2-1-2017

Game-Based Online Antenatal Breastfeeding Education: A Pilot

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Publication Information

Grassley, Jane S.; Connor, Kelley C.; and Bond, Laura. (2017). "Game-Based Online Antenatal Breastfeeding Education: A Pilot". *Applied Nursing Research, 33*, 93-95. http://doi.org/10.1016/j.apnr.2016.10.011

Game-based Online Antenatal Breastfeeding Education: A Pilot

Increasing the number of infants who are breastfed has become a global health priority because of health and economic benefits of breastfeeding for mothers and their children. While 79% of women in the United States initiate breastfeeding, only 19% of infants meet the recommendation of exclusive breastfeeding for 6 months (Centers for Disease Control and Prevention [CDC], 2016). Two modifiable factors that predict breastfeeding rates are women's breastfeeding self-efficacy and breastfeeding intention (Dennis, Heaman, & Mossman, 2011; Stuebe & Bonuck, 2012). Antenatal education interventions can impact women's breastfeeding self-efficacy and intention; however, childbearing women may not attend traditional classes, because they use the Internet for health information. Computer-based interventions may offer an effective format for women to access breastfeeding education and information (Bensley et al., 2014; Otsuka et al., 2014; Pitts, Faucher, & Spencer, 2015). The purpose of this pilot study was to evaluate the effect of the *Healthy Moms* intervention on antenatal breastfeeding self-efficacy and intention and to determine the feasibility of using an online game-based learning platform to deliver breastfeeding education.

1. Background literature

The Internet has potential for increasing women's access to antenatal education interventions, which can improve breastfeeding initiation, duration, and exclusivity (Pitts et al., 2015). A survey of 8,144 childbearing women found that most had access to the Internet, often used it for communication, and were interested in receiving health information online (Bensley et al., 2014). Using mobile devices to deliver breastfeeding education modules was effective in increasing women's knowledge of breastfeeding. Women reported learning helpful information and feeling supported in their breastfeeding decisions (Pitts et al., 2015). Computer-based

education interventions may be effective for breastfeeding promotion and education, which can improve breastfeeding outcomes through facilitating women's breastfeeding self-efficacy and affecting their breastfeeding intention (Dennis et al., 2011; Stuebe & Bonuck, 2012).

2. Methods

2.1 Design

A pretest-posttest single group design was chosen to evaluate the effect of an online game-based learning intervention on breastfeeding self-efficacy and breastfeeding intention. The *Healthy Moms* intervention was designed to educate women about breastfeeding using 3D Gamelab®, an online game-based learning platform. Women completed three quests orienting them to3D Gamelab® and up to 12 breastfeeding quests developed around three themes: *Deciding about Breastfeeding, Feeding your Baby,* and *Getting Support*. Each quest addressed a particular breastfeeding topic or concern using online learning activities such as reading a brief introduction, watching a video, exploring web sites, or posting a response to the information. For example, *Common Myths* was a quest under *Deciding about Breastfeeding*. After a brief introduction, participants watched a video created by the researchers called, *Ask Brittany*. An actress portraying a nurse responded to letters seeking advice about common breastfeeding myths. To complete the quest, participants wrote a response to a vignette about a myth.

2.2 Procedures

Recruitment began after approval was obtained from the Institutional Review Board at the researchers' university. A convenience sample of 41 women, aged 15 years or older, was recruited using flyers from eight sites that provide care to women during pregnancy and from the study website. Once consent was obtained, participants were emailed their user name for login, the link to the intervention in 3D Gamelab®, and instructions for completing the pretest and

quests. Participants had one month to complete the quests. The post-test became available to a participant once she completed all quests or after one month of study enrollment, whichever occurred first.

The pretest and post-test collected data about self-efficacy, breastfeeding intention, and demographics (e. g. maternal age, race/ethnicity, family breastfeeding history, attendance at a breastfeeding class). **Breastfeeding self-efficacy** was measured with the *Breastfeeding Self-Efficacy Scale Short-Form* (BSES-SF), a 14-item self-report Likert instrument. Respondents indicate their degree of confidence on a 5-point scale. Summed higher scores indicate greater breastfeeding self-efficacy (Dennis et al., 2011). The Cronbach's alpha coefficient was 0.84 for the antenatal assessment (Dennis et al., 2011). **Breastfeeding intention** was evaluated using a one-item measure with four categories (e. g."Just breastfeed/No formula," "Just formula/no breastfeeding," "Both breast and formula feed," or "Unsure") (Stuebe & Bonuck, 2012). **Intervention engagement** was calculated as the total number of game quests completed.

2.3 Statistical Analysis

Descriptive statistics were used to describe demographics and BSES-SF scores. A one-way ANOVA was used to ensure equality of pre-BSES-SF scores across different levels of intervention engagement. To determine whether differences in post BSES-SF scores were associated with the intervention, an analysis of covariance was used to model post-BSES-SF scores against pre-BSES-SF scores and intervention engagement. This was because women with high pre-BSES-SF values had little room to improve regardless of intervention engagement.

3. Results

Of the 41 participants who enrolled, 25 submitted the pretest and 19 the post-test. They tended to be 21 years or older (70% compared to 30% of those 15 to 20 years old), white (68% compared to 20% Hispanic, 8% Asian, and 4% African-American), in their second or third

trimester (44% and 36%, respectively), attended or planning to attend a antenatal class (80%), had been breastfed by their mothers (72%), and intended to exclusively breastfeed (68%). Intervention engagement fell into the four groups listed in Table 1. A one-way ANOVA found no significant differences among the groups in mean BSES-SF scores before ($p = 0.264$) or after ($p = 0.675$) the intervention. The analysis of co-variance revealed no

Table 1. *Intervention Engagement and Breastfeeding Self-Efficacy*

Engagement	Participants N	Age *M(SE)*	Pre-BSES *M(SE)*	Post-BSES *M(SE)*
No quests	4	24.0(1.0)	40.3(7.3)	51.1(3.7)
Orientation only	7	21.1(0.9)	55.1(4.4)	59.6(5.4)
1-6 breastfeeding	8	22.2(1.5)	51.3(8.0)	58.3(4.7)
10-12 breastfeeding	6	20.7(1.6)	59.3(3.0)	61.2(3.8)

differences among groups in BSES-SF post-intervention scores, but those with the highest BSES scores pre-intervention completed the most quests. Two participants changed breastfeeding intention, from exclusive breastfeeding to mixed and from mixed to exclusive breastfeeding.

4. Discussion

The pilot results suggest that *Healthy Moms* is a feasible method for delivering breastfeeding information online; eight women completed at least one breastfeeding quest and six completed 10 to 12 quests. Attrition was a major study limitation; 16 enrolled women did not complete the pre-test and 11 women completed no breastfeeding quests. Strategies that address this common problem in online intervention research include ease in navigating the system, reliable and relevant information, tools and feedback tailored to the individual participant, and trust in the researchers or their institution (Todkill & Powell, 2013). In this study, the formal login required by the online learning platform or the number of orientation modules may have contributed to attrition. Although the information about breastfeeding was reliable, it may not have seemed relevant to some participants at their current stage of pregnancy. Extending the

intervention study time line through 6 weeks postpartum, using more accessible mobile technologies such as cell phone applications or social media platform, revising the way the information is delivered, adding opportunities for interaction, and partnering with providers could facilitate intervention engagement. These strategies provide participants easier access to timely information from a trusted source (Todkill & Powell, 2013). Pre-intervention BSES scores were high for most participants, making changes post-intervention hard to detect. Most participants' mothers had breastfed them, a predictor of breastfeeding self-efficacy (Dennis et al., 2011). Recruitment of women whose mothers did not breastfeed could yield different results.

4.1 Research implications

A revision of the intervention would benefit from engaging women in evaluating the format and content of *Healthy Moms* for ease of use and essential information. Adding post-birth follow-up to the study design in order to evaluate participants' postpartum breastfeeding self-efficacy and initiation rates could yield important information about the impact of the intervention on women's breastfeeding choices.

5. Conclusions

Although computer-based education seems like an efficient way to deliver breastfeeding information, user practices and perceived barriers to using technology need to be explored in order to determine the most effective strategies to create and distribute computer-based content during pregnancy. Women's experiences of using current web-based technologies need to be studied to determine what online delivery formats women find useful and engaging as well as the essential breastfeeding information needed to facilitate breastfeeding self-efficacy. Further research is warranted to evaluate the revised intervention and to determine if online education can affect breastfeeding outcomes.

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