Using Text Messages to Build Parents' Capacity to Improve Child Language-Learning Opportunities

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Early Language Experiences

- Infants and toddlers from disadvantaged families hear about 30 million fewer words by their 4th birthday than other children (Hart & Risley, 1995).
- Academic success at 9 and 10 can be linked to the talk heard from birth through age 3 (Hart & Risley, 1995).
- Children who fail to acquire effective communication skills can experience relative social isolation irrespective of whatever other abilities they possess (Warren & Walker, 2005).

Parent Engagement

- Home visiting parenting programs have shown positive results with high-risk populations, but meta-analyses have not reported consistently positive outcomes for parents and children (Astuto & Allen, 2009; Sweet & Appelbaum, 2004).
- Parent engagement is a barrier to home visiting effectiveness (Korfmacher et al, 2008).
- Programs that are able to maintain parents' participation and keep them actively engaged are more likely to achieve improvements in parent and child outcomes (Gomby, 2005).
- A randomized trial examining the impact of cellular phones and text messaging on parent engagement in a home-based intervention resulted in reduced attrition, improvements in responsive parenting, and lower rates of parenting stress and depression (Carta, Lefever, Bigelow, Borkowski, & Warren, 2013).

The **primary aims** of this project are to examine how cellular phone technology can:

1) Increase and maintain parent engagement in an evidence-based intervention, and
2) Increase parents' use of language promoting strategies, and thus improve child communication and language skills of infants and toddlers receiving Early Head Start and Part C /IDEA early intervention services.

Intervention Design and Participants

- Randomized Controlled Trial, followed by secondary analyses examining effects of number of text messages sent.
- Families randomly assigned:
  - Promoting Communication (PC) Strategies (n=69)
  - PC Strategies PLUS text messaging enhanced PC Strategies (n=58)

Child and Family Demographics	Control (N = 58)		Intervention (N = 69)	
Family Characteristic	Count	%	Count	%
Primary Caregiver Education				
Less than High School	20	63%	12	38%
High School or GED	25	37%	43	63%
Post-high-school Training	13	50%	13	50%
Not Available	0	0%	1	100%
Household Yearly Income				
<10k	21	41%	30	59%
10-20k	24	49%	25	51%
20k+	12	48%	13	52%
Not Available	1	50%	1	50%
English Language Use				
None	6	38%	10	63%
Some (spoken, not primary)	8	57%	6	43%
Primary	44	45%	53	55%
	Mean (SD)	Range	Mean	Range
Length of Time in Study	8.25 (4.78)	[1, 23]	8.16 (5.64)	[1, 22]
	Control (N = 64)		Intervention (N = 86)	
Child Characteristic	Count	%	Count	%
Ind Family Service Plan Before 3				
No	39	42%	54	58%
Yes	17	44%	22	56%
Not Available	8	44%	10	56%

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Promoting Communication Strategies

- Naturalistic strategies, designed to be flexible and individualized to unique skills, needs, and diverse backgrounds of families.
- Strategies integrated with family goals.
- Families implement strategies across daily routines.
- Intervention Coach supports intervention delivery.
- Materials can be found at http://www.talk.ku.edu

Promoting Communication Strategies	PC Intervention Resources
• Arranging the Environment	• Intervention coach
• Following a Child's Lead	• Home visitor/parent manual
• Commenting and Labeling	• Video clips
• Imitating and Expanding	• PC Strategies poster
• Asking Open-Ended Questions	• Routine-specific activity cards
• Time Delay/Fill in the Blank	• Parent self-checks
• Positive Attention and Praise	• Graphic feedback for parents
• Providing Choices	• Home visitor implementation reports

Cellular Phone Intervention

- Text messages support parents' use of the PC Strategies, and promote parent engagement.
- Text message "menu" provided, but home visitors encouraged to individualize.
- Content focused on PC Strategies, but also supportive messages, fun, free resources.
- Text messages were to be sent 5x per week (3 from home visitor; 2 from coach).
- Messages could be scheduled in advance and programmed for multiple recipients.
- Intervention coaches' text messages focused on PC Strategies.

Text Message Examples

PC Strategies text message:

I heard Sylvie saying "more, more" last week. Try imitating and expanding on this with "More milk. I want more milk." This can help build her vocabulary.

Supportive text message:

I know this is a challenging time for your family. You're really holding everything together for everyone. Make sure you take time to take care of yourself. Let's talk more when we meet.

Parent and Home Visitor Satisfaction

Parent and Home Visitor Social Validity Data Summary

Item	% rating "mostly true" or "very much true"
Parent's Satisfaction of Promoting Communication Strategies	
I plan to continue using the Strategies with my child(ren) in the future.	98%
I would recommend the Strategies to other parents or family members.	97%
Parent's Satisfaction of Text Messaging	
Text messaging is a good way to stay in touch with my home visitor	100%
Text messaging helped me feel more involved with my home visitor.	98%
Text messaging helped me use what I learned with my child.	91%
The total number of text messages I received was just right for me.	88%
Home Visitor's Satisfaction of Promoting Communication Strategies	
I would you recommend the PC strategies to other Home Visitors.	100%
Home Visitor's Satisfaction of Text Messaging	
It was easy to fit text messaging into my schedule.	63%
Text messaging was useful in helping to connect/communicate with parents.	81%
Text messaging was useful in helping to promote parent engagement.	93%

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Randomized Trial Results

- ***Differences in the effects of the text messaging enhancement to PC TALK were not found to reach statistical significance:***
  - The differences on the linear and quadratic slopes of parent-rated engagement between the intervention and control group were -0.39 (SE = 0.46, p = 0.77), and 0.03 (SE = 0.03, p = 0.26), respectively.
  - The differences on the linear and quadratic slopes of home-visitor-rated engagement between the two groups were 0.02 (SE = 0.48, p = 0.97), and 0.002 (SE = 0.03, p = 0.95), respectively.
  - For the growth rate of parent's use of PC strategies, the difference between the two groups were 0.42 (SE = 0.85, p =0.62).
  - The effect of text messaging on the growth rates of Preschool Language Scale-Auditory Comprehension, Preschool Language Scale-Expressive Communication, Early Communication Indicator, and observed Child Communication were 0.17 (SE = 0.09, p = 0.07), 0.11 (SE = 0.08, p = 0.18), -0.06 (SE = 0.09, p = 0.49) and 0.04 (SE = 0.08, p = 0.64), respectively.

Secondary Analyses—Effects of Number of Texts Sent

- ***Focusing on the Text Messaging Group only (n=58), to more closely examine the effects of differences related to variations in text messaging dosage, in relation to the goal of 5 text messages per week:***
  - **Do parents who received more text messages demonstrate greater engagement?**
    - For each additional PC strategy-related text sent from home visitors, there would be a 0.26-unit increase in the growth rate of engagement, which ranged from -0.31 to 2.29 in this model (0.26, SE = 0.11, p = 0.02).
    - For each additional texts sent from intervention coaches there was a 0.09-unit increase in the growth rate of home visitor-rated engagement, which ranged from -0.09 to 1.27 in this model.
  - **Do parents who received more text messages implement the PC strategies at higher fidelity?**
    - For each additional PC strategy-related text sent by home visitors, there was an increase of 3.33 additional PC strategies used by parents, which ranged from 9 to 305 in the sample (3.33, se =1.05, $p < 0.01$).
    - For each additional text sent, there was an increase of 2.38 additional PC strategies used by parents (2.38, SE = 0.75, p < 0.01).
  - **Does text messaging dosage have indirect effects on child language outcomes through parent's PC strategy fidelity?**
    - One additional *PC strategy-related text* sent from home visitor tended to improve parent's use of strategies, which then led to an increase by 0.09 in their child Preschool Language Scale-Expressive Communication (PLS-EC) scores ($a_i * b_{ii}$ = 2.95 * 0.03 = 0.09, CI = [0.019, 0.184]). The *total number of texts sent* from home visitors also had a significant mediated effect on PLS-EC through parent's use of strategies ($a_i * b_{ii}$ = 0.04, CI = [0.004, 0.104]).
    - One additional *PC strategy-related text* sent tended to improve parent's use of strategies and then led to an increase by 0.11 in their children's ECI weighted total score ($a_i * b_{ii}$ = 3.00 * 0.04 = 0.11, CI = [0.017, 0.242). Also, a significant mediated effect was found for *total texts sent* from home visitors on ECI ($a_i * b_{ii}$ = 0.06, CI = [0.008, 0.127]).
    - One additional *PC strategy related text* sent from a home visitor tended to improve parent's use of strategies, and then led to an increase by 0.20 in observed Child Communication Weighted Total Rate ($a_i * b_{ii}$ = 2.91 * 0.07 = 0.20, CI = [0.051, 0.410]). We also found a mediated effect for *total texts sent* from home visitors on Child Communication ($a_i * b_{ii}$ = 0.11, CI = [0.012, 0.250]).