

**Using Mobile Messaging to Improve Parents Support of Preschool Children's Science Learning**

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## **1. Background and Context**

Children who engage in science activities early in life are more likely to be interested in science as adolescents and are more likely to participate in science-related careers later in life (Alexander, Johnson, & Kelley, 2012; Patrick, Mantzicopoulos, & Samarapungavan, 2009). However, many young children have limited opportunities to explore science and engineering at home (Silander, Grindal, Hupert, Garcia, Anderson, Vahey, & Pasnik, 2018). Young children also spend limited time learning science content (Greenfield et al., 2009; Piasta, Pelatti, & Miller, 2014). Many preschool educators are not trained to support children's science and engineering explorations (Greenfield et al., 2009). At home, parents often struggle to answer their child's questions about the world around them, and many lack the confidence and resources to seize everyday opportunities and engage in experiences that could deepen their child's learning and curiosity about how things work (Silander et al., 2018). Text messaging supports to parents focused on supporting their child's science learning may help enhance early learning experiences in the home.

## **2. Purpose, Objective, and Research Questions**

We analyze the impacts of an 8-week, parent-facing text messages designed to influence beliefs and practices regarding early science learning.

We answer the following research questions:

1. What is the impact of text messaging on parent perceptions of the importance of parental involvement in the children's science learning?
2. What is the impact of text messaging on parent confidence in their ability to help their child engage in science?
3. Does the text messaging increase parent engagement in science-specific learning activities with their children (digital and non-digital activities)?

## **3. Setting**

Parents of four and five-year-old children were recruited from New York, NY, San Francisco, CA, Phoenix, AZ, Minneapolis, MN, and Boston, MA.

## **4. Population, Participants, and Subjects**

A total of 431 four and five-year-old children living in Minnesota, Arizona, California; New York, and Massachusetts participated in this eight-week-long study. The sample included slightly more girls (54%) than boys. Approximately one third (35%) of participating children were identified by their parent as White, 19% as Hispanic, 18% as Black or African American, 3% as Asian, and 23% as multiracial. All families met the local criteria for qualifying as low-income, and approximately half (51%) lived in households with annual incomes of less than \$50,000. Three quarters (75%) of the children spoke English as a primary language, and 10% of parents indicated that their child received disability services (via an individualized education program or a 504 plan). We did not observe any statistically significant ( $p < .10$ ) differences between treatment- and control-assigned children or families on any of these demographic characteristics, and in no case did differences exceed the What Works Clearinghouse threshold ( $ES = 0.25$ ) for equivalent samples.

## 5. Intervention

During the intervention, treatment-assigned families received the following:

1. A tablet computer
2. Access to child-appropriate, science-related videos and games from *Cat in the Hat Knows a lot About That* developed as part of the developed these resources as part of the 2015-2020 Ready to Learn Initiative
3. Text messages designed to encourage parents to support their children's science learning

Parents were sent three types of text messages each week. On Tuesday they were sent information about the importance of early science learning and the role that parents play in supporting their children's acquisition of science and engineering knowledge. On Thursday, they were sent tips on how to engage in science-related learning activities with their children. On Saturday or Sunday, parents received a text message reminding them to encourage their children to use the study provided digital media resources.

## 6. Research Design

Families who agreed to participate in the study and completed a baseline survey were randomized to one of two conditions. The treatment condition is described above. The control condition received a tablet computer and access to child appropriate science-related videos and games but was not sent text messages.

## 7. Data Collection and Analysis

Data were collected via online surveys provided to the participating parent or caregiver. Attrition from the study was (7% in the treatment group, 2% in the control group).

We examine the impacts of the text messaging program using multivariate regression models in which we control parent's baseline confidence in helping their children learn science at home, family income, child age and child gender. The data collection and analysis procedures are consistent with those described in our submission to the Registry of Educational Effectiveness Studies.

## 8. Findings and Results

Results indicate that the intervention did not lead to statistically significant changes in parent attitudes (See figures 1 and 2) but did lead to differences in parent behaviors (see Figure 3). Parents exposed to text messaging, on average, engaged in a greater number of science learning activities with their children each week than did the parents in the control condition. We also find some suggestive evidence that treatment-assigned parents were more likely than control assigned parents to practice some but not all media co-engagement activities with their children. .

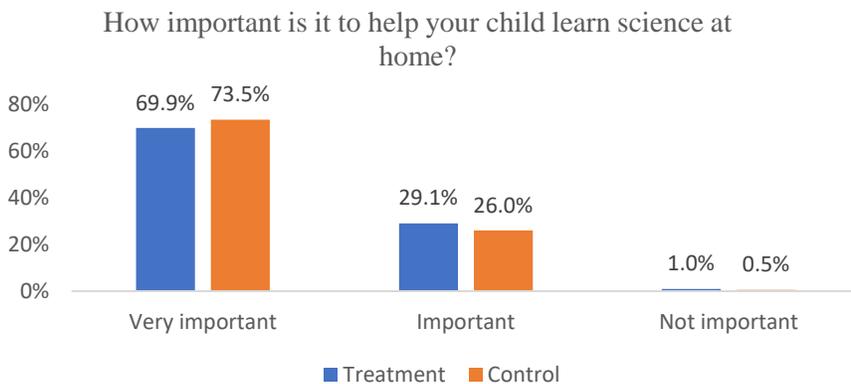
## 9. Conclusions

The results of this study suggest that the text messaging program had an impact on the science learning practices of parents of young children but did not have an impact on parents' beliefs regarding their role in early science learning. This work suggests that mobile messaging might be useful method for helping parents to support their young children's science learning. The findings suggest that efforts seeking to support children's learning through brief messages to parents might best focus on providing parents with actionable information around ideas for engaging their children in more science learning activities. That parents changed some aspects of the ways they help their children learn from media but not others suggests that interventions focused on co-mediation of media use might target efforts on improving the quality of conversations around the media, rather than on increasing co-viewing, which is a particularly time-consuming practice.

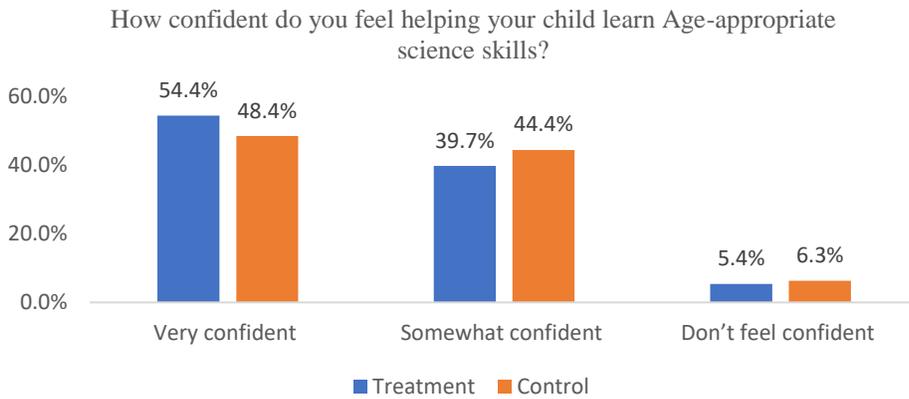
## 10. References

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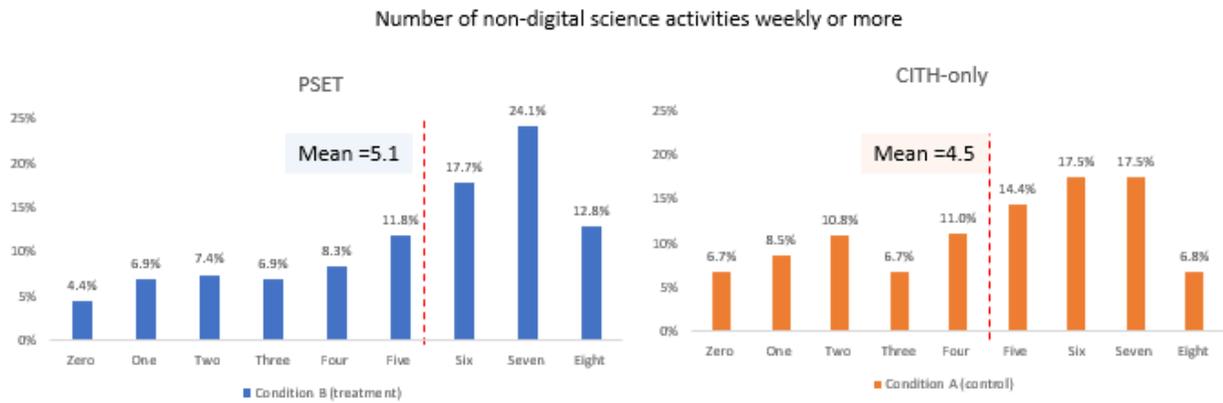
**Figure 1. Parent report of their perceived role in helping their child learn science**



**Figure 2. Parent confidence in supporting child’s science learning by condition**



**Figure 3. Parent report of non-digital science activities**



**Figure 4. Percentage of parents who report co-engagement with science media weekly or more**

