></td>
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<tr>
<td></td>
<td>Nonstereotypical Situation Knowledge N/N</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Negative Receptive Recognition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Problem solving</td>
<td>Social Problem solving</td>
<td>.57</td>
<td>.24</td>
<td>.72</td>
</tr>
<tr>
<td></td>
<td>Sad Response Choices</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Prosocial Response Choices</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aggressive</td>
<td>Emotionally Negative/Aggressive</td>
<td>.69</td>
<td>.15</td>
<td>.81</td>
</tr>
<tr>
<td></td>
<td>Negative Emotion in Social Interaction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Provoked Aggression</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Unprovoked Aggression</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Object Aggression</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prosocial</td>
<td>Emotionally Regulated/Prosocial</td>
<td>.79</td>
<td>.06</td>
<td>.88</td>
</tr>
<tr>
<td></td>
<td>Take Turns</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Cooperates</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Sharing</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Smoothly Joins Peer Activity</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Uses Words in Frustrating Situation, Then Moves On</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Uses Words in Frustrating Situation, w/ Neutral- Positive Affect</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Involved</td>
<td>Emotionally Positive/Involved</td>
<td></td>
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<tr>
<td></td>
<td>Positive Emotion Baseline</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Positive Emotion in Social Setting, Nondirected</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Intensely Involved in Activity</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Independently Creates Activities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vacant (reversed)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Listless (reversed)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>School Adjustment: Preschool</td>
<td>.79</td>
<td>.17</td>
<td>.95</td>
</tr>
<tr>
<td></td>
<td>Competence Motivation</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Attitude Toward Learning</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Attention/Persistence</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Cooperative Participation</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Self-Directedness</td>
<td></td>
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<tr>
<td></td>
<td>School Liking</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Comfort with Teacher</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>School Adjustment: Kindergarten</td>
<td>.77</td>
<td>.44</td>
<td>.95</td>
</tr>
<tr>
<td></td>
<td>Competence Motivation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Attitude Toward Learning</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Attention/Persistence</td>
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<tr>
<td></td>
<td>Cooperative Participation</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Self-Directedness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>School Liking</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Comfort with Teacher</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Academic Readiness: Kindergarten</td>
<td>.88</td>
<td>.44</td>
<td>.96</td>
</tr>
<tr>
<td></td>
<td>General Knowledge</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Language</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mathematics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Risk</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. Shaded rows indicate manifest variables that were removed from the final partial least-squares analysis due to loadings <.70.

*Nonstereotypical items pitting positive and negative emotions.

Nonstereotypical items pitting two negative emotions.
composite reliabilities. Results from this reduced model (as well as manifest variables removed from their respective LVs) are shown in Table 2.

**Initial Evaluation of the Reduced 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. This information can yield information on both convergent and discriminant validity. First, for convergent validity, an 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 LVs is less than the square root of either of their individual AVEs, 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 LVs, this suggests the discriminant validity of the target LV (Fornell & Larcker, 1981). Correlations with other LVs of less than |.7| are also frequently accepted as evidence of discriminant validity. The information in Table 3 shows that these criteria for both convergent and discriminant validity are met for all LVs in the model. Finally, examination of cross-loadings 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), these LVs showed good discriminant validity.

It is also important to examine LVs’ correlations in respect to hypothesized relations among them. As can be seen in Table 3, preschool measures of SEL were often related to other preschool measures of SEL and to classroom adjustment, as well as both kindergarten indices of school success. For example, CEC was significantly related to HEC, and both CEC and HEC were related to preschool indices of emotion knowledge, social problem solving, and emotionally negative/aggressive behaviour (marginally for CEC), as well as academic readiness in kindergarten. CEC was related to classroom adjustment at both ages. Emotion knowledge was also related to social problem solving and emotionally regulated/prosocial behaviour (marginally) during preschool, classroom adjustment at both ages (marginally for kindergarten), and

### Table 3. Inner model latent variable (LV) correlations: age 3 to kindergarten classroom adjustment and academic readiness

<table>
<thead>
<tr>
<th>Scale</th>
<th>1.</th>
<th>2.</th>
<th>3.</th>
<th>4.</th>
<th>5.</th>
<th>6.</th>
<th>7.</th>
<th>8.</th>
<th>9.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Cool executive control</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Hot executive control</td>
<td>.22*</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Emotion knowledge</td>
<td>.38***</td>
<td>.26**</td>
<td>.88</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Social problem solving</td>
<td>.40***</td>
<td>.27**</td>
<td>.26**</td>
<td>.75</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Emotionally negative/aggressive</td>
<td>-.18*</td>
<td>-.26**</td>
<td>-.05</td>
<td>-.16*</td>
<td>.83</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Emotionally regulated/prosocial</td>
<td>.08</td>
<td>-.03</td>
<td>.17*</td>
<td>-.06</td>
<td>-.08</td>
<td>.89</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Classroom adjustment: preschool</td>
<td>.20*</td>
<td>.12</td>
<td>.19*</td>
<td>.24*</td>
<td>-.27**</td>
<td>.20*</td>
<td>.89</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Classroom adjustment: kindergarten</td>
<td>.33**</td>
<td>.14</td>
<td>.19*</td>
<td>.36***</td>
<td>-.49***</td>
<td>.22*</td>
<td>.42***</td>
<td>.88</td>
<td></td>
</tr>
<tr>
<td>9. Academic readiness: kindergarten</td>
<td>.41***</td>
<td>.27**</td>
<td>.30**</td>
<td>.47***</td>
<td>-.27**</td>
<td>.16</td>
<td>.26**</td>
<td>.54***</td>
<td>.94</td>
</tr>
<tr>
<td>10. Risk</td>
<td>.10</td>
<td>.10</td>
<td>-.07</td>
<td>-.14</td>
<td>.19*</td>
<td>.13</td>
<td>-.02</td>
<td>-.19*</td>
<td>-.23*</td>
</tr>
</tbody>
</table>

*Note. Square roots of average variances extracted (AVEs) appear in bold on the diagonal; LV correlations appear below the diagonal.*

*p < .10. *p < .05. **p < .01. ***p < .001.
academic readiness in kindergarten. Social problem solving was related to preschool emotionally negative/aggressive behaviour (marginally), classroom adjustment at both ages, and academic readiness in kindergarten. Preschool emotionally negative/aggressive and emotionally regulated/prosocial behaviours were at least marginally related, in expected directions, to classroom adjustment at both ages, and preschool emotionally negative/aggressive behaviour was negatively related to academic readiness in kindergarten. Finally, both classroom adjustment indices and academic readiness in kindergarten were interrelated. LV inter-correlations thus suggested the advisability of continuing on to evaluate the inner structural path model.

Also, in terms of the relation of SEL and school success to risk status, children at risk exhibited more emotionally negative/aggressive behaviour in preschool. They were also seen as less adjusted to the classroom and less academically ready by kindergarten teachers (but not preschool teachers).

**Overview of Structural Path Model**

Figure 3 depicts the final structural model, in which nonsignificant hypothesized paths are deleted. Path coefficients in the model can be interpreted as standardized beta weights, each estimated after all other paths’ effects have been controlled. To assess whether the paths were significant, bootstrapping resampling (Efron & Gong, 1983) was performed. In this procedure, the PLS parameters of a series of random subsamples of the total sample are iteratively tested, until significance can be estimated based on their convergent findings.

Our final structural model can be summarized by noting the following significant direct effects of LVs: CEC predicted HEC, emotion knowledge, social problem solving, lack of emotionally negative/aggressive behaviour (all in preschool), and classroom adjustment and academic readiness in kindergarten. HEC predicted emotion knowledge, lack of emotionally negative/aggressive behaviour, and social problem solving during preschool, and marginally significantly predicted kindergarten academic readiness. Emotionally negative/aggressive behaviour in preschool negatively predicted classroom adjustment in both preschool and kindergarten. Emotionally regulated/prosocial behaviour in preschool predicted classroom adjustment at both ages as well as, marginally, kindergarten academic success. Social problem solving in preschool predicted classroom adjustment at both ages (marginally significant for preschool), as well as academic readiness in kindergarten. Classroom adjustment in preschool predicted adjustment in kindergarten, which in turn predicted that year’s academic readiness. Finally, risk status positively predicted both emotionally negative/aggressive behaviour and emotionally regulated/prosocial behaviour (marginally) in preschool, and negatively predicted social problem solving in preschool and both classroom adjustment (marginally) and academic readiness in kindergarten.

The paths just described are for direct effects. Smart-PLS™ also reports total effects (i.e., direct + indirect effects). Change from direct to total effects can suggest important indirect effects (i.e., the contribution of a variable via its contribution to others). In our model, several important increases in variables’ contributions were demonstrated in total effects information. For each of these results, we calculated indirect effects via the methods specified by Sattler, Völckner, Riediger, and Ringle (2010; see also Soper, 2013). Because of the exploratory nature of these analyses, we set the p-value at .10. As already noted, we expected the contribution of more foundational social–emotional competencies to school success to be mediated by more applied social–emotional competencies (or in the case of the endogenous CEC
skill, via contributions to other foundational competencies). This expectation was, in part, upheld (see Table 4): CEC also made indirect, as well as direct, contributions to variance in several other predictors via its contribution to HEC, as follows: (1) emotion knowledge; (2) social problem solving; and (3) emotionally negative/aggressive behaviour. CEC also made indirect, as well as direct, contributions to academic readiness via its contributions to (1) HEC, (2) social problem solving, and (3) kindergarten classroom adjustment. Finally, CEC also made a solely indirect contribution to kindergarten classroom adjustment, via its contribution to social problem solving.

Along with its direct contribution, HEC contributed indirectly to kindergarten academic readiness via its contributions to social problem solving. Also, along with its direct contribution, social problem solving contributed indirectly to academic readiness via its contribution to kindergarten classroom adjustment. Finally, emotionally regulated/prosocial behaviour contributed solely indirectly to academic readiness via its contribution to kindergarten classroom adjustment.

**DISCUSSION**

The present study focused on modelling relations among preschoolers’ social–emotional competencies and their contributions to teachers’ later views of classroom adjustment and academic readiness. As such, it is one of the first examinations of how the various aspects of preschool SEL operate together to contribute
to early school success. Prior to discussing the implications of these findings, it is important to consider the stability and viability of the constructs included in the measurement model.

**Outer Model of Social–Emotional Learning Constructs**

The outer model gives information on whether the manifest indicators form adequate LVs. Our results indicated that constructs of self-regulation (CEC and HEC), emotion knowledge, social problem solving, and social–emotional behaviour (specifically, emotionally negative/aggressive and emotionally regulated/prosocial), as well as teacher-rated early school success, hung together well and showed good discriminant validity. That is, outer model manifest loadings, lack of problematic cross-loadings, and composite reliabilities showed that the LVs were appropriately sturdy. Comparison of LV correlations with AVE and magnitude of cross-LV correlations both supported discriminant validity. As such, these results corroborate the notion that social–emotional competencies, although obviously interrelated, can be seen as separate elements in a child’s skill set.

The PLS process and criteria for adequate outer models often necessitate omission of originally chosen indicators. One unexpected drop from the initial model was the entire MPAC-R/S emotionally positive/productive involvement LV. In earlier research, prevalence of preschoolers’ positive emotions has generally been regarded as adaptive (Denham et al., 2003). Emotionally positive preschoolers have demonstrated better adjustment in the preschool classroom (Shin et al., 2011) and even academic readiness (Denham, Bassett, Sirotkin, & Zinsser, 2013a), and older children’s joy in the classroom is related to their anticipation of task

**Table 4. Indirect mediational pathways among social–emotional competencies, classroom adjustment, and academic readiness**

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Mediator</th>
<th>Criteria</th>
<th>Indirect effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEC</td>
<td>(HEC)</td>
<td>Emotion knowledge</td>
<td>$\beta = .042, t = 1.69, p &lt; .10$</td>
</tr>
<tr>
<td>CEC</td>
<td>(HEC)</td>
<td>Social problem solving</td>
<td>$\beta = .046, t = 1.81, p &lt; .10$</td>
</tr>
<tr>
<td>CEC</td>
<td>(HEC)</td>
<td>Emotionally negative/aggressive</td>
<td>$\beta = .048, t = 1.63, p &lt; .10$</td>
</tr>
<tr>
<td>CEC</td>
<td>(HEC)</td>
<td>Kindergarten academic readiness</td>
<td>$\beta = .044, t = 1.74, p &lt; .10$</td>
</tr>
<tr>
<td>CEC</td>
<td>(Social problem solving)</td>
<td>Kindergarten academic readiness</td>
<td>$\beta = .095, t = 2.07, p &lt; .05$</td>
</tr>
<tr>
<td>CEC</td>
<td>(Kindergarten classroom adjustment)</td>
<td>Kindergarten academic readiness</td>
<td>$\beta = .068, t = 1.86, p &lt; .10$</td>
</tr>
<tr>
<td>CEC</td>
<td>(Social problem solving)</td>
<td>Kindergarten classroom adjustment</td>
<td>$\beta = .078, t = 1.84, p &lt; .10$</td>
</tr>
<tr>
<td>HEC</td>
<td>(Social problem solving)</td>
<td>Kindergarten academic readiness</td>
<td>$\beta = .064, t = 2.00, p &lt; .05$</td>
</tr>
<tr>
<td>Social problem solving</td>
<td>(Kindergarten classroom adjustment)</td>
<td>Kindergarten academic readiness</td>
<td>$\beta = .068, t = 1.80, p &lt; .10$</td>
</tr>
<tr>
<td>Emotionally regulated/prosocial</td>
<td>(Kindergarten classroom adjustment)</td>
<td>Kindergarten academic readiness</td>
<td>$\beta = .068, t = 1.80, p &lt; .10$</td>
</tr>
</tbody>
</table>

*Note. CEC, cool executive control; HEC, hot executive control.*
success and task engagement (Pekrun, Elliot, & Maier, 2009). Similarly, productive play activity (Coolahan, Fantuzzo, Mendez, & McDermott, 2000)—the creative, cooperative, and helpful behaviours that facilitate successful play interactions—has been related to aspects of classroom adjustment, such as higher levels of competence motivation, attention, persistence, and positive attitude toward learning. On the other hand, overly exuberant positive emotions and play can be predictive of more negative outcomes (Ryedel, Berlin, & Bohlin, 2003). Thus, although it remains to be seen, perhaps positive affect and intense involvement in appropriate play activities were not optimally observed using the MPAC-R/S; alternatively, this component of the MPAC-R/S may predict other aspects of early school success, such as positive engagement, interaction, and relationships with adults.

Other MPAC indicators dropped because of low loadings that included object and unprovoked aggression, sharing, smoothly joins ongoing activity, negative affect baseline, and emotion regulation using words while maintaining neutral of positive affect. Several of these indicators (e.g., object aggression) were extremely low in frequency; others, although somewhat more frequent, did not load as hypothesized and anticipated based on earlier research (e.g., emotion regulation and smoothly joining peer activity; cf. Denham et al., 2012b). Thus, it seems that for this group of omitted indicators, methodological issues precluded their inclusion in LVs. Considering indicators separately instead of as part of already-summed aggregate showed their relative weakness, and future research should tease apart these issues.

At the same time, the scale ‘Comfort with Teacher’ did not load well on classroom adjustment at each age; this omission seems logical, because it appears more affective than the other TRSSA scales (except for ‘School Liking’, which did not load on preschool classroom adjustment). The dropping of one indicator each for CEC and HEC did reduce to one-indicator LVs; although not an ideal situation, the remaining indicators represent tasks that are seminal in the field of self-regulation (e.g., Willoughby et al., 2011).

In summary, the SEL constructs enumerated in the outer model were largely (except for emotionally positive/involved behaviour) upheld, although not always with all indicators hypothesized and measured. Although further study is warranted on several of the omitted indicators (apart from emotionally positive/involved behaviour, using words in emotionally frustrating situations and skills in joining ongoing peer activity call for follow-up research, given their theoretical importance), the remaining indicators formed useful LVs. Thus, the issue of stability of constructs for use in research and for applied purposes is an important one, and although our outer model is not ‘etched in stone’, subsequent inner model findings suggest that our LVs could be used in subsequent research, as well as meriting further study and, potentially, applied usage. Nonetheless, given that our work is among the first to examine these social–emotional competencies in one model, there is a need for replication and testing the model longitudinally, with larger sample sizes to minimize any possible capitalization on change. Such future research would further understanding of both the SEL constructs and their stability, and our early school success model, to which we now turn.

**Inner Model**

Given an adequate outer model, our findings regarding the inner model constituted another contribution of this work; significant paths among the LVs suggested important relations amongst the variables. Many, albeit not all, of our hypothesized pathways were upheld, and other indirect relations were discovered. Specifically, CEC
did indeed contribute to HEC, as also seen by Brock et al. (2009); Willoughby et al. (2011), and Denham et al. (2012c). Moreover, aspects of self-regulation were related to both emotion knowledge and social problem solving; inhibiting prepotent responses and setting aside one’s own needs facilitates exploration of others’ feelings and formulation of mutually satisfactory solutions to social problems (Carlson & Wang, 2007; Denham et al., in press-b; Schultz et al., 2001). It also makes sense that HEC is related to emotionally negative/aggressive behaviour (Ramani et al., 2010); inability to wait and tolerate emotionally taxing experiences may elicit such feelings and behaviours in young children. In sum, the direct and indirect relations of both CEC and HEC to aspects of kindergarten academic readiness also attest to their importance; although, as already noted, others have examined executive control’s direct relation with school adjustment and academic readiness, the pathways by which it indirectly contributes to these outcomes via other aspects of SEL have not been plumbed.

Specifically regarding indirect effects, CEC appeared foundational via indirect contributions to aspects of kindergarten academic readiness via both HEC and social problem solving; finally, its contribution to HEC also led to indirect contributions to preschool emotion knowledge, social problem solving, and emotionally negative/aggressive behaviour. HEC and social problem solving, too, evidenced indirect effects on kindergarten academic readiness. In sum, identification of such indirect effects is a strength of this model. Further, as in Denham et al. (2003, 2012d), emotion knowledge predicted emotionally regulated/prosocial behaviour (see also Denham et al., in press-a; Schultz et al., 2010). In contrast, emotion knowledge did not predict early school success; however, its contribution to emotionally regulated/prosocial behaviour is one that has been theoretically suggested for decades (e.g., Denham, 1986). It is theoretically useful to have more evidence of this relation with emotionally regulated/prosocial behaviour, which in turn did directly predict all aspects of early school success both directly and indirectly. Others (e.g., Welsh et al., 2010) have found only direct relations. These relations are an example of the practical significance of training preschoolers in emotion knowledge (e.g., Domitrovich et al., 2007). In contrast to the positive contribution of emotionally regulated/prosocial behaviour, emotionally negative/aggressive behaviour negatively predicted school adjustment at both ages, consistent with findings by, for example, Ladd, Birch, and Buhs (1999). For a myriad of reasons, being angry and aggressive is not conducive to a positive transition to formal schooling (Shields et al., 2001).

Social problem solving response choices of sad feelings and socially competence behaviours following peer provocation were related to school adjustment at both ages and academic readiness in kindergarten. These findings echo those of Bascoe et al. (2009) and Bierman, Domitrovich et al. (2008), providing further support for the importance of being able to think and feel constructively about social difficulties in early school success.

Preschool classroom adjustment significantly predicted the same construct of early school success in kindergarten but not academic readiness. Preschool provides young children with opportunities to adjust classroom settings where a child needs to learn how to follow teachers’ instructions and classroom routines, and concentrate on and participate in new activities, all while getting along with peers. The social demands of preschool classrooms and kindergarten classrooms are fairly similar; thus, children who are well adjusted in the preschool classroom may thus have an advantage in similarly adjusting to more formal school settings (i.e., kindergarten). Entrance into kindergarten, however, represents a significant change in the academic expectations placed on children, and therefore, it is not surprising that classroom adjustment in preschool did not predict academic readiness, but kindergarten adjustment did. Furthermore, it is important to consider,
methodologically, that a relation may be more expected between kindergarten classroom adjustment and academic readiness because the same teacher completed these measurements.

Although not a focus of this study, socioeconomic risk was included in the model in order to examine contributions of SEL constructs with such risk accounted for, and its inclusion thus strengthened our findings. Nonetheless, some of risk’s direct effects were of interest; as expected, children at socioeconomic risk, perhaps due to more chaotic and unpredictable environments, showed less positive patterns of social problem solving. As well, they were observed to be more emotionally negative/aggressive. Finally, children at risk were not seen by their Head Start teachers as less adjusted to school, but by kindergarten, teachers did see them as less academically prepared. Such patterns are supported by previous research examining emotion regulation across differing income, risk, and sociocultural contexts (Raver, 2002, 2004).

In sum, one distinct strength of this modelling approach was that it led us to uncover how foundational and more applied social–emotional competencies both directly and indirectly contribute to academic readiness. In contrast to Duncan et al. (2007), we find that, even when earlier adjustment to a school environment and risk status are accounted for, social–emotional competencies have important direct, and heretofore unspecified indirect effects, on kindergarten school adjustment and academic readiness. Furthermore, the model assessed contributions of each social–emotional competencies with the others partialled out. In short, SEL competencies matter, both individually and together, for early school success.

**Implications and Conclusions**

These variable-centred analyses complement person-centred analyses of data from 4-year-olds in the larger study. These analyses utilized data from the PSRA, CST, MPAC, and AKT in very similar conceptualizations to that enunciated here. In cluster analyses, three profiles for ‘types’ of children were isolated: SEL Competent-Social/Expressive, SEL Competent-Restrained, and SEL Risk. For example, difficulty in understanding and identifying emotions, an angry-aggressive pattern of social problem solving, and emotionally negative/aggressive behaviour were three features characterizing children in the SEL Risk group, and this group also showed deficiencies in classroom adjustment in both preschool and kindergarten (Denham et al., 2012a); the two ‘competent’ profile groups were evaluated relatively similarly by preschool and kindergarten teachers, suggestive of equifinality.

Considering these two sets of analyses together can be instructive. We need to know what ‘types’ of children differ on social–emotional competencies that lead to different patterns of early school success, so that we recognize them in the classroom, but also what specific aspects of differences (i.e., what specific competencies) lead to early school success (Bergman & Magnusson, 1997), so that we may target programming and instruction where they are needed. Thus, we know from Denham et al. (2012a) that some children can be characterized by an overall SEL Risk profile but that there are two ways to be SEL Competent—more socially active and emotionally expressive, versus more restrained—and that the children in the SEL Risk group are at a disadvantage in early school success. We also know via the present study’s variable-centred analyses that specific social–emotional competencies may perhaps be most directly and indirectly important to classroom adjustment and academic readiness—CEC, HEC, emotionally negative/aggressive and emotionally regulated/prosocial behaviour, and adaptive social

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problem solving, with a boost to emotionally regulated/prosocial behaviour from emotion knowledge.

These complementary views add up to useful information both from research and applied viewpoints. In terms of applied viewpoints, these person-centred and variable-centred results, when viewed together, bolster our assertion that our direct assessments and observational system could be used to pinpoint individual children’s strengths, weaknesses, and progress, as well as evaluating programme effectiveness. All of the competencies represented by the LVs in our variable-centred analyses appear worthy of tracking longitudinally and promotion, either because they are directly or indirectly related to, or supportive of, early school success. Person-centred analyses also suggest that these competencies sort into profiles typifying individual children and groups of children who could benefit from careful assessment.

Thus, knowing the level of children’s CEC, HEC, emotion knowledge, social problem solving, and social–emotional behaviours could assist in planning supportive early childhood instruction and teacher interaction. In fact, based on these and our other results, our research team is conducting ongoing work computerizing our emotion knowledge, social problem solving, and social–emotional behaviour measures for use by educators in the early childhood classroom. We envision teachers, social workers, and/or mental health consultant using such simplified, but developmentally grounded, assessments as a battery to inform their practice. The methods under development require little training, are very simple to perform, and will yield reports on a child’s or classroom’s progress. Such a battery could help early childhood personnel to know and reflect upon the aspects of SEL that support early school success. It is hoped that such knowledge can ultimately translate into teacher action—helping children become more knowledgeable about emotions, self-regulated, and behaviourally skilled in social–emotional areas, in order to understand individuals’ strengths and weaknesses, promote instruction, and evaluate programming.

Adoption of such a battery in preschool classrooms would represent a significant shift from the way that SEL is currently typically assessed. For example, common assessments used in Head Start programmes to evaluate children’s SEL include the Ages and Stages Questionnaire (ASQ-SE; Squires, Bricker, & Twombly, 2002) and the Teaching Strategies GOLD online assessment system (Lambert, Kim, Taylor, & McGee, 2010). Both the ASQ and the GOLD rely heavily, if not exclusively, on teacher reports of observed child behaviour. Although many of the items teachers rate children on using the ASQ (e.g., ’When upset, can your child calm down within 15 minutes?’) or GOLD (e.g., ’Manages feelings’) overlap with the constructs enumerated in our model earlier, the lack of direct assessments raises concerns of single-reporter bias. Historically, the use of direct assessments in applied settings has been time prohibitive (both for administration and training on assessment procedures); however, computer-based assessment techniques may ameliorate such concerns and enable practitioners to make instructional decisions based on valid and reliable assessments of children’s SEL.

It also could be useful to integrate these findings within the important components of preventive, competence-based programming. Programmes that focus on emotions and their effective utilization (in terms of expressiveness, knowledge, and regulation), as well as social problem solving, have already been created and evaluated. For example, Izard’s Emotion-Based Programme, the Preschool PATHS programme, and Dinosaur School have variously shown positive effects on children’s emotional expressiveness, emotion knowledge, and emotion regulation, as well as social problem solving (Domitrovich et al.; Izard et al.,
Programmes specifically designed to promote self-regulation have also begun to be evaluated; although one key programme, Tools of the Mind, has not shown convincing effects on either executive function or classroom adjustment and academic readiness in recent randomized trials (Wilson & Farran, 2012), others that take different approaches (e.g., practicing specific aspects of behavioural self-regulation via adapted circle time games, Tominey & McClelland, 2011, or attending to both children’s and teachers’ social–emotional needs, Raver et al., 2011) have shown effects on both self-regulation and academic readiness. Such programmes on emotion and self-regulation could benefit from targeted assessment such as that of our SEL battery.

In short, we have made progress in showing that (1) certain social–emotional competencies work well as reliable, discriminable constructs and may ultimately be the basis of assessment tools to form useful battery useful in applied settings and that (b) they predict, over a short period and then to kindergarten, teachers’ views of children’s positive school-related attitudes, persistence, and cooperation. These preliminary findings illustrated complex relations between preschoolers’ SEL and their early school success, and emphasized SEL’s importance. Moreover, applied uses of our findings could be very important, pending future fine-tuning of the classroom assessment battery and confirmatory work on constructs used.

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