The need for research-tested smartphone applications for promoting breastfeeding

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Compared with all other racial/ethnic groups in the U.S., African American women have the lowest rates of breastfeeding initiation, as well as continuation at 6 months (1). Among infants born in 2012, the rate of breastfeeding at 6 months was 35.3% among non-Hispanic blacks as compared with 51.4% for all infants in the U.S. (1). The rate of exclusive breastfeeding at 6 months was 13.9% among non-Hispanic blacks as compared with 21.9% for all U.S. infants. African American women are 2.5 times less likely to breastfeed than white women (2). Currently, African American women are not meeting any of the Healthy People 2020 objectives for breastfeeding.

The short- and long-term medical and neurodevelopmental advantages of breastfeeding are well-documented (3,4). Human milk consists of nutrients and biologically active compounds that provide numerous health benefits. Compared with formula feeding, breastfeeding is associated with decreased risks of common childhood infections including gastroenteritis and acute otitis media (3,4). In addition, breastfeeding reduces risk of relatively rare but serious conditions such as hospitalization for lower respiratory infection, leukemia, and sudden infant death syndrome, and, among preterm infants, necrotizing enterocolitis (4). Breastfeeding has also been associated with reduced risks of childhood obesity and asthma (3,4). Breastfeeding also provides maternal benefits. Compared with women who have never breastfed, women who breastfeed have a lower risk of developing breast cancer and may also have a lower risk of ovarian cancer (3). Compared to those who formula feed, women who breastfeed may experience other health benefits such as improved birth spacing, increased weight loss in the postpartum period, and a lower risk of obesity and obesity-related health conditions (2). Breastfeeding also increases bonding between mother and infant. Breastfeeding is beneficial to almost all mothers and infants and the benefits may be significantly greater for minority women, infants, and children who are challenged by health disparities (4).

The U.S. Department of Health and Human Services, the American College of Pediatricians, and the American Congress of Obstetricians and Gynecologists all recommend that most infants in the U.S. be breastfed for at least 12 months and that, for the first 6 months, infants be exclusively breastfed (4). The Healthy People 2020 objectives for the nation include increasing the proportion of infants who are ever breastfed, increase the proportion of infants who are breastfed at 6 months, and increase the proportion of infants who are breastfed exclusively through 6 months. A recent study found that the U.S. would save an estimated $13 billion annually from reduced direct medical and indirect costs and the cost of premature death if 90% of U.S. families followed guidelines to breastfeed exclusively for 6 months (5).

Barriers to breastfeeding include socioeconomic status, education, misperceptions, pain/discomfort, embarrassment, inconvenience, lack of family or social support, and social norms (2,4). Barriers to breastfeeding among low-income minority women include lack of access to information that promotes and supports breastfeeding and historical, cultural, social, and economic factors (2). Low-income women are more likely to return to work soon after giving birth and are more likely to be employed in jobs that make breastfeeding difficult at work (2). Women with less educational attainment or lower levels of health literacy

may be unaware of the benefits of breastfeeding and less familiar with techniques for successful breastfeeding (2,4). The marketing efforts of companies that manufacture and distribute infant formula reinforce the belief that formula feeding is the norm (4).

Systematic reviews of the literature on educational interventions to increase breastfeeding have found that peer counselors are effective for improving breastfeeding initiation, duration, and exclusivity (2,6). A recent review by Haroon *et al*. (7) found that breastfeeding education and/or support increases exclusive breastfeeding rates and decreased no breastfeeding rates at birth, <1 month, and 1–5 months. In a Cochrane review by Lumbiganon *et al*. (8), peer counseling, lactation consultation, and formal breast feeding education during pregnancy were found to increase breastfeeding duration.

Taki *et al*. (9) conducted a systematic assessment of the quality and content of infant feeding apps available from the App Store for iOS and Google Play for Android. The key words used in the review including breastfeeding, baby feeding, formula feeding, and introducing solid foods. Of the 46 apps identified that met the selection criteria, the majority (78%) were rated poor quality and almost half (47%) had a readability level above the 8th grade level.

High quality, research-tested smartphone applications (apps) could provide a useful and low-cost way to disseminate information about the health benefits of breastfeeding to the general population and to particular at-risk populations. Randomized controlled trials of the effectiveness of the use of apps for promoting maternal and child health are needed. Smartphone apps are needed that provide information about the health benefits of breastfeeding to infants and mothers; provide educational information about breast milk as normal food for most babies and the milk supply cycle; counter misperceptions and negative perceptions of breastfeeding; explain successful techniques for breastfeeding (e.g., checking if baby is getting enough breast milk); provide motivation (e.g., messages to set breastfeeding goals); and are sensitive to the needs of mothers. Of particular interest are culturally appropriate smartphone apps on breastfeeding for at-risk groups affected by health disparities such as African Americans.

A qualitative ethnographic study by Asiodu *et al*. (10) involving a sample of 14 pregnant African American women and eight support persons found that they used social media accessed through smartphones and/or computers to obtain infant development information but that they had difficulty finding information about infant feeding. The authors noted that the increased popularity and use of social media platforms offers the opportunity to created more innovative, targeted mobile health interventions for breastfeeding promotion (10). Although published studies indicate that women are interested in receiving educational information via smartphone apps, there have been no randomized controlled trials of smartphone apps on breastfeeding.

Smartphone apps can have a variety of features including visually-engaging design, video and audio capabilities, unrestricted text capabilities, access with or without cellular or Internet connection, content sharable via social media, and tracking progress anywhere and anytime. Common techniques include providing feedback, goal-setting, self-monitoring, and planning social support and change (2). About 64% of adults in the U.S. owned a smartphone in 2015 and the percentage is projected to surpass 90% by 2020. About 70% of African Americans owned a smartphone in 2015.

Although smartphone apps are available from major smartphone platforms (e.g., Android, iPhone) on breastfeeding and other maternal and child health topics, few have been tested for acceptability or effectiveness. In addition, few of these apps are based on theories of health behavior change, most do not include evidence-based features, and existing apps often do not provide evidence-based recommendations. Research-tested smartphone apps on breastfeeding are needed that are culturally tailored for African American women and other at-risk populations, and suitable for people with varying levels of health literacy and eHealth literacy. Health promotion messages that are culturally tailored for a group address the unique needs of individuals, increase their motivation, tend to be perceived as more personally relevant, and lead to a greater likelihood of behavior change.

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Footnote

Conflicts of Interest: The author has no conflicts of interest to declare.

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