

Online Health Information-seeking Behaviors and Infant Feeding Practices: A Social Cognitive Theory Perspective

Yexinyu Yang, BA
Kathryn L. Krupsky, MPH
Sarah A. Keim, PhD, MA, MS
Rebecca J. McAdams, MA, MPH
Kristin J. Roberts, MS, MPH
Lara B. McKenzie, PhD, MA, FAAHB*

Abstract

Breastfeeding benefits infants, but support is often needed to meet breastfeeding goals. Social media may help disseminate infant feeding information to caregivers. The relationship between parents' health information-seeking behaviors (HISB) on social media and infant feeding practices remains understudied. Based on social cognitive theory (SCT), parents' self-efficacy and outcome expectations are two potential factors for improving online HISB. We aimed to use SCT to describe associations between outcome expectations, self-efficacy (eHealth literacy), and online HISB across infant feeding groups among a nationally representative sample of U.S. parents. Eligible participants ($N = 580$) completed a cross-sectional online survey assessing infant feeding practices (never breastfed, only pumped, only fed-at-the-breast, and both pumped and fed-at-the-breast), self-efficacy (using eHealth literacy as a proxy), outcome expectations in online HISB, parents' online HISB on social media, and demographic information. Survey weighted linear and logistic regression models were constructed. No online activities differed by infant feeding practices. Parents who pumped only had significantly lower eHealth literacy than parents who never breastfed (adjusted $\beta = -2.63$, 95% CI: $-4.73, -0.53$). Parents who used both methods had 1.78 times greater odds of considering online tools useful for making health-related decisions (95% CI: 0.96, 3.28) and 1.49 times greater odds of considering online tools important for accessing health information (95% CI: 0.70, 3.15) than parents who never breastfed, though neither association was statistically significant. Understanding these associations between infant feeding practices and online HISB, as well as the two potential factors of parents' self-efficacy and outcome expectations, may offer implications for tailoring online social media resources to promote breastfeeding outcomes.

*Corresponding author can be reached at: Lara.McKenzie@NationwideChildrens.org

Introduction

Breastfeeding offers numerous benefits for mothers and infants (Galson, 2008; Horta et al., 2007; Kramer et al., 2008; Oddy et al., 2011). The American Academy of Pediatrics (AAP) suggests that women should exclusively breastfeed for the first six months postpartum (AAP, 2012). However, in 2017, only 84% of women in the United States

(U.S.) have ever breastfed their infants, and only 25.6% of them did so exclusively for six months, remaining below the 42.4% goal of exclusively breastfeeding for six months set by Healthy People 2030 (CDC, 2020).

Multiple factors may affect parents' breastfeeding decisions, such as maternal attitudes toward breastfeeding (Donath et al., 2003) and accessibility of breastfeeding support (Bibbins-Domingo et al., 2016).

Furthermore, the variety of infant feeding practices, such as expressing milk with a pump, add to the complexity of developing clear and accessible resources to support parents in meeting breastfeeding goals (Geraghty et al., 2013; Rasmussen & Geraghty, 2011).

Online interventions have demonstrated success in increasing breastfeeding initiation and extending breastfeeding duration in structured research settings (Cowie et al., 2011; Lau et al., 2016). However, with an increasing number of parents actively seeking breastfeeding information via social media and the Internet, more research focusing on unstructured online support is needed (Holtz et al., 2015; Tomfohrde & Reinke, 2016; Wolynn, 2012).

Health information-seeking behavior (HISB) may be beneficial during transitions to parenthood (Gibson & Hanson, 2013; Mercer, 2004). Parents' breastfeeding information-seeking qualifies as a HISB, which generally refers to information acquisition within a health context or to fulfill a health need (Johnson, 1997; Lambert & Loiselle, 2007). Previous research has shown that prenatal and postnatal women in the United States appeared to be high online health information seekers (Bernhardt & Felter, 2004). A Belgian cross-sectional study reported similar findings among first-time mothers, with breastfeeding being the number one topic among postnatal Internet searches (Slomian et al., 2017). This finding suggests the Internet and social media may be promising dissemination platforms for infant feeding resources, especially among parents demonstrating online HISB.

Online HISB can be understood through the lens of Albert Bandura's social cognitive theory (SCT). SCT explains human behaviors in terms of dynamic interactions between personal factors, behavioral factors, and environmental factors. It includes several constructs that can contribute to behavior

change amidst reciprocal determinism (Bandura, 1986b). The current study explores explicitly the value of SCT in understanding how a personal factor and a behavioral factor may contribute to the success of parents' online HISB (Figure 1). The personal factor is self-efficacy, referring to the perceived confidence in one's ability. The behavioral factor is outcome expectations, which examines the likely consequence people expect to occur as a result of their actions (Bandura, 1986a).

Because we planned to study parents' HISB performed online but needed to do so by conducting a secondary analysis, we selected the concept of electronic health (eHealth) literacy as a proxy for parents' self-efficacy in online HISB to measure parents' perceived competencies and confidence as precursors to online HISB. Designed on the foundation of SCT and self-efficacy, eHealth literacy reflects individuals' comfort and skill to access, seek, interpret, and use the health information found online (Norman & Skinner, 2006). There are two supplement questions within the eHealth literacy measure assessing respondents' self-reported interests and attitudes in engaging in online HISB (Alhuwail & Abdulsalam, 2019; Chung et al., 2018). Since outcome expectation have been proven to predict individuals' attitudes (Ajzen & Fishbein, 1980), we chose to use these supplement questions to assess parents' outcome expectations in online HISB. Parents may be motivated by outcome expectations if they hold positive attitudes towards online HISB and expect that accessing health information online would positively help them make health decisions. To understand parents' online HISB, we examined how infant feeding practices were associated with parental efficacy in online HISB, outcome expectations in online HISB, and online HISB (Figure 1 bolded pathway).

SCT further provides a possible framework to explain how parents' online

HISB may help improve parents' breastfeeding behaviors via behavioral factors and environmental factors, such as observational learning and facilitation (Figure 1). Social media may be an ideal platform for these constructs to take place. First, observational learning is commonly used to promote specific behaviors by exposing individuals to interpersonal or media display of this specific behavior (Bandura, 1986b). Online HISB on social media may expose parents to other parents' successful infant feeding experiences, engaging parents in observational learning opportunities (Holtz et al., 2015; Jin et al., 2015; Lebron et al., 2020). Second, facilitation refers to the concept that new behaviors can be facilitated by providing recourse or environmental change (Bandura, 1986b). Online HISB may encourage parents to use online resources as facilitators when they have limited resources, equipping parents with adequate infant feeding knowledge (Kornides & Kitsantas, 2013). Thus, it is theoretically compelling to study the patterns of online HISB among parents with different infant feeding practices through the lens of SCT and how SCT may further guide recommendations for improving breastfeeding outcomes (Figure 1).

The current study aims to examine associations between parents' infant feeding practices and online HISB (including outcome expectations and self-efficacy related to online HISB) among a nationally representative sample of U.S. parents who use social media and have a child younger than seven years of age, as well as to describe such associations within the framework of SCT.

Methods

Study Design and Participants

This is a secondary analysis of data from a cross-sectional study exploring parents' use of social media and childhood injury prevention knowledge (McAdams et al., in press). Participants were recruited from the Knowledge Panel, an established probability-based Internet consumer panel of U.S. adults maintained by Growth from Knowledge (GfK) Group. The panel was constructed using probability-based sampling of addresses from the U.S. Postal Service Delivery Sequence File. Eligible participants were required to: 1) be the parent or legal guardian of at least one child under seven years of age who lived with them most of the time; and 2) have used a personal Facebook, Twitter, or Instagram account at least once within the last 30 days.

Parents were recruited via emails and were compensated for completing the survey through GfK Group's incentive program. The online survey asked participants about their Internet and social media use, demographics, eHealth literacy, and infant feeding practices related to their youngest child. Survey weights accounted for non-response and were constructed to generate estimates that were nationally representative of U.S. parents of young children who use social media based on gender, age, education, race and ethnicity, household income, Census region, and urban/rural status. This study was conducted in 2018 and received approval from the Institutional Review Board at Nationwide Children's Hospital, Columbus, Ohio.

Infant Feeding Practices

Parents were asked whether the mother of the youngest child living in their household ever used a breast pump to provide breast milk to the youngest child, and whether that child was ever fed directly at the breast. We

categorized the responses as: 1) never fed-at-the-breast or fed pumped milk, 2) never fed-at-the-breast but fed pumped milk, 3) fed-at-the-breast but never fed pumped milk, or 4) both, fed-at-the-breast and fed pumped milk. We labeled the four groups as: 1) never breastfed, 2) only pumped, 3) only fed-at-the-breast, 4) both methods, respectively.

Parents' Online HISB Self-efficacy (eHealth Literacy)

Parents' eHealth literacy was used as a proxy measure to describe parents' self-efficacy in performing online HISB. We measured eHealth literacy using the 8-item eHealth Literacy Scale (eHEALS) (Norman

& Skinner, 2006). The eHEALS assesses respondents' perceived skills and comfort related to using information technology for health, and to measure fit between electronic sources and respondents. Respondents were asked to self-report their level of agreement with each item using a five-point Likert scale ("strongly agree" to "strongly disagree"). The eHEALS has demonstrated good internal consistency ($\alpha = 0.88$) and modest test-retest reliability ($r = 0.49$) for a wide range of populations and contexts (Norman & Skinner, 2006). A total eHealth literacy score is derived by summing the eight items, where a higher score represents greater self-perceived eHealth literacy (van der Vaart et al., 2011).

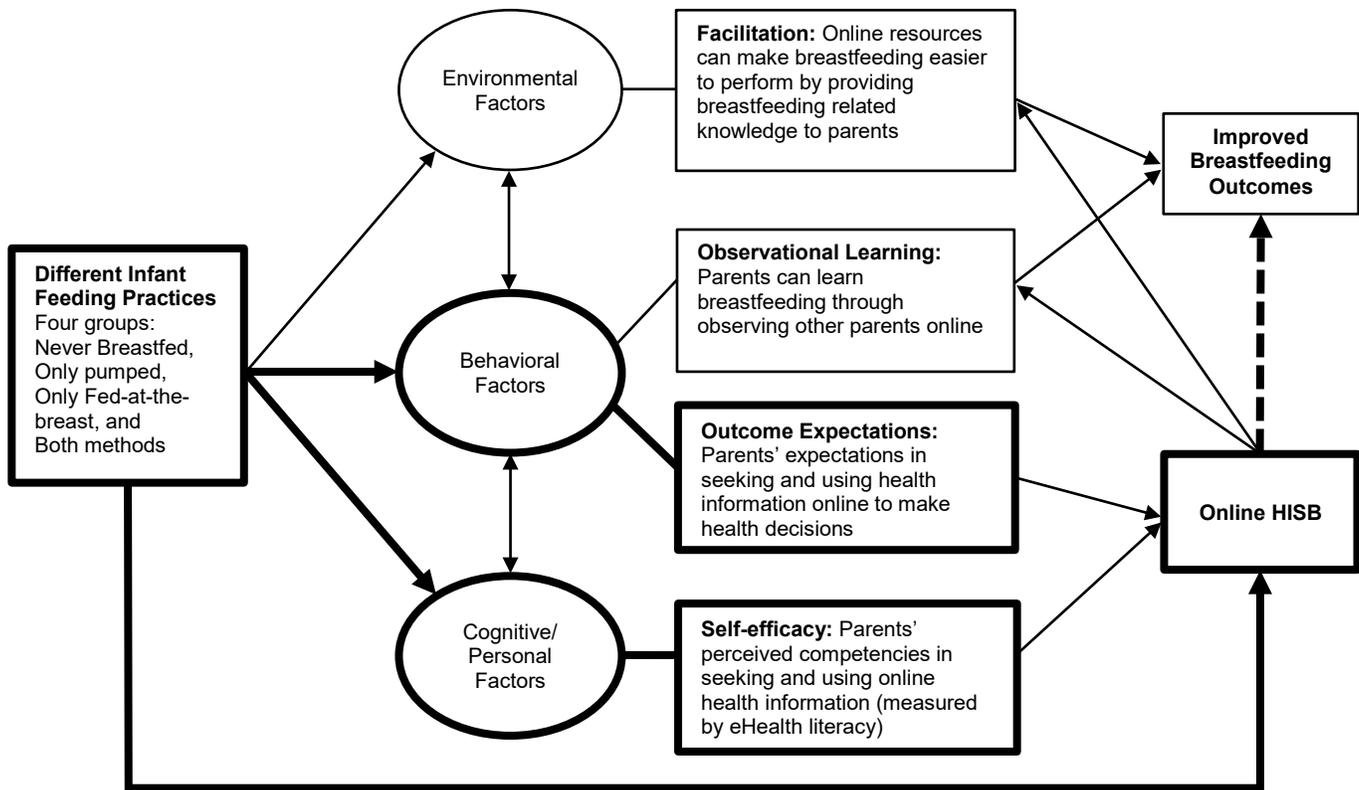


Figure 1. An adaptation of Albert Bandura's social cognitive theory (Bandura, 1986a; 1986b) to describe the associations between infant feeding practices and online health information-seeking behavior (HISB). Note. Bolded pathways refer to the three analyses we conducted in this study, including associations between infant feeding practices and outcomes expectations, associations between infant feeding practices and self-efficacy, and associations between infant feeding practices and online HISB.

Parents' Outcome Expectations in Online HISB

Two survey questions assessing parents' attitudes in online HISB were used to reflect parents' outcome expectations. The first question asked, *How useful do you feel the Internet is in helping you in making decisions about your health?* Parents responded using a five-point Likert type scale to indicate the perceived usefulness. These answers were dichotomized into "Not useful" (including "Not at all useful", "Not useful", and "Unsure") and as "useful" (including "Very useful" and "Useful"). The second question asked, *how important is it for you to be able to access health resources on the Internet?* Parents responded using a five-point Likert type scale to indicate the degree of importance. These answers were dichotomized into "Not Important" (including "Not at all important", "Not important", and "Unsure") and as "Important" (including "Very important" and "Important").

Parents' Online HISB and Other Online Activities

For online HISB, parents were asked, in the past three months, how often they: 1) *have used social media to get health-related information for their child*; and 2) *have used social media sites to gather parenting-related information*. Answers were dichotomized as "have never used" or "have used." In addition, parents were surveyed about other Internet-based behaviors thought to be related to HISB, using three questions: 1) *Thinking of your social media feeds over the past three months, have you seen breastfeeding related topics*; 2) *How much time do you spend using the Internet for personal use on a typical day (in minutes)*; and 3) *How much time do you spend using social media per week (in minutes)?* We first categorized the

continuous data collected from question two and three into quartiles, and then analyzed all three questions as categorical variables.

Demographic Information

We assessed participants' gender, race, age, educational attainment, and household income via multiple choice questions. For gender, all responses consisted of male or female. For race, because of small numbers in some racial categories, we recoded race into white, black, and other races, with missing data not accounted for in data analysis. We coded age categorically as 20-30, 31-35, 36-39, and ≥ 40 years. We coded educational attainment categorically as high school or less, some college or associate degree, bachelor's degree, and post-graduate. We coded household income categorically into $< \$40,00$, $\$40,000-74,999$, $\$75,000-124,999$ and $\geq \$125,000$. Participants' marital status was categorized as married or not married. Participants' employment status was categorized as full-time or other (including part-time, stay-at-home, student, retired, or disabled). We asked parents their youngest child's age using an open-ended question, and then coded the variable categorically into < 24 , 24-35, 36-47, 48-59, and ≥ 60 months of age.

Data analysis

Data were analyzed by using SAS 9.4 (SAS Institute Inc., Cary, NC) survey procedures and the GfK group sample weights to generate estimates that were generalizable to U.S. parents who used social media and had a child(ren) under the age of seven years. Descriptive statistics (percentages and standard errors) described the distribution of demographic characteristics overall and according to infant feeding practices. Chi-square analysis evaluated whether demographic charac-

teristics differed across four infant feeding groups. We constructed linear regression models to describe the mean difference in eHealth literacy scores across infant feeding practices. We used logistic regression models to estimate associations between our dependent variables (parents' online HISB, parents' attitudes on the perceived importance and usefulness in online HISB) and our independent variable (infant feeding practices). The variables were assigned these roles because the cross-sectional nature of the study precluded establishing a clear temporal relationship among some of the variables and because online HISB was queried for the past 3 months and so was the most proximal to the time of survey completion.

We considered respondent gender, age, educational attainment, race, marital status, employment status, household income, and youngest child's age as potential covariates based on the existing literature about the relationship between infant feeding practices and eHealth literacy (Heck et al., 2006; Jones et al., 2011; Ryan et al., 2006) (Table 1). Covariate adjusted models were developed using backwards selection to achieve parsimonious models. We removed covariates one at a time based on the largest *p*-value from the individual tests of beta coefficients. Variables remained in the model if their removal resulted in a $\geq 10\%$ change in the beta coefficients for infant feeding practices; otherwise, they were excluded from the final model.

Results

Of the 2,311 panelists invited to participate, 852 completed the survey. After excluding parents who did not have a child younger than seven years of age or who did not report using social media within the last 30 days, 580 participants who met eligibility

criteria were included in the analyses (Table 1). Educational attainment, household income, the youngest child's age, and respondent race differed according to parents' infant feeding practices.

Most parents reported having obtained a high school degree or less (34.0%), while the fewest parents reported having obtained a post-graduate degree (16.6%). The difference is more pronounced among parents who never breastfed, as 60.9% had attained a high school degree or less, while 5.8% had attained a post-graduate degree. Our sample was comprised mostly of parents who identified as white (77.4%), but the proportion of parents who were white was even greater among parents endorsing never breastfed or only pumped (86.8 and 86.0%, respectively). Families with the lowest household income made up nearly half (45.5%) of parents who never breastfed. The greatest proportion of parents endorsing both feeding practices were those who reported the highest household incomes (23.5%). Among our sample, 29.6% of parents reported having a child younger than 24 months old, with the proportion being highest among parents who used both methods (32.0%), and lowest among parents who never breastfed (21.3%).

On average, parents' eHealth literacy appeared to be slightly higher among parents who never breastfed ($M = 30.2$, $SE = .63$) and parents who used both methods ($M = 30.7$, $SE = .31$), and lower among respondents who reported either only pumped ($M = 28.1$, $SE = .88$) or only fed-at-the-breast ($M = 29.1$, $SE = .99$) (Table 2). After adjusting for confounders, the estimated mean eHealth literacy score among parents who exclusively pumped milk was 2.63 units lower (95% CI: -4.73, -0.53) than among parents who never breastfed.

Table 1

Characteristics of US Parents who Used Social Media in 2018 by Infant Feeding Practices (N = 580)

Demographic Characteristics	Overall		Never Breastfed (n = 84)		Only Pumped (n = 25)		Only Fed-at-the- breast (n = 36)		Both Methods (n = 435)		P-value
	Weighted %	(N)	Weighted %	(SE)	Weighted %	(SE)	Weighted %	(SE)	Weighted %	(SE)	
	100.0	(580)	17.6	(2.0)	4.4	(1.0)	6.6	(1.3)	71.4	(2.3)	
Gender											
Male	41.4	(214)	42.1	(6.3)	58.0	(11.0)	44.4	(10.5)	39.9	(2.8)	0.51
Female	58.6	(366)	57.9	(6.3)	42.0	(11.0)	55.6	(10.5)	60.1	(2.8)	
Educational Attainment											
High school or less	34.0	(131)	60.9	(5.8)	49.5	(11.8)	33.4	(10.8)	26.4	(2.8)	<.0001**
Some college or associate degree	26.4	(140)	20.9	(4.6)	17.9	(8.5)	26.1	(8.7)	28.3	(2.6)	
Bachelor's degree	23.1	(177)	12.4	(3.2)	12.3	(5.8)	30.2	(8.3)	25.7	(2.2)	
Post-graduate	16.6	(132)	5.8	(2.0)	20.3	(8.4)	10.3	(4.4)	19.6	(1.9)	
Age (in years)											
20-30	31.0	(141)	29.4	(6.0)	30.2	(12.4)	25.6	(9.6)	31.9	(2.8)	0.98
31-35	25.1	(166)	28.9	(5.8)	23.6	(8.9)	25.8	(7.8)	24.2	(2.3)	
36-39	22.5	(139)	17.6	(4.7)	27.3	(9.7)	29.1	(10.0)	22.8	(2.3)	
≥ 40	21.5	(134)	24.1	(5.2)	19.0	(8.5)	19.5	(6.7)	21.2	(2.2)	
Marital Status											
Married	90.8	(529)	91.8	(3.0)	96.4	(3.6)	91.8	(4.4)	90.2	(1.8)	0.74
Not married	9.2	(51)	8.2	(3.0)	3.6	(3.6)	8.2	(4.4)	9.8	(1.8)	
Employment											
Full-time	60.5	(354)	49.8	(6.4)	65.3	(10.4)	56.9	(9.6)	63.2	(2.7)	0.20
Other	39.5	(226)	50.2	(6.4)	34.7	(10.4)	43.1	(9.6)	36.8	(2.7)	

*Significance at $p < 0.05$; ** significance at $p < 0.001$

Table 1

Characteristics of US Parents who Used Social Media in 2018 by Infant Feeding Practices (N = 580) (Continued)

Demographic Characteristics	Overall		Never Breastfed (n = 84)		Only Pumped (n = 25)		Only Fed-at-the- breast (n = 36)		Used Both Methods (n = 435)		P-value
	Weighted %	(N)	Weighted %	(SE)	Weighted %	(SE)	Weighted %	(SE)	Weighted %	(SE)	
Race											
White	77.4	(484)	86.8	(4.0)	86.0	(7.7)	74.1	(8.9)	74.8	(2.7)	0.04*
Black	10.1	(39)	7.2	(3.2)	10.1	(6.8)	1.7	(1.7)	11.6	(2.7)	
Other races	10.6	(49)	4.5	(2.1)	4.0	(4.0)	22.6	(8.7)	11.5	(1.9)	
Missing	1.9	(8)	1.5	(1.5)	0.0	(0.0)	1.7	(1.7)	2.2	(1.1)	
Household Income											
< \$40,000	25.8	(124)	45.5	(6.4)	23.3	(9.2)	22.3	(7.5)	21.5	(2.5)	<0.001**
\$40,000-74,999	28.6	(153)	23.0	(5.6)	50.5	(11.7)	39.0	(10.3)	27.7	(2.6)	
\$75,000-124,999	25.9	(178)	10.0	(4.5)	20.0	(7.8)	29.3	(9.3)	27.4	(2.3)	
≥ \$125,000	19.7	(125)	11.5	(4.2)	6.3	(4.5)	9.5	(5.1)	23.5	(2.3)	
Youngest Child's Age (in months)											
< 24 months	29.6	(181)	21.3	(5.2)	24.5	(9.0)	29.7	(8.2)	32.0	(2.6)	0.04*
24-35 months	23.1	(115)	23.3	(6.3)	27.8	(12.6)	1.3	(1.3)	24.8	(2.6)	
36-47 months	13.7	(84)	9.1	(3.0)	4.0	(4.0)	19.9	(7.0)	14.9	(2.0)	
48-59 months	10.0	(56)	14.2	(3.9)	17.9	(8.2)	17.3	(8.9)	7.7	(1.5)	
≥ 60 months	20.0	(126)	26.0	(5.2)	15.2	(6.9)	24.7	(9.4)	18.4	(2.0)	
Internet for Personal/Day (in minutes)											
≤ 60 mins/day	27.3	(185)	26.7	(5.6)	28.4	(9.8)	18.2	(6.4)	28.3	(2.4)	0.37
60-120 mins/day	25.5	(150)	16.5	(3.9)	32.3	(12.5)	36.0	(10.5)	26.3	(2.5)	
120-180 mins/day	21.2	(110)	24.1	(5.6)	15.9	(7.9)	31.2	(9.3)	19.9	(2.5)	
≥ 180/day	25.9	(135)	32.8	(6.3)	23.5	(8.6)	14.7	(6.2)	25.5	(2.5)	
≤ 35.5 mins/week	25.5	(145)	15.4	(4.7)	26.5	(9.3)	34.7	(10.3)	27.1	(2.5)	0.22
35.5-98 mins/week	24.8	(149)	24.0	(5.5)	21.5	(12.7)	39.6	(9.9)	23.8	(2.3)	
98-195 mins/week	24.6	(141)	29.7	(5.8)	22.7	(9.0)	17.4	(6.5)	24.1	(2.5)	
≥ 195 mins/week	25.1	(145)	30.9	(5.9)	29.3	(9.8)	8.3	(4.2)	25.0	(2.4)	

*Significance at $p < 0.05$; ** significance at $p < 0.001$

Table 2

Parents' eHealth Literacy in 2018 by Infant Feeding Groups (N = 580)

Infant Feeding Practices	Self-efficacy for Online HISB (eHealth Literacy)				
	Mean (SE)	Unadjusted		Adjusted ^a	
		β	(95% CI)	β	(95% CI)
Never Breastfed	30.23 (0.63)	ref	-	ref	-
Only Pumped	28.10 (0.88)	-2.13	(-4.23, -0.04)*	-2.63	(-4.73, -0.53)*
Only Fed-at-the-breast	29.05 (0.99)	-1.18	(-3.46, 1.10)	-1.46	(-3.76, 0.83)
Both Methods	30.72 (0.31)	0.49	(-0.89, 1.87)	-0.14	(-1.67, 1.39)

Note. SE = standard error; CI = confidence interval; HISB = Health information-seeking behavior

^aThe adjusted β , controlled for education attainment, race, marital status, gender, and youngest child's age.

Perceptions of online tools as important or useful sources of health information showed some differences across infant feeding practices (Table 3). The majority of parents who used both feeding methods and the parents who only fed-at-the-breast indicated that being able to access health resources on the Internet is important (84% and 80.6%, respectively), as well as finding the Internet useful for making health decisions (70.3% and 60.1%, respectively). Among parents who used both feeding methods, the odds of parents who used both methods finding the Internet useful when making decisions about their health was 2.52 times (95% CI: 1.44, 4.40) that of parents who never breastfed, and the odds of parents who used both methods believing that accessing health information on the Internet was important to them were 2.35 times (95% CI: 1.27, 4.35) that of parents who never breastfed. However, after

adjusting for covariates, the odd ratios were slightly attenuated to 1.78 (95% CI: 0.96, 3.28) and 1.49 (95% CI: 0.70, 3.15), respectively, and were no longer statistically significant.

Fewer than half of the parents reported using social media for online HISB over the past three months in all four infant feeding practices, with limited evidence suggesting parents' online HISB differed according to infant feeding practices after adjusting for socio-demographics (Table 4). Parents who pumped only had the highest instances of looking for health-related information (41.4%). Parents who fed-at-the-breast only had the highest instances of looking for parent-related information (42.5%). We observed no statistically significant differences in parents' other online activities among different infant feeding practices.

Table 3

Parents' Beliefs in Using Online Resources in 2018 by Infant Feeding Practices (N = 580)

Infant Feeding Practices	Outcome Expectations for Online HISB											
	It is important for you to be able to access health resources on the Internet (yes)					The Internet is useful in helping you make decisions about your health (yes)						
	%	N	Crude OR		Adjusted OR ^a		%	N	Crude OR		Adjusted OR ^b	
			OR	(95% CI)	OR	(95% CI)			OR	(95% CI)	OR	(95% CI)
Never Breastfed	69.1	58	ref	-	ref	-	48.4	45	ref	-	ref	-
Only Pumped	60.0	18	0.67	(0.21, 2.11)	0.59	(0.19, 1.82)	47.1	16	0.95	(0.34, 2.68)	0.99	(0.33, 2.94)
Only Fed-at-the-breast	80.6	31	1.85	(0.51, 6.74)	1.32	(0.38, 4.55)	60.1	25	1.60	(0.59, 4.35)	1.14	(0.45, 2.88)
Both Methods	84.0	367	2.35	(1.27, 4.35)	1.49	(0.70, 3.15)	70.3	304	2.52	(1.44, 4.40)	1.78	(0.96, 3.28)

Note. OR = odds ratio; CI = confidence interval; HISB = Health information-seeking behavior.

^aFor adjusted OR (odds ratio), controlled for educational attainment, gender, income, and youngest child's age.

^bFor adjusted OR (odds ratio), controlled for educational attainment, gender, and youngest child's age.

Table 4

Online HISB and Other Online Activities in 2018 by Infant Feeding Practices (N = 580)

Infant Feeding Practices	Online HISB Patterns														
	Ever used social media to get health-related information over past 3 months (yes) ^a					Ever used social media to Look for parenting information over past 3 months (yes) ^b					Ever seen breastfeeding related topics on social media over past 3 months (yes) ^c				
	%	Crude OR		Adjusted OR*		%	Crude OR		Adjusted OR*		%	Crude OR		Adjusted OR*	
		OR	(95% CI)	OR	(95% CI)		OR	(95% CI)	OR	(95% CI)		OR	(95% CI)	OR	(95% CI)
Never Breastfed	31.9	ref		ref		32.1	ref		ref		31.5	ref		ref	
Only Pumped	41.4	1.51	(0.48, 4.70)	1.47	(0.36, 5.96)	35.9	1.19	(0.36, 3.87)	1.52	(0.36, 6.46)	43.6	1.68	(0.55, 5.15)	2.02	(0.53, 7.76)
Only Fed-at-the-breast	37.7	1.29	(0.48, 3.45)	0.98	(0.37, 2.56)	42.5	1.57	(0.60, 4.09)	1.02	(0.39, 2.64)	51.4	2.30	(0.87, 6.10)	1.79	(0.64, 4.98)
Both Methods	26.0	0.75	(0.41, 1.38)	0.71	(0.39, 1.30)	34.6	1.12	(0.62, 2.02)	0.95	(0.52, 1.74)	44.9	1.77	(0.98, 3.22)	1.28	(0.67, 2.44)

Note. OR = odds ratio; CI = confidence interval; HISB = Health information-seeking behavior

^aFor adjusted OR (odds ratio), controlled for youngest child’s age.

^bFor adjusted OR (odds ratio), controlled for educational attainment, gender, race, and youngest child’s age.

^cFor adjusted OR (odds ratio), controlled for gender, household income, age, and youngest child’s age.

Discussion

The World Health Organization encourages breastfeeding as a public health priority because of its long-lasting health benefits for children and mothers (Brown, 2017). Despite the ubiquity of social media and the Internet, few studies have examined how parents' online activities correlate with infant feeding practices, and even fewer have examined such relationships within a health behavior theoretical framework. This current study has described parents' online HISB in four infant feeding groups, and interpreted parents' online HISB by assessing parents' self-efficacy (eHealth literacy) and outcome expectations based on SCT.

The difference in self-efficacy we observed among the infant feeding practices points to the importance of recognizing and meeting different needs of parents with various self-efficacy levels. Parents with low self-efficacy, such as parents who only pumped, may be more receptive to websites that require lower computer proficiency. They also may benefit from page-rank strategies such as how Google highlights authoritative knowledge at the top of the search order (Guerra-Reyes et al., 2016). Parents with higher self-efficacy in online HISB, such as the parents who never breastfed, may benefit from more exposure to other parents' infant feeding experiences on social media, to feel encouraged to initiate or continue feeding practices.

A previous mixed-methods study surveyed 92 disadvantaged U.S. mothers and found their eHealth literacy positively correlated with the amount of online health-seeking practices they had engaged in over the past 12 months (Guendelman et al., 2017). In contrast, we found differences in eHealth literacy, but not in online HISB, among infant feeding groups. This may be because all participants in the current study are regular social media users. Another possible

explanation for the differences between our study and the previous study is outcome expectations. While most parents who only fed-at-the-breast or used both feeding methods reported positive attitudes in conducting online HISB, fewer than half the parents who never breastfed considered online health information useful. Although parents who never breastfed feel confident in their capability of seeking and using health information online, they may not be interested in online HISB. Additionally, parents who used both methods have the highest chances of considering the Internet useful and important for accessing health resources, indicating positive outcome expectations may help parents obtain support for both feeding methods.

Although a growing number of parents are choosing to breastfeed without feeding at-the-breast, the current study is the first to examine parents' online activities according to different infant feeding practices, adding to the strength of the current study (Keim et al., 2017). According to SCT, pump-only parents' lowest self-efficacy and relatively negative outcome expectations in online HISB would turn them away from online HISB. However, our finding showed pumped-only parents engaged in HISB as frequently as parents using other infant feeding practices. One probable reason for the pumped-only parents engaging in online HISB is their lack of in-person support from healthcare providers (Kraschnewski et al., 2014). Given their lower self-efficacy, the pump-only group may have found skills such as positioning, latch-on, and effective suckling difficult to achieve from online instructions (Colaceci et al., 2020; Graffy & Taylor, 2005; Tarrant et al., 2014). Additionally, the Affordable Care Act mandated all insurance providers cover a pump, potentially encouraging parents with limited resources to obtain a pump and to feed their children pumped milk (Hawkins et al., 2015; Kapinos et al., 2017). Lack of

professional support may become a barrier for parents with limited resources when they attempt to feed their infants (Sikorski et al., 2003). In SCT, the idea of facilitation suggests new behaviors are easier to perform when provided with tools and resources. Online resources like social media may play a facilitating role in providing tools and information to support parents to feed their children either at the breast or via a pump.

The findings regarding parents' other online activities suggested the value of observational learning in promoting breastfeeding outcomes. Social media has been found to effectively support mothers in initiating breastfeeding by sharing personal experiences, which provides observational learning opportunities (Black et al., 2020; Bridges, 2016; Skelton et al., 2008). In the current study, parents who never breastfed reported spending more time on social media weekly than parents using other infant feeding practices on average. However, they may not have many observational learning opportunities related to breastfeeding because they reported fewer instances encountering breastfeeding-related posts on social media compared to parents using other infant feeding practices. Although no significant difference was observed, this pattern still reminds us the potential of social media in providing modeling or vicarious learning to new parents.

Implications for Health Behavior Theory

By interpreting the online HISB patterns among four infant feeding groups through an SCT lens, this study offers insights into online HISB promotion strategies. For instance, healthcare providers, such as pediatricians, may be critical advocates to impact parents' outcome expectations in online HISB by helping parents see the relevance and value of online evidence-based health information (Jaks et al., 2019).

Furthermore, the current study suggests the importance of actively encouraging parents' online HISB through social media based on SCT, suggesting that online HISB could help improve breastfeeding outcomes via observational learning and facilitation. This framework may form a theoretical basis for healthcare providers, lactation consultants, and community-based breastfeeding organizations to host breastfeeding campaigns via social media platforms for new parents, allowing parents with limited resource to receive more observational learning opportunities (Bahkali et al., 2015; Marcon et al., 2019).

Since parents in various infant feeding groups presented differing eHealth literacy in online HISB, we also suggest healthcare websites or social media disseminate online resources requiring different levels of computer proficiency and usability. We hope to inspire future researchers to develop tailored online resources that support parents with all levels of self-efficacy in online HISB and meet the needs of parents utilizing specific infant feeding methods.

Limitations

First, the cross-sectional design of the current study prevented us from inferring causality or temporality between parents' online HISB and infant feeding practices. In the current study, respondents could have children up to seven years of age, leading to potentially poor recall and lack of generalizability to infants born today considering the ever-changing infant feeding practices in the United States. However, the Infant Feeding Practices Study II showed that pumping was already common in the United States in 2005-2007 (Labiner-Wolfe et al., 2008). Prior studies also demonstrated the accuracy of breastfeeding recall after many years (Li et al., 2020). Our sample included fathers, but one could reasonably expect

fathers to accurately report the basic infant feeding information on the survey even though they may not be directly involved in breastfeeding. Second, some variables may not be specific for the research questions due to the nature of the secondary analysis of existing data. For instance, not all questions on HISB were specific to breastfeeding. The specific breastfeeding questions on this national survey asked about parents' online HISB in the past three months. This period of time may not have corresponded to the actual breastfeeding time, and parents' online HISB also may have changed over time. Third, the current study did not collect data on many aspects of infant feeding practices. For instance, while differences in feeding practices are considered in the current study, we did not collect data regarding each feeding method's exclusivity. Also, we did not consider the duration of each infant feeding practice. Since infant feeding may start in hospitals and move to home settings, future research should examine whether and how the environmental transition impacts infant feeding practices.

Conclusion

Our study explored the value of SCT in explaining the associations between parents' online activities and infant feeding practices among a nationally representative sample of U.S. parents who use social media regularly and have children younger than seven years of age. Results highlight the importance of actively encouraging parents' engagement in online HISB and suggest self-efficacy and outcome expectations as two potential factors impacting online HISB based on the SCT framework. By examining the differences in parents' self-efficacy and outcome expectations for online HISB by infant feeding practices, the current study provides implications in developing and disseminating tailored online resources on social media to

support parents utilizing specific infant feeding practices. More research focusing on additional methods to encourage online HISB may represent a worthwhile investment toward achieving recommended infant feeding goals.

Discussion Question

Our findings indicate the potential of social media in encouraging parents to breastfeed via observational learning. Thus, we recommend public health sectors create and launch evidence-based informational breastfeeding campaigns on social media. What are some possible barriers for public health organizations to tailor these social media breastfeeding campaigns for parents with various self-efficacy levels? How can we overcome these barriers?

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