Delay of gratification in first grade: The role of instructional context

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A B S T R A C T

Delay of gratification, an aspect of self-regulation, describes the ability to inhibit impulsive behavior and shift attention from temptation towards goal-directed behavior. The ability to delay gratification is a highly valued skill in the early years of school. Using a Child × Environment model, this study of 176 first graders investigates the combined contribution of children’s ability to delay gratification and amount of exposure to three common instructional contexts across the school year in predicting children’s academic achievement and learning-related classroom behavior. Two interesting patterns emerged. First, more time spent in non-instruction led to less fall-to-spring improvement in math and poorer ratings of learning-related behavior the lower a child’s ability to delay gratification. Second, more time spent in teacher-managed instruction attenuated the association between low delay of gratification and poor school outcomes (i.e., math achievement, learning-related behaviors). Findings are discussed in terms of the varying amount of self-regulatory burden placed on children dependent upon instructional context.

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1. Introduction

Delay of gratification describes the ability to inhibit impulsive behavior and shift attention away from temptation, thereby postponing immediate gratification and persisting in goal-directed behavior (Mischel, Shoda, & Peake, 1988). Delay task performance involves weighing options and deciding between an immediate small reward and a larger reward to be enjoyed later (Hirsh, Guindon, Morisano, & Peterson, 2010). Across the lifespan, greater ability to delay gratification is linked to lower risk for substance abuse (Kirby, Petry, & Bickel, 1999), obesity (Duckworth, Tsukayama, & Geier, 2010), aggression and delinquency (Krueger, Caspi, Moffitt, White, & Stouthamer-Loeber, 1996), and ADHD and comorbid disorders (Nichols & Waschbusch, 2004). In brief, impaired self-control represents an enormous cost to society (Moffitt et al., 2011).

The ability to delay gratification may play an important role in the early years of school. For example, some first-graders are able to follow directions and wait for a period of time, even when faced with other enticing options; whereas other children impulsively succumb to temptation and distraction. Following directions and taking turns, both skills requiring delay of gratification, are more valued by teachers than academic skills in the transition to formal schooling (Rimm-Kaufman, Pianta, & Cox, 2000). Despite the value placed on delay skills, there is a paucity of research linking delay of gratification with achievement and behavior in the early years of school. Relatedly, teachers’ choice of instructional context determines how much responsibility teachers give children for managing their own impulses and attention versus how much teachers structure the environment so children’s self-regulatory skills are managed for them. The present study will examine whether time spent in various contexts interacts with children’s ability to delay gratification to predict first grade outcomes.

1.1. Theoretical rationale: delay of gratification in context

The present study is consistent with a theoretical perspective that emphasizes Child × Environment interactions to explain children’s ability to adapt in different contexts.

Sameroff and Mackenzie (2003) argue for the application of transactional models of development where children’s outcomes (e.g., achievement, behavior) are viewed as an interaction between child characteristics (e.g., delay skills) and their social environment (e.g., instructional contexts). Children’s delay skills at first grade entry may play a role in determining optimal instructional contexts for promoting academic achievement and learning-related behaviors. As described by Ladd, Birch, and Buhs (1999, p. 1373), “Within child × environment models, risk and protective factors are seen as originating within the child and the surrounding environment, and are distinguished by their temporal and contextual proximity to adaptive challenges, such as the transition to grade school.” Thus, children acquire attributes prior to entry into the school environment which then interact with the environmental features of the classroom to predict subsequent behavioral...
and academic outcomes. This theoretical approach is particularly relevant in understanding delay of gratification in classroom contexts.

Children enter formal schooling with a range of delay ability levels which are likely to contribute to outcomes over the course of the year (Brock, Rimm-Kaufman, Nathanson, & Grimm, 2009). Teachers must manage this broad range of skills and their choice of instructional context impacts the extent to which affordances for learning and learning-related behavior are available, dependent upon children's individual differences (Rimm-Kaufman & Wanless, 2012).

1.2. Delay of gratification: direct associations with achievement and behavior

A meta-analysis of delay of gratification task performance demonstrates strong convergent validity with parent and teacher report, self-report, and other direct assessments of self-regulation (Duckworth & Kerns, 2011), suggesting task performance is tapping into a moderately stable and observable child characteristic. Delay of gratification displays heterotopic continuity in that age-related changes in performance are anticipated (Carlson, 2005; Li-Grining, 2007). In terms of sociodemographic characteristics, girls tend to perform better on delay of gratification tasks but performance is not related to ethnicity (Li-Grining, 2007). Low family income is related to poorer delay of gratification task performance. (Evans & Rosenbaum, 2008). All three covariates (age, gender, and family income) will be considered in the present study.

The literature is relatively silent regarding a direct association between delay of gratification task performance and academic achievement in the early years of school. More often, studies have reported a lack of association between delay of gratification and achievement. For example, when analyzed concurrently with inhibitory control, delay of gratification task performance was a nonsignificant predictor of achievement for kindergarteners (Brock et al., 2009). One exception involves a small study of 28 kindergartners where significant correlations between a delay task and math and reading performance were reported (Von Suchodoletz, Trommsdorf, Heikamp, Wieber, & Gollwitzer, 2009). Interestingly, delay of gratification assessed in early childhood forecasts both academic and social competence in the later years of school (e.g., Mischel et al., 1988; Shoda, Mischel, & Peake, 1990). For example, a self-discipline composite, including delay of gratification, was a better predictor than IQ of grades, attendance, and standardized test scores in middle school (Duckworth & Seligman, 2005). Some have suggested a ‘sleepier effect’ for delay of gratification and achievement may be due to the fact that delay of gratification skills are more relevant in the later years of schooling, as children are increasingly expected to manage their own learning (Bembenutty & Karabenick, 2004). Yet, depending upon instructional context, first grade classrooms provide a range of opportunities for children to regulate or fail to regulate their behavior towards learning goals.

In contrast to the relative dearth of literature linking delay ability to achievement in first grade, a substantial literature links delay of gratification to reduced behavior problems and increased social competence (Eisenberg et al., 2000; Kochanska, Murray, Jacobs, Koenig, & VanDeVegeet, 1996; Raver, Blackburn, Bancroft, & Torp, 1999). The emphasis of the present study is to examine the role of delay of gratification in predicting learning-related behaviors, expected to be highly related to academic achievement. Learning-related behaviors in first grade are associated with math and reading achievement in subsequent years (McClelland, Acock, & Morrison, 2006; Stipek, Newton, & Chudgar, 2010).

1.3. Child × Environment model: delay of gratification and instructional context

Classrooms are social contexts in which children spend considerable time. Although curricula may be uniform across classrooms, the ways in which teachers deliver instruction to achieve learning goals and manage classroom behavior vary widely (Pianta, Belsky, Houts, & Morrison, 2007). Instructional context refers to the ways in which teachers organize their presentation of instructional material and the extent to which they tax children's regulatory skills, as well as preparation and effective use of time (Cameron, Connor, & Morrison, 2005). In the present study instructional contexts are operationalized in three ways: The amount of time teachers devote to (a) child-managed instruction (e.g., seat work, centers), (b) teacher-managed instruction (e.g., whole group lessons), and (c) time spent in non-instruction (e.g., waiting for the teacher to give directions, transitioning from one activity to another; Cameron et al., 2005). Choice of instructional context influences how much responsibility teachers give children for managing their own impulses and attention versus how much teachers structure the social environment so that children's impulses and attention are managed for them. Some classrooms may compensate for an inability to delay gratification by placing a low burden on children's self-regulatory capacity, for example through teacher-managed instruction that actively monitors and directs children's attention. Other classrooms may place a higher burden on children's self-regulatory capacity by expecting them to wait long periods of time during non-instruction, or to manage their own attention during child-managed instruction which offers less explicit adult supervision.

Teachers' choice of instructional context has implications for children's functioning in the classroom and improvement across the school year (Cameron et al., 2005). For example, kindergarteners exhibited less off-task behavior during teacher-managed instruction compared to small-group child-managed instruction (Rimm-Kaufman, La Paro, Downer, & Pianta, 2005). Research with clinical populations sheds light on the role of context for those with low ability to delay gratification. Delay of gratification task performance has demonstrated both criterion and discriminant validity in detecting ADHD symptoms (Nichols & Waschbusch, 2004). In a comparison of early elementary school children with ADHD (and ostensibly low ability to delay gratification) versus controls, children with ADHD exhibited self-regulated behavior on par with peers when they were involved in “active engagement” teacher-managed activities (Vile Junod, DuPaul, & Jitendra, 2006). However, when students were involved in “passive engagement” child-managed instruction, children with ADHD exhibited significantly lower levels of learning-related behavior (Vile Junod et al., 2006). Findings suggest extended time spent in child-managed contexts may negatively impact behavior ratings for children with low ability to delay, whereas teacher-managed instruction may be optimal for first graders with low delay skills.

Non-instructional time is expected to be disadvantageous for all children, but perhaps disproportionately so for children with low ability to delay gratification. First grade teachers who efficiently managed transitions, interruptions, and student behaviors in order to minimize non-instructional time had students who made greater achievement gains, relative to teachers who managed time poorly and took more time to begin instruction in the morning (Wharton-McDonald, Pressley, & Hampston, 1998). Moreover, teachers who poorly managed transitions had students who exhibited less learning-related behavior both during non-instructional time and—importantly—subsequent instructional time (Arlin, 1979). A child with low ability to delay gratification, by definition, has difficulty waiting in lieu of other enticing options (i.e., off-task or disruptive behavior). The wait-time imposed during non-instructional contexts may cause children with low delay ability to succumb to off-task behaviors that persist even after instruction resumes.

Taken together, teachers' choice of instructional contexts differentially tax children's self-regulatory capacities. Preliminary evidence suggests instructional contexts that increase self-regulatory burdens appear to have negative academic and behavioral implications for children with low delay ability.
1.4. Present study

Two research questions are examined: (a) Are delay of gratification skills at first grade entry associated with fall-to-spring improvement in achievement and teacher ratings of learning-related behavior? Associations between delay of gratification and learning-related behaviors are anticipated based on previous findings (e.g., Eisenberg et al., 2000; Raver et al., 1999) but a direct relation between delay of gratification and fall-to-spring improvement in achievement has not been supported in past research (e.g., Brock et al., 2009). (b) Does delay of gratification at first grade entry moderate the contribution of time spent in different instructional contexts to achievement and learning-related behaviors? Time spent in contexts that decrease self-regulatory burdens may be optimal for children with low ability to delay gratification when achievement and behavior outcomes are considered. Children with high initial levels of self-regulation may be less sensitive to differences in instructional context (e.g., Connor et al., 2010).

2. Method

2.1. Participants

Three hundred thirty-three families consented to participate in the study during kindergarten registration and open house night, representing approximately 60% of enrolled kindergarteners across seven participating schools in four school districts. Four to five children per kindergarten classroom (N = 187) were selected randomly to represent the average score of a 10-year-old North American child. Observations were conducted in seconds but converted to minutes in text for ease of interpretability. Classroom instructional context was categorized into three groups: (a) child-managed instruction: the child manages his or her own attention, as with small-group or individual seat-work without explicit teacher guidance or supervision (e.g., silent reading, math worksheets); (b) teacher-managed instruction: the teacher manages and directs the child's attention, as with calendar or circle time, phonics instruction, or story-reading; and (c) non-instructional time: refers to the amount of time children spend transitioning from one activity to another, standing in line, or waiting for the teacher to give instructions. On average, the sum of time spent across the three instructional contexts accounted for nine of 10 min of observation (see Table 1). Time spent in one setting reduced the potential for spending time in another instructional context; correlations among the three constructs ranged from nonsignificant to significant (r = −.73, p < .01; see Table 2). Other contexts (e.g., social conversation, routines, orient-organize) were excluded from analyses. As such, total time spent in instructional contexts examined in this study does not add to 100% of observed time. Inter-rater reliability was ICC = .97 on 23 dual-coded video segments.

2.3. Measures

2.3.1. Delay of gratification

A choice delay of gratification task was adapted from Hongwanishkul, Happaney, Lee, and Zelazo (2005). Research assistants (RAs) informed children they brought some “fun things” with them and they could “choose to have some now or wait until you get home after school”. RAs presented two demonstration trials. First the RA presented a cup with one candy and another with two candies. The RA modeled she could choose one candy now or two later. She chose to save two candies for later and removed the candies from sight. Next, she presented a cup with one scented sticker she could have now or six stickers she could have later. The RA opted for one sticker immediately, sniffed it and placed it on her shirt. Six test trials were created by offering two types of rewards (candies and stickers) with three amounts of reward (2, 4, or 6). If children chose to delay items, they were removed from sight to prevent distraction. Scores were the number of times children chose to delay summed across six trials. RAs administered the delay task during a videotaped piloting phase conducted with 10 children not included in this study. RAs independently coded each session to collect reliability data. Inter-rater reliability was high (ICC = 1.00) suggesting perfect agreement as to whether children chose to delay or not.
Table 1
Descriptive statistics for all study variables.

<table>
<thead>
<tr>
<th>Variables</th>
<th>n</th>
<th>Mean</th>
<th>SD</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Age (months)</td>
<td>176</td>
<td>77.34</td>
<td>3.59</td>
<td>68</td>
<td>86</td>
</tr>
<tr>
<td>2. Gender (male = 1)</td>
<td>176</td>
<td>0.52</td>
<td>0.50</td>
<td>0</td>
<td>1</td>
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<tr>
<td>3. Family income (ordinal)</td>
<td>172</td>
<td>3.69</td>
<td>1.92</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>4. Fall delay of gratification (delay occasions)</td>
<td>176</td>
<td>2.98</td>
<td>2.06</td>
<td>0</td>
<td>6</td>
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<td>5. Fall math achievement (W scores)</td>
<td>176</td>
<td>447.61</td>
<td>14.89</td>
<td>393</td>
<td>485</td>
</tr>
<tr>
<td>6. Spring math achievement (W scores)</td>
<td>174</td>
<td>457.42</td>
<td>15.96</td>
<td>417</td>
<td>498</td>
</tr>
<tr>
<td>7. Fall reading achievement (W scores)</td>
<td>176</td>
<td>414.36</td>
<td>25.57</td>
<td>364</td>
<td>491</td>
</tr>
<tr>
<td>8. Spring reading achievement (W scores)</td>
<td>176</td>
<td>450.07</td>
<td>22.54</td>
<td>397</td>
<td>504</td>
</tr>
<tr>
<td>9. Learning-related behaviors (Z score)</td>
<td>174</td>
<td>0.00</td>
<td>3.66</td>
<td>-8.03</td>
<td>5.84</td>
</tr>
<tr>
<td>10. Time in teacher-managed instruction (seconds)</td>
<td>175</td>
<td>179.69</td>
<td>95.17</td>
<td>0</td>
<td>461</td>
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<tr>
<td>11. Time in child-managed instruction (seconds)</td>
<td>175</td>
<td>204.56</td>
<td>111.02</td>
<td>5</td>
<td>475</td>
</tr>
<tr>
<td>12. Time in non-instruction (seconds)</td>
<td>175</td>
<td>168.20</td>
<td>68.91</td>
<td>38</td>
<td>396</td>
</tr>
</tbody>
</table>

Note. Family income is an ordinal variable measured in increments of $15,000 up to $100,000 or more.

2.3.5. Learning-related behaviors

Learning-related behaviors represent a summed composite of z-scores derived from four highly correlated behavior constructs \( r = .69 - .85, p < .01 \) reported by teachers. Two constructs were obtained from the Social Competence and Adjustment Scale (Ladd, Proffit, & Muth, 1996): (a) self-directed learning style (5 items, \( \alpha = .85 \), e.g., “Child keeps working on tasks when he/she encounters difficulty”) and (b) hyperactive-distractibility (5 items reversed, \( \alpha = .87 \), e.g., “Child has poor concentration or short attention span”). Teachers rated self-directed learning and hyperactive-distractibility on a scale of 1 to 3 (where 1 indicated “does not apply” and 3 indicated “definitely applies”). The third construct, work habits, was derived from the Mock Report Card (Pierce, Hamm, & Vandell, 1999) (6 items, \( \alpha = .95 \), e.g., “works well independently”). Teachers rated children's work habits on a scale of 1 to 5 (where 1 indicated very poor and 5 indicated very good). The fourth construct, self-control, was assessed using the Teacher’s Self-Control Rating Scale (Humphrey, 1982), a 15 item questionnaire using a 5-point scale, \( \alpha = .92 \), including items such as, “Student makes careless errors because he/she rushes through work”, “Student has to have things right away”.

2.4. Analytic approach

Analyses were conducted using multilevel modeling in Hierarchical Linear Modeling software HLM 7 (Raudenbush & Bryk, 2002). Children were nested within classrooms, thus the amount of variability in the dependent variables that could be accounted for at the classroom level was examined. In specifying models, unconditional models with no predictors were run to calculate the extent of nesting by computing intraclass correlation coefficients (ICCs). ICCs ranged from .09 to .20 (Math Achievement ICC = .20, \( p < .000 \); Reading Achievement ICC = .13, \( p = .005 \); Learning-Related Behaviors ICC = .09, \( p = .028 \)). In order to appropriately account for the nested structure of the data by adjusting standard errors, subsequent analyses were conducted using multilevel modeling, with restricted maximum likelihood as the method of estimation.

Main effects were added to the model to address the first research question. Yij or the model intercept represents the average outcome score for child i in classroom j, accounting for the contributions of age, gender, family income, fall delay of gratification, and error at the child level. The intercept is a function of the average of the classroom mean and error at the classroom level (Raudenbush & Bryk, 2002). Effects for slopes \( \beta 1 \)-\( \beta 5 \) were fixed. All variables were centered around the grand mean for ease of interpretation or to reduce multicollinearity. To address the question of moderation, a final model was built to address the second research question that also included instructional context and Delay of Gratification × Instructional Context interactions, represented in Figs. 1–4.

3. Results

3.1. Characteristics of children and classrooms

Descriptive statistics and correlations for all variables are reported in Tables 1 and 2 respectively. On average, children exhibited the ability to delay gratification across 3 of 6 choice trials in the fall. In a 10 minute morning block, children spent an average of 3 min in teacher-managed instruction (range 0–7.7 min), 3 min in child-managed instruction (range 0–8.0 min), and 3 min in non-instructional time (0–6.6 min). Missing data are reported in Tables 1 and 3. Four families did not report income. Two behavior questionnaires had missing items. Two children were absent during spring math assessment. Listwise deletion produced a final HLM sample of 170–172 from the original sample of 176 children.

3.2. Direct associations between delay of gratification and first grade outcomes

HLM results predicting a direct association between delay of gratification task performance at first grade entry and achievement

Table 2
Correlations among study variables.

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
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<th>3</th>
<th>4</th>
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<td>1. Age</td>
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<td>2. Gender (male = 1)</td>
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<td>.08</td>
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<tr>
<td>4. Fall delay of gratification</td>
<td>-.13</td>
<td>.02</td>
<td>-.13</td>
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<tr>
<td>5. Fall math achievement</td>
<td>.23</td>
<td>-.05</td>
<td>.22</td>
<td>.09</td>
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<td>.27</td>
<td>.10</td>
<td>.71</td>
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<tr>
<td>7. Fall reading achievement</td>
<td>.16</td>
<td>-.14</td>
<td>.24</td>
<td>-.02</td>
<td>.43</td>
<td>.48</td>
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<td>8. Spring reading achievement</td>
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<td>-.11</td>
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<td>-.05</td>
<td>.41</td>
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<tr>
<td>9. Learning-related behaviors</td>
<td>.18</td>
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<td>.16</td>
<td>.05</td>
<td>.38</td>
<td>.41</td>
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<td>.44</td>
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<td>10. Time in teacher-managed instruction</td>
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<td>-.00</td>
<td>-.10</td>
<td>.04</td>
<td>-.07</td>
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<td>-.11</td>
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<td>-.05</td>
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<td>11. Time in child-managed instruction</td>
<td>.11</td>
<td>.05</td>
<td>.05</td>
<td>-.04</td>
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<td>.03</td>
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<td>-.73</td>
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<td>12. Time in non-instruction</td>
<td>-.01</td>
<td>-.11</td>
<td>.05</td>
<td>-.01</td>
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<td>-.06</td>
<td>-.11</td>
<td>-.13</td>
<td>.04</td>
<td>-.11</td>
<td>-.49</td>
<td>----</td>
</tr>
</tbody>
</table>

* \( p < .05 \)

** \( p < .01 \)
and behavior outcomes at the end of first grade were all nonsignificant (Table 3). Covariates included age, gender, and family income for all models and fall scores for math and reading models.

3.3. Child × Environment models

Interactions between instructional contexts and delay of gratification task performance were analyzed using continuous variables. Four significant interactions are depicted in Figs. 1–4. For the purpose of visual representation, groups were created using Aiken and West’s (1991) approach; predicted values were calculated at the mean and \( \pm 1 \) SD from the mean for each variable. The combination of choosing to delay the larger reward across fewer trials at school entry and more time spent in non-instruction over the course of the school year was associated with less fall-to-spring improvement in math, \( t = -1.92, p = .057, d = .07 \) (Fig. 3), and was associated with higher ratings of learning-related behaviors, \( t = -2.57, p < .05, d = .15 \) (Fig. 4), relative to peers who exhibited better initial delay ability or spent more time in teacher-managed instruction. Child-managed instruction interacted with delay of gratification failed to predict any assessed outcomes. Similarly, reading achievement was not significantly associated with any Child × Environment interactions.

4. Discussion

The present study elucidates the role of delay of gratification in first grade achievement and classroom behavior. Preliminarily, delay of gratification was not directly associated with any outcomes. Although findings corroborate past research, they do not align with the high importance teachers place on the ability to share, wait for turns, and control impulses, all regarded as behavioral corollaries of the ability to delay gratification (Rimm-Kaufman et al., 2000). A Child × Environment approach suggests delay of gratification may be context specific. Delay ability alone does not translate into improved academics or learning-
related behaviors in first grade, but rather, weights the presence of affordances in the classroom environment. Findings reveal children's delay of gratification is associated with achievement and learning-related behavior dependent upon teachers' choice of instructional context, specifically those that increase or decrease self-regulatory burdens.

4.1. Delay of gratification × non-instructional time

Three consistent patterns emerged from Child × Environment interactions. First, the lower a child’s ability to delay gratification, the more detrimental time spent in non-instruction for fall-to-spring improvement in math (Fig. 1) and teacher ratings of learning-related behaviors (Fig. 2). Previous research suggests that effective time management serves to boost children's engagement (Rimm-Kaufman, Curby, Grimm, Nathanson, & Brock, 2009) and subsequent achievement trajectories (see Hamre & Pianta, 2007). As hypothesized, increased non-instructional time was more disruptive to classroom behavior and learning goals the lower a child's initial ability to delay gratification. Past research suggests prolonged non-instructional time was associated with off-task behavior during subsequent instructional time (Arlin, 1979). Most likely, extended wait time incited off-task behavior more frequently in children with less delay ability and consequently fall-to-spring improvement in achievement and teacher-ratings of learning-related behavior were adversely affected. Off-task behavior may be especially deleterious to fall-to-spring improvement in math due to the small proportion of time spent in first grade classrooms dedicated to math versus reading instruction (Early et al., 2005; NICHD Early Child Care Research Network, 2002).

Conversely, more time spent in non-instruction was related to higher ratings of learning-related behaviors and fall-to-spring improvement in math the higher a child’s ability to delay. Rather, children who are able to finish work quickly may spend more time in non-instructional contexts as well as demonstrate improved scores on standardized tests.

4.2. Delay of gratification × teacher-managed instruction

A second clear pattern emerged where the association between low delay of gratification and less fall-to-spring improvement in math (Fig. 3) and poorer learning-related behaviors (Fig. 4) was attenuated as time spent in teacher-managed instruction increased. Teacher-managed instruction did not confer any advantages in fall-to-spring improvement in reading for children with low ability to delay gratification. Past research conducted in rural first grade classrooms reported children spent an average of 28% of the school day in literacy instruction whereas only 6% of the school day was devoted to mathematics (Hofer, Farran, Lipsey, Hurley, & Bilbrey, 2006). The higher dose of reading versus math instruction may be sufficient to produce fall-to-spring improvement in reading for children regardless of delay ability. Moreover, literacy instruction tends to be primarily delivered in a teacher-managed context (Pianta, La Paro, Payne, Cox, & Bradley, 2002). Less is known about the choices teachers make in delivering math content. In this study, time spent in teacher-managed instruction varied from 0 to 7 min in a 10 minute cycle. Teachers who chose to deliver math instruction in a teacher-managed context had children with low delay ability improving on par with peers in math.

As hypothesized, the reduced regulatory burden in teacher-managed contexts may support classroom functioning the lower a child’s ability to delay gratification. These results corroborate findings that children in the early years of school exhibited better learning-related behaviors in classrooms that relied on teacher-managed instruction (Stallings, 1975; Stipek, Feiler, Daniels, & Milburn, 1995). By contrast, the higher a child’s ability to delay gratification, the less beneficial teacher-managed instruction appears in this study. Again, the difference between the behavior of a child with high delay ability and that of his or her peers may be more pronounced in contexts that increase regulatory burdens.

4.3. Delay of gratification × child-managed instruction

Child-managed instruction interacted with delay of gratification failed to predict any outcomes in the present study. Lack of findings may be related to variability in quality of instruction by context. Quality of instruction was not operationalized in the present study yet some classrooms may have organized and scaffolded child-managed

Table 3

<table>
<thead>
<tr>
<th>Fixed effects</th>
<th>Math achievement (n = 170)</th>
<th>Reading achievement (n = 172)</th>
<th>Learning-related behavior (n = 170)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coeff.</td>
<td>df</td>
<td>t</td>
</tr>
<tr>
<td>Intercept</td>
<td>457.54</td>
<td>36</td>
<td>299.88***</td>
</tr>
<tr>
<td>Fall achievement</td>
<td>0.72</td>
<td>134</td>
<td>11.29***</td>
</tr>
<tr>
<td>Age</td>
<td>−0.19</td>
<td>134</td>
<td>−0.89</td>
</tr>
<tr>
<td>Gender (male = 1)</td>
<td>−0.02</td>
<td>134</td>
<td>−0.01</td>
</tr>
<tr>
<td>Family income</td>
<td>0.90</td>
<td>134</td>
<td>1.64</td>
</tr>
<tr>
<td>Delay of gratification</td>
<td>0.42</td>
<td>134</td>
<td>1.07</td>
</tr>
<tr>
<td>Random effects</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>9.960</td>
<td>51.50</td>
<td>.05</td>
</tr>
<tr>
<td>Level-1 effects</td>
<td>108.91</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deviance</td>
<td>1286.83</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. Family income is an ordinal variable measured in increments of $15,000 up to $100,000 or more.

*p ≤ .05.

**p ≤ .01.

***p ≤ .001.

*HLM coefficient estimate; Var. = variance component.
instructional contexts to maximize the opportunity for learning independently or in small groups without direct supervision. Other child-managed contexts may have relied on busy work with little thought or planning. Future work can determine the role of instructional quality as well as context.

Although child-managed instruction did not play a role in supporting children with low ability to delay gratification, the long-term consequences of exposure to one context over another should be considered. Child-managed instruction may afford children more opportunities to practice and exercise self-regulated behavior by placing more demands on children to inhibit impulses and focus their attention away from distractions (Diamond, Barnett, Thomas, & Munro, 2007; Lillard & Else-Quest, 2006, September 29). Other studies indicate children show less independence, less self-reliance, and less self-confidence in teacher-managed contexts (see Golbeck, 2001; Stipek et al., 1998), suggesting exposure to child-managed contexts can be beneficial in ways that were beyond the scope of the present study. Future work may consider the long-term impact of exposure to classrooms that externally regulate children's behavior versus classrooms that offer opportunities to exercise self-regulation.

4.4. Practical significance

Teachers make many decisions for young children, for example determining how much time children spend in different instructional contexts (Connor et al., 2010). However, the decision-making process tends to emphasize children's academic proficiencies, not their self-regulatory capacities (Blair, 2002). The tendency to emphasize children's academic skills versus self-regulatory abilities in decision-making may occur because of the salience of academic skills, their immediate relation to the primary and most explicit goals of school (i.e., achievement), or, alternatively, because we lack information about how various classroom instructional environments interact with children's self-regulatory capacity. Teachers' allocation of time spent in different contexts can be viewed as a point of intervention for children who enter school lacking the skills deemed necessary for later school success.

Results from the present study inform teacher preparation and professional development programs. Time spent in various contexts by classroom varied widely (e.g., a range of 0–6.6 min spent in non-instructional time during a 10 minute observation cycle). In one study of time management, teachers were followed and given feedback on the number of minutes spent in non-instruction (Coddington & Smyth, 2008). Teachers significantly reduced the amount of time spent in non-instruction and sustained improvement in time management practices over time; moreover student engagement increased as non-instructional time decreased. Given the simple act of sharing number of minutes devoted to non-instruction can produce meaningful changes, some teachers may not be aware of the ways in which they allocate classroom time and the impact instructional contexts can have on student behavior.

4.5. Limitations

Two limitations require mention. First, this study was conducted in a rural setting in the southeastern United States. Replication of findings in suburban or urban settings elsewhere would enhance generalizability beyond this specific population. Second, four of nine interactions were significant. Type I error rate is inflated when performing multiple comparisons within the same sample by increasing the likelihood of erroneously detecting a significant finding. A Bonferroni adjustment can correct Type I errors by calculating a higher threshold for determining significance. Given the small sample size in the present multi-level study (n = 176), a Bonferroni correction would be prohibitively stringent. However, the clear and consistent pattern of results across predictors and outcomes suggests findings are practically relevant rather than random.

5. Conclusion

In sum, children's ability to delay gratification at first grade entry predicts first grade outcomes when teachers' choice of instructional context is considered. The classroom environment is increasingly viewed as a point of leverage for influencing children's developmental trajectories. The ability to delay gratification during this developmental period appears associated with a host of long-term outcomes (Kirby et al., 1999; Krueger et al., 1996). Perhaps the goal of schooling should be broadened to include salient predictors of long-term adjustment. This study speaks to our need to better understand the range of skills children bring to the classroom and the extent to which the classroom context can enhance existing skills and mitigate or exacerbate initial deficits.

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