Teacher Reports of Social-Emotional Development: Moving from Measure to Construct

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Abstract

This study evaluates how teacher report measures align with different conceptualizations of children's social-emotional development. Leveraging seven teacher report measures of social competence and behavioral regulation in a predominantly low-income, population-based rural sample of four-year-old children (n = 828), model fit and validity were evaluated in a series of confirmatory factor models, including bifactor models. A bifactor model with behavioral regulation as a general factor and an orthogonal social competence factor emerged as the preferred model. Results indicate that teacher reports of behavioral regulation capture teachers' perceptions of preschoolers' behavioral regulation. However, teacher reports of social competence reflect teachers' perceptions of both social competence and behavioral regulation. Post-hoc analyses were conducted to explore potential explanations for these findings. Implications for interpreting teacher reports of social-emotional development and for future work strengthening the quality of scalable measures of children's social-emotional development are discussed.

Keywords: Social-emotional development; Factor analysis; Teacher reports; Social competence; Behavioral regulation; Preschool

Highlights

- Do teacher report measures capture key social-emotional constructs in preschoolers?
- Reports of behavioral regulation capture preschoolers' behavioral regulation
- Reports of social competence capture social competence *and* behavioral regulation

Converging evidence indicates that preschoolers' social-emotional development is an important dimension of school readiness that can be enhanced through preschool-based interventions (e.g., Morris et al., 2014; Raver et al., 2011). As a result, the promotion and assessment of young children's social-emotional development are growing priorities for policymakers and practitioners (National Research Council, 2008; U.S. Department of Health and Human Services, 2015a). Ideally, assessments of children's learning and development help to monitor children's progress toward school readiness and to guide quality improvement initiatives (National Research Council, 2008). In relation to social-emotional development, our ability to achieve this goal is currently hindered by shortcomings in the measurement of children's social-emotional development (Jones, Zaslow, Darling-Churchill, & Halle, 2016).

Definitions of social-emotional development typically distinguish among three subdomains: social competence, emotional competence, and self-regulation (e.g., Jones & Bouffard, 2012). Despite theoretical distinctions between these subdomains, empirical evidence demonstrates consistent, and at times substantial, overlap between them (Blair, Denham, Kochanoff, & Whipple, 2004; Eisenberg, Fabes, Guthrie, & Reiser, 2000; Jones, Greenberg, & Crowley, 2015; Rhoades, Greenberg, & Domitrovich, 2009). Although there are strong theoretical rationales for why different subdomains may be interrelated (e.g., Rose-Krasnor & Denham, 2009), their empirical overlap likely stems in part from poor or limited attention to measurement, as indicated by a recent review of social-emotional measures (Halle & Darling-Churchill, 2016). As such, leading scholars have called for efforts to improve the utility of social-emotional measures by aligning the conceptual definitions of differing subdomains with their associated measures (Jones et al., 2016). Presently, measures and conceptual definitions of social-emotional development frequently encompass a broad range of skills (see Duckworth &

Kern, 2011), which raises concerns about what these measures are in fact capturing and how the information gleaned from them should be applied and interpreted.

Clarifying distinctions between subdomains is important because each is believed to shape children's development differently and interventions are often designed to target specific subdomains. For example, self-regulation may affect children's learning via their ability to pay attention and focus on completing schoolwork; difficulties in these areas reduce learning in the short term and lead to school disengagement in the long term (Blair & Diamond, 2008; Vitaro, Brendgen, Larose, & Tremblay, 2005). In contrast, emotional competence may have a more indirect effect on children's learning whereby teachers spend less time instructing emotionally difficult children, effectively reducing their opportunities to learn and thus compromising their academic success (Stuhlman & Pianta, 2002; Valiente et al., 2008). Similarly, children's ability to understand and recognize emotions has been closely linked with their ability to form positive peer relationships (Denham et al., 2003; Mostow, Izard, Fine, & Trentacosta, 2002), which are critical to children's school success (Malecki, & Elliot, 2002).

Without measures of social-emotional development that can differentiate amongst subdomains, our ability to understand and leverage distinctions between these subdomains is limited. Because school failure may result from different developmental antecedents (Cicchetti & Rogosch, 1996), it is critical to understand how different subdomains of social-emotional development shape children's school success and to utilize these understandings for targeted intervention approaches. The present state of measurement with respect to social-emotional development limits the pursuit of this goal, raising a need for research that clarifies the extent to which measures of social-emotional development align with their conceptual definitions.

Although there are multiple methods for measuring social-emotional development, from

a policy perspective, the need for advancements in measurement may be especially pressing for teacher report measures. Federal- and state-level early childhood agencies include different subdomains of social-emotional development in their learning goals and standards (Illinois State Board of Education, 2013; U.S. Department of Health and Human Services, 2015b), creating a need for scalable monitoring tools that can provide a periodic "snapshot" of children's progress toward these benchmarks. It is critical to identify assessment tools that are appropriate for this purpose (American Educational Research Association, American Psychological Association, & National Council on Measurement in Education, 2014; National Research Council, 2008). Assessments that are used for the purpose of monitoring progress at scale must be feasible to implement, and they must be aligned with the stated goals of a jurisdiction. Compared to alternative measurement approaches, such as observational measures and direct assessments (which typically require a trained one-on-one assessor), teacher report measures are feasible to administer at scale: they are inexpensive, easy to implement, and reliable in a wide range of child populations. Furthermore, because they are based on children's behavior within the classroom context, teacher reports provide valuable information about children's school readiness compared to measures from different reporters (e.g., parents) or direct assessments that are acontextual. Questions remain, however, with respect to how well teacher reports align with policymakers' expressed social-emotional learning goals and standards. Greater attention to the measurement of social-emotional subdomains may support efforts to make traction on these critical questions of alignment. Furthermore, from a research perspective, there is a growing need for scalable high-quality measures of social-emotional development as the field moves toward large-scale studies of child development.

The present study aims to clarify the alignment between measures of social-emotional

development and their theoretical constructs using a series of confirmatory factor analyses, including a novel bifactor modeling approach. Specifically, we examine the fit and validity of measurement models for competing conceptualizations of social-emotional development, capitalizing on a battery of teacher reports of social competence and self-regulation. In regard to social competence, we examine measures of peer acceptance/rejection and prosocial behaviors. For self-regulation, we examine measures of the behavioral dimensions of attention, hyperactivity, and inhibitory control, which we refer to as behavioral regulation. Our study focuses on social competence and behavioral regulation because, compared to emotional competence, these constructs of social-emotional development are more commonly and more effectively captured by teacher report measures (Campbell et al., 2016). Ultimately, this paper represents an initial step toward clarifying what is captured by teacher reports of preschoolers' social-emotional development.

Key Social-Emotional Constructs: Definitions and Implications for School Readiness

This paper examines social-emotional skills that underlie school readiness, which have important implications for young children's engagement in school activities and the quality of their learning interactions with teachers and peers (Denham, 2006; Rimm-Kaufman, Pianta, & Cox, 2000). Below we discuss the prevailing definitions of social competence and behavioral regulation and the research supporting the selection of these measures and constructs in our assessment of social-emotional development. As we describe below, both are essential components of social-emotional development and key aspects of school readiness.

Social Competence

Defined as the ability to form positive social relationships and use interpersonal resources to achieve one's goals, social competence has long been held as a central developmental

milestone in early childhood (Waters and Sroufe, 1983) and is key to early school success. For example, socially competent children are likely to enjoy more frequent and more supportive interactions with their teachers and peers — interactions that are critical to their development (Mashburn & Pianta, 2006). Given that social interactions are an essential context for the development of multiple skills, the influence of social competence can be understood through a developmental cascades framework whereby functioning in one domain (e.g., social competence) influences developmental processes across other domains over time (Cairns, 2000). Therefore, early social competence may be a cornerstone of Heckman's (2006) notion that skills beget skills. Social competence generally refers to children's ability to successfully interact across a broad range of relationships, but the construct is often measured in terms of peer relationships (Crowe, Beauchamp, Catroppa, & Anderson, 2011) although not exclusively.

Social competence reflects multiple aspects of how children relate to others and manage these relationships, including peer acceptance and social skills. These components of social competence are typically studied in isolation, but researchers have also employed latent variable modeling to combine these components and examine social competence more broadly (e.g., Santos, Vaughn, Peceguina, Daniel, & Shin, 2014). Often studied in conjunction with peer rejection, peer acceptance indicates whether children are liked by their peers or whether they experience peer maltreatment (e.g., bullying). Social skills encompass how children interact with others, particularly whether children are helpful, kind, and cooperative. These positive, voluntary actions fall under the term prosocial behaviors. Social skills and peer acceptance show moderate correlations in young children (National Institute of Child Health and Human Development Early Child Care Research Network [NICHD ECCRN], 2008), and evidence indicates that prosocial behaviors are important for children to gain peer acceptance in preschool (Lee, 2016).

A considerable body of correlational evidence suggests that both peer acceptance and prosocial skills are associated with children's successful transition to kindergarten. For example, research shows that young children who are liked by their peers tend to have higher levels of school engagement whereas children who are rejected by their peers are often at risk for school-adjustment problems (Bierman, 2004; Buhs, Ladd, & Herald, 2006). In addition, prosocial preschoolers tend to have higher levels of classroom engagement and to demonstrate superior cognitive functioning (Bierman, Torres, Domitrovich, Welsh, & Gest 2009; Coolahan, Fantuzzo, Mendez, & McDermott, 2000). Furthermore, preschoolers' social competence has been linked to lower incidences of internalizing and externalizing behaviors in elementary school (Bornstein, Hahn, & Haynes, 2010; Zhang, 2013). As a whole, this research indicates that socially competent children are more likely to have a favorable transition to kindergarten.

Behavioral Regulation

Behavioral regulation falls within the umbrella of self-regulation, but we focus on a narrow component of this broad construct. Specifically, we focus on behavioral manifestations of self-regulation that are readily observable to teachers, such as paying attention, coordinating motor behaviors, and inhibiting inappropriate actions (i.e., inhibitory control). Preschool is a critical time for the development of behavioral regulation (Kochanska, Murray, & Harlan, 2000) likely because the brain regions responsible for behavioral regulation undergo significant development during this period (Blair, 2002).

Research suggests that children with strong behavioral regulation skills are more likely to have positive experiences when they enter kindergarten classrooms. For example, children struggling with behavioral regulation have difficulties adapting to the structured environment of a typical kindergarten classroom (Rimm-Kaufman, Curby, Grimm, Nathanson, & Brock, 2009).

Learning activities require kindergarteners to follow directions, to sit still, and to maintain their attention for sustained periods of time. Across the United States, kindergarten teachers frequently report problems with these skills (Rimm-Kaufman et al., 2000), suggesting that many children enter kindergarten at a distinct learning disadvantage. This conclusion is supported by evidence showing links between preschool behavioral regulation and preschool learning in math and reading as well as later academic achievement (Howse, Calkins, Anastopoulos, Keane, & Shelton, 2003; McClelland et al., 2007; NICHD ECCRN, 2003). In addition to academic success, preschoolers' behavioral regulation is predictive of later internalizing and externalizing behaviors (Sawyer, Miller-Lewis, Searle, Sawyer, & Lynch, 2015; White et al., 2013), suggesting that behaviorally regulated children are also at lower risk for mental health problems.

Teacher Reports and the Overlap between Social Competence and Behavioral Regulation

Although teacher reports of social-emotional measures have certain drawbacks, they are suitable for capturing particular aspects of social-emotional development and for specific assessment goals. Importantly, teacher reports are most appropriate for components of social-emotional development that are outwardly expressed and are thus observable to teachers (Campbell et al., 2016). For example, how a child understands facial expressions may be poorly captured by teacher reports given that it is an internal process that cannot be observed directly and would thus require inferential jumps that compromise validity. In contrast, children's social interactions are directly observable and can thus be assessed by teacher reports. Because teacher reports are inexpensive and easy to implement, they have potential for capturing observable elements of social-emotional development at scale. On the other hand, teacher report measures have potential for bias because they often take the form of scales that ask teachers to report the relative frequency or intensity of behaviors. Because teachers have varying perspectives on (1)

what constitutes social-emotional behaviors and (2) how to answer relative frequencies or intensity on a scale, teacher reports may differ across raters and be less objective measures of social-emotional development (McKown, 2017). Despite this limitation, teacher reports are thought to capture meaningful aspects of social competence and behavioral regulation, as evidenced by their associations with other measurement approaches, such as direct assessments (Duckworth & Kern, 2011; Renk & Phares, 2004; Wu, Hart, Draper, & Olsen, 2001).

Presently, the field lacks precise understandings of what is captured by teacher report measures of social competence and behavioral regulation. In particular, making sense of the persistent overlap found between measures of young children's social competence and behavioral regulation remains a challenge for the field. From a theoretical standpoint, this overlap may occur because children's ability to regulate their behavior contributes to the quality of their interpersonal relationships (Rawn & Vohs, 2006; Rose-Krasnor & Denham, 2009). For example, children who can inhibit inappropriate behaviors may experience less interpersonal conflict and thus have higher social competence. Although these theoretical rationales are strong, there is considerable overlap in the operationalization of teacher report measures of behavioral regulation and social competence (Halle & Darling-Churchill, 2016). As such, it remains an open question whether observed empirical overlap in these measures stems from their expected theoretical relationships or whether it is an artifact of their operationalization. Interpreting teacher reports of social competence and behavioral regulation would be aided by more precise understandings of: (a) the magnitude of their empirical overlap, (b) whether their operationalization contributes to their overlap, and (c) whether the nature of their overlap presents greater challenges for interpreting one construct compared to the other. Such understandings would clarify the ways in which these measures represent social competence and

behavioral regulation as related but conceptually distinct constructs of social-emotional development — as they are described in the research literature (Jones & Bouffard, 2012).

Study Aims

The present study examines the relationship between teacher report measures of social competence and behavioral regulation by comparing and contrasting the results of a number of measurement models. First, we investigate whether teacher reports of social competence and behavioral regulation represent a single overarching construct of social-emotional development (i.e., they are best represented by a single factor model). Second, we investigate whether teacher reports of social competence and behavioral regulation represent two separate, but related, constructs of social-emotional development (i.e., they are best represented by a two-factor model). Third, we investigate whether teacher reports of social competence and behavioral regulation share an underlying construct of social-emotional development, with residual variance representing distinct constructs of social competence and behavior regulation (i.e., they are best represented by a bifactor model). We compare findings from each of these models to investigate the relation between teacher report measures of social competence and behavioral regulation in assessing children's social-emotional development.

To address these questions, we first examine model fit indices deriving from the varying factor analytic models. However, we recognize that such model fit indices inform our understanding of the shared variance between our constructs of interest but not whether the resulting factors are associated, in the ways we might expect, with key outcomes for children. Such tests of predictive validity can offer valuable information when interpreting the factors emerging from the measurement models. As discussed, teacher report measures of psychopathology and direct assessments are well suited to this end. Young children's social

competence and behavioral regulation have been linked to both internalizing and externalizing behaviors (e.g., Sawyer, Miller-Lewis, Searle, Sawyer, & Lynch, 2015; White, Jarrett, & Ollendick, 2013) and children's performance on direct assessments of social-emotional development. We use direct assessments of children's emotion knowledge (i.e., the ability to identify others' emotions) and inhibitory control (i.e., the ability to refrain from acting upon one's impulses), which have been linked to our constructs of interest (e.g., Rhoades et al., 2009; Trentacosta & Fine, 2010). We also use parent reports of children's social competence and behavioral regulation for validity tests given their correspondence to teacher report measures (e.g., Stone, Otten, Engels, Vermulst, & Janssens, 2010). In short, fit indices alone would be insufficient to yield clear information on interpreting the varying measurement models. Hence, we augment this with selected, albeit preliminary, tests of predictive validity. Together, these analyses inform interpretations of the models, thus clarifying how teacher report measures of social competence and behavioral regulation should be understood.

Method

Sample

Data for this study come from *The Family Life Project* (FLP), a prospective longitudinal study of families residing in six low-wealth counties in Eastern North Carolina and Central Pennsylvania (three counties per state) that were selected to be reflective of the Black South and Appalachia, respectively. As such, the sample of children is almost exclusively Black and White. Complex sampling procedures were employed to recruit a representative sample of 1,292 children whose families resided in one of the six counties at the time of the child's birth. A comprehensive description of the sampling plan and recruitment procedures is provided by Vernon-Feagans and colleagues (2013). Because children in the sample were recruited at birth,

all children in the sample did not attend preschool. A subsample of 828 children in the study attended preschool; analysis is restricted to this subsample. 54.5 percent of the analytic sample is White, 43.8 percent is Black.

Procedures

For our primary analyses, data were collected from teacher reports in the spring of preschool. Teachers completed ratings of children's social competence and behavioral regulation that are described below. As part of the validity analyses, we examine the associations of children's social competence and behavioral regulation with: (a) teacher reports of psychopathology collected as part of the same battery of measures, (b) direct assessments of children's inhibitory control and emotion knowledge collected in preschool and during a home visit, respectively, when each child was approximately 58 months old, and (c) parent reports collected during a home visit when each child was approximately 58 months old.

Measures

Bivariate associations between all measures are presented in Table 1.

Teacher report measures used in factor analysis. The following measures are used in each factor analysis to test our competing measurement models.

Social competence. Measures for social competence were selected if their use in the literature and item content corresponded to children's peer rejection and/or social skills. We used these criteria to ensure that we examined measures that were designed to capture social competence and that had face validity. Teachers rated children's prosocial behaviors using the Prosocial subscale of the Social Competence Scale (SCS; Conduct Problems Prevention Research Group, 1995). This study used a four-item version of the measure rated on a six-point Likert scale ranging from "almost never" to "almost always" (Cronbach's $\alpha = 0.87$). Items

include “Cooperates” and “Listens to other people’s point of view.” Teachers also completed the Prosocial subscale of the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997), which is a five-item measure rated on a three-point Likert scale ranging from “not true” to “certainly true” (Cronbach’s $\alpha = 0.83$). Items include “Considerate of other people's feelings” and “Shares readily with other children.”

Teachers rated children’s peer acceptance/rejection using the Peer Problems subscale of the SDQ, which is a five-item measure rated on a three-point Likert scale ranging from “not true” to “certainly true.” Items include “Has at least one good friend” and “Picked on or bullied by other children.” Two additional items also measuring peer acceptance/rejection on a three-point Likert scale were combined with the SDQ’s Peer Problems subscale to improve reliability. The items additional items are “Is actively rejected by peers” and “Is simply ignored by peers.” The measure is hereafter referred to as Peer Problems (Cronbach’s $\alpha = 0.82$).

Behavioral regulation. Measures of behavioral regulation were selected if their use in the literature and item content corresponded to children’s abilities to pay attention, coordinate motor behaviors, and inhibit inappropriate actions. Teachers rated behavioral regulation using the Hyperactivity/Inattention subscale of the SDQ, which is a five-item measure rated on a three-point Likert scale ranging from “not true” to “certainly true” (Cronbach’s $\alpha = 0.88$). Items include “Restless, overactive” and “Easily distracted, concentration wanders.” Teachers also completed the Inattention subscale of the Disruptive Behavior Disorders Rating Scale (DBDRS; Pelham, Evans, Gnagy, & Greenslade, 1992), which is a nine-item measure rated on a four-point Likert rating scale ranging from “never or rarely” to “very often” (Cronbach’s $\alpha = 0.93$). Items include “Fails to give close attention to details” and “Does not seem to listen when spoken to.” Lastly, teachers completed two subscales of the Children’s Behavior Questionnaire (CBQ;

Rothbart, Ahadi, Hershey, & Fisher, 2001). The Attentional Focusing subscale, which is a seven-item measure, was rated on a seven-point Likert scale ranging from "extremely untrue of the child" to "extremely true of the child" (Cronbach's $\alpha = 0.85$). Items include "Is easily distracted when listening to a story" and "strong concentration if drawing/coloring." The Inhibitory Control subscale, which is a five-item measure, was rated on a seven-point Likert scale ranging from "extremely untrue of the child" to "extremely true of the child" (Cronbach's $\alpha = 0.68$). Items include "Can easily stop activity when s/he is told no" and "Is good at following directions." Although as a whole these measures equally reflect the presence of behavioral regulation (e.g., Attentional Focusing) and of behavioral dysregulation (e.g., Hyperactivity/Inattention), the measures are all strongly correlated (range of $r = 0.71$ to 0.82), and the strength of correlations do not vary along the lines of regulation versus dysregulation. As such, the measures appear to capture the same construct, which we label behavioral regulation as it is more commonly referred in the research literature.

Measures used in validity analysis. The following measures were used to test the validity of the factors emerging from our competing measurement models.

Teacher reports of psychopathology.

Internalizing behaviors. Teachers reported on internalizing behaviors using the Emotional Symptoms subscale the SDQ, which is a five-item measure rated on a three-point Likert scale ranging from "not true" to "certainly true" (Cronbach's $\alpha = 0.76$). Items include "Many worries" and "Nervous or clingy in new situations."

Externalizing behaviors. Teachers reported on externalizing behaviors using the Conduct Problems subscale of the SDQ, which is a five-item measure rated on a three-point Likert scale ranging from "not true" to "certainly true" (Cronbach's $\alpha = 0.87$). Items include "Often has

temper tantrums or hot tempers" and "Often lies or cheats." Teachers also reported on the aggressive-oppositional behaviors using items from the Teacher Observation of Child Adaptation-Revised (TOCA-R; Werthamer-Larsson, Kellam, & Wheeler, 1991) as well as three additional items drawn from other behavior problem scales. In total, the scale includes five items rated on a six-point Likert scale ranging from "almost never" to "almost always" (Cronbach's $\alpha = 0.56$). Items include "Knowingly breaks rules" and "Hits, pushes or shoves." The overall measure is referred to as Aggressive/Oppositional Behaviors.

Direct Assessments of Social-Emotional Development.

Inhibitory control. Children completed the Walk-a-Line-Slowly task (Kochanska, Murray, Jacques, Koenig & Vandegeest, 1996) where children walk along a line as slowly as they can. Children completed the task in the spring of preschool.

Emotion knowledge. Children's emotion knowledge was measured using the Emotion Identification Accuracy and Anger Attribution Bias components of the Assessment of Children's Emotional Skills (ACES; Schultz, Izard, & Bear, 2004), which is a direct assessment of children containing three subtests of children's ability to recognize emotions: facial expressions, behavioral descriptions, and situational vignettes. The ACES was measured in children's homes when children were approximately 58 months old.

Parent reports of social competence and behavioral regulation.

Social competence. Parents rated children's prosocial behaviors using the Prosocial subscale of the SCS (Cronbach's $\alpha = 0.78$) and the Prosocial subscale of the SDQ (Cronbach's $\alpha = 0.78$). Parents rated children's peer acceptance/rejection using the Peer Problems subscale of the SDQ (Cronbach's $\alpha = 0.52$).

Behavioral regulation. Parents rated behavioral regulation using the Hyperactivity/Inattention subscale of the SDQ as well as the Attentional Focusing subscale (Cronbach's $\alpha = 0.72$) and the Inhibitory Control subscale (Cronbach's $\alpha = 0.60$) of the CBQ.

Analytic Strategy

Using confirmatory factor analysis in Mplus Version 7 (Muthén & Muthén, 1998-2012), we examined the fit and validity of competing conceptual models of social-emotional development. Model fit is examined using chi square (χ^2) tests of model fit as well as the following model fit indices: Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR). Although we are guided by the principle that fit statistics should be considered as a whole rather than relying on a single index (MacCallum, 1990), we evaluate fit using the following cutoffs established in the literature (Hu & Bentler, 1999; MacCallum, Browne, & Sugawara, 1996): CFI > 0.95; TLI > 0.95; RMSEA < 0.08; SRMR < 0.08. We consider factor loadings above 0.40 to be adequate (Hair, Black, Babin, Anderson, & Tatham, 2010). Models were fit using robust standard errors to account for skew in certain measures as well as small amounts of nesting of children within classrooms. More than 85 percent of teachers reported on fewer than four children; the majority reported on only one child. Each measurement model was analyzed using scales rather than individual items to correspond to ways in which these measures are typically used. We test the fit of three models, corresponding to theoretical conceptions of what is captured by teacher reports measure of social competence and behavioral regulation. Modeling a single construct implies that these measures capture a single overarching construct of social-emotional development. Modeling separate constructs of social competence and behavioral regulation implies that these measures reflect separate but related constructs of social-

emotional development. Modeling separate constructs of social competence and behavioral regulation that share an overlapping factor implies that these measures reflect aspects of their associated constructs while also capturing a common construct of social-emotional development.

Given the overlap in how social-emotional subdomains can be operationalized and the consistent intercorrelations found between these measures in the research literature, we tested a bifactor model with two goals in mind: (a) creating more discriminant factors of social competence and behavioral regulation and (b) directly examining the shared variance between the two factors. Bifactor models can be used when there is an underlying general factor (e.g., general intelligence) accounting for variance in subfactors (e.g., working memory, processing speed). The variance explained by the general factor can be conceptualized both as a substantive factor and as a source of contamination within the subfactors. Therefore, by including the general factor, the model removes the variance of the general factor that is contaminating the subfactors, which may result not only in "purer" factors of the theorized constructs (i.e., demonstrating discriminant validity) but also allow for substantive interpretations of the source of shared variance. Using recommendations for fitting bifactor models (Reise, Moore, & Haviland, 2010), we fitted a bifactor model where all factors were uncorrelated, one loading of each factor was set to 1, and the error terms for each indicator were uncorrelated.

In addition to examining the fit of each model, we explore the validity of each model's factors. Specifically we examine bivariate associations between each model's factors and (1) concurrent teacher reports of psychopathology, (2) concurrent direct assessments of children's social-emotional development, and (3) concurrent parent reports of social competence and behavioral regulation. These associations can be interpreted in two ways. First, they indicate whether the factors in each model are related with other measures in expected ways. Second, the

size of the associations can be compared across the factors, providing an indication of how the constructs may differ in their respective associations. For example, a lack of discriminant prediction may suggest that factors of social competence and behavioral regulation do not in fact differ. Using multiple sources of measurement considerably strengthens the robustness of our analyses by addressing whether associations extend beyond a single reporter, particularly if the patterns of association are similar across multiple measurement sources. Lastly, we conduct sensitivity checks to examine the possibility that our findings may be influenced by: (a) nesting of children within teachers (i.e., does the absence of nesting provide a different result?), (b) characteristics of the sample (i.e., are the results invariant across features of the sample?), and (c) characteristics of the measures (i.e., do the results replicate across different measures?).

Results

Model Fit

First, we fit a model reflecting a single factor of social-emotional development, hereafter referred to as the single-construct model (see Figure 1). This model showed poor model fit: $\chi^2 = 351.38$ ($df = 14$, $p < 0.05$); CFI = 0.90; TLI = 0.85; RMSEA = 0.17; SRMR = 0.04. Standardized factor loadings are presented in Table 2.

Next, we fit a model reflecting social competence and behavioral regulation as two separate, but related, constructs, hereafter referred to as the separate-constructs model (see Figure 2), which showed adequate model fit: $\chi^2 = 110.07$ ($df = 13$, $p < 0.05$); CFI = 0.97; TLI = 0.95; RMSEA = 0.10; SRMR = 0.03. As reflected in Table 3, standardized factor loadings are above 0.30, ranging from 0.60 to 0.90. However, the factors were highly correlated ($r = 0.78$).

Finally, we fit a bifactor model with an underlying general factor, a social competence orthogonal factor, and a behavioral regulation orthogonal factor (see Figure 3), which showed

the following fit: $\chi^2 = 62.74$ (df = 7, $p < 0.05$); CFI = 0.98; TLI = 0.95; RMSEA = 0.10; SRMR = 0.02. Factor loadings (see Table 4) were mostly adequate for the social competence factor (range 0.30 to 0.54) and the general factor (range 0.51 to 0.89), but loadings were poor for the behavioral regulation factor (range -0.06 to 0.49). The factor loadings for the same behavioral regulation measures all exceeded 0.82 in the separate-constructs model, indicating that they are strong indicators of behavioral regulation.

As a post-hoc analysis, we revised the bifactor model to examine whether the poor loadings of the behavior regulation items are due to the behavioral regulation factor being "too aligned" with the general factor. This bifactor model includes only two factors: a behavioral regulation general factor and an orthogonal social competence factor. The social competence factor remained essentially unchanged, and the behavioral regulation factor includes the three social competence indicator measures and the four behavioral regulation indicator measures used previously (see Figure 4). Therefore, this model examines whether the shared variance between reports of social competence and behavioral regulation is driven by teachers' reporting of behavioral regulation. As reflected in Table 5, the standardized factor loadings for the behavioral regulation general factor were generally high, ranging from 0.50 to 0.91. With respect to the social competence factor, although one indicator barely exceeded 0.30, the two other loadings exceeded 0.50, which as a whole provides sufficient evidence to signal a meaningful social competence factor. The bifactor model showed adequate model fit: $\chi^2 = 105.25$ (df = 11, $p < 0.05$); CFI = 0.97; TLI = 0.94; RMSEA = 0.10; SRMR = 0.02.

Model Validity

Validity results across the models are presented in Table 6 and Table 7. In the single-construct model, correlations between psychopathology, direct assessment, and parent report

measures were in expected directions. In the separate-constructs model, these measures' correlations with the social competence factor and the behavioral regulation factor were in expected directions, but they were *not* notably different *between* the factors; the factors' associations with teacher reports of psychopathology are nearly identical, and their associations with direct assessments and parent reports are highly comparable. In the revised bifactor model, however, the social competence factor and the behavioral regulation general factor have correlations that vary not only in terms of magnitude but also in their levels of significance. These descriptive distinctions in significance levels were observed most notably in parent reports of behavioral regulation and direct assessment measures of inhibitory control and emotion identification accuracy; only the behavioral regulation general factor was associated with them. The social competence factor was associated with these measures in the separate-constructs model, but in the bifactor model these associations were not even marginally significant.

Comparison of Models

With respect to fit indices, the single-construct model fit considerably worse than the separate-construct and bifactor models, but model fit for the separate-constructs model and the bifactor model were nearly identical. The CFI, TLI, and SRMR indices suggest excellent fit in both of these latter models. Although the RMSEA value of 0.10 in both models does not suggest good fit (Hu & Bentler, 1999), both models also have small degrees of freedom, and the RMSEA index is less reliable in such models (Kenny, Kaniskan, & McCoach, 2015). We do not use this single index to assess model fit (MacCallum, 1990) and instead consider the fit indices as a whole, which suggest adequate model fit.

Sensitivity Analyses

Nesting. Because children in the sample are differentially nested within preschool classrooms, a single teacher reported on a range of one and ten children. However, because children were recruited at birth rather than from preschool classrooms, the levels of nesting are low across the analytic sample, and small amounts of variance in the measures are explained by the classroom level (mean ICC = 0.15). Regardless, nesting raises the possibility that certain teachers could have disproportionate influence on the analyses and may bias the results. Although it is possible to run two-level bifactor models (see Muthén & Asparouhov, 2013), the application of such models to child development is rare at best, and there are considerable challenges in interpreting these models. Therefore, as an alternative approach to test for biases from unbalanced nesting, we randomly selected a single child from each teacher and reran the analyses. In this analysis the sample size diminished from 828 children to 407 children, indicating that the overall nesting is modest (i.e. about two children nested within each teacher on average). Fit indices were comparable to those in previously described models, suggesting that differential nesting does not play a role in the results presented.

Invariance. As noted earlier, children in this sample were strategically sampled to be reflective of the Black South and Appalachia. Although these are both rural, high poverty regions, they are nonetheless notably different contexts. Leveraging this difference within the sample, we run invariance analyses by geography to examine whether our findings vary across these two different regions. Because race in the sample is conflated with geography (i.e., Black children all reside North Carolina whereas White children are split between North Carolina and Pennsylvania), invariance analyses are conducted by the following groups: Black North Carolina, White North Carolina, and White Pennsylvania.

Invariance was tested in the separate-constructs and revised bifactor models but not the single-construct model given that it fit the data poorly. Our results support configural invariance in both models. Metric invariance was not supported in the separate-constructs model or the bifactor model (Sartorra-Bentler Scaled $\Delta\chi^2 = 40.76$, $p < 0.001$ and Sartorra-Bentler Scaled $\Delta\chi^2 = 47.55$, $p < 0.001$, respectively), but differences in factor loadings were generally not large in either the separate-constructs model (range 0.00 to 0.09) or the bifactor model (range 0.00 to 0.08); differences in a single loading did not drive the lack of metric invariance. Because differences generally stemmed from the White North Carolina group, post-hoc analyses were run releasing equality constraints on this group, and metric variance was supported in comparing the Black North Carolina group and the White Pennsylvania group for the distinct-constructs model (Sartorra-Bentler Scaled $\Delta\chi^2 = 8.98$, $p = 0.25$) and the bifactor model (Sartorra-Bentler Scaled $\Delta\chi^2 = 10.76$, $p = 0.38$). Thus, the small differences in factor loadings were only significant for White children from North Carolina; no differences were found between Black children from North Carolina and White children in Pennsylvania, which is most of the sample (85.5 percent).

Replication. We sought to replicate our results using additional teacher reports of social competence and behavioral regulation collected when children in the analytic sample were in first grade. For social competence, the Excluded by Peers subscale of the Child Behavior Scale (Ladd & Profilet, 1996) as well as the Social Skills subscale of the Social Skills Rating System (Gresham & Elliott, 1990) were used in addition to the aforementioned subscales of the Strengths and Difficulties Questionnaire and the Social Competence Scale. For behavioral regulation, the Hyperactivity subscale of the Social Skills Rating System was used in addition to the aforementioned subscales of the Strengths and Difficulties Questionnaire and the Disruptive Behavior Disorders Rating Scale. Results revealed the same findings; social competence and

behavioral competence factors in the separate-constructs model were highly correlated ($r = 0.84$), and patterns of factor loadings in the separate-constructs and bifactor models were comparable.

Discussion

Teacher report measures are ubiquitous in education research and have considerable potential as assessment tools at scale. Proper interpretation of these measures, however, rests upon the extent to which they clearly align with their conceptual definitions. With respect to social-emotional development, the research literature provides no definitive resolution to this critical issue, raising important questions about the proper use of teacher reports in this area of child development. This study aims to clarify the ways in which teacher reports of preschoolers' social competence and behavioral regulation are interrelated and how they should be interpreted. We examined the fit and validity of three measurement models that align with competing conceptualizations of how these constructs are interrelated. Specifically, we tested whether teacher reports of social competence and behavioral regulation assess: (a) a single overarching construct, (b) two separate constructs, or (c) two separate constructs with an overlapping factor (i.e., a bifactor model). In conducting this work, we also examined a fourth model to address poor factor loadings while still testing a bifactor structure; in this final model, behavioral regulation was treated as the general factor with social competence as an additional orthogonal factor (we discuss the decision to call the general factor "behavioral regulation" below).

The single-construct model and initial bifactor model were rejected due to poor fit and very low factor loadings, respectively. By contrast, the separate-constructs model and revised bifactor model fit the data equally well. Because model fit does not differ between the two models, one may be inclined to believe the separate-constructs model is superior given that it is more parsimonious, and, at least superficially, it appears to align with characterizations in the

literature. However, findings emerging from the validity analysis present several challenges with interpreting social competence and behavioral regulation in the manner that they are defined in the literature: two constructs of social-emotional development that are related but conceptually distinct. In the separate-constructs model, social competence and behavioral regulation were highly intercorrelated, and the two factors had near-identical associations with teacher reports of psychopathology, direct assessments of social-emotional development, and parent reports of social competence and behavioral regulation. For example, social competence and behavioral regulation are similarly correlated with an inhibitory control direct assessment, but theory would only predict the latter correlation. Therefore, the separate-constructs model appears to only align with the research literature on the surface. Because results from the separate-constructs model do not appear to differentiate social competence and behavioral regulation, the substance of the factors shows misalignment with how social competence and behavioral regulation are understood in the research literature (e.g., Jones & Bouffard, 2012).

The bifactor model is less parsimonious, but it offers considerable advantages in interpretability by modeling social competence and behavioral regulation as orthogonal factors and providing factors that have differential associations with a range of related measures (thus indicating that they are meaningfully different factors). If assessments cannot be clearly interpreted with respect to a research question or a policy benchmark, they offer questionable value. Therefore, there are strong grounds to value interpretability over parsimony in both research and practice. As will be elaborated further, the bifactor model distinguishes between social competence and behavioral regulation in ways that align more closely with how the constructs are conceptualized and is thus our preferred model.

Turning to questions of how to interpret the preferred bifactor model, we interpret the

general factor in this revised model as behavioral regulation rather than as an overarching construct of social-emotional development for two reasons. First, variance in the behavioral regulation measures is largely explained by the general factor, whereas the general factor accounts for notably less variance in the social competence measures. Second, we ran a post-hoc analysis correlating factor scores for the general factor and the behavioral regulation factor in the separate-constructs model, and results indicate that the two factors are indistinguishable (i.e., $r > 0.99$). Together this evidence suggests that the general factor can be interpreted as behavioral regulation, running counter to our expectation that a general factor would capture a broader construct of social-emotional development. Given that the general factor is behavioral regulation, it follows that the loadings for the behavioral regulation factor in the initial bifactor model would be substantially reduced because there is no meaningful variance related to behavioral regulation left to model above and beyond the general factor.

Considering these models together, what do our results suggest about the substantial overlap between teacher report measures of social competence and behavioral regulation? We conclude that teacher report measures of social competence, as commonly assessed, appear to bundle teachers' perceptions of both social competence and behavioral regulation. That is, these measures should not be interpreted purely as teachers' perceptions of social competence. We draw this conclusion for two primary reasons. First, because the behavioral regulation general factor is composed of teachers' reports of behavioral regulation *and* social competence, our results indicate that teacher report measures of social competence may also reflect teachers' perceptions of behavioral regulation. Therefore, rather than only measuring children's interpersonal relationships, teacher reports of social competence seem to also capture elements of children's behavioral regulation. Second, although teacher reports of social competence appear

strongly influenced by their perceptions of behavioral regulation, a distinct social competence factor was identified in the bifactor model. That is, net of teachers' perceptions of children's behavioral regulation, teacher reports appear to capture meaningful variance associated with social competence. Therefore, the bifactor model reflects how social competence overlaps with behavioral regulation but is also discernable apart from it. Our validity results further demonstrate the bifactor model's superior ability to differentiate the two constructs. For example, only the behavioral regulation factor is related to an inhibitory control task and parent reports of behavioral regulation, as would be expected by theory. Overall, the bifactor model distinguishes between social competence and behavioral regulation in a manner that is more aligned with theoretical descriptions in the research literature (e.g., Jones & Bouffard, 2012) compared to the separate-constructs model, which cannot effectively differentiate between the two constructs.

Altogether, our results suggest that teacher reports of social competence do in fact reflect teachers' perceptions social competence but that they also tap teachers' perceptions of behavioral regulation. In contrast, teacher reports of behavioral regulation appear to primarily reflect teachers' perceptions of children's behavioral regulation. These findings extend results from previous measurement reviews (e.g., Halle & Darling-Churchill, 2016) and empirical work (e.g., Rhoades et al., 2009; Spinrad et al., 2006) that has found overlap in teacher-report measures of these constructs. Specifically, we provide clearer empirical evidence regarding the magnitude of this overlap and find that it appears largely driven by teachers' reports of social competence being colored by their perceptions of young children's behavioral regulation.

Using multiple post-hoc analyses, we find no clear methodological explanation for our findings. We reviewed the items of each social competence measure, looking for misalignment in terms of face validity (e.g., questions unrelated to social competence or that combine social

competence and other aspects of social-emotional development). We find no systematic concerns with face validity to explain our results. In addition, we ran a post-hoc analysis of the revised bifactor model at the item level to test whether our findings were driven by particular social competence items. We found no evidence that certain items were more heavily associated with behavioral regulation than with social competence. Finally, we note that the fact that measures of behavioral regulation are more strongly inter-correlated than the social competence measures may predispose the general factor to more strongly represent the construct of behavioral regulation (as compared to social competence). However, this possibility does not guarantee that measures of social competence would be strongly explained by behavioral regulation as found in our results (factor loading range 0.50 to 0.70); the bifactor model allows social competence measures to have lower factor loadings on the general factor (i.e., factor loadings less than 0.40). Although we cannot be certain, the fact that this did not occur, and that instead social competence measures loaded onto both the behavioral regulation factor and the social competence factor, offers support for our interpretation that teacher report measures of social competence reflect teachers' perceptions of both social competence and behavioral regulation.

Although we cannot offer a definitive answer, our findings point to the operationalization of social competence and behavioral regulation as being a significant driver of the observed overlap between these two constructs. From a theoretical perspective, our results may be explained in part by the possibility that children's behavioral regulation is foundational to their social competence, meaning that socially competent children are likely to also be behaviorally regulated (Rawn & Vohs, 2006; Rose-Krasnor & Denham, 2009). Assuming that children's behavioral regulation is foundational to their social competence, a certain amount of overlap would be expected between measures of the two constructs. However, the overlap observed

between the social competence and behavioral regulation factors in the separate-constructs model ($r = 0.78$) far exceeds what would expected from the conceptual relationship that is described in the literature. Therefore, it is difficult to conceive how the observed overlap between these constructs is not being considerably driven by how they are operationalized.

We can only speculate on what specific measurement issues may underlie our findings. It may be the case that our results stem from how teachers interpret the behaviors that are the basis of their ratings. For example, if a child takes a toy from a peer, that action could be interpreted as the child lacking social competence or it could be interpreted as that child's behavior being unregulated. Teachers' attributions for children's behaviors can vary considerably (e.g., Jackson, 2002), and if behavioral regulation is more salient than social competence, it may be difficult for teachers to report solely on dimensions of social competence using the measures at hand.

Our findings demonstrate that further developing quality, scalable measures of social-emotional development remains a critical need for the field. From a policy standpoint, advances in this area would enable superior monitoring of children's progress toward expressed benchmarks of social-emotional development. From a research standpoint, advances in this area would facilitate novel research agendas that require large-scale data collection. For example, scholars have highlighted the need to understand cultural variation in social-emotional development and how the classroom composition of children's social-emotional skills may affect teaching quality and different aspects of child development (Jones et al., 2016). Traction in these areas could be made using existing teacher report measures of behavioral regulation, but additional measures seem necessary to capture young children's social competence and perhaps other elements of social-emotional development. Despite challenges highlighted by our study as well as by others (see McKown, 2017), teacher reports remain a promising measurement

approach to realize this goal. For example, teacher direct behavior ratings (Chafouleas, 2011), which ask teachers to rate the frequency of specific behaviors (e.g., speaking out of turn, playing cooperatively with a peer) over a designated period of time, are thought to be more objective than teacher report scales while remaining relatively simple to complete (McKown, 2017). Future research should investigate the extent that teacher direct behavior ratings and other alternative measurement approaches can assess children's social-emotional development at scale.

This study has three notable limitations. First, although we believe the measures used in our validity tests are appropriate, we acknowledge they are not perfect tests of validity and that our findings would be strengthened with additional measures (e.g., sociometric peer nominations). Second, it is important to note that this study uses only a handful, and a particular set, of teacher report measures of social competence and behavioral regulation. Indeed, as we noted earlier, the relatively stronger inter-correlations between the behavior regulation measures may have overstated the role of behavior regulation in our bifactor model. Although our sensitivity analyses replicated our results using additional measures of social competence and behavioral regulation collected when children in the analytic sample were in first grade, these models still included several of the same measures used in the preschool models. As such, further replicating these analyses with a broader (and/or different) set of measures would strengthen our confidence in the findings that emerged from this study. The third limitation of our findings stems from the sample only being representative of rural, low-income communities of the Black South and Appalachia—and consequently of Black and White children. Although our invariance analyses provide an indication that these results may hold across different types of samples, it is still possible that our findings may or may not be replicated in other contexts (e.g., urban areas). Future research should investigate how our findings replicate across different

measures, different populations, and different constructs of social-emotional development.

We believe that discriminating measures of social-emotional development are a critical need because theoretical distinctions between subdomains of social-emotional development are foundational to research and practice. At a fundamental level, if a measure cannot distinguish its associated construct (e.g., social competence) from other constructs (e.g., behavioral regulation), the extent to which that measure actually captures its associated construct is seriously called into question. Therefore, a measure's ability to differentiate its associated construct from other constructs is foundational to the quality and utility of that measure. In addition to informing how policymakers enact social-emotional learning benchmarks, distinctions within social-emotional development inform educational interventions' theories of change and the mechanisms tested by developmental research. However, we can only confidently monitor children's progress and test theories with sound measurement. Our approach of examining competing measurement models has been applied to measures of early childhood classroom quality (Hamre, Hatfield, Pianta, & Jamil, 2014) and to single measures of social-emotional development (Caci, Morin, & Tran, 2015), but to our knowledge no research has used this method to investigate multiple teacher report measures of social-emotional development. Applying this approach more broadly may yield insights into important measurement issues across domains of education and child development and allow for more careful study of associations between subdomains of social-emotional development and other critical aspects of children's well-being, ultimately strengthening both research and practice. There remains a considerable need for quality measures of social-emotional development that can be easily implemented and interpreted by researchers and practitioners alike. Future research should rise to meet this need by both clarifying the utility of existing measures and by advancing new measurement approaches.

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Table 1

Bivariate Correlations between Teacher Reports, Direct Assessments, and Parent Reports

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. SCS - Prosocial Behavior^{T}	—																	
2. SDQ – Prosocial^{T}	.70**	—																
3. Peer Problems^{TR}	.51**	.48**	—															
4. SDQ – Hyperactivity^{TR}	.62**	.54**	.41**	—														
5. DBDRS – Inattention^{TR}	.58**	.50**	.49**	.82**	—													
6. CBQ - Attentional Focusing^{T}	.62**	.51**	.39**	.77**	.81**	—												
7. CBQ - Inhibitory Control^{T}	.65**	.54**	.54**	.74**	.71**	.74**	—											
8. SDQ - Emotional Symptoms^{T}	-.25**	-.14**	-.37**	-.23**	-.30**	-.20**	-.20**	—										
9. SDQ - Conduct ProblemS^{T}	-.59**	-.55**	-.45**	-.65**	-.58**	-.49**	-.64**	.16**	—									
10. SCS - Aggressive Oppositional^{T}	-.62**	-.55**	-.44**	-.63**	-.58**	-.49**	-.65**	.19**	.84**	—								
11. Walk-a-line-Slowly^{D}	.12**	.12**	.13**	.20**	.21**	.19**	.20**	-.09**	-.12**	-.12**	—							
12. ACES- Emotion Identification^{D}	.18**	.15**	.17**	.21**	.24**	.25**	.19**	-.08**	-.13**	-.13**	.12**	—						
13. ACES- Anger Attribution^{D}	-.08*	-.06	-.04	.03	.02	-.03	.05	.03	.08*	.09*	-.10**	-.09*	—					
14. SCS - Prosocial Behavior^{P}	.21**	.18**	.15**	.20**	.18**	.24**	.24**	-.05	-.15**	-.13**	.07*	.18**	-.02	—				
15. SDQ – Prosocial^{P}	.22**	.21**	.18**	.26**	.21**	.23**	.26**	-.09*	-.16**	-.15**	.10**	.22**	-.03	.53**	—			
16. SDQ – Peer Problems^{P}	-.20**	-.22**	-.26**	-.21**	-.20**	-.20**	-.25**	.10**	.14**	.17**	-.15**	-.21**	.06	-.36**	-.47**	—		
17. SDQ – Hyperactivity^{P}	-.27**	-.23**	-.20**	-.36**	-.32**	-.31**	-.30**	.12**	.26**	.26**	-.16**	-.20**	.10**	-.41**	-.38**	.33**	—	
18. CBQ - Attentional Focusing^{P}	.26**	.20**	.20**	.33**	.30**	.32**	.31**	-.13**	-.21**	-.21**	.17**	.22**	-.05	.42**	.41**	-.36**	-.64**	—
19. CBQ - Inhibitory Control^{P}	.23**	.18**	.16**	.25**	.24**	.25**	.27**	-.10**	-.17**	-.18**	.12**	.22**	-.01	.40**	.44**	-.34**	-.54**	.61**

* $p < .05$; ** $p < .01$; ^{T} Teacher Report; ^{D} Direct Assessment; ^{P} Parent Report; ^{R} Reverse Coded

Table 2
Factor Loadings for Single-Construct Model

	Social- Emotional Competence	
	Estimate	*SE*
SCS- Prosocial	0.73	0.02
SDQ- Prosocial	0.63	0.03
Peer Problems[R]	0.53	0.03
DBDRS- Inattention[R]	0.89	0.01
SDQ- Hyperactivity[R]	0.89	0.01
CBQ- Attentional Focusing	0.87	0.01
CBQ- Inhibitory Control	0.83	0.02

[R] Reverse Coded

Table 3
Factor Loadings for Separate-Constructs Model

	Social Competence		Behavioral Regulation	
	Estimate	*SE*	Estimate	*SE*
SCS- Prosocial	0.89	0.01		
SDQ- Prosocial	0.78	0.02		
Peer Problems[R]	0.60	0.03		
DBDRS- Inattention[R]			0.90	0.01
SDQ- Hyperactivity[R]			0.90	0.01
CBQ- Attentional Focusing			0.88	0.01
CBQ- Inhibitory Control			0.82	0.02

[R] Reverse Coded

Table 4
Factor Loadings for Initial Bifactor Model

	Social Competence		Behavioral Regulation		General Factor	
	Estimate	*SE*	Estimate	*SE*	Estimate	*SE*
SCS- Prosocial	0.46	0.05			0.73	0.02
SDQ- Prosocial	0.54	0.06			0.61	0.03
Peer Problems[R]	0.30	0.04			0.51	0.04
DBDRS- Inattention[R]			0.48	0.09	0.83	0.03
SDQ- Hyperactivity[R]			0.25	0.06	0.85	0.02
CBQ- Attentional Focusing			0.24	0.06	0.84	0.02
CBQ- Inhibitory Control			-0.06	0.09	0.89	0.02

[R] Reverse Coded

Table 5
Factor Loadings for Revised Bifactor Model

	Social Competence		Behavioral Regulation (General Factor)	
	Estimate	*SE*	Estimate	*SE*
SCS- Prosocial	0.50	0.04	0.70	0.02
SDQ- Prosocial	0.57	0.05	0.60	0.03
Peer Problems[R]	0.33	0.04	0.50	0.03
DBDRS- Inattention[R]			0.90	0.01
SDQ- Hyperactivity[R]			0.90	0.01
CBQ- Attentional Focusing			0.88	0.01
CBQ- Inhibitory Control			0.82	0.02

[R] Reverse Coded

Table 6
Validity Tests for Teacher Reports of Psychopathology and Direct Assessments of Social-Emotional Development

	Teacher Reports of Psychopathology			Direct Assessments of Social-Emotional Development		
	Emotional Symptoms	Conduct Problems	Aggressive/ Oppositional Behaviors	ACES- Emotion Identification Accuracy	ACES- Anger Attribution Bias	Walk-a-line Slowly
	r (*SE*)	*r* (*SE*)	*r* (*SE*)	*r* (*SE*)	*r* (*SE*)	*r* (*SE*)
Single-Construct Model						
Social-Emotional Competence	-0.29*** (0.04)	-0.71*** (0.02)	-0.70*** (0.03)	0.27*** (0.04)	-0.04 (0.04)	0.22*** (0.03)
Separate-Constructs Model						
Social Competence	-0.29*** (0.04)	-0.69*** (0.02)	-0.71*** (0.03)	0.21*** (0.04)	-0.08* (0.04)	0.15*** (0.04)
Behavioral Regulation	-0.28*** (0.04)	-0.67*** (0.02)	-0.67*** (0.03)	0.26*** (0.04)	-0.03 (0.04)	0.22*** (0.04)
Bifactor Model						
Social Competence	-0.13* (0.05)	-0.52*** (0.05)	-0.56*** (0.05)	0.04 (0.05)	-0.09* (0.04)	0.02 (0.04)
Behavioral Regulation (General Factor)	-0.29*** (0.04)	-0.73*** (0.03)	-0.69*** (0.03)	0.27*** (0.04)	-0.04 (0.04)	0.22*** (0.03)

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Notes. $n = 828$ across all correlations

Table 7
Validity Tests for Parent Reports of Social Competence and Behavioral Regulation

	Parent Reports of Social Competence			Parent Reports of Behavioral Regulation		
	SDQ- Prosocial	SDQ- Peer Problems	SCS- Prosocial	SDQ- Hyperactivity	CBQ- Inhibitory Control	CBQ- Attentional Focusing
	r (*SE*)	*r* (*SE*)	*r* (*SE*)	*r* (*SE*)	*r* (*SE*)	*r* (*SE*)
Single-Construct Model						
Social-Emotional Competence	0.28*** (0.04)	-0.26*** (0.04)	0.25*** (0.03)	-0.37*** (0.03)	0.29*** (0.04)	0.36*** (0.03)
Separate-Constructs Model						
Social Competence	0.26*** (0.04)	-0.27*** (0.04)	0.24*** (0.04)	-0.30*** (0.04)	0.25*** (0.04)	0.29*** (0.04)
Behavioral Regulation	0.27*** (0.04)	-0.24*** (0.04)	0.24*** (0.03)	-0.37*** (0.03)	0.28*** (0.04)	0.36*** (0.03)
Bifactor Model						
Social Competence	0.12* (0.05)	-0.16*** (0.05)	0.12* (0.05)	-0.05 (0.05)	0.08 (0.04)	0.04 (0.05)
Behavioral Regulation (General Factor)	0.27*** (0.04)	-0.25*** (0.04)	0.24*** (0.03)	-0.37*** (0.03)	0.29*** (0.04)	0.36*** (0.03)

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Notes. $n = 828$ across all correlations

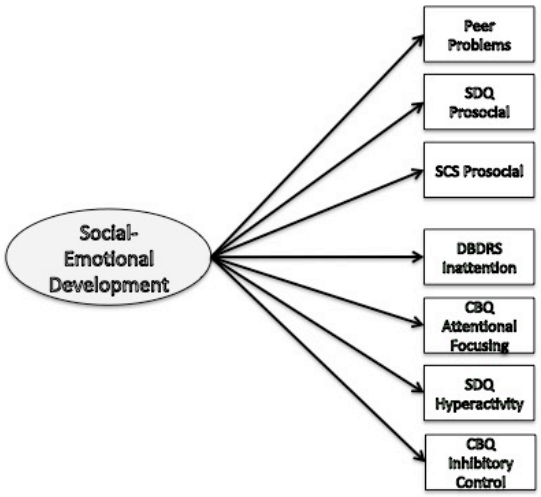

Figure 1
Single-Construct Model

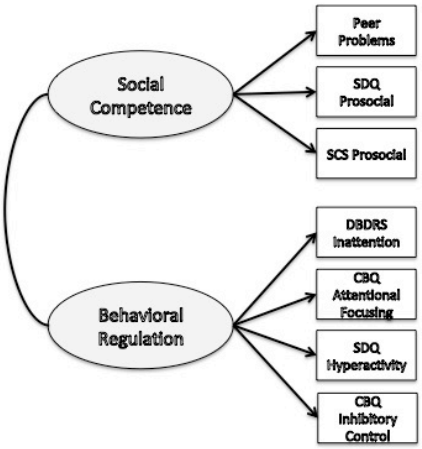

Figure 2
Separate-Constructs Model

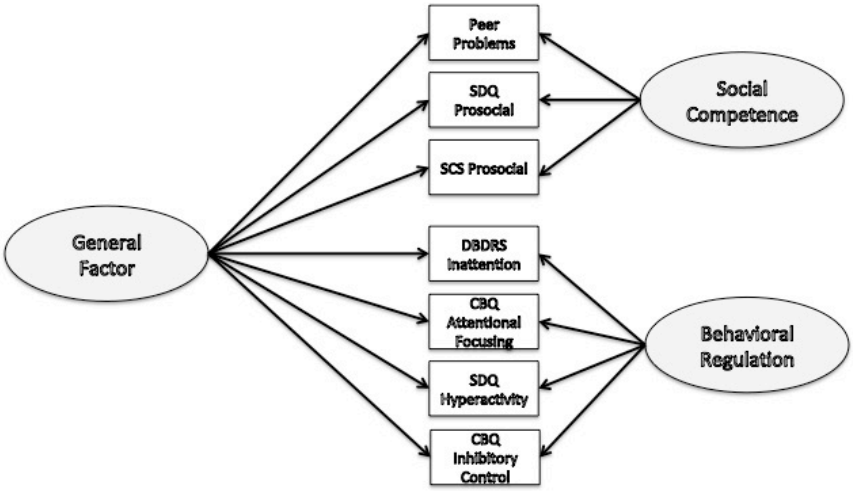

Figure 3
Initial Bifactor Model

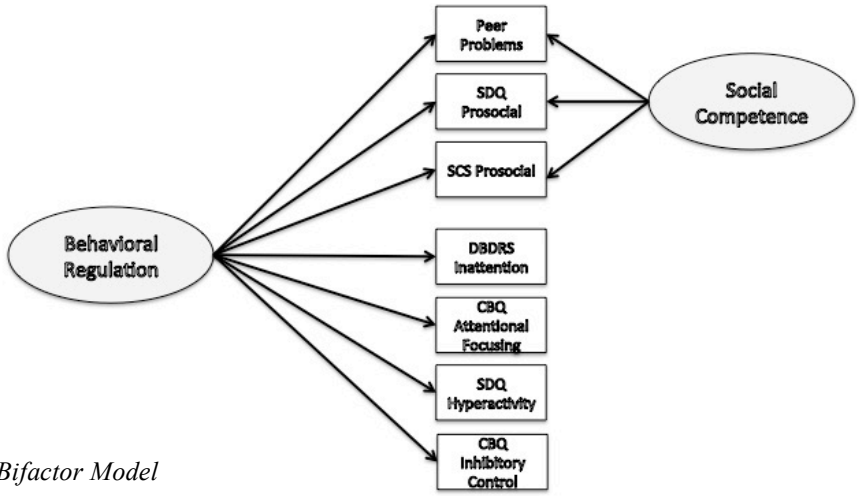

Figure 4
Revised Bifactor Model