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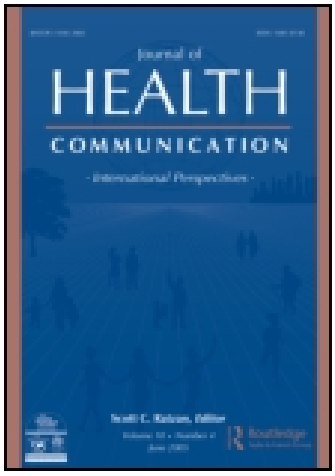

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Successful Enrollment in Text4Baby More Likely With Higher Health Literacy

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Adequate health literacy is vital for understanding and using health information. The authors assessed the health literacy of pregnant women and mothers of children under the age of 1 year and their success in self-enrolling in the Text4Baby health message program: 468 pregnant women and mothers of children under the age of 1 year completed an in-person baseline survey, including the Newest Vital Sign health literacy assessment, at 2 Metro-Atlanta Women, Infants, and Children clinics. They were asked to self-enroll in the Text4Baby message program and were later contacted by phone to see whether they had attempted to enroll in the program and whether they were successful. Of the 333 women contacted by phone to assess enrollment efforts, 21% had a high likelihood of limited literacy (a score of 0–1 on the Newest Vital Sign assessment), 48% had a chance of limited literacy (a score of 2–3), and 31% had adequate literacy (a score of 4–6). Attempting to self-enroll was not associated with health literacy ($p = .70$*), but successful enrollment was more likely with higher literacy (*$p = .01$*). Results suggested a positive association between health literacy skills and successful self-enrollment in the Text4Baby program, which suggests the need for additional outreach efforts to assure enrollment by women with low health literacy skills.*

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Mobile phones have the potential to play a significant role in health care by delivering information directly to those who need it most. Text messaging can deliver the right health information at the right time and can be particularly helpful in reaching underserved populations. Nearly 90% of Americans have mobile phones (Harris Interactive, n.d.), and those with incomes of less than $30,000 use mobile phones more than the Internet (Pew Internet and American Life Project, n.d.). More than 1.5 trillion Short Message Service (SMS) text messages were sent in the United States last year alone (CTIA, 2009). Text messaging is also disproportionately higher among women of childbearing age and minority populations who face higher infant mortality rates (CTIA, 2009).

The use of mobile phones represents an enormous and untapped source for delivering vital health information that can be concise and actionable and ultimately lead to improving individuals' health. Studies from other countries demonstrate the ability of mobile phone-related health services to help change patient behavior and improve health outcomes. For example, mobile phone health applications (mHealth) can help smokers quit (Haug, Meyer, Schorr, Bauer, & Ulrich, 2009; Rodgers et al., 2005), help HIV/AIDS patients adhere to treatments (Wessels, Nattrass, & Rivett, 2007), and help diabetics manage their disease (Franklin, Greene, Waller, Greene, & Pagliari, 2008; Wangberg, Arsand, & Andersson, 2006). A review article suggests that SMS text message–delivered interventions have positive short-term behavioral outcomes (Fjeldsoe, Marshall, & Miller, 2009). Recently, mHealth has been described as a health-literate intervention because content can be concise, clear, actionable, and created to align with literacy skills of the intended users (Parker, Dmitrieva, Frolov, & Gazmararian, 2012). To date, there have not been any studies examining the use of text message interventions targeting maternal and child health outcomes or with underserved populations in the United States. Likewise, there are no published studies looking at how health literacy relates to enrollment in a broad-scaled mHealth initiative.

On February 4, 2010, Text4Baby (http://www.Text4Baby.org) was launched through a public-private partnership that included government, corporations, academic institutions, professional associations, tribal agencies, and nonprofit organizations. The mobile health platform was provided by Voxiva, and free messaging services for 2 years was provided by participating wireless service providers. Because of this commitment, Text4Baby was the first ever free mobile health information service in the United States, and it was recognized as having great potential to reach an enormous audience. One week after the White House Office of New Media launch of Text4Baby, more than 10,000 participants were registered from all 50 states, and enrollment for the program continues to grow rapidly. As of January 13, 2012, there are 270,000 Text4Baby enrollees.

Text4Baby was conceived and developed as an innovative model for reaching and engaging the broadest possible cross section of pregnant women and new mothers. With Text4Baby, a woman can receive critical information to encourage healthy habits and behaviors for her and her baby. Participants receive three free SMS text messages each week about key prenatal and postpartum health behaviors (for pregnant women and new mothers, respectively).

Health literacy as defined by The Patient Protection and Affordable Care Act of 2010, Title V, is "the degree to which an individual has the capacity to obtain, communicate, process, and understand basic health information and services to make appropriate health decisions" (Centers for Disease Control and Prevention, n.d.). Recent reports from the Institute of Medicine and the American Medical Association

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suggest that up to one half of the American population have low health literacy that may affect their ability to read and interpret health information (Nielsen-Bohlman, Panzer, & Kindig, 2004).

Text4Baby acknowledged the prevalence of limited health literacy and its association with excess costs, higher mortality, and negative health outcomes such as less use of preventive care. Text4Baby embraced the lessons of a health-literate approach to recruit and engage underserved populations and instill healthy habits. During SMS message development, the Healthy Mothers, Healthy Babies Coalition engaged health literacy experts who worked with pregnant and postpartum women to ensure that message content was clear, understandable, and actionable by mothers of all literacy levels. Early rollout showed impressive recruitment using numerous channels, and it included MTV as the media sponsor.

Although Text4Baby messages were designed for all literacy levels, there remains concern whether literacy level affects the ability to enroll to receive these messages. In this article, we examine whether lower health literacy is associated with reduced enrollment success.

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Methods

Setting

The Text4Baby evaluation was conducted in two Women, Infants, and Children (WIC) Clinics in Metro Atlanta.

Recruitment

The evaluation team gained permission from supervisors at each clinic to recruit participants. Members of the study team recruited women for the study from the mandatory nutrition classes by distributing to women a numbered piece of paper when they entered the classroom. At the completion of the class, the dietitian introduced the member of the study team and allowed her to explain the study. The study team, based on having assessed how many of the women she had time to interview, made a predetermined random selection of the women based on the numbered slips of paper. If the class was small, the study team would approach all participants in the room. Selected women, if agreeable, were given a 6-question screener to determine eligibility for the study. Women were eligible for the study if they had all of the following characteristics: (a) they were the biological mothers of children under the age of 10 months or they were currently pregnant, (b) they had a working cell phone, (c) they could receive text messages, (d) they had not been enrolled in Text4Baby previously, and (e) they spoke English. A research assistant briefed women who were eligible for the study on the terms of participation, including receiving text messages and incentives for their participation. Women interested in participating completed both Emory informed consent and Health Insurance Portability and Accountability Act agreement forms with the researcher. To account for varying literacy levels among participants, all documents were read out loud.

Baseline Survey

After consenting, participants received an orally administered pregnant or postpartum version of the survey, taking approximately 10 minutes to complete. Items on the

survey included demographics, knowledge of pregnant/postpartum information, current practices in pregnancy or with child rearing, and a health literacy assessment. The Newest Vital Sign (NVS) instrument was used to assess the health literacy skills of respondents (Weiss et al., 2005). The NVS is a 6-question screening tool used in clinical settings, and it can be completed in 3 minutes or less. The NVS is based on an ice cream nutrition label, and participants are asked to interpret and think about how they would act on the information. The NVS assessment is analyzed on the basis of a scoring rubric for the number of questions answered correctly. If a participant answers 4 to 6 questions correctly, this almost always predicts that they have adequate literacy. A score of 2 to 3 points indicates a chance of limited literacy, and a score of 0 to 1 predicts a high likelihood (50%) of limited literacy (Weiss et al., 2005). The NVS tool has been shown to have good sensitivity and specificity at predicting low literacy, and high internal consistency where participants had to have math skills and the ability to use abstract reasoning (Weiss et al., 2005).

Upon completion of the baseline survey, women provided up to two phone numbers that could be used for follow-up contact. Research assistants gave all study participants a leaflet that provided details and steps for signing themselves up to begin receiving the Text4Baby SMS messages. Women enrolling in Text4Baby SMS messages could either enroll by sending a text message to a dedicated number or enroll through a website.

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Enrollment Assessment Call

To assess Text4Baby self-enrollment status, research assistants attempted to contact women by phone starting approximately 1 week after baseline; up to several dozen attempts at contact were made over the course of several months. Once contact was made, information gathered included whether women had tried to enroll in Text4Baby, if enrollment was successful, and whether they had started to receive text messages. If the women answered that they had not signed up for messages, those who were still interested in receiving messages were enrolled by the interviewer via the Text4Baby website.

Incentives

Women were given a US$7 gift card upon completing the baseline survey and a second gift card of US$10 after completing the 1-week follow-up survey.

Analysis

For this analysis, we examined the subset of women who had both NVS scores (from the baseline survey) and the follow-up telephone contact that assessed enrollment status. Demographics and the relations between NVS and *enrollment attempted* (yes/no) and *enrollment attempted and succeeded* (yes/no) were described. To assess the possible effects of loss to follow-up on results, we compared demographic characteristics of those responding at baseline to the analysis subset. Bivariate relations were tested for statistical significance using the Rao-Scott chi-square test or an F test ($\alpha = .05$). Responses were weighted to adjust for the proportion of women selected in each nutrition class (the venue where we approached the women) and the nonresponse rate in those classes (i.e., the proportion of those approached declining to participate in the study). Thus, the values reported are estimates of what would have been seen if the

whole population of the two WIC clinics had been queried. All analyses accounted for the sample design and sample weights by employing SAS survey procedures (version 9.2, SAS Institute, Cary, NC); a finite population correction factor was applied to variance estimates.

Results

A baseline survey was administered to 468 women. A total of 333 participants had both the NVS health literacy score and completed a follow-up telephone survey, of whom 315 had no missing information on enrollment variables. The characteristics of the women contacted at follow-up were nearly identical to all who had an initial interview (not shown). Among these pregnant women and mothers of children under the age of 1 year attending two urban WIC clinics, 21% had a high likelihood of limited literacy (a score of 0–1 on NVS), 48% had a chance of limited literacy (a score of 2–3 on NVS), and 31% had adequate literacy (a score of 4–6 on NVS; see Table 1). The average age was 26.4 years, 43% had some college education, 91% were Black/non-Hispanic African American, 60% had never married and were not currently living with a partner, 43% were employed at least part time, 56% had a household income of less than $10,000, and 61% had households of one to three members.

Those with a higher level of health literacy were more likely to be modestly older (literacy level 0–1, 26.2 years; 2–3, 25.5 years; 4–6, 27.9 years; $p < .0009$), to have completed some college (0–1, 15%; 2–3, 38%; 4–6, 69%; $p < .0001$), be currently employed or a student (0–1, 34%; 2–3, 53%; 4–6, 67%; $p = .0282$), and tended to have a household income over $20,000 (0–1, 12%; 2–3, 16%; 4–6, 29%; $p = .0002$). Health literacy was not significantly associated with race/ethnicity, marital status, or household size.

Overall, 52% of women attempted to enroll themselves through the website or by texting in the Text4Baby program (Table 2). Of those attempting to enroll, 68% were successful. Attempting to enroll was not associated with health literacy level ($p = .7005$); however, successful attempts were more likely with increasing NVS scores (0–1, 58%; 2–3, 69%; 4–6, 78%; $p = .0120$).

Discussion

In this small study at two Metro-Atlanta WIC clinics, we found evidence that those with good health literacy skills were more likely to successfully self-enroll in the Text4Baby program. Overall, most women who attempted enrollment successfully completed it. However, successful enrollment was achieved only about half the time among women with low-health literacy (NVS score 0–1); approximately three quarters of the women with the highest literacy scores successfully completed enrollment. These results suggest that the skill level needed for navigating enrollment is most challenging for the segment of women most in need of the health messages. This is particularly concerning considering that, in general, mHealth message programs especially target underserved, less literate populations. Future research is needed to determine what is needed to help individuals with lower health literacy skills navigate mHealth initiatives, which can also assist with slowing the progression of the growing digital divide in the United States.

The primary limitation of this study is that the women were sampled from the population of two WIC clinics in a single metropolitan area; results may therefore not apply to other demographics, such as rural residents or those with greater financial

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Table 1. Demographics and their association with health literacy among participants responding to the survey assessing Text4Baby self-enrollment

			Newest Vital Sign score[a]			
	Overall ($N = 333$)		0–1 $n = 67$ (21%)	2–3 $n = 165$ (48%)	4–6 $n = 101$ (31%)	
	N^b	Weighted percentage[c] or M (95% CI)	Weighted percentage or M (95% CI)	Weighted percentage or M (95% CI)	Weighted percentage or M (95% CI)	p
Age in years	329	26.4 (26.0, 26.7)	26.3 (25.1, 27.4)	25.5 (25.1, 25.9)	27.8 (27.3, 28.4)	.0009
Education						<.0001
Less than high school	38	11	24	11	2	
High school or vocational training	151	47	61	52	29	
College and above	144	43	15	38	69	
Race/ethnicity						.4535
Black/African American, non-Hispanic	302	91	88	94	89	
Other	230	9	12	6	11	

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Marital status						.0816
Single or never married	196	60	66	64	50	
Living with a partner or married	113	31	29	30	33	
Separated, divorced, or widowed	24	9	5	6	17	
Employment status						.0282
Employed	143	43	28	43	54	
Unemployed	153	46	64	47	33	
Student	36	11	8	10	13	
Household income						.0002
Less than $10,000	174	56	71	65	34	
$10,001 to $20,000	77	24	18	19	37	
More than $20,000	60	19	12	16	29	
Number of people in household supported by this income						.8991
1–3 people	199	61	58	62	61	
4–5 people	102	30	35	29	29	
More than 5 people	32	9	7	10	10	

[a]Based on number of Newest Vital Sign questions answered correctly (http://pilot.train.hrsa.gov/uhc/pdf/module_02_job_aid_vital_sign.pdf).
[b]Missing *n*: age, 4; race/ethnicity, 1; employment status, 1; household income, 22.
[c]Weighted to reflect the population sampled; percentages may not add to 100 because of rounding.

Table 2. Status of self-enrollment stratified by Newest Vital Sign score

	n	Weighted percentage[b] (95% CI)
Self-enrollment[a] attempted	315	52 (49, 55)
Total		
Newest Vital Sign score		
0–1 (21%)	64	50 (42, 57)
2–3 (48%)	154	50 (46, 54)
4–6 (31%)	97	56 (50, 61)
		$p = .7005$
Attempted and succeeded		
Total	158	68 (66, 70)
Newest Vital Sign score		
0–1 (20%)	31	48 (41, 55)
2–3 (46%)	73	69 (66, 73)
4–6 (34%)	54	78 (72, 83)
		$p = .0120$

[a]Eighteen people had missing information on enrollment measurements.
[b]Weighted to reflect the population sampled.

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resources. Also, the relation between health literacy and the ability to self-enroll in mHealth programs may differ among men, who were not included in this study. The loss to follow-up was about 30%, which could also bias results. In this low-income population, the sharing of phones, use of month-to-month phone contracts, and a high phone disconnection rate may have contributed to the difficulty in making phone contact with our participants. However, demographic characteristics of those who could not be contacted by telephone for follow-up were similar to those contacted and are included in the analysis (data not shown).

This study of enrollment in Text4Baby among underserved, minority women attending WIC clinics in an urban setting highlights the role of health literacy skills in successful self-enrollment. The Healthy Mothers, Healthy Babies Coalition group recognized the importance of health literacy and used lessons from health literacy to create text messages that were tested with the intended target audience in order to ensure that content was understandable, navigable, and actionable. Although extensive efforts were made to create health literate messages, additional work is needed to further examine the Text4Baby enrollment process and determine whether alternate promotional avenues may be more effective to encourage women to enroll. Specifically, women are given information about the program during a hectic WIC clinic visit, often with several children in tow. Information from our 1-week follow-up call suggested that women simply forgot to enroll or lost the enrollment directions.

Women can enroll in the Text4Baby program either online or directly from their cell phone. To date, the majority of women enrolling in Text4Baby nationwide have used their cell phone (using SMS) to register. Although the web enrollment form follows Mobile Marketing Association guidelines regarding information captured and the description of the actual program, it was not tested with consumers as a result of limited resources. Future research should be conducted that examines the enrollment process, particularly in view of the results from this study.

This study provides the first report of how health literacy skills relate to successful self-enrollment in the large, national Text4Baby program. Results can inform national U.S. efforts with Text4Baby and can also have implications for others who are exploring emerging mHealth technology and its ability to provide useful information to underserved people in the United States and in other countries. These types of evaluations are needed to understand how the application of new media and the lens of health literacy can be used to address pressing health disparities that are prevalent and costly, particularly among underserved population.

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