Supporting parent time spent on educational activities among preschoolers in Head Start:

Experimental evidence applying insights from behavioral economics

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Abstract

Meeting the objective of supporting children’s developmental outcomes through early childhood educational settings hinges on parent involvement. Psychological factors related to parent decision making, such as demands on attention, misestimation and related biases about children’s education and learning, may uncover new avenues to supporting parent involvement above and beyond conventional approaches. Applying insights from economics and cognitive decision making, we created and experimentally tested a bundle of enhancements to the parent component of Getting Ready for School (GRS), a play-based educational curriculum designed to buttress cognitive and behavioral development, and currently being implemented in New York City Head Start classrooms. Compared to children that received the typical GRS curriculum, the enhanced package of personalized invitations, child-friendly activity planners, text-message reminders, and commitment reinforcement increased parent attendance across a variety of GRS events, as well as the time parents spent with children on educational activities outside of the classroom.

Keywords: early childhood education, parent involvement, parent engagement, behavioral economics, poverty
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Parent-targeted early childhood educational programs aim to reduce the socio-economic inequities in children’s developmental outcomes and bolster the chances that every child is equivalently prepared to succeed (Duncan & Magnuson, 2012). Meeting the objective of improving children’s developmental outcomes through these educational settings hinges on parents’ decisions and behavior, whether spending time with a child, attending a workshop, or shifting day-to-day parenting practices. Yet, engaging parents in these and related ways can be challenging. Preventative interventions struggle to elicit parents’ buy in and sustain parent involvement throughout the course of the intervention (Fishel & Ramirez, 2005; Gross, et al., 2009; Halgunseth, Peterson, Stark, & Moodie, 2009). Some interventions for behavior problems show only 30 to 48 percent of targeted families participating (Garvey et al.2006; Heinrichs et al.2005; Baker et al. 2011) and some preschool based educational programs report that less than half of parents attend workshops and similar offerings (Dawson-McClure et al., 2015; Mendez at al., 2009).

Why is parent involvement low and erratic even when parents are well informed, and educational programs are free and accessible? Though many programs address a variety of personal and environmental barriers, from structural (e.g. providing transportation, child care, food, conflicts in work schedules) to psychosocial (Brookes, Summers, Thornburg, Ispa, & Lane, 2006; Brooks-Gunn, Berlin, & Fugilini, 2000), motivated parents with good intentions do not follow through with early education offerings and recommendations. This raises questions about other influences that are potentially responsive to program design, such as parents’ available attention and energy, but are pulled elsewhere (Mullainathan & Shafir, 2013). This pull may be particularly heightened among low income parents, who are the targets of early preventive and education initiatives, as the daily financial stressors of their lives can place high cognitive and
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emotional demands on attention and self-control in the present, with little economic or social cushion to support recovery (Gennetian, Darling & Aber, 2016; Mullainathan & Shafir, 2013). Consequently, the parents and their children who could benefit most from early childhood education are also the ones who face circumstances that might make it especially difficult to be involved and follow through (Mani, Mullainathan, Shafir, & Zhao, 2013; Shah, Mullainathan, & Shafir, 2012).

Parent involvement and early childhood education

Parents play a critical role in promoting their child’s school readiness, through supportive parenting practices in the home and involvement in children’s early education (Van Voorhis, Maier, Epstein, & Lloyd, 2013). Three aspects of parent involvement matter during early childhood: home-based, school-based, and the home-school connection (Epstein, 2001). Home-based involvement is conventionally captured through parent self-reports of the frequency, type, and quality of parent-child interactions or by direct observations of the home environment (Hayes, Berthelsen, Nicholson & Walker, 2016); whereas school-based involvement captures the ways in which families participate with school events such as field trips, and educational workshops, or volunteer in the classroom. The home-school connection is a hybrid of the home involvement and school-based involvement elements and specifically defined by the bi-directional relationship and communication between parents and teachers (Fantuzzo, McWayne, Perry, & Childs, 2004; Fantuzzo, Tighe, & Childs, 2000; Mendez, 2010); teachers’ perception of parent involvement at school, and official recordings of participation in school based events (Dearing, Kreider, Simpkins, & Weiss, 2006; Dearing, McCartney, Weiss, Kreider, & Simpkins, 2004).
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Parent involvement, across the dimensions of home and school, has been found to favorably support pre-academic skills and social emotional development in preschool children (Fan & Chen, 2001), persisting across different cultural groups, levels of socioeconomic status, and ages (Fantuzzo et al., 2004; Miedel & Reynolds, 1999; Smith, Robbins, Stagman, & Mahur, 2013; Van Voorhis, Maier, Epstein, & Lloyd, 2013). Even though low-income parents are more likely to face stressors – overcrowding, maternal education, mental health problems – that may interfere with parent involvement, higher levels of parent involvement in school from kindergarten to 5th grade has been shown to predict increased child literacy (Dearing et al., 2006); and, home-involvement reported among Head Start families was the strongest predictor of receptive vocabulary, conduct problems, and attituds towards learning (Fantuzzo et al. 2004). Similar results were found in a sample of low-income kindergarten children (McWayne, Hampton, Fantuzzo, Cohen, & Sekino, 2004).

Research on early preventative programs also suggests that the extent of family engagement (attendance, participation and follow through with recommendations) predicts program impact. (Henrich & Gadaire 2008; Weiss, Caspe, & Lopez, 2006). As one example, findings from the Chicago Longitudinal Study show that frequency of parents’ participation at their children’s school and the number of activities in which parents participated in the preschool Child-Parent Centers (CPC) program were favorably associated with higher reading achievement and lower rates of grade retention in eighth grade (Miedel & Reynolds, 1999) and influenced subsequent achievement by increasing children’s motivation and parent involvement throughout the elementary grades (Hayakawa, Englund, Warner-Richter, & Reynolds, 2013; Reynolds, Ou, Mondi, & Hayakawa, 2017).
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The role of parent psychological decision-making factors

Parents play an integral role as active agents making a variety of decisions on behalf of their children regarding their own involvement and the role and involvement of others. Yet, many of the theoretical frameworks that guide the development of early childhood materials, curricula, and programs do not offer guidance about ways to support parents’ decisions. In fact, much of parent decision making behavior is assumed: parents are assumed to be clearly evaluating whether a program is worth signing up for; understanding and acting on all of the steps to enroll; and having the attention and energy to listen and execute good parenting practices every day. Combining the theories of conventional economics with cognitive decision-making and social psychology, we focus on the ways in which context, and the cognitive processing related to attention, self-control, social norms, and identity, affect parent’s real-world, in-the-moment decision-making. This framework, also identified as behavioral economics (BE), provides a complementary lens to ecological and transactional theory in child development (Brofenbrenner, 1979, 2005; Gennetian, Darling & Aber, 2016) as well as economic theory on parent investment (Becker 1993).

We take the perspective that parent engagement in early childhood education is an essential ingredient of parents’ investment in their children’s human capital. Decisions related to program uptake and participation are economic decisions to invest – or not – in children’s future economic well-being. This framework acknowledges that parents’ decisions can be affected by a myriad of other factors including attentional demands influenced by: their multiple identities as workers, friends, spouses, protectors, and nurturers that at any one time may not equally align with program objectives; the ways in which other trusted parents’ and peers choose to act; and, their personal rubrics rather than objective metrics to evaluate children’s development.
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Incorporating parent mental resources and decision making biases into early education models

We focus on three ways that parents can be redirected or can miscalculate their decisions in the context of their (and, their child’s) involvement in early childhood education: attention, estimation or judgment of relevance of activities or services for their children, and calculation of future benefits.

Like all individuals, parents have a finite amount of attention to bring to the myriad of decisions in their life in addition to their parenting decisions. And, like time and money, available cognitive resources to make these decisions may be drained and replenished depending on other demands and circumstances (Mischel & Ayduk, 2011). In addition to any job or employment requirements, parents must shuffle transportation and child care needs, food shopping, housework and related household maintenance. Problems with any of these, such as caring for a sick child, pull attention away from other requirements. What otherwise appear as seemingly simple decisions and tasks related to care, maintenance and investment in their children may require more cognitive and mental resources than parents have available to attend to it and thus it is left incomplete. Resulting high cognitive load can also exacerbate impediments to follow through even under typical features of programs. For example, multiple choices is a permeating tenet of most parent targeted programs to protect “parental choice,” yet too many choices may be paralyzing rather than liberating (Iyengar & Leper, 2001). Cues about who parents are or what role parents are taking can have outsized effects on decisions at hand (Akerlof & Kranton, 2010) such that drawing attention to the salience of a given parent identity, for example, can alter how parents evaluate options (LaBoeuf, Shafir, & Bayuk, 2010).
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Parent involvement (and any related engagement) decisions may also be swayed by beliefs about their children that could be misaligned with objective assessments. Parents exhibit upwardly biased beliefs about their children’s effort in school (Bergman, 2016) and underestimate the implications of their children’s absences (Rogers & Feller, 2017). Such beliefs of a child’s performance or behavior can contribute to parent disengagement from programs, amid a general sense that more effort is unnecessary because the child is already doing well.

As a by-product of self-control, limited attention and mis-estimation are further exacerbated by the human tendency toward a present bias when a smaller immediate reward is more highly regarded over a more substantial future gain (Mischel & Ayduk, 2011). In parenting terms, parents, particularly those with constrained economic resources, may face more difficult decisions about taking away from resources that are needed now for a vague sense of how those resources might positively impact children’s future success. It is challenging to evaluate the present benefit to allocating limited available time to educational workshops or activities (versus more work hours or household management) when the future benefit is ambiguous.

The cognitive decision making factors highlighted here—limited attention, mis-estimation, and present bias—do not represent a comprehensive list of the ways in which mental resources and psychological biases may influence parents’ evaluations and thus subsequent decisions via a BE framework. However, barriers are diagnosed through a new lens, and may uncover new approaches to support parent involvement. Early education and intervention design is redirected to the practical features that will support small, potentially day-to-day, parenting decisions and choices guided by a framework that could reduce the gap between parents’ intentions to optimize their involvement and interactions with their children and follow through.
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Present study

We ask how complementary strategies designed to harness or address cognitive decision making factors that influence parent decisions may bolster involvement in early childhood programming. We focus on design enhancements that direct parent attentional resources, shape parent judgment of current relevance of activities or services for their children, and parent calculation of future benefits to their children from their involvement. These design strategies are applied and experimentally tested with the Getting Ready for School (GRS) program, a play-based early education program that supports children’s reading, math and self-regulation skills and that is currently implemented and being evaluated across several New York City Head Start centers. Such a focus on parent engagement is predicated on evidence that it matters: parent attendance at GRS events was favorably associated with growth in children's language, literacy skills, and delayed gratification across the preschool year.

Method

The Getting Ready for School Early Education Program

The Getting Ready for School (GRS) program was originally designed for parents in low and middle income countries to promote math and literacy skills through play-based activities and parent workshops. A small randomized study with Head Start families demonstrated improvements in math skills over and above a Head Start-as-usual experience (Noble et al., 2012). GRS was subsequently enhanced by developing a classroom curriculum and adding activities to support children’s self-regulation that can be used by both parents and teachers (Jones, Kargman, Kargman, & Bailey, 2014). The resulting enhanced GRS model is a supplementary play-based preschool early education program targeting the development of language, literacy, mathematics, and self-regulation skills in preschool aged children by
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enhancing the home and classroom environment. With the assistance of a GRS coach, teachers choose weekly activities to implement in the classroom for 30-45 minutes every day, and then assign similar activities for parents to implement at home, via a weekly home-school connection letter. Activities follow a developmental trajectory, may be adapted to meet the needs of individual children, and are designed to use resources typically found in preschool classrooms or homes. (Further information about the classroom component is available from the authors.)

The GRS parent component, which is the focus of this study, offers a matrix of options for parents to promote school readiness skills at home including an orientation meeting, weekly parent-teacher letters that explain what activities are taking place in the classroom and suggest activities from the book to do at home, eight workshops throughout the year that offer hands on instruction to parents on ways to support children’s learning, and three GRS parties in the child’s classroom, with small stations set up to encourage opportunities to practice activities together in a fun environment that celebrates learning and meet other families.

Despite its seamless integration into existing Head Start programs, GRS, similar to other early childhood initiatives, faced challenges related to parent participation and follow through: In 2014-15, although 66 percent of parents attended at least one event, average attendance to parent workshops was low hovering at 18 percent. Thirty seven percent of parents attended the 2014-15 academic year GRS kick-off meeting, and less than 1 in 5 parents returned the parent-teacher letter feedback form at any point during the year.

The GRS program enhancements

We designed a bundle of design enhancements for the 2015-16 cohort based on research conducted with the prior year’s cohort (see Supplementary materials for more detail as well as images of the enhancement materials in Appendices A to D).
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Kickoff invitation and reminders via texts. To address limited attention, parents received a personalized invitation to the kick-off meeting at school rather than the generic letter-sized flyer that was typically used to convey or announce information to parents from schools. To simultaneously convey some social proof, or external importance, of the event from a trusted source, the invitation explicitly mentioned that the children’s teacher would also be in attendance (Allcott, 2011); and, to prime parent identity as not only their children’s nurturer but also their first teacher, the invitation included a GRS branded image with the latter message (McQueen & Klein, 2006). The postcard-sized invitation also included handwritten information about the location and time of the meeting to prompt parents to focus more attention on the personalized message.

A text message commitment reminder with the location and time of the meeting was designed to facilitate the translation of parents’ intention to attend the kick-off meeting into action and reduce inaccurate calibration of benefits of attending. These reminders were hypothesized to prime implementation intentions, as we asked parents to reply “Y” if they planned to attend the event. Such plan making activities have been demonstrated to encourage behaviors in various domains including voting behavior (Nickerson & Rogers, 2010), and vaccination (Milkman, Beshears, Choi, Laibson, & Madrian, 2011).

Activity trackers. To elicit calibration of beliefs of one’s behavior with actual behavior, the objective of increasing time spent on GRS activities outside of the classroom was supported through child friendly activity trackers that looked like a planning calendar. Trackers were accompanied by a re-designed letter, with fewer and more explicit activity choices (reducing attentional demands), and with targets on the amount of time to spend on each activity. Stickers tied to each of the GRS activity domains (math, literacy, and self-regulation) accompanied the
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activity tracker to encourage children to become involved in documenting the day and type of activity. The activity trackers, like the parent-teacher letters, were distributed to parents on a weekly basis. The activity trackers not only reinforced the fun nature of GRS activities – discarding the sense of homework-like responsibility conveyed from the previous letters – but also encouraged repeated parent-child engagement throughout the week (with little demands placed on parents to calibrate the rewards).

*Play-based early learning tips via texts.* Text-distributed tips were further designed to address parents’ possible present bias and overconfidence of a child’s current abilities and achievement across skill levels; and, to reinforce the future return to spending time on GRS activities while reminding them to utilize activity trackers. At least one caregiver (mostly parents, and the majority mothers) received five personalized text messages per week that provided creative tips for parents to engage with their child in GRS activities. The text messages were strategically scheduled to redirect parents’ attention at opportune times during the day (e.g., right after school, after dinner) to spending time with their children.

**Experimental Design**

GRS was implemented in 4 Head Start-preK centers. A total of eight classrooms received the GRS early education program and six classrooms received typical Head Start services. Randomization of the experimental test of the bundle of enhancements labeled “BE” occurred at both the child (or family) level and the classroom level among the children and classrooms participating in GRS. Children within classrooms were randomized to receive either personalized invitations to the kick-off meeting with reminders or receive a generic flyer. Classrooms participating in GRS were randomized within centers to receive either weekly activity trackers
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and weekly tips via texts supporting GRS content or GRS-as-usual weekly parent-teacher letters without activity tracker or text messages. All procedures presented in this study were approved by the author’s Institutional Review Boards.

Participants

A total of 257 children across 14 classrooms in 4 Head Start Centers in New York City were approached to participate in the study. Among the 257 families, 12 (4.7 percent) families dropped before signing consents, 35 (13.6 percent) did not return the consent, and 210 (81.7 percent) families consented to participate. Among the 210 consented families, 18 (8.6 percent) families left the school over the course of the academic year. Of the 18, eight belonged to GRS-BE classrooms, 2 to GRS only classrooms, and 8 to control classrooms. All children in the center were eligible to participate with no exclusion criteria related to language or special educational services.

Measures

Measures of parent involvement capture the dimensions of school- and home-based engagement and parent-teacher GRS related communication.

Attendance. Attendance at GRS events, such as the beginning-of-year kick-off meeting, workshops, and parties, was collected by coaches at each event via sign-up sheets. Attendance is counted at the child level via dichotomous variables tracking attendance to each event overall and by season, and aggregated measures on the number of events.

Activity tracker return rates. Parents and caregivers were requested to return activity trackers or feedback forms seven days after the Friday on which they were originally distributed. The return status of each activity tracker distributed over the 23-week experimental testing
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period was recorded dichotomously such that 1 indicated return and 0 indicated no return and aggregated to represent the total number of activity trackers returned over the 23-week period.

**Time spent on GRS and other educationally related activities.** Data on time spent on GRS activities outside of the classroom was collected through self-reports from April 20 to 25, 2016, via three modes: text message response, in person at child drop off or pick up, and phone calls. Because implementation of self-report via text messaging was confounded with loss of service with certain network carriers, the few text responses that we did receive were excluded from analysis. Respondents in the GRS-as-usual and GRS-BE group were asked three questions: “Did you have time to do GRS activities with your child last week? If yes, how many minutes did you spend doing GRS activities?”, “Does anyone else do GRS activities with your child? Who does GRS activities with your child?”, and “How many minutes did you spend doing other non-GRS learning activities, like math, writing, or reading?” Respondents in the control group (no GRS) were asked comparable questions regarding having time to do learning activities with their child, if anyone else does learning activities with their child, and how many minutes spent on learning activities. These questions were also available in Spanish translation. 144 were completed in person \((n = 50\) controls; 33 GRS-Only; 61 GRS-BE) and 46 via phone survey \((n = 17\) controls; 11 GRS-Only; 18 GRS-BE).

We relied on data from the in-person reports and then filled in missing values via phone survey reports when available. We also collected information on time spent on activities both via in-person reports and phone for \(n = 6\) mothers. Five of the six reported more minutes on time via phone than via postcard. Thus, our approach of prioritizing in-person postcard data is conservative. If a range was reported, we took the minimum value of the range and did not cap a maximum on values. Overall, we achieved an 88 percent response rate across data collection
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modes. We focus on maternal reports on time spent on GRS activities (though results are robust to the inclusion of a small number of reports on time spent from other caregivers). Of the sample, 3 children were sick (1 GRS-as-usual and 2 GRS-BE) during the time period in which we inquired about time spent on activities and thus were removed from the analysis.

Covariates. Demographic characteristics were collected at baseline from the consented sample via a parent survey including parental education, income, household size and composition, employment status, country of origin, time spent in the US, and participation in public benefits. Overall, 168 families (80%) returned the parent survey.

Analysis

We used independent-measures t-tests to test the effects of receiving a kickoff event invitation and text reminders on attendance to the kickoff effect, comparing families randomized to receive the child-level BE enhancements with families who received GRS as usual. Second, we examined the effects of the classroom level BE enhancements (activity trackers and weekly text message tips) on measures of school- and home-based involvement and parent-teacher communication (attendance to workshops, returned feedback forms or activity trackers, and time spent on GRS activities). For variables with non-homogenous variances between groups, Welch’s t-test was used with noninteger values of degrees of freedom. Adjusted estimates of treatment effects were also derived from ordinary least squares, or logit for dichotomous outcomes, regressions, controlling for a minimal set of covariates (not shown). We calculated cluster-robust standard errors to adjust for the possibility of within-classroom correlation. For all outcomes related to the activity tracker return rates, the cluster-robust standard errors were larger than standard errors calculated with OLS regressions in part due to loss of power. However, the qualitative pattern of results with the adjustments for clustering were the same.
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We additionally ran analyses with a school fixed effect to capture school-level heterogeneity. This approach also adjusts for the embedded cluster nature of the data (and, methodologically provides similar adjustments as might be achieved using an HLM technique). Again, results are qualitatively similar even after controlling for school fixed-effects.

To ensure a comparable sample across the measures, the final sample of 155 was determined based on nonmissing information from the 2016 data collection of consented families to measure time spent on GRS activities outside of the classroom. The eligible sample at time of measurement for time on activities was 192 families (since 18 children dropped out during the course of the academic year). Therefore, although the descriptive statistics of the study’s sample will include 210 consented families at the beginning of the school year to assess successful random sampling at the time of randomization, analyses of outcomes among GRS families (GRS-BE vs. GRS only) use the sample size of $n = 99$, and analyses of time spent on activities among GRS families and control (i.e. Head Start only) use the sample size of $n = 155$ (from the eligible $n = 192$ in April at the time of data collection). Analyses of each outcome measure were also conducted with the available sample for each measure and with no restriction on observations with nonmissing data for time spent on GRS activities, and results were substantively similar to the main analyses with observations with nonmissing data (available upon request). Demographic and socio-economic characteristics of the study sample show that 90 percent self-identified as Hispanic, a majority of children resided with both parents, most mothers were employed. There were no statistically significant differences in observable

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1 The child level FE model is as follows: $Y_{it} = \beta_{1\text{Covariates}} + \mu_i + \varepsilon_{it}$ where $Y$ equals the attendance/parent engagement outcome for child $i$ in center $t$, $\mu_i$ is the unobserved time invariant school effect, and $\varepsilon_{it}$ is an error term.
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characteristics between groups, indicating that our randomization was successful (Supplemental Table 1).

Results

Implementation. Parents provided consent to use their mobile phone numbers for the receipt of texts, with the option to opt-out at any time. No parent or caregiver receiving the GRS-BE texts opted out. Results were mixed on text-based responses to an r.s.v.p. sent out for the kick-off event though higher than conventional approaches using mail. Twelve families replied yes via text and 1 responded no, i.e. 13 of 47, or 28 percent of families texted a reply.

GRS-as-usual and GRS-BE school-based involvement. Table 1 shows that on average 67 percent of families receiving GRS-as-usual attended at least one GRS event (any workshop or the kick-off, shown under the GRS-only column), with 38 percent attending only the kick-off meeting. Parents of children that received the child-level behavioral enhancements were 15 percentage points more likely to attend the beginning-of-year kick-off meeting. In other words, a child-level personalized invitation to the kickoff coupled with text-based reminders increased the kick-off attendance rate by 40 percent, exceeding by 3 percentage points the initial goal of reaching a 50 percent attendance rate (at \( p < 0.075 \)). The GRS program included eight scheduled workshops over the 2015-16 academic year from September to June. Even though the BE enhancements were not specifically targeted to influence workshop attendance, there were spillover effects on other aspects of parent involvement. Parents in the GRS-BE group who received the classroom-level BE enhancements – activity trackers and tips via text – were 32 percentage points more likely to attend any workshop (GRS-BE: \( M = 53.3 \) percent, GRS-Only: \( M = 21.2 \) percent, \( t(79.48) = 3.31, p = .001 \)), 26 percentage points more likely to attend more than one workshop (GRS-BE: \( M=38.3 \) percent, GRS-Only: \( M=12.1 \) percent, \( t(89.34) = 3.06, p = \))
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.003), and, thus attended on average at least one workshop more than parents in the GRS-Only group (GRS-BE: \( M = 1.43 \), GRS-Only: \( M = 0.45 \), \( t(91.81) = 3.30, p = .001 \)). These results were robust, and increased in size of impact, when controlling for the child-level BE enhancements.

Analyses of workshop attendance by domain (not shown), and separately by whether the workshop took place in the autumn or spring, further showed that parents in the GRS-BE group who received the classroom level BE enhancements had higher and sustained attendance for the literacy and self-regulation workshops. Approximately 33 percent of parents in the GRS-BE group attended the fall literacy workshop, while 13 percent of parents in the GRS-Only group did, \( t(81.74) = 2.28, p = .026 \). Similarly in the spring, parents in the GRS-BE group were 23 percentage points more likely to attend the literacy workshop (GRS-BE: \( M = 31.7 \) percent, GRS-Only: \( M = 9.09 \) percent, \( t(91.75) = 2.86, p = .005 \)). Overall, there was a detectable drop off in attendance in the spring among parents in the GRS-Only group.

Figure 1 shows that drop off in attendance from autumn to spring occurred equivalently for both the GRS-BE and GRS-Only group. Although the GRS-BE parents had a larger drop in attendance between autumn and spring, GRS-BE attendance rates were still higher in the spring as compared with the spring attendance of GRS-only parents and caregivers.

GRS-as-usual and GRS-BE parent-teacher communication. The last panel of Table 1 presents return rates of letters and activity trackers as our measure of parent to teacher feedback. Fifty percent of the parents in the GRS Only group every returned a weekly feedback form over the November 2015 to April 2016 period, with an average of 5.3 times returned over the 23 weeks. Parents in the GRS-BE group returned, on average, 11.12 activity trackers, compared with 5.33 generic feedback letters returned by those in the GRS-Only group, \( t(80.87) = 3.87, p < .001 \). The comparison of the median number of activity tracker returns showed a similar pattern.
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(not shown, GRS-BE: Median = 12.5; GRS-Only: Median = 3). GRS-BE parents were also more likely to repeatedly return the activity trackers each week: 56.6 percent of parents in the GRS-BE group returned activity trackers for more than half of weeks as compared with 24.2 percent of parents who returned the generic feedback letter in the GRS-Only group, \( t(76.25) = 3.26, p = .002 \). The number of returned activity trackers and the number of parents who returned activity trackers more than 50 percent of eligible weeks maintained statistical significance controlling for within-classroom correlation.

**GRS, GRS-BE, and Control (Head Start as usual) time spent on activities outside of the classroom.** Table 2 shows that children in the GRS-Only spent 45 minutes on average during the week on GRS activities outside of the classroom. In comparison, children in the GRS-BE group who received the classroom level BE enhancements spent 28 minutes more on average, in the given week, than children in the GRS-Only group on GRS activities (GRS-BE: \( M = 73.0 \), GRS-Only: \( M = 44.9 \), \( t(90.20) = 2.30, p = .024 \)). Children in the GRS-BE group also spent 47 minutes more on other educational activities than those in the GRS-Only group (GRS-BE: \( M = 85.7 \), GRS-Only: \( M = 38.2 \), \( t(93.86) = 3.11, p = .003 \)). Overall, GRS-BE children spent on average 159.8 minutes on GRS and other educational activities combined, statistically significantly greater than the 83.0 minutes spent by children in the GRS-Only group, \( t(89.14) = 3.76, p < .001 \), and marginally greater than 117.2 minutes spent by children in Control group, \( t(120.93) = 1.73, p = .087 \).

The BE enhancements also appeared to influence who spent time on GRS or educational activities with the child (not shown). Thirty six percent of children in the GRS-BE group reported to have spent time on GRS or other educational activities with their siblings, and this
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Proportion was significantly higher than 18 percent of children in the GRS only group, \( t(80.52) = 1.94, p = .056 \), as well as 18 percent of children in control group, \( t(116.34) = 2.27, p = .025 \).

Discussion

Parents play an essential role in the success of early childhood education and interventions yet there are prevailing challenges to supporting and increasing parents’ uptake and follow-through with program activities and recommendations. Psychological factors that affect parent decision making may impede or support parent involvement: parenting is a series of small decision points with certain levels of available attention and mental resources, and influenced by assumptions or judgments, any one of which can derail – or promote – their subsequent participation in their children’s learning at home or at school.

Even though the GRS program was streamlined in existing Head Start programming, with child care, food and other incentives, and had multiple formats for accessing material, the parent involvement challenges were similar to many early childhood education programs. We showed consistent favorable effects on parent involvement from the bundle of experimentally tested psychologically informed (BE) enhancements. Parents of children in the experimental group were 15 percentage points (or, 40 percent) more likely to attend the beginning-of-year kick-off meeting (in response to the personalized invitations, and reminder and commitment texts); returned, on average, twice as many activity trackers to their child’s teacher (in response the classroom based behaviorally designed activity trackers and text tips); and spent a half hour more per week on GRS activities at home (in response to the cumulative and combined behavioral economic enhancements). The findings suggest change in parents’ in-the-moment decisions as well as cascading effects on parenting habits as parents in the GRS-BE group were more likely to attend GRS workshops without any additional BE reinforcement.
SUPPORTING PARENT TIME SPENT ON PRESCHOOL CHILDREN’S EDUCATIONAL ACTIVITIES

Strengths and Limitations

Our methodological design allowed us to test the impact of the psychologically informed design features but did not allow us to pinpoint the specific reason why decision making shifted. Randomization at both the child and classroom levels allowed us to reduce the risk of inter-class contamination and control for nesting effects, while maximizing power. Because we did not have baseline information from parents on the time spent on educational activities, we were not able to evaluate trajectories of changes in parents’ behavior. Richer baseline data might have also allowed us to better understand who was most, or least, responsive to the BE enhancements.

Although we took a conservative route to ameliorate discrepancies in parent report of the time spent on educational activities, more objective measures of time spent, and measures of time spent for specific developmental domains, might have uncovered a more nuanced connection between GRS domain-specific activities and potential impacts on children’s development. Methods used in larger scale time-diaries (such as the American Time Use Survey) might be one strategy for future consideration. In addition, our measurement did not capture the quality of the parent-child interaction, or the distribution of that time over the week. Despite the demonstrable involvement of other caregivers in children’s early education, the enhancements tested in this study focused on parents more specifically, in part because of the targeted nature of the format of the enhancements such as through a texting platform among those who consented to enroll. Finally, our study sample included a relatively small sample of predominantly low-income immigrant families. It is possible that our findings would not generalize to broader preschool populations.

Implications and Conclusion
SUPPORTING PARENT TIME SPENT ON PRESCHOOL CHILDREN’S EDUCATIONAL ACTIVITIES

Public and private initiatives have actively responded to the emergent social and neuroscientific evidence base documenting the early socio-economic gaps in development and the benefits of targeting services to children during their earliest period of development (Heckman, 2006). However, effect sizes tend to be small (Borman, Hewes, Overman, & Brown, 2003), and benefits for many of these programs appear to fade (Bailey, Duncan, Odgers, & Yu, 2017). Combining psychologically rooted behavioral economic insights with early educational programming can enhance not only school- and home-based parent involvement but also parent-teacher communication, creating an avenue for achieving relatively larger and longer sustained impacts.
SUPPORTING PARENT TIME SPENT ON PRESCHOOL CHILDREN’S EDUCATIONAL ACTIVITIES

References


SUPPORTING PARENT TIME SPENT ON PRESCHOOL CHILDREN’S EDUCATIONAL ACTIVITIES


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_Science, 341_(6149), 976-980.


Figure 1. GRS workshop attendance by domain, season and treatment group. Parents and caregivers in the GRS-BE group had higher attendance rates at workshops.
## SUPPORTING PARENT TIME SPENT ON PRESCHOOL CHILDREN’S EDUCATIONAL ACTIVITIES

### Table 1

| Patern School-based involvement and parent-teacher communication in GRS and impact of enhancements |
|-------------------------------------------------|----------------|----------------|----------------|----------------|
| GRS-BE | GRS-only | 95% Confidence Interval on Difference | p |
| M | SD | M | SD | Difference |
| Parent school-based involvement outcomes | | | | |
| Attended kick-off/orientation meeting (%) | 0.53 | 0.50 | 0.38 | 0.49 | 0.15 | (0.353, 0.055) | 0.075 |
| Sample size | 47 | 47 | |
| From September 2015 to June 2016 | | | | |
| Attended any GRS event (%) | 0.82 | 0.39 | 0.67 | 0.48 | 0.15 | (-0.045, 0.345) | 0.129 |
| Attended any workshop (%) | 0.53 | 0.50 | 0.21 | 0.42 | 0.32 | (0.128, 0.515) | 0.001 |
| Attended more than 1 workshop (%) | 0.38 | 0.49 | 0.12 | 0.33 | 0.26 | (0.092, 0.432) | 0.003 |
| # events attended | 2.65 | 2.21 | 1.52 | 1.72 | 1.13 | (0.314, 1.956) | 0.007 |
| % of events attended in the autumn | 0.31 | 0.31 | 0.14 | 0.21 | 0.17 | (0.061, 0.229) | 0.003 |
| % of events attended in the spring | 0.21 | 0.20 | 0.14 | 0.15 | 0.68 | (-0.044, 0.139) | 0.066 |
| Parent-teacher communication outcomes | | | | |
| Over a 23 week period (November 2015 to April 2016): | | | | |
| Number of times returned feedback form | 11.12 | 7.84 | 5.33 | 6.32 | 5.78 | (2.809, 8.758) | < 0.001 |
| Ever returned weekly feedback form (%) | 0.78 | 0.42 | 0.61 | 0.50 | 0.18 | (-0.026, 0.381) | 0.087 |
| Returned weekly feedback form more than once (%) | 0.75 | 0.44 | 0.55 | 0.51 | 0.20 | (-0.004, 0.414) | 0.055 |
| Returned more than 50% of feedback form (%) | 0.57 | 0.50 | 0.24 | 0.44 | 0.32 | (0.126, 0.522) | 0.002 |
| Never returned weekly feedback form (%) | 0.22 | 0.42 | 0.39 | 0.50 | -0.18 | (-0.381, 0.026) | 0.087 |
| Sample size | 60 | 33 | |

Source: GRS program data on attendance and feedback forms collected by program coaches and authors.

Notes: Enhancements for the attendance to kick-off outcome is randomized at the child-level. All other outcomes are randomized at the classroom level. Findings are qualitatively similar in multi-variate regressions controlling for selected socio-economic and demographic characteristics and center/school fixed effects.
### Table 2

**Home-based involvement in GRS and educational activities and impact of enhancements**

<table>
<thead>
<tr>
<th>Time on activities (in minutes)</th>
<th>GRS-BE</th>
<th>GRS-Only</th>
<th>Control</th>
<th>GRS-BE vs. GRS-Only</th>
<th>GRS-BE vs. Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
<td>effect size</td>
</tr>
<tr>
<td>Time on GRS activities</td>
<td>73.00</td>
<td>80.84</td>
<td>44.85</td>
<td>36.86</td>
<td>n/a</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.41 (-.019, 0.839)</td>
</tr>
<tr>
<td>Time on other activities</td>
<td>85.66</td>
<td>94.80</td>
<td>38.18</td>
<td>53.49</td>
<td>117.20 135.25</td>
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<tr>
<td>Total time on education plus GRS activities</td>
<td>159.83</td>
<td>136.16</td>
<td>83.03</td>
<td>59.74</td>
<td>117.20 135.25</td>
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<tr>
<td>Source: Self-report data collected by authors on April 25, 2016</td>
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<tr>
<td>Notes: Cohen’s d used for effect size calculation. Findings are qualitatively similar in multi-variate regressions controlling for selected socio-economic and demographic characteristics, and center/school fixed effects.</td>
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