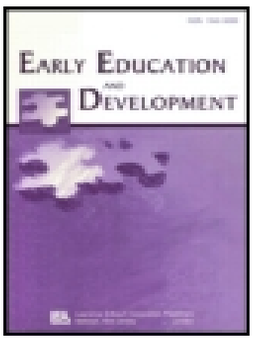

Early Education and Development

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/heed20

Profiles of Dysregulation Moderate the Impact of PreschoolTeacher–Student Relationships on Elementary School Functioning

Benjamin L. Bayly & Karen L. Bierman

To cite this article: Benjamin L. Bayly & Karen L. Bierman (2021): Profiles of Dysregulation Moderate the Impact of PreschoolTeacher–Student Relationships on Elementary School Functioning, Early Education and Development, DOI: 10.1080/10409289.2020.1865785

To link to this article: https://doi.org/10.1080/10409289.2020.1865785

View supplementary material

Published online: 17 Jan 2021.

Submit your article to this journal

View related articles

View Crossmark data

Full Terms & Conditions of access and use can be found at
https://www.tandfonline.com/action/journalInformation?journalCode=heed20

EARLY EDUCATION AND DEVELOPMENT
https://doi.org/10.1080/10409289.2020.1865785

Routledge
Taylor & Francis Group

Check for updates

Profiles of Dysregulation Moderate the Impact of PreschoolTeacher–Student Relationships on Elementary School Functioning

Benjamin L. Bayly[a] and Karen L. Bierman[b]

[a]Agricultural Economics, Sociology, and Education, Pennsylvania State University; [b]Psychology, Pennsylvania State University

ABSTRACT

Research Findings: Children's readiness to handle the expectations of elementary school depends heavily on their self-regulation skills. Self-regulation includes both cognitive and behavioral elements; however, past studies have typically looked at cognitive and behavioral self-regulation in isolation or as a composite score rather than examining self-regulation profiles. Conceptually, a profile characterized by pervasive cognitive and behavioral self-regulation difficulties may have different developmental roots than a profile limited to behavioral regulation difficulties and children displaying these different profiles likely require different intervention supports. In the current study, latent profile analysis with cognitive and behavioral self-regulation indicators revealed four unique self-regulation profiles for preschool children (*N*=566): Pervasive Dysregulation (cognitively and behaviorally dysregulated), Behavioral Dysregulation (behaviorally dysregulated only), Average Self-Regulation, and High Self-Regulation. *Practice or Policy:* Latent moderational analyses indicated that while both the Pervasive and Behavioral Dysregulation group were at increased risk for less desirable kindergarten and 2nd grade outcomes, this risk was offset to a greater extant for children from the Behavioral Dysregulation profile when they experienced a close, non-conflictual teacher-student relationship in preschool. Ultimately, high-quality teacher-student relationships may be effective for supporting children who present behavioral challenges without cognitive self-regulatory challenges, but pervasively dysregulated children may require more intensive support.

Self-regulation skills play a critical role in promoting children's school readiness and their ability to handle the expectations of elementary school (Blair & Raver, 2015; Raver et al., 2013). Self-regulation is a broad term that reflects both cognitive and behavioral elements (Blair & Raver, 2015). For children to be successful in school, they need to be able to focus their attention and mentally manipulate information (cognitive self-regulation) as well as practice impulse control, engage in on-task learning efforts, and interact appropriately with both their teachers and peers (behavioral self-regulation). Cognitive and behavioral self-regulation are not only important for school readiness, but also promote later school success (Bohlmann & Downer, 2016; Vitiello & Greenfield, 2017). While cognitive and behavioral self-regulation are unique constructs (Sasser et al., 2015) they are not always treated as such, with past research often combining elements of both into a single variable instead of examining patterns of cognitive and behavioral self-regulation (e.g., Liew et al., 2010). This is an important gap to address as young children with different profiles of cognitive and behavioral self-regulatory abilities likely require different supports in early childhood to set them up to succeed after the transition to

CONTACT Benjamin L. Bayly blb339@psu.edu Agricultural Economics, Sociology, and Education, The Pennsylvania State University, 204A Ferguson Building, University Park, PA 16802.
Supplemental data for this article can be accessed on the publisher's website.
© 2021 Taylor & Francis Group, LLC

elementary school. In the current study, we utilize latent profile analysis (LPA) with cognitive and behavioral indicators of self-regulation to identify unique profiles of self-regulation and examine how membership in these profiles moderated the impact of preschool teacher-student relationships (TSRs) on kindergarten and 2nd grade academic, attention, and social-emotional outcomes.

Economic Disadvantage and Poor Self-regulation

Children from economically disadvantaged backgrounds are at an increased risk for deficits in both cognitive and behavioral self-regulation compared to their more economically advantaged peers (Ryan et al., 2006). Economically disadvantaged children are more likely to struggle with working memory and attentional skills as well as impulsivity compared to their more economically advantaged peers (see Hackman et al., 2010; Miller et al., 2011). These deficits likely reflect the negative developmental impact of multiple adversities associated with poverty, including elevated exposure to stressors in their homes and neighborhoods (Berliner, 2013), fewer available academic resources (Ferguson et al., 2007), and less access to high-quality, center-based preschools (McCartney et al., 2007). Additionally, research has shown that parents living in economically disadvantaged households are more likely to struggle with poor mental health and use harsh and inconsistent parenting, both of which negatively impact children's ability to regulate their emotions and behaviors (Blair et al., 2014; Deater-Deckard et al., 2012). Repeated exposure to stressful environments has been shown to negatively impact the hypothalamic pituitary adrenal (HPA) axis, making it more difficult for children to self-regulate in stressful situations (Badanes et al., 2011). One indicator that the HPA axis is not functioning optimally is disrupted patterns of diurnal cortisol; something that economically disadvantaged children are five times more likely to display than their more economically-advantaged peers (Zalewski et al., 2012). Economically disadvantaged children are less likely to grow up in a cognitively stimulating environment, as children in poverty have been shown to have access to fewer books, hear fewer words from their parents, and are less likely to be read to than children living outside of poverty (Evans, 2004; Hoff et al., 2002). Similarly, while multiple studies have found the quality of childcare to matter the most for economically disadvantaged children (e.g., Currie, 2001; McCartney et al., 2007), low-income families are often constrained in their childcare choices and hence children are less likely to attend high-quality, center-based care (Magnuson et al., 2004; Yesil-Dagli, 2011).

Socio-economic disparities in self-regulation emerge early in life and persist throughout school, ultimately reducing high school graduation rates and employment opportunities (Ryan et al., 2006). A key goal of publicly funded preschool programs, such as Head Start, is to promote self-regulation skills to increase school readiness and improve long-term academic success (Administration for Children and Families, 2015; Blair & Raver, 2015).

Teacher-Student Relationships

Within the preschool context, researchers have speculated that the quality of the TSRS that children experience may play a critical role in promoting their self-regulation skills (Hamre & Pianta, 2001). The quality of TSRs is typically measured along the two dimensions of closeness and conflict. Closeness refers to the level of warmth and openness in the relationship, whereas conflict refers to adversarial tensions and coercive interactions between student and teacher (Pianta, 2001). Consistent with the results of a large meta-analysis that included students age preschool to high school (Roorda et al., 2011), studies focused specifically on young children have shown that closeness and conflict are both associated with academic achievement (Hamre et al., 2008; Jerome et al., 2009), attention skills (Thijs et al., 2012), and social competence (Griggs et al., 2009; Pianta & Stuhlman, 2004).

In addition to concurrent associations, longitudinal studies suggest that the quality of TSRs in the early school years predicts student school adjustment in subsequent years. For example, following 4-year-old children from preschool into elementary school, Peisner-Feinberg et al. (2001) found that preschool TSR closeness had modest long-term effects on children's school adjustment, with the

strongest effects on the social adjustment of children from more at-risk backgrounds, controlling for family background and general preschool classroom quality. Extending longitudinal follow-up for five years, Howes (2000) found that preschool TSRs uniquely predicted children's second-grade social competence with peers, with the effects of child baseline adjustment and concurrent second grade TSRs included in the regression. Subsequent-year findings of TSRs are encouraging, as they suggest that promoting positive TSRs in preschool can be an effective mechanism to set children up for sustained school success, either through supporting the acquisition of new skills that remain in later years or putting children on a more desirable trajectory which allows for benefits to be accrued over the years (McClelland et al., 2006).

Self-Regulation and Teacher-Student Relationships

High-quality TSRs may be particularly beneficial to students with poor self-regulation skills (Hamre & Pianta, 2001; Liew et al., 2010; Valiente et al., 2008). For example, Graziano et al. (2015) found children with poor self-regulation skills (i.e., externalizing behavior problems and poor cognitive self-regulation) who experienced close, non-conflictual relationships with their preschool teachers were rated as more kindergarten-ready than their counterparts who had low-quality TSRs. Similarly, Griggs et al. (2009) found children who exhibited difficulties adapting to new situations and intense or unfriendly behaviors at home, were more well adjusted socially in preschool when they experienced low-conflict TSRs.

At the same time, self-regulation is a broad construct and researchers have noted multi-dimensional distinctions that may be important for understanding the impact on school functioning and the benefits associated with high-quality TSRs. Importantly, researchers have distinguished the behavioral aspects of self-regulation, conceptualized as individual differences in temperament-based emotional reactivity, and the cognitive aspects of self-regulation associated with the neural systems that regulate attention, working memory, and cognitive inhibitory control (Blair & Razza, 2007; Hongwanishkul et al., 2005; Liew, 2012). The behavioral aspects of self-regulation may be particularly important for the control of emotional arousal, impulses, and activity levels, and are reflected in classroom behaviors such as engaged learning and the inhibition of distractible, disruptive, and aggressive behavior (Brock et al., 2009; Kochanska et al., 2009). The cognitive aspects of self-regulation, often conceptualized and assessed as executive functioning (EF), may play a critical role in the acquisition of knowledge, reasoning, and problem-solving, thus promoting attention skills and academic achievement (Blair & Razza, 2007; Kim et al., 2013).

Supporting this distinction, Kim et al. (2013) found that EF measures collected at age 4 years (i.e., motor inhibition, response suppression, and effortful attention) uniquely predicted later academic performance in the early school years, whereas behavioral measures of self-regulation (i.e., impulse control and emotion regulation) assessed with behavioral delay of gratification tasks uniquely predicted later behavioral problems. Similarly, Brock et al. (2009) found that EF measures collected in kindergarten predicted math achievement, classroom attention, and learning engagement, whereas behavioral delay of gratification tasks were not associated with academic achievement or behavioral outcomes when examined concurrently with EF.

Understanding the developmental functions of behavioral and cognitive self-regulation as independent dimensions is important, but equally important is understanding the developmental experiences of children exhibiting different profiles of cognitive and behavioral self-regulation. Person-centered analyses (i.e., LPA) allow researchers to treat a study population as heterogeneous (Syvertsen et al., 2009) and to explore profiles of cognitive and behavioral self-regulation as they exist in different populations. In a prior study with first-grade children, Sparapani et al. (2019) used LPA and identified latent profiles that were characterized primarily by: 1) behavioral difficulties with average cognitive skills (language and EF skills); 2) behavioral difficulties with cognitive skill deficits; 3) cognitive skill deficits and poor social skills but no externalizing behavioral problems; and 4) average behavioral and cognitive skills. Similarly, in an LPA by Sandilos et al., (2019) with preschool measures of academic,

EF, behavioral, and learning approach indicators the authors presented three profiles: 1) low-range academics and EF, mid-range positive behaviors and learning approaches; 2) mid-range academics and EF, low-range positive behaviors and learning approaches; and 3) high-range academics, EF, positive behaviors, and learning approaches. Although Sparapani et al. (2016) were not focused specifically on self-regulation profiles or preschool children and Sandilos et al. (2019) incorporated measures outside of self-regulation (e.g., academic performance), their results suggest variability may exist in profiles of cognitive and behavioral skills of young children. An important remaining question is whether distinct profiles characterized by differential patterns of behavioral and cognitive self-regulation are evident during the preschool years, and if so, whether they benefit in different ways from the supports offered by high-quality TSRs.

From a conceptual standpoint, the developmental roots of behavioral dysregulation (without concurrent cognitive dysregulation) may be different than the developmental precursors of profiles that involve a combination of cognitive and behavioral dysregulation and, hence, response to early interventions may differ as well. Theorists have suggested that the roots of behavioral dysregulation are temperamental, associated with high emotional reactivity and impulsivity (Blair & Razza, 2007; Brock et al., 2009; Kochanska et al., 2009). As such, socialization opportunities that foster emotional security and scaffold behavioral control, such as those provided by teacher-student closeness, may be particularly beneficial (Campbell & von Stauffenberg, 2008; Hamre & Pianta, 2001). Prior research suggests that supportive TSRs increase on-task learning behaviors and improve academic performance by decreasing student emotional distress (Thijs & Koomen, 2008) and by shaping the social behaviors that promote academic performance, such as peer engagement and classroom participation (Palermo et al., 2007). In contrast, TSRs that are high in conflict exacerbate behavioral dysregulation when teachers respond to problematic behaviors with punitive actions that elicit coercive reactivity and counter-aggression from students and undermine effective learning engagement (Myers & Pianta, 2008). Indeed, Portilla et al. (2014) found that conflictual TSRs in kindergarten were associated with decreases in kindergarten learning engagement which, in turn, predicted reduced levels of first-grade academic skills. For children whose preschool self-regulation deficits are primarily behavioral, the kinds of emotional and behavioral supports afforded by high-quality TSRs may be sufficient to promote behavioral improvements and later school adjustment.

In contrast, more pervasive patterns of cognitive and behavioral self-regulation difficulties in children growing up in poverty may often reflect chronic exposure to unpredictable stress that floods the HPA axis and impedes the development of the prefrontal cortex (see Blair & Raver, 2015 for review). Although high-quality TSRs are likely to be of benefit to children with pervasive self-regulatory deficits, they may be insufficient in isolation to remediate future academic and behavioral risks unless accompanied by additional intervention supports designed to strengthen cognitive self-regulation skills.

The Current Study

The current study addressed three key questions regarding preschool self-regulation profiles and potential differential responding to high-quality preschool TRS, examined within an economically disadvantaged sample. First, the study addressed the question of whether preschool children exhibit distinct self-regulation profiles by conducting LPA using multiple measures of cognitive and behavioral self-regulation. Based upon the elementary school findings of Sparapani et al. (2016), we hypothesized that distinct profiles would emerge, including a profile defined primarily by behavioral dysregulation, a profile defined by more pervasive cognitive and behavioral dysregulation, and a profile defined by average cognitive and behavioral self-regulation. Second, the study addressed two longitudinal questions, testing whether children exhibiting different self-regulation profiles in preschool experienced academic or behavioral difficulties after they transitioned into elementary school and testing whether the TSRs children experienced in preschool influenced their academic or behavioral difficulties after they transitioned into elementary school. We examined closeness and

conflict separately and tested prediction to children's immediate outcomes in kindergarten and later outcomes in second grade. We anticipated that preschool self-regulation deficits would predict school adjustment difficulties in kindergarten and second grade, including less optimal academic performance and social adjustment and higher rates of attention problems. We also hypothesized that preschool TSRs would contribute to elementary school outcomes, with closeness promoting future academic success and conflict portending future behavior problems. Finally, we addressed the question of whether children's self-regulation profiles in preschool were associated with differential response to TSRs, hypothesizing that children exhibiting behavioral dysregulation only might particularly benefit from teacher-student closeness but also be particularly negatively affected by teacher-student conflict.

Method

Procedure and Participants

Data for this study came from the Head Start REDI (*Re*search-based *D*evelopmentally *I*nformed) Project (Bierman et al., 2017). As part of two sequential intervention trials, four cohorts of preschool children ($N = 556$) were recruited from 44 Head Start classrooms at the start of the pre-kindergarten year. During the first trial with cohorts 1 and 2 ($N = 356$), Head Start classrooms were randomly assigned to receive Head Start as usual or Head Start REDI which included enriched curriculum components and professional support for teachers (see Bierman et al., 2008). During the subsequent trial with cohorts 3 and 4 ($N = 200$), all classrooms used the Head Start REDI curriculum and children were randomly assigned (within classroom) to receive an additional parent-focused intervention (see Bierman et al., 2015). Letters describing the study were sent home, and parents provided informed consent for their child's participation. At the first time point, almost all children were four or five years old ($M = 4.67$ years; SD =.32), were evenly split between boys and girls (51% girls), and represented diverse racial/ethnic groups (58% European American; 25% African American; 19% Latinx). The majority (70%) came from families living under the poverty line.

LPA analyses were conducted using the baseline data for all children in the sample, before any intervention occurred. Subsequent outcomes excluded cohort 3 and 4 participants as children continued to receive additional support promoting school success during kindergarten (when outcome data for the current study was first collected; $N = 200$). The remaining sample of $N = 356$ were assessed into elementary school through second grade. Subsequent analyses controlled for exposure to the enriched REDI curriculum during Head Start. Attrition was minimal (86% retention in second grade) and was not significantly related to any family characteristic.

Measures

Preschool measures of self-regulation, TSRs, and covariates were collected in the fall of the prekindergarten year. Elementary school outcomes included measures of academic achievement, attention problems, and social competence that were collected in the spring of kindergarten and second grade.

Self-Regulation

Cognitive self-regulation was measured with four direct assessments of EF skills In the *Peg Tapping* task (Diamond & Taylor, 1996) emphasizing inhibitory control, children were instructed to tap a peg twice when the examiner tapped once and to tap once when the examiner tapped twice. After a few practice items with feedback, scores reflected the total number of accurate responses out of 16 subsequent trials (M = 8.21; SD = 6.09; $\alpha = .89$). In the *Backward Word Span* task (Davis & Pratt, 1995) emphasizing working memory, children were asked to repeat a list of words in reverse order. After a few practice items with feedback, children were presented with a set of trials that increased

gradually in difficulty level, starting with two words and increasing by one word up to five total words. Their score reflected the highest number of words the child repeated correctly in reverse order (M = 1.22, SD = .52). In the *Dimensional Change Card Sort* (DCCS; Frye et al., 1995) emphasizing attention set-shifting skills, children were asked to sort a set of cards based on either their shape or color, then asked to sort the cards by the other dimension. Scores were calculated after the switch in rules and based on the percentage of successful trials out of six (M = .57, SD = .45; α = .94). The *Walk a Line Slowly* task (Kochanska et al., 1996) tapped impulse control and required children to walk along a six-foot long line on the floor. They were asked to repeat the task twice, first walking more slowly and then walking as slowly as possible. Their score was the difference between the child's time on the first to third trial (M = .43, SD = .59).

Consistent with prior self-regulation studies (see McClelland & Cameron, 2011), behavioral self-regulation was measured with teacher ratings of self-control and disruptive-aggressive behaviors. Assistant and lead teachers completed the *School Readiness Questionnaire* developed for the Head Start REDI project (Bierman et al., 2008) which included nine items rated on a 6-point scale (1 = strongly disagree; 6 = strongly agree) assessing self-controlled behaviors (e.g., "has the self-control necessary to do well in school"; "can follow the rules and routines that are part of the school day"; "can work independently"). Assistant and lead teacher mean scores were averaged to create one measure reflecting the behavioral self-control of each child (M = 4.90; SD = .89; α = .95). Teachers also rated children on the authority acceptance subscale of the *Teacher Observation of Classroom Adaptation – Revised* (TOCA-R; Wethamer-Larsson et al., 1989) assessing seven impulsive, disruptive, and aggressive behaviors using a 6-point scale (1 = never; 6 = almost always; e.g., breaking rules, ignoring adults, yelling, pushing, fighting with others). Assistant and lead teachers' ratings were averaged to create an overall aggression score (M = 1.89; SD = .83). The TOCA-R has good construct validity and reliability (Wethamer-Larsson, et al., 1991; α = .88 in the current study).

Teacher-Student Relationships

Assistant and lead preschool teachers completed the closeness and conflict subscales of the *Teacher-student Relationship Scale Short-Form* (STRS-SF; Pianta, 2001). The closeness subscale consists of seven items reflecting teachers' positive feelings toward a child as well as the warmth and bonding in their relationship (e.g., "I share an affectionate, warm relationships with this child"). The conflict subscale consists of eight items and reflects teachers' feelings of tension, argument, and frustration experienced in their relationship with each child (e.g., "dealing with this child drains my energy"; "this child and I always seem to be struggling with each other"). Teachers responded to items using a 5-point scale (1 = definitely does not apply; 5 = definitely applies). Assistant and lead teacher ratings on each scale were calculated as mean item scores and averaged (closeness M = 4.36; SD = .52; conflict M = 1.74; SD = .82). Both the closeness and conflict subscales of the STRS-SF have acceptable convergent and discriminant validity (see Tsigilis & Gregoriadis, 2008) as well as good reliabilities (in the current study, closeness: α = .92; conflict: α = .95).

Elementary Outcomes

Outcomes included academic achievement, attention problems, and social competence, all constructs relevant to overall school success (Durla,et al., 2011). Reading achievement was measured with the Sight Word Efficiency subscale of the *Test of Word Reading Efficiency* (TOWRE; Torgesen et al., 1999) which measures the number of words read correctly by a child in 45 seconds and possesses good test–retest reliability (Torgesen et al., 1999). As a second measure of academic performance teachers ranked each child's performance relative to classroom expectations in areas of reading, writing, and language skills (1 = near the very bottom of the class to 5 = near the very top of the class; α = .91).

The *ADHD Rating Scale* (DuPaul, 1991) was used to assess children's attention problems. Elementary teachers rated 14 items describing inattention and impulsivity (e.g., "has trouble staying focused"; "has trouble waiting his or her turn") on a 4-point scale (0 = not at all; 3 = very much). The

ADHD Rating Scale has been validated and possesses good internal consistency (DuPaul, 1991; α = .94 – .95 across time points in the current study).

Teachers completed the 12 items from the *Social Competence Scale* (SCS; Conduct Problems Prevention Research Group [CPPRG], 1995). Items measured both prosocial behaviors (e.g., "shares with others") and emotional regulation (e.g., "controls temper when there is a disagreement"). Elementary teachers responded to the items on a 6-point scale (1 = almost never; 6 = almost always). The SCS has been shown to have acceptable construct validity and reliability in a sample of preschool children (Gouley et al., 2008; α = .94 – .95 across time points in the current study).

Covariates

All weighted regression analyses controlled for the county location of the Head Start program, the REDI intervention, the child's race, gender, and age, and maternal depression. Maternal depression was measured using maternal ratings on the Center for Epidemiologic Studies-Depression Scale (CES-D: Radloff, 1977; α = .87).

Plan of Analysis

First, latent profile analysis (LPA) was used to identify unique subgroups of participants based upon child scores on the six measures of self-regulation, using 1000 random start values in Latent GOLD version 5.1 (Vermunt & Magidson, 2016). We assessed model fit using Bayesian information criterion (BIC), Akaike information criterion (AIC), and consistent AIC (CAIC) (see Nylund et al., 2007). Additionally, we took into account the size, interpretability, and differentiation of the latent profiles (Collins & Lanza, 2010).

Next, weighted logistic regressions were conducted to assess associations between preschool self-regulation profiles, preschool TSR closeness and conflict, profile by TSRs interactions, and student elementary school outcomes in kindergarten and second grade. Rather than assigning individuals to profile classes using posterior probabilities for these analyses (i.e., classify-analyze; Clogg, 1995), we used the bias-adjusted 3-step approach introduced by Bolck et al. (2004; BCH) and conducted weighted regressions in Latent GOLD 5.1. The BCH approach is seen as advantageous over one-step approaches and classify-analyze because bias is reduced by weighting participants to membership in each latent profile based off their posterior probabilities (opposed to assigning participants to a profile) and latent profile sizes and definitions do not shift when the distribution of an outcome is misspecified (Bakk & Vermunt, 2015).

Finally, when a meaningful profile by TSR interaction was detected at the trend level ($p < .10$) suggesting that the TSR had a differential impact across profiles, regressions were conducted within each profile to better understand the difference in impact of the TSR across the latent profiles.

Results

Latent Profile Solution

Table 1 provides the information criteria for LPA models with 1–6 profiles. While BIC, AIC, and CAIC continued to show improved model fit through the 6-profile solution, a 4-profile solution was selected as optimal for two reasons. The 5- and 6-profile solutions resulted in very small subgroups, which fell well below the sub-group size that Monte Carlo analyses suggested were needed to detect the anticipated effect sizes (e.g., $N = 66$, 18% of the sample). In addition, the 5- and 6-profile solutions differed from the 4-profile solution by distinguishing additional profiles with high self-regulation, and this study was focused on understanding the school outcomes of children experiencing dysregulation.

The four profiles were named to reflect the unique patterns of self-regulation that defined them. Profile means and significant differences among profiles as determined by Wald test-paired comparisons are provided in Table 2. The Pervasive Dysregulation profile (30% of the sample) had clear self-

Table 1. Fit indices for LPA models one through six.

Number of classes	Number of parameters	AIC	BIC	CAIC	Smallest profile size
1	12	9032.2794	9084.3425	9096.3425	–
2	25	5544.2066	5652.6714	5677.6714	18%
3	38	4661.8120	4826.6786	4864.6786	18%
4	**51**	**3860.7512**	**4082.0194**	**4133.0194**	**18%**
5	64	3331.8131	3582.5134	3646.5134	6%
6	77	2914.9328	3249.0045	3326.0045	2%

Selected fit index in bold

Table 2. Mean values and paired comparisons for 4-profile solution.

	4 profile solution				
	Whole Sample	Pervasive Dysregulation (30%)	Behavioral Dysregulation (22%)	Average Regulation (29%)	High Regulation (18%)
Cognitive Self-Regulation					
Peg Tapping Task	8.21	5.06^{a}	7.45^{b}	8.81^{b}	13.19^{c}
Backward Word Span	1.22	1.00^{a}	1.00^{a}	1.00^{a}	2.19^{b}
Walk a Line	.43	.27^{a}	.31^{b}	.41^{c}	.87^{d}
DCCS	.57	.00^{a}	.60^{b}	1.00^{d}	.77^{c}
Behavioral Self-Regulation					
Aggression	1.89	2.08^{a}	2.05^{ab}	1.65^{d}	1.78^{bc}
Self-control	4.90	4.50^{a}	4.58^{a}	5.26^{b}	5.36^{b}

Means with different superscripts indicate significant differences, $p < .05$ in paired comparisons.

regulatory deficits with unfavorable scores on all measures of cognitive and behavioral self-regulation. The Behavioral Dysregulation profile (22% of the sample) had unfavorable scores equivalent to the Pervasive Dysregulation profile on the two behavioral self-regulation measures, but scores on most of the cognitive self-regulation measures that were significantly higher than the Pervasive Dysregulation profile (with *Backward Word Span* as the only exception). The Average Regulation profile (29% of the sample) had significantly better scores than the Pervasive Dysregulation profile on all self-regulation measures except for *Backward Word Span*, and significantly better scores than the Behavioral Dysregulation profile on both measures of behavioral self-regulation. The High Regulation profile (18% of the sample) had scores that were significantly higher than the Pervasive Dysregulation group on all self-regulation measures and significantly higher than the Behavioral Dysregulation group on all but one of the self-regulation measures (the exception was *Aggressio*n.) The High Regulation profile also had significantly higher scores than the Average Regulation profile on three of the cognitive self-regulation measures (*Peg Tapping, Backward Word Span, Walk a Line Slowly*), although it had equivalent scores on *Self-control*, and less positive scores on *DCCS* and *Aggression*. The Average and High Regulation profiles had very similar median aggression scores (1.52 vs. 1.53, respectively) reflecting low levels of aggression in both of these groups. However, six children in the High Regulation group (about 6% of the profile) had aggression scores at or above 3.5 despite high EF and self-control skills, creating considerable variability in aggression among children exhibiting this profile and an elevated mean aggression score. These were likely socially dominant children who used aggressive behaviors strategically in social interactions (Hawley, 2003). Given that the Average and High Regulation profiles were both characterized by self-regulatory strengths and the study was focused on understanding how TSRs might moderate the outcomes of preschool children with different profiles of dysregulation, the Average and High Regulation profiles were combined into a single comparison group for predictive analyses, labeled Regulated.

Predicting School Readiness and Elementary Outcomes

Using the 3-step BCH approach, we assessed the impact of latent profile membership, TSRs (closeness and conflict separately), and the latent profile by TSRs interaction on each of these outcomes controlling for Head Start program; REDI preschool intervention; child race, gender, and age; and maternal depression. All regression analyses accounted for the clustering of children within a classroom and the Regulated profile served as the reference group.

Preschool Self-Regulation Profiles

Regressions revealed significant associations between preschool self-regulation profiles and kindergarten outcomes. The two dysregulated groups (the Pervasive and Behavioral profiles) did not differ and both under-performed relative to the Regulated group in kindergarten reading achievement (Pervasive M = 7.16,; Behavioral M = 6.28; Regulated M = 9.38), teacher-rated academic performance (Pervasive M = 2.69; Behavioral M = 2.62; Regulated M = 3.45), and attention problems (Pervasive M = .88; Behavioral M = .99; Regulated M = .74; Table 3).

Two years later, children who were dysregulated in preschool continued to under-perform relative to the Regulated group in second grade reading achievement (Pervasive M = 44.40; Behavioral M = 42.87; Regulated M = 51.28), and academic performance (Pervasive M = 2.56; Behavioral M = 2.77; Regulated M = 3.30; Table 3).

Teacher-Student Closeness and Conflict

Regression results also revealed significant associations between preschool TSRs and kindergarten outcomes. Preschool teacher-student closeness significantly predicted higher levels of kindergarten reading achievement and academic performance, reduced attention problems, and improved social competence (Table 4). Preschool teacher-student conflict significantly predicted increased attention problems and reduced social competence in kindergarten but was not significantly associated with kindergarten achievement.

Two years later, preschool teacher-student closeness remained significantly associated with improved reading achievement. Similarly, preschool teacher-student conflict continued to significantly predict increased attention problems and reduced social competence.

Interactions between Preschool Self-Regulation Profiles and TSRs

Of central interest in this study was the possibility of differential effects of preschool TSRs depending upon children's self-regulatory skills. A marginally significant interaction emerged between preschool self-regulation profile and teacher closeness on kindergarten attention problems (p = .07; this interaction became statistically significant by second grade (p < .05). Similarly, a marginally significant interaction emerged between preschool self-regulation profile and teacher conflict on kindergarten reading achievement (p = .08); this interaction also became statistically significant by second grade (p <

Table 3. Sample means and standard deviations for Kindergarten and 2nd-grade outcomes.

Outcome	Pervasive Dysregulation	Behavioral Dysregulation	Regulated
Kindergarten			
Reading Achievement	7.16 (5.74)[a]	6.28 (7.11)[a]	9.38 (8.69)[b]
Academic Performance	2.69 (.88)[a]	2.62 (1.51)[a]	3.45 (1.11)[b]
Attention Problems	0.88 (.49)[ab]	0.99 (.76)[a]	0.74 (.63)[b]
Social Competence	4.12 (.65)	4.04 (1.18)	4.32 (.88)
2nd Grade			
Reading Achievement	44.40 (12.75)[a]	42.87 (20.91)[a]	51.28 (14.88)[b]
Academic Performance	2.56 (.91)[a]	2.77 (1.73)[a]	3.30 (1.23)[b]
Attention Problems	0.88 (.51)	0.82 (.74)	0.86 (.69)
Social Competence	4.11 (.67)	4.07 (1.17)	4.28 (.99)

Means with different superscripts indicate significant differences, p <.05; means were calculated controlling for relevant covariates

Table 4. Z-values and Wald values for the effects of teacher-student closeness, student-teacher conflict, latent profile, closeness by profile, and conflict by profile on kindergarten and 2nd grade outcomes.

Outcome	Closeness	Conflict	Latent Profile	Closeness x Profile	Conflict x Profile
Kindergarten					
Reading Achievement	2.46*	.06	7.10*	1.51	5.00†
Academic Performance	4.49***	−1.43	19.07***	2.08	5.02†
Attention Problems	− 2.58**	7.60***	12.41**	5.27	2.04
Social Competence	4.20***	− 7.22***	7.28*	1.04	.53
2nd Grade					
Reading Achievement	2.96**	−.85	12.46**	1.00	8.53*
Academic Performance	1.30	1.33	20.21***	.80	4.26
Attention Problems	− 1.63	3.02**	.32	11.45**	.64
Social Competence	1.32	− 3.41***	2.13	2.41	.94

*** p <.001; ** p <.01; * p <.05; † p <.10

the impact of closeness and conflict are reported in z-values (e.g., a 1 SD increase in closeness coincided with a 2.46 SD increase in kindergarten sight words). The effect of profile membership and the TSR by profile interactions are reported in Wald values.

.05). Finally, there was an additional marginally significant interaction between self-regulation profile and teacher conflict on kindergarten academic performance as rated by teachers (p = .07). These interactions documented areas in which children with different dysregulated profiles were more heavily influenced by their preschool TSRs than children in the Regulated group, as illuminated in the following analyses.;

Within-Profile Regressions

To better understand how preschool TSRs differentially influenced the later school outcomes of children displaying different preschool self-regulation profiles, predictive regressions were conducted within each profile when a meaningful interaction was detected (i.e., with closeness on attention problems; with conflict on reading achievement and academic performance). Results of these within-profile regressions are shown in Table 5. Consistently, the quality of the preschool TSR had the strongest impact on children from the Behaviorally Dysregulated profile. For children in the Behaviorally Dysregulated profile, preschool TSR closeness significantly predicted decreased attention problems in kindergarten and second grade. In contrast, preschool TSR closeness was unrelated to attention problems for the Pervasively Dysregulated profile at both grade levels. For Behaviorally Dysregulated children, a one-*SD* increase in preschool closeness coincided with a 3.17 *SD* decrease in kindergarten attention problems and a 2.26 *SD* decrease in 2nd grade attention problems, compared to only a .60 *SD* decrease in kindergarten and a .36 *SD* decrease in 2nd grade for the Pervasive group. Similarly, conflict had a significant negative impact on kindergarten and second-grade reading achievement for the Behaviorally Dysregulated but not the Pervasively Dysregulated profile. In terms of magnitude, a one-*SD* increase in preschool conflict coincided with a 2.13 *SD* decrease in

Table 5. Effect of closeness and conflict within each self-regulation profile.

	Pervasive Dysregulation		Behavioral Dysregulation		Regulated	
	Closeness	Conflict	Closeness	Conflict	Closeness	Conflict
Kindergarten						
Reading Achievement	–	−1.19	–	−2.13*	–	1.51
Academic Performance	–	.15	–	−2.73**	–	−.35
Attention Problems	−.60	–	−3.17**	–	−1.36	–
2nd Grade						
Reading Achievement	–	.54	–	−2.43*	–	1.39
Attention Problems	.36	–	−2.26*	–	−2.31*	–

The impact of closeness and conflict are given in z-values (e.g., a 1 SD increase in conflict coincided with a 2.13 SD decrease in kindergarten reading achievement in the Behavioral Dysregulation profile); statistical significance represents the impact of closeness or conflict within a given profile; *** p <.001; ** p <.01; * p <.05

kindergarten reading achievement and a 2.43 *SD* decrease in 2nd grade reading achievement for the Behaviorally Dysregulated children, compared to only a 1.19 *SD* decrease in kindergarten and .54 *SD* increase in 2nd grade for the Pervasive group. Overall, closeness and conflict were significant predictors for all five kindergarten and 2nd grade outcomes tested within the Behavioral Dysregulated group but were not statistically significant for any of the outcomes tested within the Pervasive group.

Discussion

Consistent with similar LPA studies (Sandilos et al., 2019; Sparapani et al., 2016) our LPA results documented the multi-dimensionality of self-regulation during the preschool years, identifying subgroups of children exhibiting different profiles of behavioral and cognitive self-regulation skills. In this economically disadvantaged sample, one-third of the preschool children exhibited pervasive deficits in self-regulation, reflecting delays in measures of both cognitive and behavioral self-regulation; another 22% of the sample struggled with behavioral self-regulation without demonstrating cognitive self-regulation deficits.

The quality of TSR appears to have a differential impact on preschool children depending on their self-regulation capacities. It may be that while both the Pervasive and Behaviorally Dysregulated profiles demonstrated self-regulatory deficits, they present different challenges within a preschool classroom. For example, given their behavioral self-regulation deficits, children from both profiles were likely to struggle with managing emotions, behaviors, and impulses. In this way, children in these two profiles likely looked similar in the classroom. However, children from the Behaviorally Dysregulated group should be able to hold and direct their attention and remember classroom rules given their ability to self-regulate cognitively, showing greater flexibility in thinking and likely greater persistence when tackling new learning challenges. For teachers interacting with Behaviorally Dysregulated children it may be sufficient to establish close, non-conflictual relationships; providing emotional support and positive behavioral management may be enough to foster productive classroom engagement given their higher level of attention control. However, this is unlikely to be sufficient for addressing the needs of children with Pervasively Dysregulated profiles. Even with emotional support and positive behavioral management, children in this latter group probably need additional classroom supports to foster productive learning engagement, given their struggles with attention and working memory. More intensive instruction may also be necessary to support children from the Pervasively Dysregulated group. For example, it may be more effective for preschool teachers to promote self-regulation skills of the Pervasively Dysregulated profile through interventions that have been designed to target self-regulation skills (e.g., Red Light, Purple Light; Tominey & McClelland, 2011) or provide children with strategies to help them self-regulate (e.g., Turtle Technique, Schneider, 1974).

The longitudinal analyses conducted in this study showed that preschool children exhibiting either profile of dysregulation (Pervasive or Behavioral) were at similar elevated risk for later reading underachievement, poor academic performance, and attention problems in kindergarten, with the effects on reading underachievement and poor academic performance still evident in second grade. This finding seems somewhat inconsistent with two prior studies that found no unique prediction to academic performance from behavioral dysregulation measures when the influence of EF (i.e., cognitive regulation) was accounted for (Brock et al., 2009; Kim et al., 2013). Two methodological differences in the study approach may account for these inconsistent findings. First, the prior studies utilized delay of gratification tasks to measure behavioral dysregulation, whereas we used teacher reports of self-control and disruptive-aggressive behaviors. These teacher ratings consisted of items that are relevant for school success (e.g., "this child has the self-control necessary to do well in school;" "this child breaks rules"). It is possible that the behavioral measures we used were more relevant for learning and academic success compared to delay of gratification, which may be more removed from academic outcomes. Second, the prior studies used variable-centered analyses, in which they fully controlled for cognitive EF skills when evaluating the predictive contributions of behavioral

dysregulation. In contrast, the current study used person-centered analyses to reflect the distribution of cognitive and behavioral dysregulation as they occur in preschool populations. Although children in the Behaviorally Dysregulated profile that emerged had comparable scores to the sample mean on all cognitive measures and significantly better cognitive self-regulation than children in the Pervasively Dysregulated group, they still showed lower cognitive self-regulation on *walk a line slowly* and *DCCS* relative to the Average and Highly Regulated profiles. It's possible that any struggles with impulse control and attentional shifting skills combined with poor behavioral self-regulation are sufficient to diminish later school success. Ultimately, the present findings suggest that variable-centered analyses may under-estimate the risks associated with behavioral dysregulation. That is, in this study, preschool children who were best characterized by problems in the domain of behavioral dysregulation were not protected from future academic difficulties.

In general, having a close TSR during the preschool year was predictive of enhanced kindergarten reading achievement, academic performance, social competence, and reduced attention problems, with sustained associations in second grade for reading achievement and attention problems. Conversely, having a conflictual TSR in preschool predicted reduced social competence and elevated attention problems in kindergarten and second grade. Interestingly, significant profile by TSR interactions indicated that children were impacted differentially by TSRs depending on their latent profile. While some caution should be taken in interpreting these results given that teachers reported on both children's behavioral self-regulation and the quality of TSR, it is important to note that teachers are reporting behavioral challenges among both Pervasively and Behaviorally Dysregulated, but teacher reported closeness and conflict appears to be impacting these children differentially. The benefits of a high-quality TSR appeared amplified for preschool children exhibiting the Behavioral Dysregulation profile. Indeed, within-profile regressions showed that, for Behaviorally Dysregulated children, having a high-quality TSR during the preschool year significantly mitigated their risk of reading underachievement and attention problems in kindergarten and second grade. In contrast, the quality of TSR experienced during preschool was not significantly associated with the school outcomes of children who exhibited Pervasive Dysregulation. We interpret this finding to mean that a high-quality TSR alone was not sufficient to address the multiple self-regulation deficits of children exhibiting the Pervasive Dysregulation profile who likely need additional enrichment (in addition to a high-quality TSR) to promote their later school adjustment.

The greater impact of a positive preschool TSR on the elementary school adjustment of Behaviorally versus Pervasively Dysregulated children may ultimately stem from the different etiological factors and developmental paths that account for these two self-regulatory profiles. That is, the pattern seen in the Pervasive Dysregulation profile, with deficits in both cognitive and behavioral aspects of self-regulation is thought to reflect a delay in neuro-development which may be the result from exposure to chronic stressors and low-quality early education supports experienced by many children growing up in poverty (Blair & Raver, 2015). Economic disadvantage is often associated with repeated and cumulative exposure to stressors that disrupt optimal cognitive functioning by overloading the HPA axis, ultimately blunting the development of the prefrontal cortex and making it more difficult for young children to self-regulate (Badanes et al., 2011; Raver et al., 2013). For children from the Pervasively Dysregulated subgroup, it is possible that growing up exposed to the adversities associated with poverty has led to experiencing multiple stressors in their environments (Berliner, 2013; Evans, 2004) and this has negatively impacted their biological ability to cognitively and behaviorally self-regulate. In contrast, the pattern seen in the Behavioral Dysregulation profile, with difficulties in regulating behavior but without deficits evident in EF, is thought to result from temperamental factors and exposure to socializing influences that fail to adequately support the learning of behavioral skills (Campbell & von Stauffenberg, 2008). If it is indeed true that Behavioral Dysregulation is the result of more social influences and Pervasive Dysregulation is a consequence of impaired neuro-development, it is not altogether surprising that a high-quality social TSR would be more effective in offsetting the future risk for school difficulties for the Behaviorally Dysregulated group. The results found here for children in the Behaviorally

Dysregulated group are similar to those reported by Griggs et al. (2009) for children with difficult temperaments (by parent report) who were more well adjusted socially when they experienced low-conflict TSRs (Griggs et al., 2009).

Preschool children with poor behavioral regulation or a difficult temperament are more likely to be disruptive or non-compliant in the classroom. If a teacher responds to these problematic behaviors with coercive interactions (i.e., with punitive actions and withdrawal) the teacher may unintentionally reinforce and escalate conflict and ultimately undermine the child's learning engagement (Myers & Pianta, 2008; Portilla et al., 2014). However, if a teacher is able to provide positive redirection and support without escalating teacher-child conflict, the child is more likely to remain positively engaged in the classroom and develop more effective social and behavioral skills (Pianta et al., 2012). It is important to note that the behavioral self-regulation deficits of children within the Behaviorally Dysregulated group may strain their relationships and make it more difficult for teachers to develop a high-quality TSR with them. Behavioral problems often make teachers' jobs more difficult as they can be disruptive and cause problems between peers (LaPointe, 2003). Ultimately, behavioral problems have been shown to be the strongest predictor of conflict within a TSR (Murray & Greenberg, 2000; Murray & Murray, 2004). However, the present findings suggest that for preschool children who struggle with behavioral regulation in the context of intact EF, a close relationship can provide emotional security and a model of appropriate behavioral control, whereas a conflictual relationship is likely to amplify and reinforce acting out behaviors (Campbell & von Stauffenberg, 2008). Essentially, it may be more challenging for teachers to establish a high-quality TSR with children from the Behaviorally Dysregulated group, but if a teacher is successful in doing so, the dividends could be immense. In contrast, children exhibiting the Pervasive Dysregulation profile with deficits in both behavioral and cognitive regulatory domains may require more intensive support (e.g., positive TSRs *and* high-quality educational instruction) to promote school success.

Implications, Limitations, and Future Directions

Taken in concert, our LPA and subsequent regression results highlight the variability in the self-regulatory capacities of children growing up in economically disadvantaged circumstances as well as the varying effectiveness of high-quality TSRs in offsetting the challenges poor self-regulation presents for school success. These findings are consistent with a conceptualization of different developmental roots for the Pervasive and Behavioral Dysregulation profiles, although additional research is needed to validate those conceptual models.

Given concerns around teacher preparedness and a lack of resources, particularly in settings outside of Head Start and other publicly funded preschool programs (Bassok et al., 2016), it would appear to be a tall order for preschool teachers to identify children demonstrating different self-regulation profiles. This would likely prove extra challenging due to the commonalities in behavioral challenges presented by the Pervasive and Behavioral Dysregulation groups; however, a general awareness of the unique strengths and challenges children present in their classrooms is likely to carry important implications for later school success. It may be helpful for teachers to understand differences in cognitive and behavioral self-regulation abilities by identifying specific situations where children in their classrooms seem to struggle and thrive. For those with pervasive dysregulation, it is likely that multiple activities and settings in the classroom trigger disengagement, frustration, or disruptive behaviors (e.g., circle time, literacy work), whereas children with behavioral dysregulation in isolation may seem to struggle in very specific settings (e.g., when interacting with peers). An awareness of unique types of dysregulation in early childhood among early educators may lead to a better understanding of the reasons behind common challenges presented in the classroom and may promote a better "goodness-of-fit" (Thomas & Chess, 1977) in the classroom where teachers are better able to match their interactions to the needs of their students. For example, if behavioral self-regulatory challenges (without cognitive regulatory deficits) have a social learning basis, children showing this profile may particularly benefit from social and behavioral interventions during

preschool. Emphasizing the importance of close, non-coercive relationships may be an extremely effective mechanism for supporting groups of children who present behavioral challenges, but do not demonstrate cognitive self-regulatory challenges. On the other hand, children who exhibit more pervasive self-regulatory deficits may not benefit from the provision of behavioral supports alone; these children may require additional intervention efforts directed at strengthening their cognitive regulatory skills. The implication is that preschool teachers should strive to foster close and non-conflictual relationships with all children who are exhibiting challenging behaviors in the classroom, which can be enhanced with professional development support and coaching on positive behavioral management strategies (Elek & Page, 2019). But beyond intervening to support behavioral regulation, preschool teachers must also track children's cognitive skill development, taking note of children who struggle with attention and memory difficulties that may reflect impairments in cognitive regulation. Research has identified behavioral signals associated with EF deficits, although research is still needed to determine how effectively preschool teachers could be trained to screen children for EF delays (Ackerman & Friedman-Krauss, 2017), in order to seek consultation from education specialists for additional assessments and appropriate interventions.

Our longitudinal analyses further indicate that children's early self-regulatory capacities are relevant for later school success and that both pervasive and behavioral self-regulation deficits are risk factors for attention problems and poor academic achievement. This is particularly meaningful in the present sample as these were primarily children from economically disadvantaged backgrounds. Economic disadvantage presents multiple challenges for children's school success independent of children's self-regulation skills (see Berliner, 2013). Coupling self-regulatory deficits that are critical for school success (e.g., memory and attentional skills) with these challenges (e.g., lack of school resources) may have a cumulative impact on children's wellbeing and amplify the risk for negative school outcomes. Additionally, children with better self-regulation skills have been shown to be more resilient against the adverse risks that often accompany growing up in poverty (Blair & Raver, 2012). This makes efforts to promote both cognitive and behavioral self-regulation skills within economically disadvantaged areas critical as a means to buffer against additional risks and increase resilience (Buckner et al., 2003).

Naturally, this study is not without limitations. The sample and measures used in LPA may affect the profiles that emerge and hence replication of the profiles found in the current study is necessary to determine the reliability and generalizability of the profiles found here. While the profiles were fairly well differentiated (e.g., the Pervasive Dysregulation profile had significantly worse scores on five out of the six indicators compared to the Average Regulation profile and had significantly worse scores on all indicators compared to the High Regulation profiles) there were a couple of oddities in the profiles. For example, although children from the High Regulation profile performed significantly better than children from the Average Regulation profile on three out of four cognitive measures, they performed similarly on self-control and had higher levels of teacher-reported aggression. These differences in aggression were driven by a few children who were highly regulated cognitively, but also had elevated levels of teacher-reported aggression. Prior research has identified a subgroup of aggressive preschool children who use aggression strategically in social interactions to exert social dominance and leadership (Hawley, 2003). While aggression is typically viewed negatively by preschoolers, some children use aggressive behaviors (e.g., taking toys away from other children or threatening to exclude a child from play) to influence those around them and boost their social status (Nelson et al., 2005). Similar to the handful of aggressive children exhibiting a High Regulation profile in this study, these are children with good attention and impulse control skills who use proactive aggression to effectively control their social interactions, which stands in contrast to the impulsive, reactive, and often ineffective aggressive behaviors that are typical of children exhibit the Behaviorally Dysregulated profile. Additionally, it is not uncommon during elementary school for children with higher cognitive abilities to respond negatively when they do not have their cognitive needs met (see Robinson, 2008). Both the use of proactive aggression to exert social control and possible negative responses to inadequate cognitive stimulation may have ultimately influenced teachers' reports of aggressive behaviors within the High

Regulation profile. However, this is speculative and further indicates the need for replication of the profiles; future research should be directed to unpack potential associations between high cognitive self-regulation and aggression, as well as implications for these children.

Cognitive self-regulation was assessed with direct observations; however, behavioral self-regulation was assessed with teacher ratings. While this is common in studies assessing behavioral self-regulation, it is a limitation as teacher ratings may be influenced by other facets of a child's functioning or by the classroom context, thus introducing bias into the measurement of behavioral dysregulation (McClelland & Cameron, 2011). Additionally, because teachers also rated teacher–student relationships, this potentially increased the level of association with behavioral dysregulation (relative to cognitive dysregulation) due to shared method variance. It is also worth noting that kindergarten and 2nd grade regressions did not control for preschool pre-academic skills, which may have contributed to the poor academic performance of Behaviorally and Pervasively Dysregulated children in elementary school (but did not likely account for the moderating impact of TSRs on the elementary adjustment of children exhibiting these two profiles.)

Although the longitudinal design of the current study is a strength, the regression models used here do not support causal inferences and hence our interpretation of the associations found in this study remain speculative. Additional research is needed to better understand etiological factors and developmental pathways that may distinguish children who exhibit pervasive versus behavioral-only profiles of dysregulation. In this study, we can only speculate about the mechanisms that might link high-quality TSRs with improved academic performance and attention skills among behaviorally dysregulated children. Future research could shed light on this connection by assessing relevant mediating variables and randomly assigning children to interventions designed to improve TSRs.

An added limitation is that the sample included children in classrooms that were using REDI enhancements to the classroom curriculum and teachers who were receiving professional development supports (see Bierman et al., 2008 for more information about this intervention.) The intervention did not significantly affect TSRs (closeness $p = .92$; conflict $p = .58$) and intervention status (Head Start as usual; Head Start REDI) was included as a control variable in all analyses. Unfortunately, the sample was not large enough to evaluate children in different profile subgroups within the intervention and control groups separately.

Given the links between economic-disadvantage and poor self-regulation (Ryan et al., 2006), the present study focused on a low-income sample. However, this limits the generalizability of our findings and it remains unclear whether the results would be the same in a more nationally representative sample that included a greater range in family income. Finally, while we feel that the longitudinal nature of this study is a strength, it is important to note the amount of time that passed between when self-regulation and TSRs measures were collected and when the elementary outcomes were collected. During this period of time, there were multiple potentially relevant events occurring that could have affected the findings. For example, children with pervasive dysregulation may have experienced additional stress and risk factors (e.g., neighborhood and familial risks) compared to other children (Blair & Raver, 2015). It is possible that TSRs in preschool did have a positive impact for these children, but additional stress and risk factors diluted this positive influence after the transition into elementary school.

Conclusion

Limitations notwithstanding, this study presents additional evidence that self-regulation is a multidimensional construct and that children exhibiting different profiles of self-regulation may respond differentially to some educational supports. Additionally, our findings add to the literature on the effectiveness of TSRs in promoting school readiness and school success. TSRs do not impact all children the same way and understanding different self-regulatory capacities and their developmental roots represents one potential mechanism for understanding why closeness and conflict are more relevant for some children's school success.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

This work was supported by the National Institute on Drug Abuse awards [P50DA010075 and T32DA017629] and the National Institute of Child Health and Human Development awards [R03HD098445, HD046064, and HD43763]. The content is solely the responsibility of the authors and does not necessarily represent the official views of the funding agencies.

References

Ackerman, D., & Friedman-Krauss, A. (2017). *Preschoolers' executive function: Importance, contributors, research needs and assessment options* (ETS Research Report Series). Wiley Periodicals, Inc. https://doi.org/10.1002/ets2.12148.

Administration for Children and Families (2015). *Head start early learning outcomes framework ages birth to five*. U.S. Department of Health and Human Services. Retrieved February 20, 2019, from https://eclkc.ohs.acf.hhs.gov/sites/default/files/pdf/elof-ohs-framework.pdf

Badanes, L. S., Watamura, S. E., & Hankin, B. L. (2011). Hypocortisolism as a potential marker of allostatic load in children: Associations with family risk and internalizing disorders. *Development and Psychopathology*, *23*(3), 881–896. https://doi.org/10.1017/S095457941100037X

Bakk, Z., & Vermunt, J. K. (2015). Robustness of stepwise latent class modeling with continuous distal outcomes. *Structural Equation Modeling: A Multidisciplinary Journal*, *23*(1), 20–31. https://doi.org/10.1080/10705511.2014.955104

Bassok, D., Fitzpatrick, M., Greenberg, E., & Loeb, S. (2016). Within-and between-sector quality differences in early childhood education and care. *Child Development*, *87*(5), 1627–1645. https://doi.org/10.1111/cdev.12551

Becker, D. R., McClelland, M. M., Loprinzi, P., & Trost, S. G. (2014). Physical activity, self-regulation, and early academic achievement in preschool children. *Early Education and Development*, *25*(1), 56–70. https://doi.org/10.1080/10409289.2013.780505

Berliner, D. (2013). Effects of inequality and poverty vs. teachers and schooling on America's youth. *Teachers College Record*, *115*(12), 1–26. https://www.researchgate.net/profile/David_Berliner2/publication/289267621_Effects_of_inequality_and_poverty_vs_teachers_and_schooling_on_America's_youth/links/5fb44bfc45851518fdb071cb/Effects-of-inequality-and-poverty-vs-teachers-and-schooling-on-Americas-youth.pdf

Bierman, K. L., Domitrovich, C. E., Nix, R. L., Gest, S. D., Welsh, J. A., Greenberg, M. T., Blair, C., Nelson, K., & Gill, S. (2008). Promoting academic and social-emotional school readiness: The head start REDI program. *Child Development*, *79*(6), 1802–1817. https://doi.org/10.1111/j.1467-8624.2008.01227.x

Bierman, K. L., Heinrichs, B. S., Welsh, J. A., Nix, R. L., & Gest, S. D. (2017). Enriching preschool classrooms and home visits with evidence-based programming: Sustained benefits for low-income children. *Journal of Child Psychology and Psychiatry*, *58*(2), 129–137. https://doi.org/10.1111/jcpp.12618

Bierman, K. L., Welsh, J. A., Heinrichs, B. S., Nix, R. L., & Mathis, E. T. (2015). Helping head start parents promote their children's kindergarten adjustment: The research-based developmentally informed parent program. *Child Development*, *86*(6), 1877–1891. https://doi.org/10.1111/cdev.12448

Blair, C., & Raver, C. C. (2015). School readiness and self-regulation: A developmental psychobiological approach. *Annual Review of Psychology*, *66*(1), 711–731. https://doi.org/10.1146/annurev-psych-010814-015221

Blair, C., Raver, C. C., Berry, D. J., & New York University Family Life Project Investigators. (2014). Two approaches to estimating the effect of parenting on the development of executive function in early childhood. *Developmental Psychology*, *50*(2), 554–565. https://doi.org/10.1037/a0033647

Blair, C., & Razza, R. P. (2007). Relating effortful control, executive function, and false belief understanding to emerging math and literacy ability in kindergarten. *Child Development*, *78*(2), 647–663. https://doi.org/10.1111/j.1467-8624.2007.01019.x

Bohlmann, N. L., & Downer, J. T. (2016). Self-regulation and task engagement as predictors of emergent language and literacy skills. *Early Education and Development*, *27*(1), 18–37. https://doi.org/10.1080/10409289.2015.1046784

Bolck, A., Croon, M., & Hagenaars, J. (2004). Estimating latent structure models with categorical variables: One-step versus three-step estimators. *Political Analysis*, *12*(1), 3–27. https://doi.org/10.1093/pan/mph001

Brock, L. L., Rimm-Kaufman, S. E., Nathanson, L., & Grimm, K. J. (2009). The contributions of 'hot' and 'cool' executive function to children's academic achievement, learning-related behaviors, and engagement in Kindergarten. *Early Childhood Research Quarterly*, *24*(3), 337–349. https://doi.org/10.1016/j.ecresq.2009.06.001

Buckner, J. C., Mezzacappa, E., & Beardslee, W. R. (2003). Characteristics of resilient youths living in poverty: The role of self-regulatory processes. *Development and Psychopathology*, *15*(1), 139–162. https://doi.org/10.1017/S0954579403000087

Campbell, S. B., & von Stauffenberg, C. (2008). Delay and inhibition as early predictors of ADHD symptoms in third grade. *Journal of Abnormal Child Psychology*, *37*(1), 1–15. https://doi.org/10.1007/s10802-008-9270-4
Clogg, C. C. (1995). Latent class models. In Handbook of statistical modeling for the social and behavioral sciences (pp. 311–359). Springer.
Collins, L. M., & Lanza, S. T. (2010). *Latent class and latent transition analysis*. John Wiley & Sons, Inc.
Conduct Problems Prevention Research Group. (1995). *Teacher social competence scale technical report*. http://www.fasttrackproject.org
Currie, J. (2001). Early childhood education programs. *Journal of Economic Perspectives*, *15*(2), 213–238. https://doi.org/10.1257/jep.15.2.213
Davis, H. L., & Pratt, C. (1995). The development of children's theory of mind: The working memory explanation. *Australian Journal of Psychology*, *47*(1), 25–31. https://doi.org/10.1080/00049539508258765
Deater-Deckard, K., Wang, Z., Chen, N., & Bell, M. A. (2012). Maternal executive function, harsh parenting, and child conduct problems. *Journal of Child Psychology and Psychiatry*, *53*(10), 1084–1091. https://doi.org/10.1111/j.1469-7610.2012.02582.x
Diamond, A., & Taylor, C. (1996). Development of an aspect of executive control: Development of the abilities to remember what I said and to "Do as I say, not as I do". *Developmental Psychobiology*, *29*(4), 315–334. https://doi.org/10.1002/(SICI)1098-2302(199605)29:4<315::AID-DEV2>3.0.CO;2-T
DuPaul, G. J. (1991). Parent and teacher ratings of ADHD symptoms: Psychometric properties in a community-based sample. *Journal of Clinical Child Psychology*, *20*(3), 245–253. https://doi.org/10.1207/s15374424jccp2003_3
Durlak, J. A., Weissberg, R. P., Dymnicki, A. B., Taylor, R. D., & Schellinger, K. B. (2011). The impact of enhancing students' social and emotional learning: A meta-analysis of school-based universal interventions. *Child Development*, *82*(1), 405–432. https://doi.org/10.1111/j.1467-8624.2010.01564.x
Elek, C., & Page, J. (2019). Critical features of effective coaching for early childhood educators: A review of empirical research literature. *Professional Development in Education*, *45*(4), 567–585. https://doi.org/10.1080/19415257.2018.1452781
Evans, G. W. (2004). The environment of childhood poverty. *American Psychologist*, *59*(2), 77. https://doi.org/10.1037/0003-066X.59.2.77
Ferguson, H., Bovaird, S., & Mueller, M. (2007). The impact of poverty on educational outcomes for children. *Paediatrics & Child Health*, *12*(8), 701–706. https://doi.org/10.1093/pch/12.8.701
Frye, D., Zelazo, P. D., & Palfai, T. (1995). Theory of mind and rule-based reasoning. *Cognitive Development*, *10*(4), 483–527. https://doi.org/10.1016/0885-2014(95)90024-1
Gouley, K. K., Brotman, L. M., Huang, K.-Y., & Shrout, P. E. (2008). Construct validation of the social competence scale in preschool-age children. *Social Development*, *17*(2), 380–398. https://doi.org/10.1111/j.1467-9507.2007.00430.x
Graziano, P. A., Slavec, J., Ros, R., Garb, L., Hart, K., & Garcia, A. (2015). Self-regulation assessment among preschoolers with externalizing behavior problems. *Psychological Assessment*, *27*(4), 1337–1348. https://doi.org/10.1037/pas0000113
Griggs, M. S., Gagnon, S. G., Huelsman, T. J., Kidder-Ashley, P., & Ballard, M. (2009). Student–teacher relationships matter: Moderating influences between temperament and preschool social competence. *Psychology in the Schools*, *46*(6), 553–567. https://doi.org/10.1002/pits.20397
Hackman, D. A., Farah, M. J., & Meaney, M. J. (2010). Socioeconomic status and the brain: Mechanistic insights from human and animal research. *Nature Reviews. Neuroscience*, *11*(9), 651–659. https://doi.org/10.1038/nrn2897
Hamre, B. K., & Pianta, R. C. (2001). Early teacher–child relationships and the trajectory of children's school outcomes through eighth grade. *Child Development*, *72*(2), 625–638. https://doi.org/10.1111/1467-8624.00301
Hamre, B. K., Pianta, R. C., Downer, J. T., & Mashburn, A. J. (2008). Teachers' perceptions of conflict with young students: Looking beyond problem behaviors. *Social Development*, *17*(1), 115–136. https://doi.org/10.1111/j.1467-9507.2007.00418.x
Hawley, P. H. (2003). Strategies of control, aggression, and morality in preschoolers: An evolutionary perspective. *Journal of Experimental Child Psychology*, *85*(3), 213–235. https://doi.org/10.1016/S0022-0965(03)00073-0
Hoff, E., Laursen, B., & Tardif, T. (2002). Socioeconomic status and parenting. In M. H. Bornstein (Ed.), *Handbook of parenting* (2nd ed., pp. pp. 231–252). Erlbaum.
Hongwanishkul, D., Happaney, K. R., Lee, W. S. C., & Zelazo, P. D. (2005). Assessment of hot and cool executive function in young children: Age-related changes and individual differences. *Developmental Neuropsychology*, *28*(2), 617–644. https://doi.org/10.1207/s15326942dn2802_4
Howes, C. (2000). Social–emotional classroom climate in child care, child–teacher relationships and children's second grade peer relations. *Social Development*, *9*(2), 191–204. https://doi.org/10.1111/1467-9507.00119
Hughes, J. N., Luo, W., Kwok, O. M., & Loyd, L. K. (2008). Teacher-student support, effortful engagement, and achievement: A 3-year longitudinal study. *Journal of Educational Psychology*, *100*(1), 1. https://doi.org/10.1037/0022-0663.100.1.1
Jerome, E. M., Hamre, B. K., & Pianta, R. C. (2009). Teacher–child relationships from kindergarten to sixth grade: Early childhood predictors of teacher-perceived conflict and closeness. *Social Development*, *18*(4), 915–945. https://doi.org/10.1111/j.1467-9507.2008.00508.x

Kim, S., Nordling, J. K., Yoon, J. E., Boldt, L. J., & Kochanska, G. (2013). Effortful control in "hot" and "cool" tasks differentially predicts children's behavior problems and academic performance. *Journal of Abnormal Child Psychology*, *41*(1), 43–56. https://doi.org/10.1007/s10802-012-9661-4

Kochanska, G., Barry, R. A., Jimenez, N. B., Hollatz, A. L., & Woodard, J. (2009). Guilt and effortful control: Two mechanisms that prevent disruptive developmental trajectories. *Journal of Personality and Social Psychology*, *97*(2), 322–333. https://doi.org/10.1037/a0015471

Kochanska, G., Murray, K., Jacques, T. Y., Koenig, A. L., & Vandegeest, K. A. (1996). Inhibitory control in young children and its role in emerging internalization. *Child Development*, *67*(2), 490. https://doi.org/10.2307/1131828

LaPointe, J. M. (2003). Teacher–student conflict and misbehavior: Toward a model of the extended symmetrical escalation. *Journal of Classroom Interaction*, *38*(2), 11–19. https://www.jstor.org/stable/23869344

Liew, J. (2012). Effortful control, executive functions, and education: Bringing self-regulatory and social-emotional competencies to the table. *Child Development Perspectives*, *6*(2), 105–111. https://doi.org/10.1111/j.1750-8606.2011.00196.x

Liew, J., Chen, Q., & Hughes, J. N. (2010). Child effortful control, teacher–student relationships, and achievement in academically at-risk children: Additive and interactive effects. *Early Childhood Research Quarterly*, *25*(1), 51–64. https://doi.org/10.1016/j.ecresq.2009.07.005

Lonigan, C. J., Wagner, R. K., Torgesen, J. K., & Rashotte, C. A. (2007). *TOPEL: Test of preschool early literacy*. Pro-Ed Publishing.

Magnuson, K. A., Meyers, M. K., Ruhm, C. J., & Waldfogel, J. (2004). Inequality in preschool education and school readiness. *American Educational Research Journal*, *41*(1), 115–157. https://doi.org/10.3102/00028312041001115

McCartney, K., Dearing, E., Taylor, B. A., & Bub, K. L. (2007). Quality child care supports the achievement of low-income children: Direct and indirect pathways through caregiving and the home environment. *Journal of Applied Developmental Psychology*, *28*(5–6), 411–426. https://doi.org/10.1016/j.appdev.2007.06.010

McClelland, M. M., Acock, A. C., & Morrison, F. J. (2006). The impact of kindergarten learning-related skills on academic trajectories at the end of elementary school. *Early Childhood Research Quarterly*, *21*(4), 471–490. https://doi.org/10.1016/j.ecresq.2006.09.003

McClelland, M. M., & Cameron, C. E. (2011). Self-regulation and academic achievement in elementary school children. *New Directions for Child and Adolescent Development*, *2011*(133), 29–44. https://doi.org/10.1002/cd.302

Miller, G. E., Chen, E., & Parker, K. J. (2011). Psychological stress in childhood and susceptibility to the chronic diseases of aging: Moving toward a model of behavioral and biological mechanisms. *Psychological Bulletin*, *137*(6), 959. https://doi.org/10.1037/a0024768

Murray, C., & Greenberg, M. T. (2000). Children's relationship with teachers and bonds with school: An investigation of patterns and correlates in middle childhood. *Psychology in the Schools*, *38*(5), 425–446. https://doi.org/10.1016/s0022-4405(00)00034-0

Murray, C., & Murray, K. M. (2004). Child level correlates of teacher–student relationships: An examination of demographic characteristics, academic orientations, and behavioral orientations. *Psychology in Schools*, *41*(7), 751–762. https://doi.org/10.1002/pits.20015

Myers, S. S., & Pianta, R. C. (2008). Developmental commentary: Individual and contextual influences on student–teacher relationships and children's early problem behaviors. *Journal of Clinical Child & Adolescent Psychology*, *37*(3), 600–608. https://doi.org/10.1080/15374410802148160

Nelson, D. A., Robinson, C. C., & Hart, C. H. (2005). Relational and physical aggression of preschool-age children: Peer status linkages across informants. *Early Education and Development*, *16*(2), 115–140. https://doi.org/10.1207/s15566935eed1602_2

Nylund, K. L., Asparouhov, T., & Muthén, B. O. (2007). Deciding on the number of classes in latent class analysis and growth mixture modeling: A Monte Carlo simulation study. *Structural Equation Modeling: A Multidisciplinary Journal*, *14*(4), 535–569. https://doi.org/10.1080/10705510701575396

Palermo, F., Hanish, L. D., Martin, C. L., Fabes, R. A., & Reiser, M. (2007). Preschoolers' academic readiness: What role does the teacher–child relationship play? *Early Childhood Research Quarterly*, *22*(4), 407–422. https://doi.org/10.1016/j.ecresq.2007.04.002

Peisner-Feinberg, E. S., Burchinal, M. R., Clifford, R. M., Culkin, M. L., Howes, C., Kagan, S. L., & Yazejian, N. (2001). The relation of preschool child-care quality to children's cognitive and social developmental trajectories through second grade. *Child Development*, *72*(5), 1534–1553. https://doi.org/10.1111/1467-8624.00364

Pianta, R. C. (2001). *Student–teacher relationship scale–short form*. Psycho-logical Assessment Resources.

Pianta, R. C., Hamre, B. K., & Allen, J. P. (2012). Teacher-student relationships and engagement: Conceptualizing, measuring, and improving the capacity of classroom interactions. *Handbook of Research on Student Engagement*, 365–386. https://doi.org/10.1007/978-1-4614-2018-7_17

Pianta, R. C., & Stuhlman, M. W. (2004). Teacher-child relationships and children's success in the first years of school. *School Psychology Review*, *33*(3), 444. https://doi.org/10.1080/02796015.2004.12086261

Portilla, X. A., Ballard, P. J., Adler, N. E., Boyce, W. T., & Obradović, J. (2014). An integrative view of school functioning: Transactions between self-regulation, school engagement, and teacher-child relationship quality. *Child Development*, *85*(5), 1915–1931. https://doi.org/10.1111/cdev.12259

Radloff, L. S. (1977). The CES-D Scale. *Applied Psychological Measurement*, *1*(3), 385–401. https://doi.org/10.1177/014662167700100306

Raver, C. C., Blair, C., & Willoughby, M. (2013). Poverty as a predictor of 4-year-olds' executive function: New perspectives on models of differential susceptibility. *Developmental Psychology*, *49*(2), 292. https://doi.org/10.1037/a0028343

Robinson, N. M. (2008). The social world of gifted children and youth. In S. I. Pfeiffer (Ed.), *Handbook of giftedness in children* (pp. pp. 33–51). Boston, MA.

Roorda, D. L., Koomen, H. M., Spilt, J. L., & Oort, F. J. (2011). The influence of affective teacher–student relationships on students' school engagement and achievement: A meta-analytic approach. *Review of Educational Research*, *81*(4), 493–529. https://doi.org/10.3102/0034654311421793

Ryan, R. M., Fauth, R. C., & Brooks-Gunn, J. (2006). Childhood poverty: Implications for school readiness and early childhood education. In B. Spodek & O. N. Saracho (Eds.), *Handbook of research on the education of young children* (pp. pp. 323–346). Lawrence Erlbaum Associates Publishers.

Sandilos, L. E., Whittaker, J. V., Vitiello, V. E., & Kinzie, M. B. (2019). Preschoolers' school readiness profiles and the teacher-child relationship: A latent transition approach. *Journal of Applied Developmental Psychology*, *62*, 185–198. https://doi.org/10.1016/j.appdev.2019.02.010

Sandilos, L. E., Whittaker, J. V., Vitiello, V. E., & Kinzie, M. B. (2019). Preschoolers' school readiness profiles and the teacher-child relationship: A latent transition approach. *Journal of Applied Developmental Psychology*, *62*, 185–198. https://doi.org/10.1016/j.appdev.2019.02.010

Sasser, T. R., Bierman, K. L., & Heinrichs, B. (2015). Executive functioning and school adjustment: The mediational role of pre-kindergarten learning-related behaviors. *Early Childhood Research Quarterly*, *30*(1), 70–79. https://doi.org/10.1016/j.ecresq.2014.09.001

Schneider, M. (1974). Turtle technique in the classroom. *Teaching Exceptional Children*, *7*(1), 22–24. https://doi.org/10.1177/004005997400700112

Sparapani, N., Connor, C. M., Day, S., Wood, T., Ingebrand, S., McLean, L., & Phillips, B. (2019). Profiles of foundational learning skills among first graders. *Learning and Individual Differences*, *70*, 216–227. https://doi.org/10.1016/j.lindif.2016.07.008

Syvertsen, A. K., Cleveland, M. J., Gayles, J. G., Tibbits, M. K., & Faulk, M. T. (2009). Profiles of protection from substance use among adolescents. *Prevention Science*, *11*(2), 185–196. https://doi.org/10.1007/s11121-009-0154-9

Thijs, J., Westhof, S., & Koomen, H. (2012). Ethnic incongruence and the student–teacher relationship: The perspective of ethnic majority teachers. *Journal of School Psychology*, *50*(2), 257–273. https://doi.org/10.1016/j.jsp.2011.09.004

Thijs, J. T., & Koomen, H. M. Y. (2008). Task-related interactions between kindergarten children and their teachers: The role of emotional security. *Infant and Child Development*, *17*(2), 181–197. https://doi.org/10.1002/icd.552

Thomas, A., & Chess, S. (1977). *Temperament and development*. Brunner Mazel.

Tominey, S. L., & McClelland, M. M. (2011). Red light, purple light: Findings from a randomized trial using circle time games to improve behavioral self-regulation in preschool. *Early Education and Development*, *22*(3), 489–519. https://doi.org/10.1080/10409289.2011.574258

Torgesen, J. K., Rashotte, C. A., & Wagner, R. K. (1999). TOWRE: Test of word reading efficiency. Psychological Corporation.

Tsigilis, N., & Gregoriadis, A. (2008). Measuring teacher–child relationships in the Greek kindergarten setting: A validity study of the student–teacher relationship scale–short form. *Early Education and Development*, *19*(5), 816–835. https://doi.org/10.1080/10409280801975826

Valiente, C., Lemery-Chalfant, K., Swanson, J., & Reiser, M. (2008). Prediction of children's academic competence from their effortful control, relationships, and classroom participation. *Journal of Educational Psychology*, *100*(1), 67–77. https://doi.org/10.1037/0022-0663.100.1.67

Vermunt, J. K., & Magidson, J. (2016). *Technical guide for latent GOLD 5.1: Basic, advanced*, and syntax. Statistical Innovations Inc.

Vitiello, V. E., & Greenfield, D. B. (2017). Executive functions and approaches to learning in predicting school readiness. *Journal of Applied Developmental Psychology*, *53*, 1–9. https://doi.org/10.1016/j.appdev.2017.08.004

Werthamer-Larsson, L., Kellam, S., & Ovesen-McGregor, K. E. (1989). Teacher observation of classroom adaptation-revised (TOCA-R). Johns Hopkins prevention center training manual.Johns Hopkins University. https://doi.org/10.1037/t31163-000

Yesil-Dagli, U. (2011). Center-based childcare use by Hispanic families: Reasons and predictors. *Children and Youth Services Review*, *33*(7), 1298–1308. https://doi.org/10.1016/j.childyouth.2011.03.004

Zalewski, M., Lengua, L. J., Fisher, P. A., Trancik, A., Bush, N. R., & Meltzoff, A. N. (2012). Poverty and single parenting: Relations with preschoolers' cortisol and effortful control. *Infant and Child Development*, *21*(5), 537–554. https://doi.org/10.1002/icd.1759

Zaslow, M., Tout, K., Halle, T., Whittaker, J. V., & Lavelle, B. (2010). *Toward the identification of features of effective professional development for early childhood educators. Literature review*. Office of Planning, Evaluation and Policy Development, US Department of Education.