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Pediatric injury information seeking for mothers with young children: The role of health literacy and ehealth literacy

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Abstract

Background—An understanding of preferred sources of injury information among parents is needed to develop best practices for information dissemination. Yet, almost no research examines injury information seeking for a national sample of mothers.

Methods—A cross-sectional online survey was conducted in 2013 with 1081 mothers in the United States (U.S.) with at least one child <6 years. We measured self-report health literacy with the Morris Single-Item Screener (18% low), and eHealth literacy using the eHEALS (28% low).

Results—The internet was the most preferred source for injury information (76%), followed by health providers (44%), and family/friends (35%). Most mothers selected the internet as the first choice for information about bicycle helmets (65%) and car seats (63%). For poison prevention, preferences were mixed; 48% internet compared with 41% health providers. Mothers with low health literacy were more likely to have discussed injury prevention with their doctors ($P = 0.022$) and searched for injury information ($P = 0.001$), but less likely to report the internet as a top source ($P < .0001$). Mothers with low eHealth literacy were less likely to search for injury

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information ($P < 0.0001$) and report the internet as a top source ($P < 0.0001$), and slightly more likely to rely on health providers for information ($P = 0.028$).

Conclusions—Findings suggest the internet is a common source of injury prevention information, but health providers remain a valuable resource for mothers, especially those with lower literacy skills. Despite widespread internet use, health providers should be sure to communicate injury prevention information to mothers, especially those at risk for low health literacy and eHealth literacy.

Keywords

Child; Ehealth; Health literacy; Health providers; Injury; Internet; Media; Mothers

Introduction

Injuries are the leading cause of death in the United States (U.S.) among persons aged 1–19 years, and account for 37% of all deaths within this age group as of 2009.¹ Motor vehicle or traffic related deaths are the most common, followed by suffocation, drowning, and poisoning. Lack of parental knowledge about injury hazards and prevention practices are important factors related to failure to utilize recommended strategies.² Research is continually identifying new injury hazards and prevention methods for parents to adopt, but dissemination often focuses on academic literature as opposed to publicly accessible information sources. Dissemination via traditional and new media is a potentially powerful mechanism for providing information to the general public.³

Understanding where parents seek injury information is necessary to determine the best ways to disseminate injury prevention information to parents. A number of studies have examined general health information sources among parents,^{4–9} but few articles focus on injury information. In a qualitative study of 32 fathers of children aged 2–6, fathers noted the internet as their most frequent source of information on child safety, and also referred to the importance of published resources, community organizations, and access to personal connections.¹⁰ Specific to poisoning, one study found 39% of parents were likely to use the internet in a poisoning scenario.¹¹ Another study of 121 parents in Australia examined information sources used prior to bringing a child to an emergency department during a poisoning event; top mentioned sources were poison information centers, the emergency department, and a doctor's office.¹² While providing important findings, small sample sizes and in some cases a focus solely on poisoning are limitations of this prior work.

It is equally important to identify whether skills related to health information seeking, health literacy and eHealth literacy are associated with source preferences, especially because health literacy is associated with health disparities for parents.¹³ Health literacy has been defined as 'the degree to which individuals can obtain, process, understand, and communicate about health-related information needed to make informed health decisions'.¹⁴ eHealth literacy is similar, but has a focus on electronic communication; it is considered to be 'the ability to seek, find, understand, and appraise health information from electronic sources and apply the knowledge gained to addressing or solving a health problem'.¹⁵ While both are important for seeking and understanding injury information, and applying

recommendations, little is known about how these skills may impact injury information seeking and understanding. One study of caregivers recruited from pediatric clinics found that those with low health literacy were less likely to follow recommended injury prevention guidelines for car seat position,¹⁶ but did not examine information seeking.

No research has studied injury information preferences for a national sample, or how health literacy and eHealth literacy skills may impact information source preferences. In general, research about best practices for disseminating injury information to parents is limited. Because of these significant gaps in the literature, this study seeks to address the following research questions in order to inform best practices for disseminating injury prevention information to mothers.

1. What are mothers' preferences for information sources for injury prevention information? How do these preferences vary by self-report health literacy and eHealth literacy, even when controlling for demographic variables?
2. What are mothers' preferences for information sources for topics related to bicycle helmets, car safety seats, and poison prevention (among the top causes of injury deaths as noted above)? How do these preferences vary by self-report health literacy and eHealth literacy, when controlling for demographic variables?

Methods

This study uses data from a cross-sectional online survey. The study was approved by the institutional review board at the Research Institute at Nationwide Children's Hospital. We utilized quotas for age, income, race, and ethnicity to ensure our sample would be diverse and reflect the U.S. population of mothers with young children.

Survey sample

The online survey was fielded over a 22 day period in 2013 in the U.S. In order to be eligible for the study, the participants had to be at least 18 years old, female, and the mother of at least one child under the age of 6 living in their home. Panelists were recruited from an email invitation ($n = 50\,770$) sent out through Survey Sampling International (SSI) or Dynamix. A total of 4299 people clicked the link provided in the invitation. Of those, a total of 4131 panelists started the survey. Of these, 901 did not complete the eligibility questions, 838 were ineligible, 648 abandoned the survey before completion, and 167 were pilot data respondents. A total of 1537 were eligible and of these, 1081 completed the survey and are included in this analysis.

Survey questions

We asked questions to determine participant eligibility including respondent's age, whether or not the respondent was the mother of at least one child under age 6, and whether or not the child under age 6 lived in household. Participants also had to be able to successfully view a test video, as video clips were shown as part of the survey and participants were asked to answer questions in response to viewing those video clips (those data are not reported on in this paper). We asked a series of questions about media use (TV use, reading

magazines/newspapers), internet and cell phone access and use, and frequency of online activities, such as using social network sites or reading/commenting on blogs. We asked questions about preferences for health information sources in general and for specific topics, including both injury and non-injury topics, and how they share information with other mothers. We asked the following demographic questions other than those asked to determine eligibility including: number and age of all children in household, race and ethnicity, primary language spoken in the home, whether or not the respondent was born in the U.S., employment status, education, income, geographic area (i.e. urban or rural), marital status, and whether the household was a single or dual parent household.

Health literacy and eHealth literacy

Many commonly used health literacy measurement tools, such as the Newest Vital Sign,¹⁷ must be administered in-person so cannot be used in an online survey. The Morris Single-Item Literacy Screener^{18,19} has been evaluated as a single-item self-report question that does a reasonable job of detecting problems reading health information. It asks, 'How often do you need to have someone help you when you read instructions, pamphlets, or other written material from your doctor or pharmacy?' Per the scoring instructions,¹⁹ those who responded *Sometimes*, *Often*, or *Always* were classified as low self-report health literacy while those who responded *Never* or *Rarely* were classified as high self-report health literacy.

To assess eHealth literacy, we used the eHEALS scale, which uses eight self-report questions 'to measure consumers' combined knowledge, comfort, and perceived skills at finding, evaluating, and applying electronic health information to health problems'.²⁰ Response choices for the original scale used a five point Likert scale (1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Undecided*, 4 = *Agree*, 5 = *Strongly Agree*), with score totals range from eight to 40. We chose to use a frequency scale (1 = *Always*, 2 = *Often*, 3 = *Sometimes*, 4 = *Rarely*, 5 = *Never*), again with score totals ranging from eight to 40, but with the lowest score representing the highest eHealth literacy. The Cronbach's alpha coefficient for the eHEALS with this sample was 0.92, compared to 0.88 in the original study.²⁰ We grouped responses to create a low and high eHealth literacy group, similar to the health literacy measure; dichotomization of eHEALS has been used in at least one other study.²¹ We grouped respondents with a score of zero to 16 in the high eHealth literacy group (someone who chose *Always* or *Often* for all answers would fall within this range), and those with scores of 17–40 in the low eHealth literacy group.

Analysis

Select Survey International provided an SPSS data file to the study principal investigators. Data were converted into a STATA file and analyzed by using STATA 13. Chi-square tests were used to compare respondent groups, and multivariate logistic regressions to run adjusted models. Adjusted models accounted for the following variables in addition to self-report health literacy or eHealth literacy: age, race, ethnicity, geographic area, education, employment, income, household structure, and marital status. We did not adjust for U.S.-born or primary language spoken because of the lack of variation in responses to these variables.

Results

The study sample was diverse by income, race, and ethnicity as expected given the quotas used to recruit participants. For health literacy, 18% of the sample was in the low self-report health literacy group (compared to 82% in the high self-report health literacy group). For eHealth literacy, the range of scores was eight to 32 (mean = 13.7, median = 13.5). After combining scores to create groups, 28% were in the low eHealth literacy group compared to 72% in the high eHealth literacy group. Table 1 provides demographic information for the sample, and also shows the comparisons of demographics with self-report health literacy and eHealth literacy.

The respondents in our online survey were highly connected electronically; almost everyone had at least one home computer (98%) and of these, 98% had a high-speed connection. All respondents reported use of the internet (100%), which was necessary for participation in this study, and having one's own cell phone (98%), and 84% reported that their cell phone was a smartphone. Respondents were also highly engaged with social networking; 95% reported having a Facebook profile and 63% said they had a profile on another social networking site. Of note, is that despite frequent internet use, 65% reported hearing little or nothing about injury research in the media in the past month.

Over one-half of our sample (60%) reported ever having looked for injury prevention information for themselves or a family member. Even when adjusted for other demographics, those with low self-report health literacy were more likely to have looked for information (73% vs. 58%). However, respondents with low eHealth literacy were less likely to have searched for information (43% vs. 68%).

In addressing *Research Question 1*, Table 2 shows the internet was the preferred source of injury information for the majority of participants (76%). Other popular sources of information were health providers (44%), friends or family (35%), magazines (10%), television (10%), and books (7%). Less popular sources not shown in the table include health organizations (4%), and brochures (2%); newspapers, radio, people at work, and other were all 1% or less.

Just under one-half of the sample reported ever having discussed injury prevention with their child's doctor (46%). People with low self-report health literacy were more likely to report talking to a doctor about injury information compared to those while high self-report health literacy (55% vs. 44%). However, those with low eHealth literacy were less likely to have talked with a doctor (40% vs. 49%).

Comparisons of information preferences with self-report health literacy and eHealth literacy show the internet was less likely to be selected as a top preference, both for those with low self-report health literacy (63% vs. 80%) and for those with low eHealth literacy (62% vs. 80%).

In answering *Research Question 2*, Table 3 presents information on the top three information choices by topic. For bicycle helmets, most respondents selected the internet as the first choice for information (65%). This was followed by friends of family (17%), health care

providers (7%), media (including television, newspapers, magazines, or books) (5%), some other way (5%), and smartphone apps (1%). The internet was also the first choice for information about car seats (63%), followed by family or friends (14%), health care providers (13%), media (4%), some other way (5%), and smartphone apps (1%).

Information seeking about poison prevention differed slightly from the other two topics. Nearly half of the respondents chose the internet as the primary choice for information (48%). Following close behind, 41% of respondents selected health care providers as their preferred source of poison prevention information. These top choices were followed by family or friends (5%), media (3%), some other way (2%), and smartphone apps (2%).

There were few differences by health literacy and eHealth literacy for injury information preferences with one exception. EHealth literacy appeared to play a role in using the internet for information across all three topic areas. Those with lower eHealth literacy were less likely to report the internet as a first choice.

Discussion

Findings suggest that the internet may be an effective way to disseminate messages about injury prevention. Important research is regularly conducted about risk factors for pediatric injury and recommendations for injury prevention are provided. While research is often published in academic journals, it is less clear how often findings are disseminated directly to the general public, including parents of young children. Given the high reliance on the Internet as an injury information source found in this study, efforts should be made to develop best practices for injury dissemination through the Internet using channels that parents are likely to access. When considering best practices, study findings suggest information dissemination may vary by topic. Parents may prefer certain information sources for some injury topics compared to others. It is also important to consider that today's information environment has become crowded and is also much more individualized. This means it is increasingly important to understand the information sources and preferences of a target population. In addition, choice of search engine or automated search engine filtering may lead to different information obtained online across users.

Parental skills, such as numeracy, information literacy, eHealth literacy, and health literacy impact the ability to understand messages being provided, accurately assess the risk of a particular injury to their children, and make decisions about actions to take. Utilizing the internet could serve as an effective tool to disseminate this information in an effective, simple and easy to understand way. An important finding of this study is that those with lower skills prefer health providers as an information source, suggesting health providers should be considered a valuable resource for providing injury prevention information to families. Ensuring that families most at risk get access to information that they can easily understand is important for reducing health disparities. This study found mother with low eHealth literacy were more hesitant about using the internet for injury information. Finding ways to improve skills for these mothers, and disseminating information on the internet in a way that makes it easy to access and understand, are also important strategies to consider.

While this study provides important, new information to the injury field about injury information seeking, there are some limitations to address. First, the use of an online survey sample means we surveyed mothers who typically access the internet. Findings may be different for samples recruited in other ways, and future research is needed with populations who have no or low internet use. However, mothers in the U.S. have high rates of internet use in general (over 90%),²² even among low-income groups, so the use of an online sample is reasonable. Respondents could not complete the survey using a smartphone due to limitations of the survey system, and statistics show that many from low-income households solely use smartphones for internet access.²³ However, our demographics suggest that we have a reasonable inclusion of mothers from low-income groups. Another limitation is that we only surveyed mothers, as we felt that there was likely to be heterogeneity of perspectives on media use for injury prevention between parents that was beyond the scope of this study. Fathers' perspectives are, however, also important, and while some pediatric injury studies have included fathers^{24–26} or focused solely on fathers,¹⁰ most research has focused on mothers.²⁵ An important area of future work would be to look at injury information seeking among fathers, and to compare differences between mothers and fathers. Finally, we did not request information about the titles or names of specific websites or other digital tools such as smartphone applications used by mothers for information seeking. Future research should consider collecting more specific data to determine best channels for information dissemination, and to detect whether or not literacy skills are linked with quality of information sources.

Most studies of injury that have focused on media or technology are about specific interventions.^{26–30} This study represents a first look at injury information seeking across multiple sources. Future work is needed to explore parent and caregiver exposure to, understanding of, and influence of injury prevention messages on various media channels, including news sites and social media. Future work should also focus on specific populations, such as adolescent or immigrant parents. While across group differences are often considered (i.e. mothers compared to adolescents), within group differences are important to identify as well. Subgroups of mothers, such as those who mainly speak Spanish, are likely to have different information preferences. Experiments would also be useful to compare injury messages provided through different channels (Facebook, Twitter, news articles, etc.), to identify which is preferred and more likely to be understood, and to analyze content about injury in social media, as has been done with other topics.^{31–34} Finally, interventions seeking to improve skills such as health literacy or eHealth literacy may assist parents in better accessing and understanding injury prevention information.

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Biographies

Jennifer Manganello is an Associate Professor at the University at Albany School of Public Health. She is a health communication scholar who incorporates theories, concepts, and methods from the fields of public health and communication. Her research focuses on health literacy as well as the effects of media on attitudes, behaviors, and policies that put young people (children, adolescents, young adults) at risk for negative health outcomes. She has applied a broad range of skills and methodologies (quantitative, qualitative, mixed methods) to conduct both primary data collection and secondary data analysis. She has published her work in journals such as the *Journal of Health Communication*, *Archives of Pediatrics and Adolescent Medicine*, and *Public Health Nutrition*. Before starting at UAlbany, Dr Manganello was a Post-Doctoral Research Fellow at the Annenberg Public Policy Center, University of Pennsylvania, where she is currently a Distinguished Research Fellow. She earned her Ph.D. from the Department of Health Policy and Management at the Johns Hopkins Bloomberg School of Public Health.

Angela Falisi, MPH is a Fellow at the National Cancer Institute within the Health Communication and Informatics Research Branch (HCIRB). As part of this training program, Angela supports administrative and research priorities of the HCIRB. Her current areas of interest focus on health literacy, digital and mobile technology and social media, particularly how they affect health and inform innovative health education and communication strategies. In the past, Angela has held positions at the New York State Department of Health and at the University at Albany School of Public Health. She has also worked at the Skorton Center for Health Initiatives at Cornell University where she developed and delivered mental health outreach initiatives and psycho-educational alcohol intervention programs. Angela earned a Master's in Public Health (MPH) in Social Behavior and Community Health from the University at Albany, SUNY, and a Bachelor of Science in Biology and Society from Cornell University.

Kristin Roberts graduated with her Master in Public Health in 2008 after completing her Bachelor of Science in Biological Sciences at Ohio University and Master of Science from Miami University. She is currently a Research Project Coordinator in the Center for Injury Research and Policy (CIRP) at the Research Institute at Nationwide Children's Hospital. Her research focuses on child safety, home safety and behavior modification. Ms. Roberts has over 8 years of experience as a Project Director and data analyst on federally-funded projects, large dataset analysis, and similar online surveys and parent focus groups.

Dr Katherine Clegg Smith is an Associate Professor in the Department of Health, Behavior and Society in the Johns Hopkins Bloomberg School of Public Health. She is a social scientist whose research over the past decade has focused on the communication of health information, with a special concentration in communication pertaining to the prevention and treatment of chronic disease. A focal concept in Dr Smith's research agenda is the consideration of health as a social product. Much of her research involves exploration of the ways in which people come to understand health topics and their own health experiences, and the role played by various social institutions in shaping such perceptions. Dr Smith directs the Johns Hopkins University Center for Qualitative Studies in Health and Medicine; her methodological expertise includes the collection, analysis, and interpretation of qualitative and mixed methods data pertaining to health communication. She has published more than 90 research papers; her theoretical and methodological interests have led her to work on a wide variety of public health issues including (but not limited to) tobacco, diet, injury, infectious disease, cancer, alcohol, and environmental concerns.

Lara McKenzie, PhD, MA is a Principal Investigator in the Center for Injury Research and Policy at the Research Institute at Nationwide Children's Hospital and an Associate Professor in the Department of Pediatrics, College of Medicine and the Division of Epidemiology, College of Public Health at The Ohio State University. Dr McKenzie's research focuses on how to increase adoption of parent safety behaviors such as the use of carbon monoxide alarms, smoke alarms, child safety seats and booster seats to prevent and/or reduce the consequences of childhood injuries. Dr McKenzie's research also focuses on injuries associated with consumer products and sports and activity-related injuries treated in hospital emergency departments. Dr McKenzie's influence is not limited to industry

scientists and professionals. Her ease in communicating home injury hazards and solutions with parents has made her a highly sought after expert in mainstream media outlets. She has been interviewed in numerous national sources such as the New York Times, CNN, ABC, NBC, CBS, Time magazine, USA Today, The Today Show, NPR, among others.

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Table 1
 Demographics for participants, and comparison of self-report health literacy (HL) and eHealth literacy (EHL) ($n = 1081$)

	Survey sample	Low HL $n = 198$	High HL $n = 883$	HL P -value	Low EHL $n = 299$	High EHL $n = 761$	EHL P -value
<i>Age</i>				0.045			0.069
18–29	48%	54%	46%		42%	50%	
30–39	40%	38%	40%		44%	38%	
40+	13%	8%	14%		13%	12%	
<i>Race</i>				<0.0001			0.275
White	73%	67%	75%		76%	72%	
Black or African American	12%	10%	21%		9%	13%	
Asian/Pacific Islander	6%	12%	4%		5%	6%	
Other	9%	11%	9%		10%	9%	
<i>Hispanic – Yes</i>	17%	22%	16%	0.052	16%	18%	0.601
<i>Born in the U.S. – Yes</i>	91%	87%	92%	0.043	87%	92%	0.012
<i>English as Primary Language Spoken at Home – Yes</i>	98%	96%	97%	0.205	97%	98%	0.306
<i>Two-parent Household – Yes</i>	81%	77%	81%	0.181	80%	81%	0.725
<i>Married – Yes</i>	70%	68%	70%	0.437	70%	70%	.791
<i>Geographic Area</i>				0.105			.047
City/urban	33%	40%	32%		28%	36%	
Suburban	47%	43%	48%		52%	45%	
Rural	20%	17%	20%		20%	19%	
<i>Education</i>				0.008			0.355
High school or less	18%	20%	18%		21%	17%	
Vocational/some college	36%	27%	38%		34%	37%	
College graduate or higher	45%	53%	44%		45%	46%	
<i>Employment</i>				0.000			0.054
Employed	45%	57%	42%		39%	47%	
Homemaker	41%	29%	43%		46%	39%	
Other	14%	14%	15%		14%	14%	
<i>Household income</i>				0.139			0.349
Less than \$20 000	17%	16%	17%		18%	16%	

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	Survey sample	Low HL <i>n</i> = 198	High HL <i>n</i> = 883	HL <i>P</i> -value	Low EHL <i>n</i> = 299	High EHL <i>n</i> = 761	EHL <i>P</i> -value
\$20 000 to \$39 999	23%	23%	23%		24%	23%	
\$40 000 to \$59 999	19%	19%	19%		15%	21%	
\$60 000 to \$79 999	26%	21%	27%		28%	25%	
\$80 000 or more	14%	20%	12%		13%	14%	
Not sure	1%	2%	1%		1%	1%	

Note: Bold text indicates significant *P*-values.

Table 2

Injury information seeking and preferences for injury related information sources by self-report health literacy (HL) and eHealth literacy (EHL), unadjusted and adjusted

	Total n = 1081	Low HL	High HL	Unadjusted P-value	Adjusted P-value	Low EHL	High EHL	Unadjusted P-value	Adjusted P-value
<i>Discussed injury prevention with child's doctor – Yes</i>	46%	55%	44%	0.009	0.022	40%	49%	0.015	0.022
<i>Ever looked for injury prevention information for self or family – Yes</i>	60%	73%	58%	<0.0001	0.001	43%	68%	<0.0001	<0.0001
<i>Two most important ways of getting injury information (could select 2)</i>									
Internet	76%	63%	80%	<0.0001	<0.0001	62%	80%	<0.0001	<0.0001
Health providers	44%	39%	45%	0.233	0.486	53%	42%	0.022	0.028
Friends or family	35%	34%	35%	0.867	0.953	41%	34%	0.114	0.209
Magazines	10%	13%	9%	0.201	0.453	12%	10%	0.386	0.426
TV	10%	17%	9%	0.006	0.005	9%	11%	0.454	0.705
Books	7%	10%	6%	0.091	0.088	7%	7%	0.858	0.994

Note: Bold text indicates significant P-values.

Table 3

Top three information preferences for bicycle helmets, car seats, and poison prevention by self-report health literacy (HL) and eHealth literacy (EHL), unadjusted and adjusted

	Total n = 1081	Low HL	High HL	Unadjusted P-value	Adjusted P-value	Low EHL	High EHL	Unadjusted P-value	Adjusted P-value
Internet first choice for information for:									
Bicycle helmets	64%	57%	66%	0.017	0.057	61%	67%	0.077	0.060
Car seats	63%	58%	64%	0.143	0.277	59%	65%	0.060	0.028
Poison prevention	48%	47%	48%	0.867	0.940	41%	51%	0.003	0.004
Health providers first choice for information for:									
Bicycle helmets	7%	8%	7%	0.828	0.813	8%	6%	0.358	0.232
Car seats	13%	12%	13%	0.796	0.392	11%	13%	0.412	0.452
Poison prevention	41%	38%	41%	0.499	0.242	43%	39%	0.197	0.177
Family/friends first choice for information for:									
Bicycle helmets	17%	20%	17%	0.248	0.295	18%	17%	0.507	0.605
Car seats	14%	18%	14%	0.138	0.118	17%	13%	0.118	0.084
Poison prevention	5%	7%	5%	0.231	0.183	6%	4%	0.115	0.196

Note: Bold text indicates significant P-values.