



“Baby Wants Tacos”: Analysis of Health-Related Facebook Posts from Young Pregnant Women

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Abstract

Objectives Pregnant young women gain more weight than recommended by the National Academy of Medicine, increasing the likelihood of adverse maternal and fetal outcomes. The purpose of this study is to use online social media to understand beliefs and practices surrounding weight gain, diet and exercise during pregnancy among young women. **Methods** Facebook posts were mined from young women ages 16 to 24 during pregnancy who were consented from two Midwest primary care clinics serving low-income communities. Natural language processing was used to identify posts related to weight gain, exercise and diet by keyword searching. Two investigators iteratively coded the mined posts and identified major themes around health behaviors. Outcome measures included the frequency of posts and major themes regarding health behaviors during pregnancy. **Results** Participants (n = 43) had a mean age of 21 (SD 2.3), and the largest subgroups identified as black (49%; 26% white, 16% Hispanic, 9% other) and having graduated from high school (49%; 24% completed some high school and 24% completed at least some post-secondary education). Among the 2899 pregnancy posts analyzed, 311 were related to weight. Major themes included eating behaviors and cravings (58% of identified posts), body image (24%), the influence of family, partners and friends (14%), and the desire to exercise (4%). **Conclusions for practice** Facebook posts revealed that young women often frame their thoughts and feelings regarding weight gain in pregnancy in the context of food cravings and body image and that friends and family are important influencers to these behaviors.

Keywords Pregnancy · Weight gain · Social media · Facebook · Cravings · Adolescent

Abbreviation

LMP Last menstrual period

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Significance

Healthcare providers face a unique challenge when it comes to counseling young women on healthy weight gain pregnancy. This analysis of Facebook posts shows that to better engage this population, discussions should specifically address unhealthy food cravings, body image issues and the daily influence provided by family, friends and partners.

Introduction

Excess weight gain during pregnancy is a serious health concern affecting the majority of pregnant adolescents and young women in the US, contributing to the risk of long-term obesity in mother and child and leading to delivery complications such as operative delivery and still birth (Siega-Riz et al. 2009; Oken et al. 2008; Nehring et al. 2011; Fraser et al. 2011; Gould Rothberg et al. 2011; Viswanathan et al. 2008; Sridhar et al. 2014; Rong et al. 2015).

The National Academy of Medicine (NAM) guidelines for weight gain during pregnancy apply to both adults and adolescents, but the majority of pregnant adolescents and young adults gain more weight than recommended by the NAM (Harper et al. 2011; Institute of Medicine 2009; Groth et al. 2013; Joseph et al. 2008). The most recent literature defines adolescence as occurring between the ages of 10 and 24 (Sawyer et al. 2018). Pregnant and obese young women are at increased risk for excess weight gain in pregnancy (Harper et al. 2011; Groth et al. 2013; Ogden et al. 2014). Despite many studies of this patient population, there is a significant gap in health care providers' understanding of youth perceptions and knowledge surrounding weight gain during pregnancy.

Face-to-face interactions, either in the health care clinic, or during individual interviews and focus groups, are limited in their ability to provide insight into the life of youth. Youth often have difficulty verbalizing their beliefs due to their ongoing cognitive, social, and emotional development and limited health literacy (Chang et al. 2013; Nelson and Quintana 2005; Manganello 2008; Smith et al. 2014; Bassett et al. 2008). Furthermore, discomfort with speaking to adults or health care providers may lead to desirability bias (Raacke and Bonds-Raacke 2008).

Online social media use is pervasive and central to the way youth orient themselves to the world and others and provides a window into their unfiltered values and beliefs. According to Pew Research Center, 88% of 18–29 year-olds reported using Facebook in 2016, compared to 80% in 2018 (Greenwood and Perrin 2016; Smith 2018). More than one-third of adolescents check their profile page daily and another 25% check every few days (Greenwood and Perrin 2016). In this study, we performed online social media mining to gain further insight into the lives of pregnant youth, specifically around body image, food, exercise, and influences during pregnancy.

Methods

Forty-three pregnant women ages 16–24 from two separate Midwest primary care clinics in low income areas consented for longitudinal Facebook mining. Demographic data (including age, race, educational status, household income, household members and relationship status) were self-reported on an online questionnaire at the first study visit. Notably, the sample could be characterized as an underserved population as demonstrated by the high proportion of racial/ethnic minorities and low median annual household income (\$3800). Additionally, gestational weight gain was calculated by taking the difference between each participant's weight at the final obstetric visit and pre-pregnancy weight obtained at the first prenatal visit. These weights

were extracted by retrospective chart review. Gestational weight gain was characterized as either below, within, or above the NAM guidelines.

Extraction of Facebook posts was performed using the Facebook application program interface (API) at two separate occasions in 2016—once upon recruitment (usually in first trimester or early second trimester) and again in the third trimester. Prior to their initial prenatal visit and recruitment, participants were unaware of social media mining and did not have an opportunity to curate their social media history. At each extraction, participants granted access to their accounts by signing into Facebook during a standard clinic visit. Access was immediately terminated after the participants logged out of their accounts. To protect the privacy of non-consented individuals, items posted by non-consented individuals was not retrieved or analyzed. Posts containing emojis were also analyzed. However, photos were not evaluated as part of this study to protect the privacy of non-consented individuals who may have appeared in photos. Posts pertaining to weight gain, food and exercise were identified by finding keywords (e.g., craving, food, fat, exercise) and their morphological variants through the use of Natural Language Processing (NLP). See “Appendix A” for full list of search terms. These posts were sorted by time stamp so that those outside of pregnancy were excluded from analysis. The gestational age at each post was calculated using the time stamp and last menstrual period (LMP). Two investigators coded these posts and determined recurring major themes and subthemes relating to weight gain. Only English-language posts were analyzed. Iterative coding was used to establish a formal codebook once consensus was gained between two investigators (GS, AM). A third investigator was used to decide any conflicts (TC). Outcomes identified included the major themes and subthemes related to weight gain and the frequency of posts belonging to each of these categories. This study was approved by the Institutional Review Board of the University of Michigan (HUM00104989).

Results

Quantitative Results

The study included 43 young women aged 16–24. Approximately 2% of posts were Spanish language and were not analyzed. Participants ($n = 43$) had a mean age of 21 (SD 2.3), and the largest subgroup identified as black (49%; 26% white, 16% Hispanic, 9% mixed race, Native American, or other). The largest subgroup graduated from high school (49%), while 24% completed only some high school and 24% completed at least some post-secondary education. See Table 1 for participant characteristics.

Table 1 Demographic characteristics of sample, n = 43

Demographic	Category	Number (%)
Race (n = 43)	Non-Hispanic black	21 (49%)
	Non-Hispanic white	11 (26%)
	Hispanic	7 (16%)
	Non-Hispanic mixed race or other	3 (7%)
	Native American	1 (2%)
Age (n = 43) (mean age 21; standard deviation 2.3 years; range 16–24)	Younger than 18	4 (9%)
	Between 18 and 21	19 (44%)
	Older than 21	20 (47%)
Educational status (n = 42)	Completed some high school	13 (31%)
	High school graduate	20 (47%)
	Completed some post-secondary education ^a	9 (21%)
Median household annual income (n = 28) ^a	\$3800 (range \$0–40,000)	
Household members (n = 42) ^c	Subject's children	12 (29%)
	Parent	11 (26%)
	Significant other (boyfriend, fiancé, husband)	11 (26%)
	Roommate	5 (12%)
	Lives alone	2 (5%)
	Relationship status (n = 37) ^b	Single, never married
	In a relationship but not married	20 (54%)
	Married	1 (2%)

^aSubjects younger than age 18 were all counted as completing some high school; 2 of 4 were currently enrolled in school

^bQuestion not asked to participants under age 18

^cCategories not mutually exclusive

Of all mined posts (n = 2899), 311 posts included information relating to health behaviors in pregnancy. The most common themes identified in these posts were eating behaviors/cravings, body image, exercise and the influence of family, partners and friends. Representative posts and frequency of posts related to each theme and subtheme can be found in Tables 2, 3, 4, and 5. Gestational ages corresponding to each quotation are included in each table under the column titled “Gestational age at the time of post”. Extractions occurred once in the first trimester or early second trimester and again in the third trimester.

Qualitative Results

The most common themes amongst health-related posts in pregnancy were those pertaining to food and cravings, accounting for 58% of all health-related Facebook posts. Among food-related posts, 52% referenced cravings for specific foods (“up craving chicken nuggets with sweet and sour sauce and a caramel frappe with extra caramel with a medium fry fresh asf”). Only 8% of food posts referenced foods that would be commonly considered to be healthy (i.e., fruit and vegetables) in accordance with USDA recommendations (Choose My Plate 2018). Additionally, 8% of posts cited pregnancy-related discomfort as a motivator of a food

behavior (“haven’t kept anything down in 3 days... now im craving ichiban”). Posts detailing the consumption of large quantities of food made up 12% of total food posts (“I’m having the type of day where I just want to eat and eat. I think that’s what I’m going to do”). Finally, 8% of these posts referenced the babies’ desires to eat certain foods (“my little baby love bacon, I crave it all day I’m about to make me a bacon bagel sandwich”).

Posts concerning body image were categorized as those with positive, negative and neutral tones. Thirty-nine percent of these posts reflected a neutral stance towards the changes occurring to their bodies during pregnancy (“my stomach is starting to shape and get bigger lol and a lil heavy”). Negative posts accounted for 35% of posts (“my boobs get in the way as much as my stomach does I want my little tits back”). Positive posts accounted for 26% of the total body image posts (“it’s so cute how my belly is starting to poke out I swear im growing overnight but im still smaller then an average 5-month pregnant woman”).

Subjects cited partners (“had a great date with my baby today. Went to red robin and got a free birthday burger, stopped by denny’s and got a free birthday breakfast, and went to the park to walk it all off. Now I’m sick and tired. But it was worth it.! thank you babe. I love you”), family members (“I crave slushies all day everyday, and I get what

Table 2 Representative posts on eating behaviors and related subthemes

Major theme: eating behaviors		Number of participants posting about theme: 25 women		Total number of posts about theme: 180 posts	
Subtheme	Demographics	Gestational age at time of post (weeks)	Weight data	Facebook post	Facebook post
Cravings (n = 94)	23 years old, black/non-Hispanic, vocational training	5	BMI 22.3, +37 lbs, over	I want everything 2 eat but I'll settle 4 home made cheese burgers & some onion rings	
	22 years old, black/non-Hispanic, some college	21	BMI 25.9, +37 lbs, over	I need fries from Mcdonald's and a ice from burger king!	
	20 years old, black/non-Hispanic, high school graduate	22	BMI 33.6, -3 lbs, under	I crave sugar...sugar...n more sugar	
	23 years old, black/non-Hispanic, vocational training	23	BMI 22.3, +37 lbs, over	I'll try the no pork thing after this baby. My cravings are too real! wtbs; fried pork chops, mac & cheese, broccoli w/cheese, & biscuits 4 dinner	
"Baby wants..." (n = 15)	17 years old ^a	24	BMI 25.5, +17 lbs, within	Up craving chicken nuggets with sweet and sour sauce and a caramel frappe with extra caramel with a medium fry fresh asf	
	22 years old, white/non-Hispanic, some high school	30	BMI 19.2, +35 lbs, within	I'm having the type of day where I just want to eat eat and eat. I think that's what I'm going to do	
	19 years old, black/non-Hispanic, high school graduate	11	BMI 22.2, +45 lbs, over	My little baby love bacon, I crave it all day I'm about to make me a bacon bagel sandwich	
	17 years old ^a	13	BMI 25.5, +17 lbs, within	I absolutely hate doritos but...my baby seems to love them... I just wanna throw every pack of doritos I have away cause every time I look at them it's like my soul tell me to eat them	
Feeling unwell as justification for unhealthy eating (n = 14)	24 years old, black/non-Hispanic, high school graduate	17	BMI 22.6, +30.5 lbs, within	So me and peanut just ate and I think peanut still hungry cause for the first time after eating I'm not full	
	20 years old, mixed/Hispanic, some high school	34		I have stuffed my face three times today...I feel super fat lol but I know my baby girl ate good...	
	17 years old ^a	11	BMI 19.7, +36 lbs, over	Haven't kept anything down in 3 days... now im craving ichiban	
		14	BMI 25.5, +17 lbs, within	I don't see how y'all eat so much when y'all pregnant... my appetite has decreased tremendously. I don't want to eat anything or have a taste for anything. I only cook for [name] and my family literally. I snack on things throughout the day but it's never a whole entire meal I can eat	

Table 2 (continued)

Major theme: eating behaviors				
Number of participants posting about theme: 25 women				
Total number of posts about theme: 180 posts				
Subtheme	Demographics	Gestational age at time of post (weeks)	Weight data	Facebook post
Sharing diet-related behaviors with others (n = 74)	23 years old, black/non-Hispanic, vocational training	18	BMI 22.3, +37 lbs, over	About 2 make pepper steak & rice 4 the first time! thinking about corn bread w/it. idk! what y'all make w/y'all pepper steak & rice?
	22 years old, white/non-Hispanic, high school graduate	25	BMI 24.5, +47 lbs, over	Shout out to all the pregnant girls on my facebook! we have a reason to stuff our faces! lol
	22 years old, mixed/non-Hispanic, high school graduate	33	BMI 19.2, +13 lbs, under	Omg I have the worst stomach ache I just ate potato soup, a years oldgurt, a pickle, peaches and drunk a cup of pickle juice.. lmaaaaa

+/- positive/negative weight gain during pregnancy

Demographics header = age (years), race/ethnicity, highest education level obtained

Weight data header = pre-pregnancy body mass index (BMI), weight gain during pregnancy, Institute of Medicine (IOM) classification of weight gain at the end of pregnancy R

lol laughing out loud, *lmao* laughing my ass off, *wtbs* with that being said, *asf* as fuck, *omg* oh my god/gosh, *idk* I don't know

^aDemographics not completed by participant

Table 3 Representative posts on body image and related subthemes

Sub-theme	Demographics	Gestational age at time of post (weeks)	Weight data	Facebook post
Major theme: body image				
Number of participants posting about theme: 22 women				
Total number of posts about theme: 75 posts				
Positive image (n = 21)	23 years old, black/non-Hispanic, vocational	8	BMI 29.8, +42 lbs, over	Cant hide it no more little baby getting me fat it's going to be a long summer but it's worth it #blessed
		16		It's so cute how my belly is starting to poke out I swear im growing overnight but im still smaller then an average 5 month pregnant woman
	22 years old, mixed race/non-Hispanic, high school graduate	19	BMI 19.2, +13 lbs, under	Bellies are so cute in hoodies
	23 years old, black/non-Hispanic, vocational	20	BMI 22.3, +37 lbs, over	I'm 130 lbs now idcc if I stay fat after this baby I never want 2 be skinny like I was again I know that !! I've gained 17 lbs in 4 months ! I'll be happy if I make it to 145 lbs by the end of this pregnancy. #eamthickagain-please
	17 years old ^a	26	BMI 25.5, +17 lbs, within	Actually convinced I'm in pretty good shape and will snap back quick asf
	16 years old ^a	29	BMI 26.1, +14 lbs, under	Idc what nobody say I'm beautiful asf
	16 years old ^a	5	BMI 26.1, +14 lbs, under	She called me a fat hippo [name]
	19 years old, mixed race/non-Hispanic, high school graduate	20	BMI 23.4, +39 lbs, over	My face getting chunky
	22 years old, white/non-Hispanic, some high school	21	BMI 19.3, +35 lbs, within	I barely have any clothes that fit anymore thankful for the one flannel out of the 3 I have that still fits. #pregnant-problems
	22 years old, white/non-Hispanic, high school graduate	22	BMI 24.5, +47 lbs, over	When your not even 6 months pregnant and someone ask you of your about to pop. fuckk im going to get huge
Negative image (n = 29)	22 years old, mixed race/non-Hispanic, high school graduate	33	BMI 19.2, +13 lbs, under	My boobs get in the way as much as my stomach does I want my little tits back
	20 years old, mixed race/Hispanic, high school graduate	35	BMI 20.1, +26 lbs, within	Only cause I look humongous!!! 8 months down, hurry up fat man!!!

Table 3 (continued)

Sub-theme	Demographics	Gestational age at time of post (weeks)	Weight data	Facebook post
Major theme: body image				
Number of participants posting about theme: 22 women				
Total number of posts about theme: 75 posts				
Neutral image (n = 32)	22 years old, white/non-Hispanic, some high school	7	BMI 19.3, + 35 lbs, within	Call me crazy but I can already see a difference in my stomach. if anyone really knows me, they would know I've always had a very flat tummy. I will constantly take pictures of my stomach to see the difference. #7weeks 2 days our little baby is growing
	19 years old, black/non-Hispanic, high school graduate	14	BMI 22.2, + 45 lbs, over	Idk why my stomach look that big on that picture it's not big at all y'all
	19 years old, white/non-Hispanic, some high school	17	BMI 20.4, + 35 lbs, within	It feels so good to finally feel comfortable in my surroundings lol that baby bump got me feeling fat
	24 years old, black/non-Hispanic, high school graduate	17	BMI 22.6, + 30.5 lbs, within	My stomach is starting to shape and get bigger lol and a lil heavy

+/- positive/negative weight gain during pregnancy

Demographics header = age (years), race/ethnicity, highest education level obtained

Weight data header = pre-pregnancy body mass index (BMI), weight gain during pregnancy, Institute of Medicine (IOM) classification of weight gain at the end of pregnancy^R

lol laughing out loud, *idc* I don't even care, *idk* I don't care, *idk* I don't know, *asf* as fuck

^ademographics not completed by participant

Table 4 Representative posts on influencers of health behaviors and related subthemes

Sub-theme	Demographics	Gestational age at time of post (weeks)	Weight data	Facebook post
Major theme: influencers				
Number of participants posting about theme: 16 women				
Total number of posts about theme: 43 posts				
Partner influencing food choices (n = 11)	18 years old, white/non-Hispanic, some college	8	BMI 31.2, - 8 lbs, under	I swear I have the best boyfriend ever! took me to dinner at antonio's and then the movies. I love you baby
	24 years old, black/non-Hispanic, some college	14	BMI 29.2, + 29 lbs, over	Had a great date with my baby today. went to red robin and got a free birthday burger, stopped by denny's and got a free birthday breakfast, and went to the park to walk it all off. now I'm sick and tired. But it was worth it.! thank you babe. I love you
	21 years old, black/non-Hispanic, high school graduate	28	BMI 40.0, + 45 lbs, over	"Imbo [name] said im blessed because I told her when [name] take me out to eat im allowed to get a drink and dessert Imbo"
Family and friends influencing food choices (n = 25)	17 years old ^a	9	BMI 25.5, + 17 lbs, within	Cried because [name] wanted to take me to taco bell instead of burger king we compromised with wendy's
	23 years old, black/non-Hispanic, vocational school	9	BMI 22.3, + 37 lbs, over	Pickles & ranch omg so good !!! & [name] got me eating hot fries. this poor baby
	16 years old ^a	19		Real friends satisfy your cravings when you're pregnant s/o 2 [name]!! hot wings & fries in the making
	24 years old, black/non-Hispanic, high school graduate	18	BMI 26.1, + 14 lbs, under	I crave slushies all day everyday, and I get what I want because my momma loves me
	19 years old, white/non-Hispanic, some high school	25	BMI 28.9, + 29 lbs, over	I love going to my grandma house she made mac and cheese and gave me most of it
		26	BMI 20.4, + 35 lbs, within	I just want to thank my grandma because the other day I really had no energy or patience to go into the store I was sick as a dog so she went out and got me a bunch of fruit, soup, gatorade and crackers...oh and I forgot the vernors. The whole care package and I appreciate it really a lot and I love you very much, thank you grandma!!!
Friends influencing body image (n = 3)	22 years old, white/non-Hispanic, some high school	24	BMI 19.3, + 35 lbs, within	Last time I wore this dress was in June... [name] you were right this dress that you let me borrow definitely makes my belly pop

Table 4 (continued)

Major theme: influencers					
Number of participants posting about theme: 16 women					
Total number of posts about theme: 43 posts					
Sub-theme	Demographics	Gestational age at time of post (weeks)	Weight data	Facebook post	
Friends influencing exercise habits (n = 3)	21 years old, black/non-Hispanic, high school graduate	4	BMI 40.0, +45 lbs, over	I need a consistent, committed workout partner with motivation, dreams and goals ugh wtf !! lol	
	19 years old, mixed race/non-Hispanic, high school graduate	6	BMI 37.6, +44 lbs, over	That after gym life with [name]	
	18 years old, white/non-Hispanic, some high school	29	BMI 18.6, +27 lbs, within	The hardest thing in the world is to stay positive and healthy when the one you love is damn near gone, & everything else comes before you	
Other influencer (n = 4)					

+/- positive/negative weight gain during pregnancy

Demographics header = age (years), race/ethnicity, highest education level obtained

Weight data header = pre-pregnancy body mass index (BMI), weight gain during pregnancy, Institute of Medicine (IOM) classification of weight gain at the end of pregnancy R

lol laughing out loud, *lmbo* laughing my butt off, *wtf* what the fuck, *s/o* shout out

^aDemographics not completed by participant

Table 5 Representative posts on exercise

Major theme: exercise			
Total number of participants posting about theme: 12 women			
Total number of posts about theme: 13 posts			
Demographics	Gestational age at time of post (weeks)	Weight data	Facebook post
21 years old, black/non-Hispanic, high school graduate	4	BMI 39.0, + 45 lbs, over	I need a consistent, committed workout partner with motivation, dreams and goals ugh wtf !! lol
24 years old, black/non-Hispanic, some college	14	BMI 29.2, +29 lbs, over	Had a great date with my baby today. went to red robin and got a free birthday burger, stopped by denny's and got a free birthday breakfast, and went to the park to walk it all off. now I'm sick and tired. But it was worth it.! thank you babe. I love you
23 years old, black/non-Hispanic, vocational training	15	BMI 29.8, + 42 lbs, over	Working out while pregnant keeps my energy going
20 years old, black/non-Hispanic, some high school	17	BMI 17.3, +22 lbs, under	I wanna take my son in a pool to bad I can't swim lmfao
19 years old, white/non-Hispanic, some high school	17	BMI 20.4, + 35 lbs, within	Who wants to go on a drive or walk in the park...not ready for bed yet
24 years old, black/non-Hispanic, high school graduate	26	BMI 22.6, + 30.5 lbs, within	I think I wanna go walk around the mall who wants to go with me?
21 years old, white/non-Hispanic, high school graduate	32	BMI 43.5, + 22 lbs, over	After my son born imma work out my goal is 150–175 lb
24 years old, white/non-Hispanic, high school graduate	32	BMI 19.7, + 22 lbs, under	Does anyone wann do something today? hangout? go walk around the mall? anything?

+/- positive/negative weight gain during pregnancy

Demographics header = age (years), race/ethnicity, highest education level obtained

Weight data header = pre-pregnancy body mass index (BMI), weight gain during pregnancy, Institute of Medicine (IOM) classification of weight gain at the end of pregnancy R

lol laughing out loud, wtf what the fuck, lmfao laughing my fucking ass off

^aDemographics not completed by participant

I want because my momma loves me”) and friends (“real friends satisfy your cravings when you’re pregnant s/o 2 [name]!! hot wings & fries in the making”) as enabling behaviors surrounding eating and exercise. The majority of the posts cited family members and friends (72.1%) and partners (25.6%) as influencing their health-related behaviors—most commonly, with regards to their food choices. The remaining portion of these posts cited more nonspecific influencers (“the hardest thing in the world is to stay positive and healthy when the one you love is damn near gone, & everything else comes before you”). None of the posts described direct recommendations made by companions regarding weight gain but rather narrated instances in which food behaviors had been directly or indirectly enabled by the companion (“so my mom [name] made a strawberry shortcake cake with cheese cake included and surprised me to a very good dinner with some family I

love her so much even the impossible is possible with her #mysuperwoman”).

Posts regarding exercise in pregnancy accounted for the smallest proportion of total weight-related posts (4%). These posts were divided equally between those mentioning having exercised, or planning to exercise (“took little baby for a run at the park... it’s such a nice day”), those wanting to exercise more (“dawg, I’m playing just dance with my lil sister & let’s just say my ass need to hit the gym, a bitch is mf tide”) and those soliciting help completing their exercise goals (“I think I wanna go walk around the mall who wants to go with me?”).

Discussion

Facebook posts of young women provide unique and unfiltered insight into their beliefs surrounding health behaviors during pregnancy. This sample specifically represents an underserved population as demonstrated by the high proportion of ethnic minorities and low median annual household income (\$3800). This research demonstrates that young pregnant women commonly post about topics impacting weight gain during pregnancy, which include eating behaviors, exercise habits, issues around body image and individuals who influence their health behaviors. The unique methods of this study allowed examination of participants' processed thoughts in a comfortable and familiar medium to participants, which is often not afforded in a traditional face-to-face interview. In regards to eating behaviors, our findings suggest that not only do young women post frequently about cravings and desires for typically unhealthy foods, but that they will also go to great lengths to satisfy these desires including walking to fast food restaurants and soliciting friends to drive them or deliver food to them. The association between excess gestational weight gain and the frequency of food cravings—specifically high fat and fast foods—has been demonstrated in other longitudinal studies (Blau et al. 2018; Orloff et al. 2016). With these habits and desires in mind, health care providers can better engage in relatable conversations with young pregnant women in order to promote healthy weight gain during pregnancy. While a health care provider might typically inform a patient of NAM guidelines for weight gain during pregnancy, very few young pregnant women post about weight gain directly or exact pounds gained. This data suggests that discussing cravings and mitigating those cravings may be a more patient-centered approach to discussing recommended weight gain during pregnancy. Likewise, health care providers may approach exercise during pregnancy by asking who young pregnant women could identify as an exercise partner. Our results suggest that young women are generally interested in engaging in physical exercise during pregnancy and prefer to do so with others (see Table 5). As demonstrated in previous qualitative analyses, emotional support from exercise partners contributes to greater self-efficacy in implementing exercise behaviors (Rackow et al. 2015; Carron et al. 1996).

Body image was also a commonly discussed topic on social media among young pregnant women. Those providing health care to young pregnant women should be aware that their patients are concerned and posting about body image, in both a positive and a negative light. Previous studies have found that women value discussions with providers about weight gain and body image during

pregnancy (Watson et al. 2016). Some women in our study viewed weight gain and changes in their body as positive signs of healthy fetal status while some viewed weight gain as negative and commented on the desire to return to their pre-pregnancy body shape quickly after delivery. Traditionally, health care providers focus on healthy weight gain recommendations during a woman's pregnancy, but these posts suggest that when caring for young pregnant women, it may be impactful and relevant to their health framework to discuss weight gain in regards to body image as this has been shown to have associations with gestational weight gain. Previous qualitative studies have reflected this association. In particular, lower attractiveness scores and dissatisfaction with body weight earlier in pregnancy correspond with greater gestational weight gain (Hill et al. 2013; Sui et al. 2013). Questionnaires evaluating body image during pregnancy could be easily implemented in primary care practice and could be potentially useful to identifying those at-risk for exceeding recommendations for gestational weight gain (Sui et al. 2013; Fuller-Tyszkiewicz et al. 2012).

As expected, but not frequently acknowledged by health care providers, young pregnant women are especially subject to external influences regarding health behaviors. Participants frequently posted about both healthy and unhealthy behaviors that were influenced by family, friends, and partners. Rather than limiting counseling to directive education around eating and exercise as it relates to weight gain in pregnancy, health care providers could discuss healthy behaviors by considering the messages they are receiving from important people in their lives and those who encourage or discourage their choices. A 2016 study by Cheng et al. found an inverse relationship between partner support and gestational weight gain, with increased perceived partner support corresponding with healthier gestational weight gain. Conversely, a qualitative study conducted in 2016 highlighted that pregnant women often perceive pressure from partners and family members to "eat for two" as a barrier to limiting gestational weight gain (Cheng et al. 2016; Kim et al. 2016). Encouraging partners, friends and family members to accompany young pregnant women to their visits may also represent an opportunity to provide education to patients as well as their family and friends.

Limitations

Our research demonstrates a novel approach to understanding an underserved population and highlights unique perspectives held by this group. However, we acknowledge the limitations of our research. Like traditional methods of collecting qualitative data, social media posts and mining may only show one facet to a multi-faceted phenomenon. Women

may post one sentiment, but feel or behave differently in real life. Additionally, because our study population is comprised primarily of low-income minority young women, our findings may not be generalizable to other populations. Furthermore, we acknowledge that participants in our study may have amplified their posts in order to garner a desired response from peers and that these amplified posts may not always reflect their ultimate actions. Though participants were not aware of the research focus of the study during social media mining, participants could have potentially filtered or altered their responses after the first mining in anticipation of a second mining of their data. It is also possible that despite our efforts to include an exhaustive list of words related to weight-gain in pregnancy, our key word search may have systematically omitted posts that may have otherwise informed our research question. The interpretation and coding of the Facebook posts was performed by at least two investigators. However, we acknowledge the limitation of interpreting text-based data in assessing complex sentiments such as sarcasm and humor.

Conclusions

Facebook posts of young women provided unfiltered insights into their thoughts and behaviors around health during pregnancy. The posts revealed that young women often frame their thoughts and feelings regarding weight gain in pregnancy in the context of food cravings and body image. For example, young women posted frequently about giving into cravings. Using this knowledge, healthcare providers could target conversations about healthy eating and appropriate weight gain in pregnancy by acknowledging cravings and providing healthier alternatives that make healthy eating convenient. For example, providers might discuss strategies to ensure that healthy snacks are the foods that are visible and within reach at home and to think head to order healthier alternatives at frequented fast food chains. Previous studies have demonstrated that, though young pregnant women acknowledge the importance of a healthy and well-balanced diet, they are unwilling to sacrifice convenience and affordability. (Wise 2015) Social media posts by young women also demonstrate that friends and family are important influencers to weight-related behaviors during pregnancy. Providers should acknowledge the impact that such persons have, but also empower young women to make healthy choices, especially during pregnancy. While acknowledging that inappropriate gestational weight gain is a problem that faces both adolescent and adult pregnant women, healthcare providers may better engage young pregnant women in particular in more meaningful conversation and encourage change by utilizing a youth-centered framework of body image, cravings and influencers during pregnancy.

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Compliance with Ethical Standards

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

Appendix A

Exercise	Diet	Body image/ weight gain	Pregnancy
Work out	Vegetable	Weight, weight gain	Preg
Sweat	Pop, soda	Fat, chubby	Pregna
Run	Fruit	Pregnant	Knocked up
walk	Craving	Bump, belly	Bun (in the oven)
Gym	Hungry	Gain, pounds, lb, scale	Baby
Bike	Starving	Heavy, big, huge	With child
Move	Full	Wobble	With baby
Bicycle	Quarter pounder	Tiny, small	Expecting
Perspiration	McDonalds	Overweight, obese	
Be active	Greasy	Large, big, wide	
Active	Chips	Butt, buttocks, stomach	
Yoga	Eat	Shape, figure, body	
Exercise	Snack	Boobs, breast, chest	
Stairs	Energy	Bulge	
Play	Starved	Fatness, adipose	
Race	Nosh	Belittled	
Squat	Starvation	Abdomen, abs	
Work	Protein	Fleshy	
Treadmill	Dairy	Fatten, fatty	
Elliptical	Carbs	Torso, tummy	
Dumb bell	Water	Stretch marks, stretch	

Exercise	Diet	Body image/ weight gain	Pregnancy
Bench press	Yogurt	Booty, ass	
Swim	Cheese	Flat	
Jog	Meat	Flabby	
	Fish	Hippo, cow, pig	
	Burger	Ugly	
	Taco	Beautiful, pretty, cute	
	Steam	Skinny, fit	
	Cook	Feet	
	Fry	Swollen, swell, swoll	
	Bake	Glow	
	Cook	Healthy, unhealthy	
		Bread	Chunk, chunky Tit, tits

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