Does Social Support Predict Pregnant Mothers' Information Seeking Behaviors on an Educational Website?

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Abstract We examine how social support (perceived support and support from a spouse, or committed partner) may influence pregnant women's information seeking behaviors on a pregnancy website. We assess information seeking behavior among participants in a trial testing the effectiveness of a web-based intervention for appropriate gestational weight gain. Participants were pregnant women ($N = 1{,}329$) recruited from clinics and private practices in one county in the Northeast United States. We used logistic regression models to estimate the likelihood of viewing articles, blogs, frequently asked questions (FAQs), and resources on the website as a function of perceived social support, and support from a spouse or relationship partner. All models included socio-demographic controls (income, education, number of adults and children living at home, home Internet use, and race/ethnicity). Compared to single women, women who were married or in a committed relationship were more likely to information seek online by viewing articles (OR 1.95, 95 % CI [1.26–3.03]), FAQs (OR 1.64 [1.00–2.67]), and blogs (OR 1.88 [1.24–2.85]). Women who felt loved and valued (affective support) were more likely to seek information by viewing articles on the website (OR 1.19 [1.00–1.42]). While the Internet provides a space for people who have less social support to access health information, findings from this study suggest that for pregnant women, women who already had social support were most likely to seek information online. This finding has important implications for designing online systems and content to encourage pregnant women with fewer support resources to engage with content.

Keywords Spousal support · Perceived social support · Pregnancy · Online information seeking

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Introduction

Social support, including perceived and actual support from known others [1], is widely associated with positive health outcomes. Researchers argue that social support is beneficial to health because it buffers stress associated with challenging health circumstances [2, 3]. For example, in the absence of social support people suffer detriments to immune system functioning and depression [4–7]. Pregnancy is a challenging health circumstance that elicits stress, physical and psychological changes [8–10]. Social support is beneficial to a number of health outcomes during

and after pregnancy (e.g., depression, labor length and complications, and birth weight) [8, 11, 12].

An unanswered question in the literature is the mechanisms through which social support influences pregnancy outcomes. We believe one explanation is that social support provides information or encourages information seeking, which helps women manage pregnancy health. While many information sources are available to pregnant women, the Internet is an increasingly common health information resource [13–15]. Fox reported that 59 % of all US adults have looked online for health information [15]. People use the Internet to access information from sources ranging from health professionals to personal health commentaries [15]. The Internet provides access to information to meet health needs and provides opportunities to research and discuss issues that might be difficult to discuss in person [16]. Online health information sources (e.g., online health communities, blogs, health information websites like WebMD, etc.) provide people with access to information at any time of the day that would be difficult to access readily face-to-face [17].

Women increasingly use the Internet for information during pregnancy [18–20], both to acquire new information and to gain supplemental information that was unclear when provided by health care professionals [19]. This information helps women make informed decisions about pregnancy and improves their ability to communicate with health care providers [19]. Women also discuss information found online with partners [19]. Online support groups, blogs, and websites also provide pregnant women and new mothers with instrumental support (e.g., informal information sharing with mothers and formal information from health professionals) that helps them to cope with pregnancy-related struggles [21].

Women from socially disadvantaged groups (e.g., single mothers, low-income women, women from medically underserved racial/ethnic groups) may particularly benefit from pregnancy-related information online, but no study has examined whether these women are in fact seeking this information online. Existing studies have focused primarily on women of higher socioeconomic status who are married or in committed relationships [19, 21].

While women with fewer support resources could make up for this deficiency by seeking information online, evidence from single and socially disadvantaged women in Collins and colleagues' study suggests that women from these groups may be unlikely to seek out this information online. Controlling for biomedical risk factors and depression, Collins and colleagues' [8] research suggests that having supportive people in one's network predicts how proactive women are about information seeking during pregnancy. Women who were more satisfied with social support, both perceived and actual [22], initiated prenatal

care earlier than women who were less satisfied. Women who received greater amounts of informational support from people in their social network delivered babies who appeared healthier five minutes after birth (i.e., higher APGAR scores). Women with more supportive people in their network also delivered babies with higher birth weight. Collins and colleagues' findings suggest that online access to pregnancy-related information could benefit women who have greater social support resources, but such a pattern would reinforce information disparities [23–25].

In the present study we extended Collins and colleagues' [8] findings to pregnant women's online information seeking behaviors in the context of a web-based intervention designed to promote appropriate gestational weight gain. We assessed social support using *network support* (e.g., spousal or partner support) and *perceived social support* [8, 26]. Perceived social support is based on several important dimensions of social support: affective support (i.e., perception that one is loved and valued), confidant support (i.e., perception that one has people to discuss problems), and instrumental support (perception that one has help or assistance with material needs and tasks) [26]. Each conceptualization provides unique information about the effects of social support on health behaviors and pregnancy outcomes [8, 26]. Based on Collins and colleagues' [8] work, we predicted that greater network support (women who are married or in a committed relationship), and greater perceived social support, would increase likelihood of seeking pregnancy-related information online (Hypotheses 1 and 2). We also examined whether these relationships differed by education, income, race/ethnicity, home Internet use, and number of children and adults living at home.

Methods

For this study we used data from a larger experiment that explored the use of a pregnant women's website for appropriate gestational weight gain during pregnancy and for returning to pre-pregnancy weight postpartum. All participating institutional review boards approved the study procedures and participants gave written consent to participate. We analyzed data from women who completed a prenatal baseline questionnaire and used the website at least once ($n = 1{,}329$ out of 1,680 women who met inclusion criteria and enrolled).

The pregnancy website randomly assigned participants to one of three conditions: (1) a healthy weight intervention during pregnancy and postpartum, (2) a healthy weight intervention during pregnancy only, and (3) a non weight-based control. We analyzed data from the pregnancy phase, meaning that conditions 1 and 2 were functionally

equivalent for the time period studied. All participants had access to pregnancy information and features on the website, including features for gathering information and advice about pregnancy (e.g., articles, frequently asked questions (FAQs), and local resources sections), appointment calendars and reminders (e.g., prenatal vitamin and water reminders), and opportunities to share experiences with other women (e.g., blogs).[1] Intervention conditions (1 and 2) provided participants with access to additional website features for tracking and setting weight maintenance goals. This paper includes experimental condition as a control in all analyses; effects of this randomized treatment will be presented in future papers.

Participants

Participants were pregnant women planning to deliver in one county in the Northeast US who consented to the study at or before 20 weeks gestation. Eligible women were 18 to 35-years old, intended to keep their baby, read and understood English, and had a valid email address. Women who had a body mass index (BMI[2]) $\geq$35 and <18.5 were excluded. Women who had eating disorders, had previously experienced gastric bypass, suffered from medical conditions that interfere with weight, or had experienced 3 or more consecutive miscarriages were excluded.

All pregnant women who received prenatal care at the practice sites of the four county hospitals in the area and met inclusion criteria were offered enrollment. Participants were recruited from clinics, private practices, community sites, and through mailings to ensure a representation of racial/ethnic minorities that mimicked the local population. Experts in community health assisted in recruitment to ensure that the study population was representative of the local population of pregnant women. Minority recruitment was similar to 2007 proportions among the eligible sample as documented in county data from the local perinatal data system: 67 % White Non-Hispanic (present study: 72 %), 19 % Black Non-Hispanic (18 %), 9 % Hispanic (7 %), and others 5 % (3 %).

Predictors

Perceived social support was assessed using a 10-item scale [26]. Participants evaluated social support from friends and family using a 7-point likert scale, where, 1 = 'much less support than I would like' and 7 = 'as much support as I

would like'. The scale included items designed to measure affective support (i.e., being loved and valued; 'I have people who care what happens to me'), confidant support (i.e., someone is available to discuss important problems; 'I have chances to talk to someone about my personal or family problems'), and instrumental support (i.e., help with tasks and material needs; 'I have help around the house or with child care') [26]. Factorability of items was examined using a principal components factor analysis with Varimax rotation. Two main components emerged (eigen value > 1), accounting for 67.77 % of the variance. All items were clearly differentiated between two components with primary loadings exceeding 0.6 and all loadings below 0.4. Factors that emerged are labeled 'Affective support' ($M = 6.52$, $SD = 1.00$; Cronbach's $\alpha = .90$) and 'Instrumental-confidant support' ($M = 5.97$, $SD = 1.28$; Cronbach's $\alpha = .84$). Affective support items related to feeling valued and loved. Instrumental-confidant support items related to having access to people who provided material or financial support and with whom women could share problems.

Network support was operationalized as current relationship status. Response options were: single or casually dating ($n = 137$), committed relationship or engaged ($n = 288$), living in marriage-like relationship ($n = 97$), married ($n = 787$), separated ($n = 9$), divorced ($n = 3$), and widowed ($n = 0$). Eight participants did not provide relationship status. Single, separated, and divorced were combined to form a single category ($n = 149$). Committed relationship, living in a marriage-like relationship, and married were combined to form a committed relationship category ($n = 1,172$). Committed relationship participants reported that the baby's father was more supportive (married: $M = 6.86$, $SE = .03$; marriage-like relationship: $M = 6.73$, $SE = .07$; committed relationship: $M = 6.67$, $SE = .04$; combined mean: $M = 6.80$, $SE = .02$) than single participants (single: $M = 5.02$, $SE = .06$; separated: $M = 6.22$, $SE = .23$; divorced: $M = 5.33$, $SE = .41$; combined mean: $M = 5.10$, $SE = .12$), suggesting that relationship status corresponded closely with perceived partner support [comparison of combined means: $t(1,316) = 27.42$, $p < .001$]. Network support was closely related to perceived social support. Single participants reported lower levels of affective support ($M = 5.71$, $SE = .13$) and instrumental-confidant support ($M = 5.12$, $SE = .15$) than committed relationship participants [affective $M = 6.63$, $SE = .02$, $t(1,316) = 11.07$, $p < .001$; instrumental-confidant $M = 6.09$, $SE = .15$, $t(1,303) = 8.80$, $p < .05$].

Demographic controls included household income (i.e., dichotomized to indicate whether or not a participant is low-income, defined as receiving or eligible to receive PCAP (i.e., expanded Medicaid during pregnancy), which is for people at <185 % of federal poverty line), education, number of adults living at home, number of children under

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[1] The pregnancy website was developed by professional developers with extensive feedback from pregnant women using a series of intercept surveys, in-depth interviews and focus groups. A four-week usability pilot was conducted with the final website prior to data collection for this study.

[2] BMI is weight in pounds multiplied by 703 and divided by height measured in inches squared.

Table 1 Socio-demographic predictors of information seeking behavior ($N = 1{,}329$)

Socio-demographic variables	% (n)
Low income	
No	63 (838)
Yes (receiving or eligible to receive expanded Medicaid)	37 (491)
Education	
High school diploma or less	22 (286)
Some college or technical school	29 (386)
Undergraduate degree or higher	49 (653)
Number of adults in household (including self)	
One	10 (136)
Two	75 (993)
More than two	14 (182)
Relationship status	
Committed relationship	88 (1,172)
Single	11 (149)
Number of children in household (under age 18)	
None	42 (52)
One	33 (311)
Two	5 (52)
More than two	5 (47)
Home internet use	
Never	5 (70)
Less than once a week	6 (77)
A few times a week	16 (212)
Most days of the week	19 (256)
Everyday	53 (699)
Race/ethnicity	
White, Non-Hispanic or Latino	72 (890)
Black, Non- Hispanic or Latino	18 (222)
Other, Non- Hispanic or Latino	3 (36)
Hispanic or Latino	7 (88)
Perceived social support	
Affective support, M (SD)	6.52 (1.00)
Instrumental-confidant support, M (SD)	5.97 (1.28)

18 living at home, home Internet use frequency, and race/ethnicity (see Table 1).

Dependent Variables

To assess likelihood of information seeking, we gathered website activity data. We assessed viewing of FAQ (e.g., 'what foods are good sources of folic acid?'), articles (e.g., about maternal, infant health), resources (e.g., information about prenatal care providers, news articles about pregnancy), and blog entries written by other users (e.g., about nutrition, breastfeeding). The dependent variables (DVs) were four dichotomous variables: whether or not a person viewed at least one article, FAQ, resource, or blog entry.

Data Analysis

To test study hypotheses, four separate logistic regressions (one for each dichotomous DV) were used to account for the high frequency of participants not using the FAQ, article, resource, and blog entry features of the website [27]. Models included perceived affective support, perceived instrumental-confidant support, and relationship status as predictors of DVs (summarized in Table 2). All models included control variables. We additionally examined whether magnitude and direction of social support effects on information seeking differed by controls. We also tested for interactions between predictors and control variables. Participants were not required to complete all baseline questionnaire items. Thus, participants who did not complete predictor and control items were excluded from analyses using listwise deletion (final analytic $N = 1{,}275$, 95.9 % of participants).

Results

Participants in the study logged into the website 24.74 times on average ($SD = 31.95$) with a median of 17 logins. Hypothesis 1 predicted that women in a committed relationship would be more likely to seek information than single women. Controlling for education, income, race/ethnicity, number of children and adults in the household, home Internet use, and experiment arm, being in a committed relationship increased odds of seeking information for three of the four DVs ($p < .05$). The odds of a woman in a committed relationship viewing an article was 1.95 times greater; viewing a FAQ was 1.64 times greater; and viewing a blog was 1.88 times greater than a single woman. The odds of a woman in a committed relationship viewing a resource was not different from the odds of a single woman. H1 was supported for viewing articles, FAQs, and blogs, but not resources. Having network support from a committed partner positively influenced information seeking.

Hypothesis 2 predicted that women with more perceived social support would be more likely to seek information than women with less perceived support. Two factors assessed perceived support: affective and instrumental-confidant support. Affective support influenced information

Table 2 Information seeking by perceived social support, relationship status, and controls (N = 1,275)

Predictors	Article view OR (CI)	FAQ View OR (CI)	Resource view OR (CI)	Blog entry view OR (CI)
Relationship status				
Committed relationship	1.95 (1.26–3.03)**	1.64 (1.00–2.67)*	1.41 (.92–2.17)	1.88 (1.24–2.85)**
Single (Ref)				
Perceived social support				
Affective support	1.19 (1.00–1.42)*	1.13 (.96–1.35)	1.11 (.94–1.30)	1.05 (.88–1.24)
Instrumental-confidant support	.82 (.72–.94)	.86 (.77–1.00)*	.86 (.76–.98)*	.90 (.79–1.03)
Education				
High school or less	.57 (.39–.83)**	.47 (.31–.70)***	.48 (.33–.71)***	.65 (.44–.96)*
Some post high school	.82 (.61–1.12)	.86 (.63–1.15)	.76 (.56–1.02)	.79 (.58–1.07)
Undergraduate or greater (Ref)				
Low income				
No	1.24 (.91–1.69)	1.16 (.85–1.58)	1.12 (.83–1.52)	1.02 (.74–1.40)
Yes (Ref)				
Hispanic				
No	1.19 (.79–1.78)	.83 (.55–1.26)	1.11 (.75–1.65)	1.22 (.80–1.83)
Yes (Ref)				
African American				
No	1.68 (1.20–2.37)**	1.87 (1.29–2.69)**	1.28 (.91–1.79)	1.19 (.84–1.68)
Yes (Ref)				
Number children under 18	.94 (.84–1.06)	.97 (.86–1.09)	.95 (.85–1.07)	.97 (.87–1.09)
Number of adults over 18	1.01 (.89–1.16)	1.03 (.90–1.18)	1.01 (.89–1.16)	1.06 (.92–1.22)
Home internet use	1.15 (1.03–1.28)*	1.08 (.97–1.21)	1.15 (1.04–1.28)**	1.08 (.97–1.20)
Experiment Arm				
Intervention during pregnancy and postpartum	.70 (.52–.93)*	.70 (.53–.94)*	.63 (.48–.84)**	.90 (.67–1.22)
Intervention during pregnancy, control postpartum	.64 (.48–.85)**	.69 (.52–.91)*	.65 (.49–.86)**	.76 (.57–1.02)
Control (Ref)				

Cells contain adjusted OR (*OR* odds ratio) estimates and 95 % CI (*CI* confidence interval). Only significant interaction terms are included in the results depicted

FAQ frequently asked questions

* $p < .05$; ** $p < .01$; *** $p < .001$

seeking for article viewing only. As affective support increased by one unit, participants were 1.19 times *more* likely to view articles ($p < .05$). Instrumental-confidant support was a significant predictor of two of the four DVs, but influenced information seeking in the opposite direction from our prediction. As instrumental-confidant support increased by one unit, participants were 1.16 times *less* likely to view FAQs ($p < .05$) and 1.16 times *less* likely to view resources ($p < .05$). Findings partially supported H2. More positive perceptions of affective support

made women more likely to view articles. Unexpectedly, more positive perceptions of informational-confidant support made women *less* likely to view FAQs and resources.

While not the primary focus of the study, several additional variables emerged as predictors of information seeking. Participants who had more education were more likely to view articles, FAQs, resources, and blogs. Also, women who are African American were less likely to view FAQs than women who are not. As expected, experimental condition had a significant effect on article, FAQ, and resource viewing, such that women in weight management conditions viewed fewer articles, FAQs, and resources. This finding likely emerged because these conditions provided more website features to women.

Subsequent analyses (not shown in tables) revealed four significant interactions. However, these interactions did not reveal consistent patterns, and revealed small differences in the magnitude of relationships between groups, but not fundamental differences in relationships. These models did not provide evidence that effects of social support were socially patterned in any predictable way. In light of the number of tests conducted and the likelihood of 1 in 20 tests being significant at $p < .05$ by chance, it is likely that the significant interactions were chance findings.

Discussion

This study explored how network support and perceptions of social support shaped pregnant women's online information seeking behaviors. Findings supported the hypothesis that pregnant women who already have access to structural, networked social support resources were more likely to seek information online. Women in committed relationships were more likely to seek information by viewing articles, FAQs, and blog entries on a pregnant women's website.

Findings partially supported the hypothesis that women with more perceived support would be more likely to seek information online. Women with more affective support (i.e., feeling valued and loved) were more likely to view articles on the website. Results indicated that having social support contacts to discuss problems and provide material support was associated with information seeking in the opposite direction. Women with more instrumental-confidant support were less likely to view FAQs and resources.

Beyond the hypothesized findings, this research showed that education is consistently associated with information seeking online. In line with previous research on the knowledge gap and disparities in health information seeking, education influenced information seeking, such that participants who have more education were more likely to seek information [23]. Women who have at least an undergraduate education were more likely to view articles, FAQs, resources, and blogs than women with a high school education or less.

Participants' experimental condition in the larger study predicted information seeking behaviors (viewing articles, FAQs, and resources), such that women who viewed a website with more features engaged in less information seeking. This finding makes sense given that participants in these conditions had access to additional interactive weight management features (e.g., setting diet or physical activity goals, tracking weight), which may have been more engaging and left less time for information seeking. This finding is important because it suggests that websites that provide many features distribute user's attention and influence information intake.

This study provides important insights about the role that perceived affective support and network support play in pregnant women's information seeking online. Informational support is an important component of decision-making during pregnancy [8]. While scholars have argued that the online environment provides a useful space for seeking information about health issues for people who have fewer offline support resources [17], previous studies exploring Internet use by pregnant women and mothers have underrepresented single women and women of disadvantaged backgrounds [19, 21]. Overall, our research suggests that the omission of single women is problematic, since networked support played a significant role in information seeking during pregnancy. At the same time, we found few differences in the effects of social support on information seeking by socio-demographic factors.

The present study contributes to the health communication literature by suggesting the need to find better ways to engage women who have less perceived affective and network social support on pregnancy websites to help these women benefit from the health information available online [15, 18–20]. Future research should explore techniques that encourage women with fewer support resources to use pregnancy websites by offering tailored content and creating areas of websites for single women or women with low support. These women may feel that generalized content about pregnancy is less personally relevant, which may be alienating.

Our research also sheds light on how social support can be conceptualized in research studying social support, pregnancy, and information seeking [8, 19]. Network support was a predictor of online information seeking, as was perceived affective support. Most pregnant women discuss information found online with partners [19]. The presence of network and affective support may empower women, making them feel confident or motivating them to seek out information online. Partners, who are invested in the health of baby and mother, may also encourage women to seek information.

Interestingly, higher levels of perceived instrumental-confidant support (i.e., having people to discuss problems with and provide support) were associated with less information seeking. People with more instrumental-confidant support may have been less likely to view FAQs and resources online because they were able to access this information from people in their lives (e.g., other mothers). Future research should explore how having support from people with pregnancy expertise influences online information seeking.

Limitations

This research sheds light on how social support may influence online information seeking, but our findings may not generalize beyond pregnant women or to other geographic locations. Future studies should determine whether social support has a similar association with educational website use in different health contexts and populations. We also cannot generalize our conclusions to all online information seeking about pregnancy. Women presumably used other websites to access pregnancy information, and we cannot speak to how social support influenced these behaviors.

We also cannot draw conclusions about how long participants spent looking at website content. This information would provide richer data on how much participants processed and engaged with content, and about how social support influences which types of information were most important to women.

Further, while we controlled for a variety of potential confounders, we cannot account for the influence of unmeasured variables. Future research will be important to determining how seeking this information online influences dietary, physical activity, or weight-related outcomes among pregnant women.

Lastly, the conclusions of this study are limited to information seeking behaviors and do not provide data on how these behaviors influence pregnancy outcomes.

Conclusion

While research suggests that the Internet provides a space for people who have less social support to access health information [17], our findings demonstrate that in the context of pregnancy, women who already have social support were most likely to seek information online. Future research will be important to better understand why pregnant women who already have support are more likely to seek information online, and find ways to design online systems and content to encourage women with fewer support resources to engage with content.

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