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Cell phone and computer use among parents visiting an urban pediatric emergency department

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Introduction:

The pediatric emergency department (PED) has been utilized as a venue to provide prevention education. In 2011 there were over 29.4 million hospital emergency department (ED) visits by children¹; estimates suggest that 58–82% of children were in need of non-urgent care.^{2,3} Children comprise about one quarter of all ED visits; about 2 in 5 children in the US receives care in an emergency department each year.^{4,5,6,7,8} Pediatric emergency departments have been successfully utilized to provide prevention education for numerous health topics via a variety of mediums.^{9,10,11,12} The American College of Emergency

Physicians has a long expressed interest in using the ED as a venue to provide injury prevention education.¹³

However, concern about utilizing web-based technology has been expressed because of known disparities in computer ownership by economic strata. Computer ownership and Internet access is lower among those with lower household income. According to the 2013 PEW foundation survey of broadband Internet access it is estimated that 70% of Americans have broadband access in their home with access varying by race and economic strata.¹⁴ Though disparities in home based Internet exist, disparities in Internet access overall are diminishing rapidly as groups that historically had low Internet access, such as minorities and those with low household income, are more commonly reporting an Internet-enabled mobile device as their primary source of Internet access.¹⁵ Growth of smart phone ownership has occurred across the economic spectrum.¹⁴ Despite this increase, only 31% of those earning under \$30,000 report smartphone ownership, compared to 68% in those with household income above \$75,000.¹⁶ Although technology use has been generally established in low-income populations, it remains important to understand the technology use behaviors specifically of a PED population. The PED has been proven to be a place to distribute health information and program planners need to understand the technology patterns of this population to develop interventions that stay current with the technological access.

As technology continues to expand and educators build more programs for Internet and mobile phone platforms, the need to better understand low-income families' technology access and preferences is of growing importance. In preparation for a randomized trial aimed at improving safety behaviors among low income, urban families, we assessed cell phone and computer usage, and preferences for receipt of health promotion materials among parents recruited from two PED. The objective of this study was to understand the technology use and preferences for a sample of families visiting a PED. In preparation for a larger randomized of a smart phone intervention we surveyed parents in order to determine feasibility and preference for receipt of health education messages via text messaging, smart phone and email. Though previous work has described cell phone ownership in low-income populations, we believe this is the first study to report specifically on smart phone ownership in a low income population.

Materials and Methods

We visited two Pediatric Emergency Departments in Baltimore, MD and Little Rock, AR during the hours likely to have a high volume of patients; generally between 3–7PM. These two emergency departments were chosen for the larger randomized trial because they provide both urban and rural participants.

Data Collection:

A convenience sample of parents of children 8 years old or younger were invited to complete a self-administered survey in the waiting area. The survey was developed by the study team and offered in English and Spanish. The four page survey consisted of questions about cell phone and computer access and use, preferences for delivery of health information, and basic demographics. Parents were asked to report on all locations where

they accessed the Internet. No identifying information was collected, and parents were not compensated for participation. The survey intended as formative work for the larger parent study was piloted with the target population but not validated. These methods were approved by the Institutional Review Board at the Johns Hopkins School of Public Health and the University of Arkansas Medical Sciences.

Data Analysis:

Descriptive frequencies were calculated for demographics, cell phone and computer access and use, and preferences for delivery of health information. Chi-square analysis was used to examine differences between hospitals. A generalized McNemar's test was performed to examine differences in email and Internet use between users of cell phones and computers because these are dependent categorical data.¹⁷ All analyses were conducted in SAS 9.2 (SAS Institute, 2008, Cary, NC).¹⁸

Results:

Two hundred thirty-eight surveys were completed. Respondents were primarily female (83%), less than 35 years old (74%), and had at least a high school diploma or GED (94%). Forty-three percent were employed full time. Parents from the two sites were comparable on the characteristics assessed, with the exception of race and employment where the distributions differed. (Table 1) None of the remaining results differed by site, so data are reported for the two sites combined.

The vast majority (96%) of respondents reported owning a cell phone. Among those reporting the type of cell phone, 88% reported owning a smart phone. Android and iPhone were the most popular brands (45% and 32%, respectively) among smart phone owners (Table 2). Almost all (95%) participants reported Internet use (Table 3). Over half (63%) of respondents reported having computer Internet access at home; 31% reported having Internet access at work. Of cell phone owners, 92% reported daily text messaging activity (Table 4).

Patterns of behavior emerged for both cell phone and computer use (Table 4). Respondents were more likely to check their email daily through their smart phone rather than their computer (75% vs 50%, $p < 0.0001$). Similarly, accessing the Internet daily was more likely to occur via smart phone compared to computer (78% vs 67%, $p = 0.002$).

Parents were asked their preference for being contacted by an injury prevention program about child safety. Email (35%) and text messages (26%) were the most popular choices, but mail (16%) and voice message (3%) were also endorsed by parents. 19% of parents selected multiple options (data not shown).

Discussion:

In our convenience sample of parents visiting the PED, there was both high access to technology and high usage of technology, although previous literature has demonstrated this population to have low-income.¹⁹

Among cell phone owners, most respondents reported owning a smart phone, and also that they use their cell phone more often than a computer to access the Internet and to check their email. Having computer access and the ability to access the Internet from home was also common among our sample. Previous studies which reported on the utilization of cell phones to interact with patients have reported on the use of text messaging.^{20,21,22,23} Previous work has not been reported specifically on the use of smart phone technology, which provides additional capacity beyond text messaging to deliver health education through the use of apps and an Internet connection.

Earlier studies have identified the use of technology as strategy to help busy clinicians deliver important counseling and health promotion information to their patients.^{19,24} As the availability and utilization of technology continues to grow, it is important to have an understanding of its role in health promotion and preventive medicine. A growing number of interventions have used technology to improve child health outcomes and behavior^{9,10,11,12}. Technology-based interventions make use of a variety of tools such as interactive web-sites, text-message reminders and smart phone apps. These interventions have produced mixed results, for example, in a randomized trial of text messaging to improve adherence to the childhood immunization schedule, there were no statistically significant differences between the group receiving text messages reminders and the group receiving postcard reminders.²⁵ However, another study found that text messaging increased the receipt of meningococcal, tetanus–diphtheria–acellular pertussis and Haemophilus influenzae B immunizations.²⁶ Text message reminders to promote vaccinating for human papillomavirus and influenza have also yielded significantly higher rates of vaccination in children of parents receiving text message reminders.^{27,28}

The availability of text messaging on nearly all cell phones shows great promise to reach low-income audiences. Text4Baby, a free text-message service that delivers information about maternal and child health topics, has been found to be widely accepted among low-income pregnant and mothering women in the United States.^{20,21,22} In 2013, 468 pregnant and postpartum women were given instructions on enrolling into the Text4Baby program in order to assess the enrollment process and reception of the cell phone program. Of those 468 women, 82% had a household income of less than \$20,000. 351 mothers completed the one-month follow-up and 162 of those mothers were able to successfully self-enroll into the program on their own personal cell phones.²² Another text messaging intervention, TExT-MED, was successful in improving medication adherence and reducing emergency department utilization at the Los Angeles County Hospital of the University of Southern California. This ED serves more than 170,000 resource-poor families annually. Participants were eligible to participate if they had a cell phone and the ability to receive text messages. 128 individuals enrolled into the study, and the majority reported that they found the program to be useful.²³ Despite the successes of these text message based programs in appealing to low income families, we could find no example of smartphone based programs specifically designed to reach low income families.

These results have implications for health interventions and programs that rely on technology to deliver educational information, appointment reminders, and/or other health information. Those aiming to provide caregivers with health information should consider

allowing the use of multiple formats for the delivery of this information. Multiple formats of receiving health information were available to the majority of the families in our study, and they reported a variety of preferences for accessing health information. Despite the ubiquity of smart phone ownership, respondents reported a preference for receiving health information via email rather than text message, though they were more likely to check their email with their smart phone rather than a computer. Respondents also reported that they were more likely to use their smart phones to access the Internet on a daily basis. Smart phones are prevalent among low-income families, and utilizing their capacity for mobile apps and text messaging may be suitable for health interventions targeting underserved populations that are accessing health care settings. Furthermore, it may be more effective to use cell phone based interventions rather than computer based interventions.

Our data are limited by being both self-reported and obtained through a convenience sample. It is therefore unclear to what extent our results are generalizable and accurate. Additionally our assumption that our sample represents a low-income population is based on our previous work with the populations rather than specific reporting by our convenience sample. Despite these limitations, we feel that our results can be useful for health educators and clinical providers who are considering utilizing technology to reach their population. Additional consideration must be given to programs relying on text messaging, as some cell phone owners may incur additional charges for the receipt of text messages. Similarly those considering interventions involving email messages need to be aware of the accessibility of Internet access in the homes of their target audiences and/or the availability of free Wi-Fi in public spaces. Interventions with the flexibility of reaching their target audiences through multiple formats (texting, email etc) should be considered as a choice of delivery method that may provide the best opportunities to reach the greatest percentage of any given population. A further limitation of the study is that we neglected to ask participants about the consistency of their cell phone service. Families who struggle financially may not have constant access to cell phone service, which would limit the reliability of interventions relying on families' initial reports of cell phone access.

More research is needed on current practices in the use of mobile technology to reach parents and caregivers. Once this is established, best practices from the field, as well as lessons learned through formal studies, can be integrated to ensure that healthcare providers are making the best possible use of mobile technology.

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Table 1.

Demographic characteristics of sample of 238 adults in Little Rock, AK and Baltimore, MD

	Arkansas (N=144)	Maryland (N=94)	Total (N=238)	Chi Square P value
	N (%)	N (%)	N (%)	
Sex *				0.56
Male	22 (15.7)	15 (18.8)	37 (16.8)	
Female	118 (84.3)	65 (81.3)	183 (83.2)	
Age *				0.99
<25 years	45 (31.5)	28 (31.8)	73 (31.6)	
25–34 years	61 (42.7)	36 (40.9)	97 (42.0)	
35–44 years	27 (18.9)	17 (19.3)	44 (19.0)	
>45 years	10 (7.0)	7 (8.0)	17 (7.4)	
Race *				<0.01
African American/Black	50 (35.0)	60 (70.6)	110 (48.2)	
White	75 (52.5)	15 (17.7)	90 (39.5)	
Hispanic	13 (9.1)	3 (3.5)	16 (7.0)	
Other	5 (3.5)	7 (8.2)	12 (5.3)	
Language				
English	137 (95.1)	90 (95.7)	227 (95.4)	0.83
Spanish	7 (4.9)	4 (4.3)	11 (4.6)	
Education *				0.31
Less than High School	5 (3.5)	8 (9.2)	13 (5.7)	
High School (GED)	65 (46.1)	35 (40.2)	100 (43.9)	
More than High School	46 (32.6)	30 (34.5)	76 (33.3)	
College or more	25 (17.7)	14 (16.1)	39 (17.1)	
Employment *				<0.01
Full time	64 (44.4)	34 (39.5)	98 (42.6)	
Part time	13 (9.0)	23 (26.7)	36 (15.7)	
Unemployed	67 (46.5)	29 (33.7)	96 (41.7)	

* Of 238 participants, 18 omitted responses for sex, 7 for age, 10 for race, 10 for education, and 8 for employment.

Table 2.

Cell Phone Ownership Among 223 Respondents *

Type of Phone	N (%)
Android	84 (37.7)
iPhone	60 (26.9)
Other smart phone	26 (11.7)
Smart phone (brand not given)	18 (8.1)
Non-smart phone	25 (11.2)
No cell phone	10 (4.5)
Total	223 (100)

* 3 participants did not report if they owned a cell phone; 12 participants indicated that they owned cell phones but did not provide information regarding type of phone

Table 3.

Reported location to access internet via computer among N=231 respondents *

	N(%)
I don't use the internet	11 (4.7%)
Location used to access Internet	
Home	146 (63.2%)
Work	71 (30.7%)
On Phone	95 (41.1%)
School	17 (7.4%)
Library	40 (17.3%)
Other	19 (8.2%)

*
7 respondents omitted responses.

**
Multiple choices were possible for this questions

Table 4.**Cell and Computer Use Phone Use**

	Among N=225 Cell Phone Owners	Among N=238 Computer Users	McNemar's test
	N (%)	N (%)	
Send or get text messages *			
Daily	194 (91.5)		
Weekly	6 (2.8)		
Monthly	2 (0.9)		
Rarely	8 (3.8)		
Never	2 (0.9)		
Use computer for any reason *			
Daily		158 (70.9%)	
Weekly		33 (14.8%)	
Monthly		8 (3.6%)	
Rarely		20 (9.0%)	
Never		4 (1.8%)	
Send or get email messages *			
Daily	158 (74.9)	110(50.0)	p<0.001
Weekly	7 (3.3)	39(17.7)	
Monthly	5 (2.4)	11(5.0)	
Rarely	10 (4.7)	34(15.5)	
Never	31 (14.7)	26(11.8)	
Access the internet *			
Daily	165 (78.2)	147(66.5)	p=0.002
Weekly	12 (5.7)	29(13.1)	
Monthly	5 (2.4)	11(5.0)	
Rarely	11 (5.2)	21(9.5)	
Never	18 (8.5)	13(5.9)	

* 13 participants omitted information on using a cell phone to send or receive text messages, 14 on using a cell phone to send or get email messages, and 14 on using a cell phone to access the internet. 15 participants omitted information on general computer use, 18 on use of a computer to send or get email messages, and 17 on use of a computer to access the internet.