American Journal of Men's Health
2017, Vol. 11(3) 719–725

DOI: 10.1177/1557988316679562
journals.sagepub.com/home/JMH
SAGE

Engaging Men in Prenatal Health Promotion: A Pilot Evaluation of Targeted e-Health Content

Michael Mackert, PhD[1], Marie Guadagno, MS[1], Allison Lazard, PhD[2], Erin Donovan, PhD[1], Aaron Rochlen, PhD[1], Alexandra Garcia, PhD[1], and Manuel José Damásio, PhD[3]

Abstract

Pregnancy outcomes in the United States continue to rank among the worst in the developed world. Traditional maternal–child health promotion tends to focus exclusively on women, leaving men out of programs that can affect family health. Scholars advocate including men in prenatal health to reduce maternal and infant mortality and morbidity. This study explored the perceived role of men in prenatal health, the use of an e-health application, and participant-suggested ways of improving the application moving forward. This study interviewed men in a large Southwestern U.S. city with an average age of 26.0 years (N = 23). The sample was 52% White, 26% Hispanic, 9% Asian, 9% multiracial or other, and 4% Black. Participants were asked about pregnancy health and used a pregnancy-related e-health application on a tablet computer. Participants provided opinions on content, ease of use of tablets, and recommendations for a stronger application. Despite perceived barriers such as time constraints, financial burdens, and an unclear role, men believe it is important to be involved in pregnancy health. Most found the application to contain useful and interesting information. Participants recommended the addition of videos and interactive modules to make the application stronger. This study explored the use of a targeted e-health application to introduce men to prenatal health education. Results indicate men feel favorable to this type of intervention. Additional refinement of the application could include interactive tools or "push content" to further engage men in this important topic.

Keywords

health communication, health education, fathering, behavioral research, family functioning

Received July 11, 2016; revised October 14, 2016; accepted October 20, 2016

Introduction

Pregnancy outcomes in the United States continue to rank among the most troublesome of all nations with a developed health care system. Recent vital statistics reports estimates 6.15 infant deaths per 1,000 live births and 15.8 to 28.0 maternal deaths per 100,000 live births, with the largest maternal death rate increase occurring from 2008 to 2013 (Kassebaum et al., 2014). In addition, an estimated 60,000 women each year suffer pregnancy-related issues considered "near miss" maternal mortality, in which a woman survives severe complications during pregnancy, childbirth, or the postpartum period (Creanga et al., 2014).

Improving pregnancy outcomes is one of the goals of the U.S. Healthy People 2020 initiative as well as a major target of the United Nations Sustainable Development Goals (Creanga et al., 2014; United Nations, 2015). Health care access and support during the prenatal/perinatal phases can reduce the risks associated with factors that drive infant mortality, such as preterm birth (Kassebaum et al., 2014). Examples of these include health promotion programs, nutritional assessments, immunizations, mental health screenings, and more

[1]The University of Texas at Austin, Austin, TX, USA
[2]University of North Carolina at Chapel Hill, Chapel Hill, NC, USA
[3]Universidade Lusófona, Lisboa, Portugal

Corresponding Author:
Marie Guadagno, Stan Richards School of Advertising & Public Relations, The University of Texas at Austin, 1 University Station A1200, Austin, TX 78712-0116, USA.
Email: mariea@utexas.edu

(Creanga et al., 2014; Kassebaum et al., 2014; Khanani, Elam, Hearn, Jones, & Maseru, 2010).

In addressing these burdensome pregnancy outcomes, mass and social media campaigns aimed toward women have thus far played a key role in community-driven health research (Alcalay, Ghee, & Scrimshaw, 1993; Shefner-Rogers & Sood, 2004; Thomas, Hauser, Rodriguez, & Quinn, 2010; Valente, Poppe, & Merritt, 1996). However, to date, such interventions have almost entirely left men outside of a defined role in prenatal care and pregnancy outcomes (Widarsson, Kerstis, Sundquist, Engström, & Sarkadi, 2012). Despite the breadth of research that identifies that including men in these initiatives can improve outcomes (Alcalay et al., 1993; Shefner-Rogers & Sood, 2004; Thomas et al., 2010; Valente et al., 1996), pregnancy continues to be a domain where men feel "invisible" or "unwelcome"—prompting calls for programs that educate men on pregnancy health (Widarsson et al., 2012). Additional perceived barriers for men being involved in prenatal health include having to work (no time) and the expense of classes or programs (Mackert, Guadagno, Donovan, & Whitten, 2015; Widarsson et al., 2012).

Given these commonly cited barriers of an unclear role, time, and financial burden, the potential of e-health to reach men, bridge this gap, and motivate them to be more involved in prenatal health is promising (Mackert et al., 2015). e-Health has the ability to educate difficult-to-reach audiences, such as men, and to tailor information in ways that could resonate better than existing programs designed predominantly for women. Applications on handheld devices such as phones or tablets present even more convenient access to crucial health information (Pew Research Center, 2015).

In consideration of the promise for e-health interventions targeted toward men, the current study sought to explore the perceived role of men in prenatal health and the potential of e-health to reach men. Specifically, the purpose of this project was to assess e-health intervention content targeted specifically to men regarding prenatal health. The remainder of this article provides a description of study methods and results, as well as implications for future research and practice.

Research Questions

This study aimed to investigate the value of an e-health application to educate men about pregnancy-related health. The following research questions guided this investigation:

Research Question 1: How do men perceive their role in pregnancy health?

Research Question 2: Is the e-health application a promising avenue for improving men's knowledge of pregnancy-related health information?

Research Question 3: How can the e-health application be improved to reach and resonate with more men moving forward?

The answers to these questions add to the body of research about how to encourage men to be positively involved in prenatal health to promote better outcomes. Leveraging an e-health application would allow the delivery of this information to male audiences that have time or financial constraints.

Method

Participants

After institutional review board approval, adult male participants were recruited via a public calendar on the website of a research university in a large Southwestern city. All males 18 years or older were eligible to participate, regardless of their status as a student or affiliation with the university. The men were given a $25 cash incentive and gave their consent to participate in the study. The sample (N = 23) had an average age of 26.0 (SD = 7.3) and consisted of 52% White (12 participants), 26% Hispanic (6 participants), 9% Asian (2 participants), 9% multiracial or other (2 participants), and 4% Black (1 participant). All participants reported having at least some level of postsecondary education. Three participants (13%) had at least one child or a partner who was pregnant at the time of participation.

Application Research and Development

The application was built with a responsive website design approach, which ensures the content is optimally shown in the users' environment and not platform or device specific. All topics covered in individual modules were shown in card layout, a container-style design popularized by social media, on the application's home page. Participants could access a module's content by clicking on the illustrative icon, title, or description on the home page or from the navigation bar, which remained constant on all pages (see Figure 1 or visit the site at www.menspregnancyplaybook.com). General guidelines for ensuring clear communication—such as sufficient use of white space, consistent headings, relevant visuals to reinforce text, and plain language whenever possible—were followed when developing educational content (National Cancer Institute, 2003).

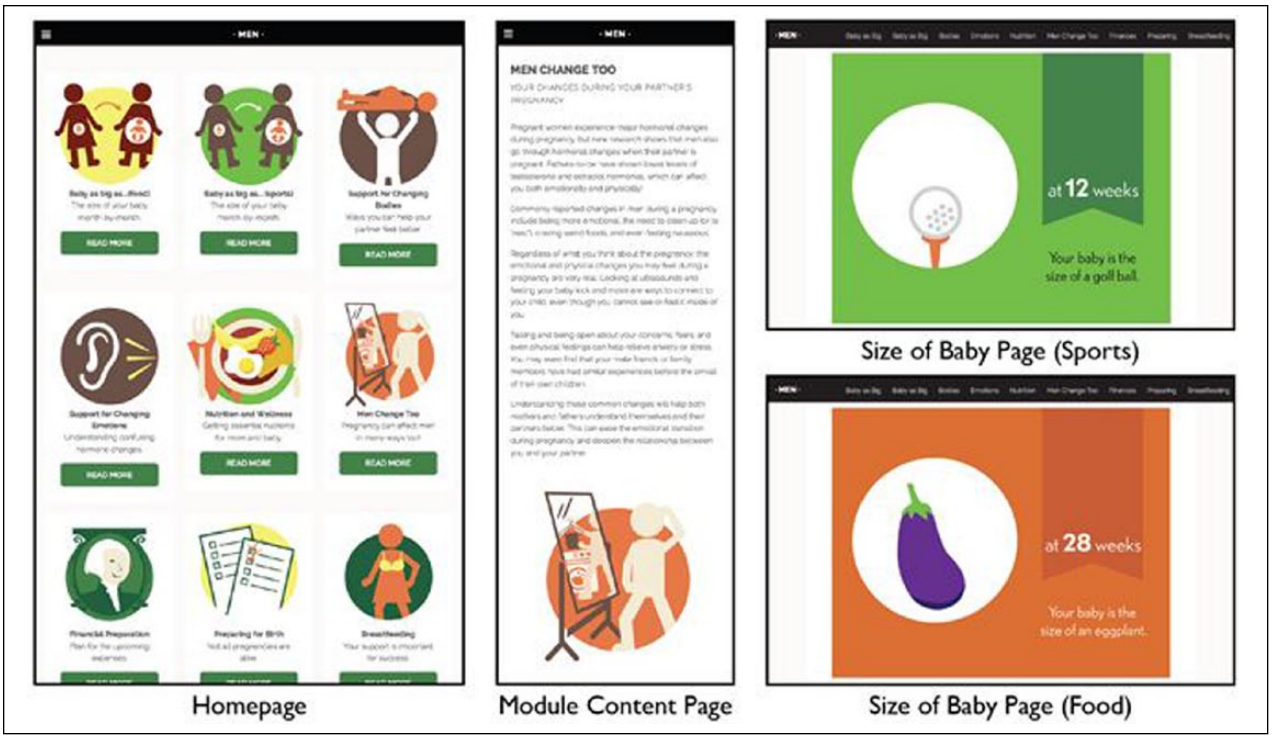

Figure 1. Website Snapshot.

Study Procedures and Data Analysis

A graduate research assistant conducted a semistructured interview with participants to discuss issues surrounding the role of men in pregnancy health, attitudes toward prenatal health and education programs, ideas on how to get men more involved in pregnancy, and their use/nonuse of technology when searching for health information. Interviews and surveys were conducted in English and audio recorded. The overall study procedure was modeled on previous research studying the use of technology to engage hard to reach populations (Mackert, Love, & Whitten, 2009; Tian, Champlin, Mackert, Lazard, & Agrawal, 2014; Shefner-Rogers & Sood, 2004).

The participants then spent 5 to 7 minutes navigating through the e-health application on a tablet computer, allowing them to browse at their own pace and explore the content. Their navigation was tracked by a screen recording device and the participants were systematically observed by the graduate research assistant to assess general attitudes, actions, navigational issues, and technical trouble. Attitudes while browsing the application could range from "Highly Engaged" (e.g., taking time to read content) to "Bored/Distracted" (e.g., not clicking on photos, skimming through content).

Participants were asked to navigate through two slideshows that detailed week-by-week fetal development. One slideshow used common fruits and vegetables as visuals to illustrate fetal growth (similar to widely downloaded pregnancy applications and webpages) and another slideshow used common sports objects to illustrate week-by-week growth.

The participants were then asked open-ended questions related to the content of the application and use of the tablet computer, such as what they found most interesting on the application and what could be done to make it better. Participants also completed a 12-item survey about prenatal health and future use of similar applications; survey items used 7-point Likert-type scales from 1 (*strongly disagree*) to 7 (*strongly agree*).

Finally, health literacy was assessed with the Newest Vital Sign (NVS; Weiss et al., 2005). The NVS is a brief, six-item assessment of health literacy that correlates with other well-established health literacy measures such as REALM. A score of 0 to 1 on the NVS reflects a 50% or greater chance of limited health literacy, a score of 2 to 3 suggests the possibility (25%) of limited health literacy, and a score of 4 or greater reflects adequate health literacy. The average NVS score was 5.3 ($SD = 1.0$), suggesting the sample had adequate levels of health literacy.

Both qualitative and quantitative methods were used to analyze the data. Descriptive statistics were used for the quantitative elements of the interview, for example, the Likert-type items displayed in Table 1. Audio files of each interview were transcribed—notes, observations,

Table 1. Post-Application Exposure Items.

Item	Post-application, *M* (*SD*)	Median (IQR)
I believe knowing about pregnancy is useful.	6.7 (0.6)	7.0 (0.5)
It is important to know about things that could hurt your baby during pregnancy.	7.0 (0.0)	7.0 (0.0)
If I know about things that could hurt my unborn baby, I will try to help my partner avoid them.	6.8 (0.5)	7.0 (0.0)
I can take a lot of action to ensure my baby is healthy.	5.5 (1.1)	5.0 (1.5)
I am concerned that my baby will not be healthy.	4.2 (2.4)	4.0 (4.5)
Complications and unhealthiness can be life threatening to a baby.	6.7 (0.8)	7.0 (0.0)
Complications and unhealthiness can be life threatening to a woman.	6.7 (0.6)	7.0 (0.5)
It is hard to make sure my baby is healthy because I am not the one who is pregnant.	3.7 (1.5)	3.0 (2.0)
I found this tablet easy to use.	6.4 (0.9)	7.0 (1.0)
I thought this app easy to use.	6.5 (0.8)	7.0 (1.0)
This app contained useful information.	6.1 (0.9)	6.0 (1.0)
I would use an app like this on my phone or tablet to learn more about pregnancy.	4.8 (1.6)	5.0 (1.5)

Note. IQR = interquartile range.

and screen-tracking recordings were analyzed for themes pertinent to the research questions. A graduate student researcher and a faculty member of the research team conducted a thematic analysis by independently reviewing each transcript for relevant and recurring topics.

Results

Results are organized by the research questions and relevant themes that emerged during analysis. Results of the 7-point Likert-type scale items, taken after exposure to the application, are included in Table 1. The scale items include perceptions about pregnancy health and safety, the use of tablets, and the likelihood of using an application such as this in the future.

> **Research Question 1:** How do men perceive their role in pregnancy health?

The participants felt very strongly that knowing about pregnancy is useful ($M = 6.7$, $SD = 0.6$) and that it is important to know about things that could hurt a baby during pregnancy ($M = 7.0$, $SD = 0.0$). The men agreed that if they knew about things that could harm an unborn baby, they would do their best to help their partner avoid them ($M = 6.8$, $SD = 0.5$). There was a somewhat lower, but still relatively high, perception that they could take action (on their own) to ensure their baby was born healthy ($M = 5.5$, $SD = 1.1$).

All 23 participants used the word "support" when asked about the role and responsibility of a man in pregnancy. When asked to go more in-depth into what "support" means, responses revealed both instrumental support (e.g., tangible offers to help, taking care of finances, and helping with chores) and emotional support (e.g., just "being there" for a pregnant woman). As an example, one participant, age 19, reflected instrumental support:

> I feel like it's the husband's job to do whatever they can to be there, be supportive both physically and emotionally . . . obviously the wife has to take time off. So the husband should, for that time at least, bring some more money . . . and because obviously the food craving and stuff—you need nutrition and vitamins for two people, right? I think that those 9 months are the period when the wife will need the husband the most.

Understanding the hormonal changes—mostly mentioned when discussing emotional support—came up frequently throughout the interviews as a responsibility for men. One participant noted he knew about hormonal changes, but did not understand the physiology behind them: "That's something we have learned in biology classes in high school and we see in, you know, TV shows that there is always comedy about it, you know, they always exaggerate hormones."

Barriers to Involvement

When the participants were asked about perceived barriers to being involved in pregnancy, the idea of physical disconnect (e.g., they are not the ones carrying a baby in utero) arose. Some men thought this disconnect made it more difficult to be involved in pregnancy health, while others noted that it existed, but they would try their best to empathize. "It's, you know, alien. I mean they can try and empathize but there's only so much you can do without actually being in the women's shoes." Another participant, age 27, explained:

> I mean it's obviously a major issue. It's like you can read all the books and you can get things about what your partner is going through. You can imagine what it's like, but you are never going to be able to like actually know what's going on.

Time and availability concerns also arose as potential barriers—there was a perception among participants that prenatal classes were only available during the workweek at inconvenient times. A 21-year-old participant suggested,

> Weekends would be better than week days in terms of like one thing, so I am not taking off from work. Saturday morning I guess 12 or like may be like a week night or non 9 to 5 typical.

Importance of Communication

The importance of communication between the man and a pregnant woman was also frequently discussed by the participants. They felt men may receive "mixed messages" from their pregnant partners on how they want them to be involved—and that hormones may exacerbate this, "It's a very emotional time for everyone involved" stated a 19-year-old participant, "and especially with, sounds bad saying, but the raging hormones that come with pregnancy, there's all sorts of I need help but don't smother me but I can do this myself but I need help . . . "

Several participants believed there were culture-based mixed messages regarding how men should be involved in pregnancy. A 27-year-old responded, "I think sometimes . . . it's not masculine to be super involved in the pregnancy—yeah it's a cultural thing."

> **Research Question 2:** Does the e-health application appear to be a promising avenue for improving men's knowledge of pregnancy-related health information?

All participants stated they used electronic devices such as cell phones, tablets, or laptop computers to access health information. Google and WebMD were commonly mentioned as sites used when searching for information about health and illness symptoms. Two scale items indicated that most participants felt comfortable using a tablet ($M = 6.4$, $SD = 0.9$) and thought the application itself was easy to use ($M = 6.5$, $SD = 0.8$).

Most participants (21 of 23) were observed as being "Engaged" with the application. They felt the content was geared toward first-time fathers. In general, the participants enjoyed the graphics and stated that they were easy to understand. They liked the overall "feel" of the application. The average time spent on the overall application was 4:51. "It took five minutes maybe to look through almost the entire thing so it wasn't a time-suck and it kind of covered all the bases," explained a 21-year-old participant.

The participants were encouraged to view both slideshows that detailed fetal development, one using photos of commonly known fruits and vegetables, and the other using commonly known sports equipment. A total of 39% of the participants liked the sports-themed slideshow the best, but the majority (61%) preferred the fruits and vegetables images. A common sentiment regarding preference was that the use of fruits and vegetables was easy-to-understand and reinforced the importance of a healthy diet while pregnant.

A screen recorder tracked the clicks on the application and the length of time a participant stayed on each content module. The tracking indicated that outside of the two fetal development slideshows, the nutrition content was the most clicked on module (13 of 23) followed by financial preparation (12 of 23). A 27-year-old participant said "I would say the nutrition one was the one that I found most useful just because it seems like it's like something you can directly impact." A 26-year-old stated:

> I like the finance thing. I thought that was a good tool because I don't think that when you imagine having a kid that's one of the first things that comes to mind. It's probably second or third but I think also the amount of planning and the amount of preparation that should go into that kind of illustrates that and I thought that was really interesting.

> **Research Question 3:** How can the e-health application be improved to reach and resonate with more men moving forward?

The participants were generally mixed about whether they would use an application such as this one in the future ($M = 4.8$, $SD = 1.6$). They were asked to describe ways to improve the particular application and their suggestions were wide ranging and the word "engaging" was frequently brought up—from adding videos and games inside the application, to personalizing the experience, to changing the font size and color. A 19-year-old participant suggested the application be more dynamic by allowing users to input personal information, such as finances, to make the experience more tailored:

> It seems like a onetime read. Obviously you can read it multiple times but men are not going to read it as much, right? You want an app that most people are going to go over and over again. You could have budget information be one thing, but then you'd also have like have an excel document or something or some kind of text base thing where you could set up a little goal or something or where you could actually type in your goals.

While some felt the addition of videos and quizzes would make the content more exciting for men, a 27-year-old

participant perceived these tactics to be "one-way" communication and therefore not engaging enough. He explained,

> I think a video is still the same thing where it's just one way. What about a quiz on the nutritional and wellness . . . maybe you could have things that you like or a budget or some food items you have and it could spit back out some recipes. Or like a financial preparation you can enter into your salary and it spits out "you should be setting aside this much per week." Something where it's interactive.

While the majority of the participants stated the application had "just the right amount of information," several went on to suggest adding links or drop-down content for those who want to read further into the topic. External links to reputable health care websites were recommended as well as the option to view videos about the topic within the application.

Discussion

Increasing men's involvement in prenatal health is a promising approach to improving maternal and child health outcomes. A preliminary investigation suggested potential in using e-health as an avenue to engage men in this issue (Mackert et al., 2015), and this study built on that with targeted content developed specifically for men.

Substantiating the findings of previous work on men and prenatal health (Mackert et al., 2015; Shefner-Rogers & Sood, 2004; Widarsson et al., 2012), the results overwhelmingly suggested the perceived role of a man in pregnancy health is "support." This includes both instrumental and emotional support, and it suggests an interest and need for content designed to help men meet these recognized needs in their partners during pregnancy. Instrumental needs and support may be easier to identify for men, as suggested by their greater interest in financial preparation and nutritional information, and could be an easier way to introduce this topic to men.

The evaluation of the e-health content was extremely favorable. The one primary criticism—that it was content they only needed to read once and lacked interaction—was a function of the pilot phase of the research. With this approach validated in this pilot, a clear next step is to move forward with development of interactive tools such as a financial planning calculator or "push" content in a mobile application that could notify a user of a developing baby's growth; other research with this kind of e-health content has reported that such features are the most popular among users (Mackert et al., 2015).

The primary limitation of this investigation is a small convenience sample, so a broader evaluation of this content and approach is necessary. Including the additions discussed above (e.g., interactivity), future iterations of the site should seek to tailor information to those across various cultures and socioeconomic levels. By using feedback from participants, the content can reach a balance between being broadly applicable but still individualized and useful—regardless of the level of health literacy the user may have. Thus far, the overwhelming positive reactions of participants—both to the health issue, content, and design of the intervention—is promising.

Improving maternal and child health outcomes is a priority for many countries and international health organizations. Engaging men in the topic is a promising, but largely underutilized, approach. Effectively targeting men with well-designed e-health interventions is one promising approach to drive improved maternal and child health outcomes.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: The authors received financial support for this research from UT Austin|Portugal International Collaboratory for Emerging Technologies.

References

Alcalay, R., Ghee, A., & Scrimshaw, S. (1993). Designing prenatal care messages for low-income Mexican women. *Public Health Reports*, *108*, 354-362.

Creanga, A. A., Berg, C. J., Ko, J. Y., Farr, S. L., Tong, V. T., Bruce, F. C., & Callaghan, W. M. (2014). Maternal mortality and morbidity in the United States: Where are we now? *Journal of Women's Health*, *23*, 3-9.

Kassebaum, N. J., Bertozzi-Villa, A., Coggeshall, M. S., Shackelford, K. A., Steiner, C., Heuton, K. R., . . . Lozano, R. (2014). Global, regional, and national levels and causes of maternal mortality during 1990–2013: A systematic analysis for the Global Burden of Disease Study 2013. *Lancet*, *384*, 980-1004.

Khanani, I., Elam, J., Hearn, R., Jones, C., & Maseru, N. (2010). The impact of prenatal WIC participation on infant mortality and racial disparities. *American Journal of Public Health, 100*(Suppl. 1), S204-S209.

Mackert, M., Love, B., & Whitten, P. (2009). Patient education on mobile devices: An e-health intervention for low health literate audiences. *Journal of Information Science, 35*, 82-93.

Mackert, M., Guadagno, M., Donovan, E., & Whitten, P. (2015). Including men in prenatal health: The potential of e-health to improve birth outcomes. *Telemedicine and e-Health, 21*, 207-212.

National Cancer Institute. (2003). *Clear & Simple: Developing effective print materials for low-literate readers*. Retrieved from https://www.nih.gov/institutes-nih/nih-office-director/office-communications-public-liaison/clear-communication/clear-simple

Pew Research Center. (2015). *Health fact sheet*. Retrieved from http://www.pewinternet.org/fact-sheets/health-fact-sheet/

Shefner-Rogers, C. L., & Sood, S. (2004). Involving husbands in safe motherhood: Effects of the SUAMI SIAGA campaign in Indonesia. *Journal of Health Communication*, *9*, 233-258.

Thomas, K. B., Hauser, K., Rodriguez, N. Y., & Quinn, G. P. (2010). Folic acid promotion for Hispanic women in Florida: A vitamin diary study. *Health Education Journal*, *69*, 344-352.

Tian, C., Champlin, S., Mackert, M., Lazard, A., & Agrawal, D. (2014). Readability, suitability, and health content assessment of patient education materials on colorectal cancer screening. *Gastrointestinal Endoscopy, 80*, 284-290.

United Nations. (2015). *Sustainable development knowledge platform*. Retrieved from https://sustainabledevelopment.un.org/post2015/transformingourworld

Valente, T. W., Poppe, P. R., & Merritt, A. P. (1996). Mass-media-generated interpersonal communication as sources of information about family planning. *Journal of Health Communication*, *1*, 247-266.

Weiss, B. D., Mays, M. Z., Martz, W., Castro, K. M., DeWalt, D. A., Pignone, M. P., . . . Hale, F. A. (2005). Quick assessment of literacy in primary care: The Newest Vital Sign. *Annals of Family Medicine*, *3*, 514-522.

Widarsson, M., Kerstis, B., Sundquist, K., Engström, G., & Sarkadi, A. (2012). Support needs of expectant mothers and fathers: A qualitative study. *Journal of Perinatal Education*, *21*, 36-44.