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BRIEF REPORT

A Feasibility Study to Promote Optimal Weight in First Time Pregnant Mothers and Their Babies: Lessons Learned in a US-Mexico Border Community

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Abstract

Introduction Obesity rates among US Hispanic women and children are high. Childhood obesity prevention beginning prenatally is desirable, but studies show mixed results. *Methods* We tested a pilot intervention to promote optimal gestational and infant weight with primigravid Hispanic women at a Federally Qualified Health Center (FQHC) on the U.S.-Mexico border. The intervention included *promotora*-led exercise, nutrition, breastfeeding activities (n = 23), supported by text/social media messaging (text messaging prenatally, private Facebook page postnatally). Measures included demographics, BMI, weight gain/retention, infant feeding, and attendance. *Results* Most women were U.S. born (73%), Spanish-language dominant (83%), with ≤ high school education (65%), and overweight/obese (56%). Retention rates were modest for the prenatal component (50%), supported by an SMS text-messaging program. Retention of the remaining postnatal sample, supported by a private Facebook® page, was 100%. Of women who regularly attended group sessions pre and postpartum, over 70% were within 5 lbs of pre-pregnancy weight at 6 months postpartum. A private Facebook® group was feasible for out-of-class support, including among women with regular cross-border mobility. *Discussion* While the intervention was well-received, almost 2/3 of the original participants did not follow up postpartum. Importantly, the findings indicate the use of social media (private Facebook® page) was more feasible than the SMS text-messaging program and may be a successful approach to reach and engage women living in mobile and transnational settings. Future studies should examine social media as an intervention tool to influence optimal weight and encourage healthy behaviors in primigravidas living near the U.S.-Mexico border.

Keywords Hispanic · Obesity · Pregnancy · U.S.-Mexico border · Social media

Significance

What is already known on this subject? Pre-pregnancy BMI and GWG influence child and adolescent anthropometric outcomes. Mother-baby perinatal interventions have shown some effectiveness, however, more coordination between the prenatal and postnatal periods and effective intervention strategies in mobile and culturally diverse communities are needed.

What this study adds? In a highly mobile border community, using culturally sensitive social media can be an important tool for connecting and reaching low-income Hispanic participants with health messages, who may otherwise be lost to follow-up.

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Introduction

Hispanic women and children in the U.S. experience high rates of obesity (Ogden et al. 2015). Studies demonstrate the importance of maternal weight before and during pregnancy for fetal programming of obesity and excess adiposity into childhood and adolescence (Hivert et al. 2016; Mourtakos et al. 2016; Zhao et al. 2016). Moreover, short inter-pregnancy interval, excess maternal weight gain and high pre-pregnancy BMI influences fetal programming in subsequent pregnancies, thus highlighting the importance of obesity prevention early in the life course cycle (Nader et al. 2012). In 2009, the Institute of Medicine (IOM) made updated gestational weight gain (GWG) recommendations according to pre-pregnancy BMI categories. Yet, weight gain outside the recommended ranges continues (Truong et al. 2015) and is associated with suboptimal maternal and child outcomes in the short and long term (Houghton et al. 2016; Maier et al. 2016).

A wide range of prenatal and postpartum interventions focused on optimal GWG have tested nutritional, behavioral, physical activity (PA) and breastfeeding strategies. While some studies have shown significant intervention effects, recent reviews of pregnancy interventions indicate a lack of consistency in methodology, measurement and generalizability to unique populations as well as mixed results for healthy GWG and infant outcomes (Gregory et al. 2016). Current research interventions targeting specific groups, such as obese Hispanic women during pregnancy, show promise for changing behavior and outcomes (Chasan-Taber et al. 2015; Hawkins et al. 2015). Hispanic women in the U.S. are a heterogeneous group with dramatically varying contexts. Cross-border communities represent one example with unique influences (e.g. border crossing, migrant work, and disparities between culture-of-origin and mainstream health beliefs).

Social media is a promising tool to support health promotion (O'Brien et al. 2016). Until recently, the digital divide has precluded its use in low-income and ethnic-racial minority groups. However, over the past few years, social media use has become almost universal in younger Hispanic/Latino populations (Vyas et al. 2012). Evidence shows that both women and Hispanics are interested in using electronic media (social media, text messaging) to receive preventive health messages (Baptist et al. 2011). In addition, social media can enhance social support, especially for new parents (Bartholomew et al. 2012; Thoren et al. 2013; Zhang et al. 2013). Recent studies emphasize the particular importance of maternal influence on child obesity and the need for research on use of social media in this context (Doub et al. 2016; Gruver et al. 2016). Harnessing this method of communication and connection to provide social support for health behaviors could significantly enhance interventions and public health programs.

This study aimed to test the feasibility of an intervention with mother-infant dyads to promote recommended GWG in primigravidas, optimal infant feeding, and return to pre-pregnancy weight. It also aimed to understand influences, barriers, beliefs, and logistics through a bi-cultural and bi-national lens in order to lay the groundwork for future interventions.

Methods

This feasibility study was implemented from 2010 to 2013 in collaboration with a Federally Qualified Health Center (FQHC) located near the U.S.-Mexico border in San Diego, California. This clinic serves a largely Hispanic community near the busiest border crossing in the world; an area with high rates of cross-border mobility for employment, health care and social connections. The FQHC serves as a hub and provides a variety of services including maternal and child health care, dental care, Women, Infants and Children (WIC), and other social support services to the surrounding community. Importantly, many individuals in this area seek medical care on both sides of the border, from providers in San Diego and Tijuana, which can result in conflicting health information and recommendations. The pilot intervention design and components were informed by key informant interviews among select clinic staff, two focus groups with primigravid women (English and Spanish), a pilot cooking class, and meetings with clinic providers (physicians and nurse practitioners). Pilot intervention participants were recruited from the clinic and enrolled during early pregnancy (≤ 20 weeks of pregnancy). Inclusion criteria were: primigravid, ≥ 18 years of age, spoke English or Spanish, and received care at the FQHC. Exclusion criteria were: high-risk pregnancy that would impede ability participate (e.g. bed rest).

The pilot intervention, beginning July 2012, was designed to promote optimal weight during pregnancy and the first 6 months postpartum in primigravid women and their babies. The intervention focused on nutrition, PA, and breastfeeding. A *promotora* (community health worker) delivered the intervention through interactive group nutrition and PA sessions. Breastfeeding was supported by a breastfeeding peer counselor, a young woman from the community who had recently successfully breastfed her own child. The *promotora* and peer counselor completed WIC peer counselor breastfeeding training together. These bilingual, *promotora*-led classes consisted of nutrition curriculum [culturally adapted from the Diabetes Prevention Program materials (Knowler et al. 2002)], PA classes with a certified fitness instructor,

and support during and outside of class from the breastfeeding peer counselor (Fig. 1).

Participants set goals related to their GWG, plans for infant feeding, and filled out a "habit book" to monitor nutritional intake. Staff from the research department, WIC, and the clinic, including prenatal case managers, assisted with recruitment and study logistics. An automated text message system was implemented at the start of the program to provide updates and feedback to the participants from the *promotora*. The weekly prenatal sessions focused alternately on PA and nutrition. Postnatally, weekly sessions resumed at 2 months postpartum and continued until 5–6 months postpartum focusing on infant feeding and mother's nutrition. This study was reviewed and approved by the Institutional Review Boards at the University of California, San Diego and the FQHC where the research was performed. All study participants gave informed consent prior to participation.

Measures

Maternal measures included demographics (e.g. age, marital status, race/ethnicity, education, birthplace, income), anthropometric measures (height, weight, weight gain during pregnancy, postnatal weight loss, baby length/weight), class attendance, nutrition, PA and breastfeeding beliefs and attitudes, feedback about group sessions, and internet usage. Using pre-post surveys developed by study investigators, staff and promotora, PA and breastfeeding beliefs and attitudes were assessed using likert scales. After each session, women completed a short survey about usefulness of class topics, change in behaviors, likes and dislikes from class activities, and suggestions. Mothers reported on infant feeding practices postnatally.

Results

We enrolled 23 primigravid women ≤20 weeks pregnant at the time of their first prenatal visit. Most were U.S. born (73%), Spanish-language dominant (83%), with ≤high school education (65%), and overweight/obese (56%). The intervention included weekly *promotora*-led sessions promoting healthful nutrition and PA. Between visits, the *promotora* provided ongoing support for nutrition and PA by phone calls and text messages each week. In the fourth month (~32 weeks gestation), the breastfeeding peer counselor provided guidance and support based on the WIC breastfeeding curriculum training. The intervention was well-received; 100% of the participants said they "would recommend the program to a friend". There was a 2-month gap between the prenatal and postnatal programs designed to avoid burdening new mothers in the immediate post-partum period. The timing coincided with a change in the *promotora* (the original *promotora* needed a full time position and this position was only part time) and a brief interruption in project funding.

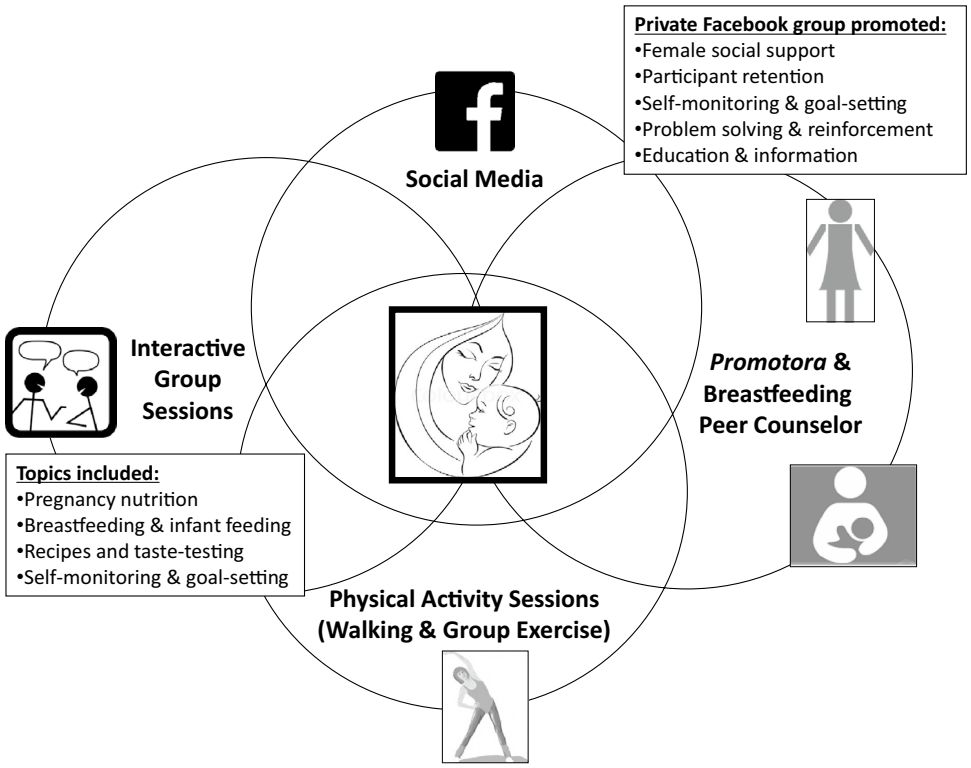

Fig. 1 Intervention delivery components

Social Media Results

The original research design was to provide health behavior support using a bidirectional mobile SMS Spanish/English system. However, during the prenatal component, most participants used pay-as-you-go phone plans, which function on both sides of the border, but did not support the automated system. A Hispanic student researcher suggested using a private group Facebook® page to post health messages and promote interaction between participants and with the *promotora* (Fig. 2). Overall internet usage rates were high for this group. All participants accessed the Internet from several times per day to several times per week. They averaged 8 h per week online and "almost always" used Internet time to access social media sites (such as Facebook®).

We implemented a private group Facebook® page and messaging feature for one-on-one interaction with the *promotora*, for the postnatal component. In order to join the private Facebook® group, participants maintained an active Facebook® user account and became Facebook® "friends" with the *promotora*. Special IRB protections were implemented due to the use of social media Facebook® pages and participants were re-consented for this portion of the project. One participant did not have an existing Facebook® page and chose not to initiate a page for the study. The Facebook® group was well-received and more feasible than the text messaging system. Moreover, because of the proximity to U.S.-Mexico border and regular movement back and forth, internet connection was more accessible than phone service across the binational region. An unforeseen benefit was improving our ability to maintain contact with participants, even when phones were out-of-service or numbers had changed (Fig. 2). Retention during the prenatal component (supported by text messaging) was 52% (12/23). After delivery, 67% (8/12) returned for the postnatal component (supported by private group Facebook® page). Of these, 100% (8/8) participated through the end of the program (6 months postpartum). This group included women without phones and women spending the majority of their time in Mexico. Participants used the private group to encourage each other to come to group sessions (e.g. "I didn't see you in class, Silvia - see you next week"). The women responded regularly, often within minutes of our postings. Most women became Facebook® "friends" with each other (not a study a requirement), creating a small social network among themselves. They also communicated among each other and with the group about the birth of their babies, sharing pictures and birth announcements.

Postnatal Group Results

We began the postnatal component with 8 returning participants. All 8 women continued to participate with the *promotora* and the group by Facebook®; 7 continued to attend group sessions 5–6 months postpartum. The following findings are based on this sample. In the postpartum group, 100% initiated breastfeeding and half were providing breast milk at 3 months postpartum (exclusive, partial or expressed). Important factors in breastfeeding success included consultation with the breastfeeding peer counselor or having a mother who had successfully breastfed. By 5 months postpartum, 5 of 7 women (70%) had dropped below or within 5 pounds of their pre-pregnancy weight. Participants reported enjoying simple mother-baby exercise and light walking groups. There were barriers to engaging in the PA component, including: (1) no previous PA prior

Fig. 2 Sample private Facebook® page message in Spanish (with English translation)

to pregnancy; (2) beliefs/concerns about PA during pregnancy; (3) lower motivation to attend PA class than those on maternal nutrition and baby information; (4) PA sessions were held in a different location than the regular FQHC and (5) not all participants wanted to engage in group walking. Another challenge for the participants was many had forgotten the nutrition guidance presented during the prenatal period on intake of sugary beverages, choosing lower fat substitutions, nutrition labels, and portion sizes.

Discussion

Findings from this pilot study indicate an intervention designed to promote optimal weight in primiparous Hispanic women during pregnancy and the post-partum period was feasible. The program was well-received; the social media component was feasible and uniquely helpful in maintaining group cohesion and participant contact in a mobile border community setting. Several studies in low-income Hispanic women, employing lifestyle interventions spanning pre- and post-natal periods demonstrated good participant retention and benefits for GWG (Chasan-Taber et al. 2015; Hawkins et al. 2015). Yet, another study found no differences in infant outcomes among mothers who participated in a prenatal intervention compared to those who did not (Gregory et al. 2016). Our small pilot study resulted in important lessons learned about feasibility, logistics, perceptions, and unique barriers in this community related to location (e.g. text messaging issues related to cross-border communication) and culture-bound beliefs (e.g. discussing cultural beliefs about optimal weight gain during pregnancy, PA during and after pregnancy, and breastfeeding). Other studies have similarly demonstrated the importance of understanding immigrant perspectives related to the sensitive times of pregnancy and the postpartum period (Kim et al. 2016).

The Facebook® component was well received and tremendously helpful for participant retention. The use of social media improved our capacity to educate, reinforce health behaviors and promote social support for nutrition and PA. The Facebook® group allowed participants more frequent and deeper contact with the *promotora* and each other. The *promotora* monitored the Facebook® page to ensure patients were receiving accurate information and being treated respectfully. In our setting on the U.S.-Mexico border, it transformed our ability to reach and be reached by the participants, overcoming international limitations of phone and text messaging systems. Many people in the border area have specific phones that function on both sides of the border but do not support automated messaging systems. Moreover, the Facebook® group provided much deeper connections than the one-to-one text messaging system could; women gained social support from each other and the *promotora*. These findings may be especially relevant for young, low-income, minority women receiving care from FQHCs throughout the U.S., of which there are over 1300, serving over 24 million patients (Kaiser Family Foundation 2015).

We recognize important limitations to be considered for future interventions. First, the sample size limited interpretation of results and overall generalizability. Second, we acknowledge the potential problem of selection bias; those women who were retained were likely more motivated to pursue nutrition, PA and breastfeeding than their peers who did not continue in the intervention. This may be an important factor in the positive outcomes in those who remained in the intervention until the end. Third, participant retention was a significant challenge due to a number of logistical factors including frequency of classes (i.e. participant burden), lack of ability to coordinate group sessions with scheduled clinic appointments with providers or WIC, and the location of PA sessions away from the FQHC. In addition, the two phases of our project were funded by separate grants resulting in a brief interruption in grant funding. Another important challenge was that the breastfeeding peer counselor was not permitted to visit and support participants in the hospital, a critical factor for early breastfeeding success. Nonetheless, participants in the postnatal group demonstrated impressive success providing breastmilk, 100% initiation and 50% at 3 months. In this setting, ~80% of mothers start formula before the first clinic or WIC visit in the first weeks of life.

Despite the limitations, this study provides important new information to be incorporated into future research promoting optimal weight in Hispanic women and their babies during the perinatal period, including in settings where there are cultural and physical barriers. From both a logistical and health care perspective, the integration of obstetric and pediatric care providers should be incorporated into future studies (Gregory et al. 2016; Whitaker et al. 2016). More research to test social media for health communication, behavior change and social support is needed, especially for hard-to-reach populations, including highly mobile populations (Gruver et al. 2016; Herring et al. 2014). While we learned many things during this study, perhaps the most important was that providing health messages to young adults using their preferred modes of communication increases the likelihood they will receive and consider the messages. Future studies should ideally begin pre-conception, given the importance of pre-pregnancy weight and early GWG trajectories (Catalano and deMouzon 2015). Moreover, studies should examine lifestyle intervention paired with biological markers (e.g. placental obesity markers, microbiome for baby and mother, and breastmilk composition), which may reveal important early life risk or protective factors for offspring. This study reveals important implications for new mothers, whose health is inextricably linked to that of generations to follow.

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Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflicts of interest.

References

Baptist, A. P., Thompson, M., Grossman, K. S., Mohammed, L., Sy, A., & Sanders, G. M. (2011). Social media, text messaging, and email-preferences of asthma patients between 12 and 40 years old. *Journal of Asthma, 48*(8), 824–830. https://doi.org/10.3109/02770903.2011.608460.

Bartholomew, M. K., Schoppe-Sullivan, S. J., Glassman, M., Kamp Dush, C. M., & Sullivan, J. M. (2012). New parents' Facebook use at the transition to parenthood. *Family Relations, 61*(3), 455–469. https://doi.org/10.1111/j.1741-3729.2012.00708.x.

Catalano, P., & deMouzon, S. H. (2015). Maternal obesity and metabolic risk to the offspring: Why lifestyle interventions may have not achieved the desired outcomes. *International Journal of Obesity (London), 39*(4), 642–649. https://doi.org/10.1038/ijo.2015.15.

Chasan-Taber, L., Marcus, B. H., Rosal, M. C., Tucker, K. L., Hartman, S. J., Pekow, P., et al. (2015). Proyecto Mama: A lifestyle intervention in overweight and obese Hispanic women: A randomised controlled trial–study protocol. *BMC Pregnancy Childbirth, 15*, 157. https://doi.org/10.1186/s12884-015-0575-3.

Doub, A. E., Small, M., & Birch, L. L. (2016). A call for research exploring social media influences on mothers' child feeding practices and childhood obesity risk. *Appetite, 99*, 298–305. https://doi.org/10.1016/j.appet.2016.01.003.

Gregory, E. F., Goldshore, M. A., Henderson, J. L., Weatherford, R. D., & Showell, N. N. (2016). Infant growth following maternal participation in a gestational weight management intervention. *Childhood Obesity, 12*(3), 219–225. https://doi.org/10.1089/chi.2015.0238.

Gruver, R. S., Bishop-Gilyard, C. T., Lieberman, A., Gerdes, M., Virudachalam, S., Suh, A. W., et al. (2016). A social media peer group intervention for mothers to prevent obesity and promote healthy growth from infancy: Development and pilot trial. *JMIR Research Protocols, 5*(3), e159. https://doi.org/10.2196/resprot.5276.

Hawkins, M., Hosker, M., Marcus, B. H., Rosal, M. C., Braun, B., Stanek, E. J., et al (2015). A pregnancy lifestyle intervention to prevent gestational diabetes risk factors in overweight Hispanic women: A feasibility randomized controlled trial. *Diabetic Medicine, 32*(1), 108–115. https://doi.org/10.1111/dme.12601.

Herring, S. J., Cruice, J. F., Bennett, G. G., Davey, A., & Foster, G. D. (2014). Using technology to promote postpartum weight loss in urban, low-income mothers: A pilot randomized controlled trial. *Journal of Nutrition Education and Behavior, 46*(6), 610–615. https://doi.org/10.1016/j.jneb.2014.06.002.

Hivert, M. F., Rifas-Shiman, S. L., Gillman, M. W., & Oken, E. (2016). Greater early and mid-pregnancy gestational weight gains are associated with excess adiposity in mid-childhood. *Obesity (Silver Spring), 24*(7), 1546–1553. https://doi.org/10.1002/oby.21511.

Houghton, L. C., Ester, W. A., Lumey, L. H., Michels, K. B., Wei, Y., Cohn, B. A., et al. (2016). Maternal weight gain in excess of pregnancy guidelines is related to daughters being overweight 40 years later. *American Journal of Obstetrics and Gynecology, 215*(2), e241–248. https://doi.org/10.1016/j.ajog.2016.02.034.

Kaiser Family Foundation. (2015). State health facts, providers and service use: Federally qualified health centers. Retrieved 25 April 2017 from http://kff.org/state-category/providers-service-use/federally-qualified-health-centers/.

Kim, L. P., Koleilat, M., & Whaley, S. E. (2016). A qualitative study to examine perceptions and barriers to appropriate gestational weight gain among participants in the special supplemental nutrition program for Women Infants and Children Program. *Journal of Pregnancy*. https://doi.org/10.1155/2016/4569742.

Knowler, W. C., Barrett-Connor, E., Fowler, S. E., Hamman, R. F., Lachin, J. M., Walker, E. A., et al. (2002). Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *New England Journal of Medicine, 346*(6), 393–403. https://doi.org/10.1056/NEJMoa012512.

Maier, J. T., Schalinski, E., Gauger, U., & Hellmeyer, L. (2016). Antenatal body mass index (BMI) and weight gain in pregnancy—its association with pregnancy and birthing complications. *Journal of Perinatal Medicine, 44*(4), 397–404. https://doi.org/10.1515/jpm-2015-0172.

Mourtakos, S. P., Tambalis, K. D., Panagiotakos, D. B., Antonogeorgos, G., Alexi, C. D., Georgoulis, M., et al. (2016). Association between gestational weight gain and risk of obesity in preadolescence: A longitudinal study (1997–2007) of 5125 children in Greece. *Journal of Human Nutrition and Dietetics*. https://doi.org/10.1111/jhn.12398.

Nader, P. R., Huang, T. T., Gahagan, S., Kumanyika, S., Hammond, R. A., & Christoffel, K. K. (2012). Next steps in obesity prevention: Altering early life systems to support healthy parents, infants, and toddlers. *Childhood Obesity, 8*(3), 195–204. https://doi.org/10.1089/chi.2012.0004.

O'Brien, C. M., Cramp, C., & Dodd, J. M. (2016). Delivery of dietary and lifestyle interventions in pregnancy: Is it time to promote the use of electronic and mobile health technologies? *Seminars in Reproductive Medicine, 34*(2), e22–e27. https://doi.org/10.1055/s-0036-1583533.

Ogden, C. L., Carroll, M. D., Fryar, C. D., & Flegal, K. M. (2015). Prevalence of obesity among adults and youth: United States, 2011–2014. *NCHS Data Brief* 219, 1–8.

Thoren, E. M., Metze, B., Buhrer, C., & Garten, L. (2013). Online support for parents of preterm infants: A qualitative and content analysis of Facebook 'preemie' groups. *Archives of Disease in Childhood-Fetal and Neonatal Edition, 98*(6), F534–F538. https://doi.org/10.1136/archdischild-2012-303572.

Truong, Y. N., Yee, L. M., Caughey, A. B., & Cheng, Y. W. (2015). Weight gain in pregnancy: Does the Institute of Medicine have it right? *American Journal of Obstetrics and Gynecology, 212*(3), e361–368. https://doi.org/10.1016/j.ajog.2015.01.027.

Vyas, A. N., Landry, M., Schnider, M., Rojas, A. M., & Wood, S. F. (2012). Public health interventions: Reaching Latino adolescents via short message service and social media. *Journal of Medical Internet Research, 14*(4), e99. https://doi.org/10.2196/jmir.2178.

Whitaker, K. M., Wilcox, S., Liu, J., Blair, S. N., & Pate, R. R. (2016). Provider advice and women's intentions to meet weight gain, physical activity, and nutrition guidelines during pregnancy. *Maternal and Child Health Journal, 20*(11), 2309–2317. https://doi.org/10.1007/s10995-016-2054-5.

Zhang, Y., He, D., & Sang, Y. (2013). Facebook as a platform for health information and communication: A case study of a diabetes group.

Journal of Medical Systems, 37(3), 9942. https://doi.org/10.1007/s10916-013-9942-7.

Zhao, P., Liu, E., Qiao, Y., Katzmarzyk, P. T., Chaput, J. P., Fogelholm, M., et al. (2016). Maternal gestational diabetes and childhood obesity at age 9–11: Results of a multinational study. *Diabetologia, 59*(11), 2339–2348. https://doi.org/10.1007/s00125-016-4062-9.