Psychosocial and sociodemographic contributors to breastfeeding intention in first-time mothers

Tondy Baumgartner, MD, MSEd[1], Surya Sruthi Bhamidipalli, MPH[1], David Guise, MSc, MPH[1], Joanne Daggy, PhD[1], Corette B. Parker, DrPH[2], Melissa Westermann, MD[3], Samuel Parry, MD[4], William A. Grobman, MD, MBA[5], Brian M. Mercer, MD[6], Hyagriv N. Simhan, MD[7], Robert M. Silver, MD[8], Ronald J. Wapner, MD[9], George R. Saade, MD[10], Uma M. Reddy, MD, MPH[11] David M. Haas, MD, MS[1] for the nuMoM2b study

[1]Indiana University, [2]RTI International, [3]University of California, Irvine, [4]University of Pennsylvania, [5]Northwestern University, [6]Case Western Reserve University, [7]University of Pittsburgh, [8]University of Utah, [9]Columbia University, [10]University of Texas Medical Branch, Galveston, TX [11]*Eunice Kennedy Shriver* National Institute of Child Health and Human Development (NICHD)

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Corresponding author:

David M. Haas, MD, MS, Dept. of OB/GYN, Indiana University School of Medicine, 550 N.

University Blvd, UH 2440, Indianapolis, IN 46202, (317) 944-1661, dahaas@iupui.edu

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Abstract

Objective: Breastfeeding has multiple benefits for women and babies. Understanding factors

contributing to intention to exclusively breastfeed may allow for improving the rates in first-time

mothers. The study objective was to examine factors associated with a woman's intention to

breastfeed her first child.

Methods: A secondary analysis of the prospective "Nulliparous Pregnancy Outcomes Study:

monitoring mothers-to-be" (nuMoM2b) study of nulliparous women in the U.S. with singleton

pregnancies was performed. Sociodemographic and psychosocial factors were analyzed for

associations with breastfeeding intention.

Results: For the 6,443 women with complete information about breastfeeding intention and all

factors under consideration, women who intended to breastfeed (either exclusively or any

breastfeeding) were more likely to be older, not black, have reached a higher level of education,

have higher incomes, have a lower body mass index (BMI), and be nonsmokers. Reporting a

planned pregnancy and several psychosocial measures were also associated with intention to

breastfeed. In the multivariable analysis for exclusive breastfeeding, in addition to age, BMI,

race, income, education, and smoking, of the psychosocial measures assessed, only women with

higher hassle intensity ratios on the Pregnancy Experience Scale had lower odds of exclusive

breastfeeding intention (OR 0.71, 95% CI 0.55-0.92). Other psychosocial measures were not

associated with either exclusive breastfeeding or any breastfeeding after controlling for

demographic characteristics.

Conclusions for Practice: Several sociodemographic factors, having a planned pregnancy, and fewer intense pregnancy hassles compared to uplifts are associated with intention to exclusively breastfeed. Identifying these factors may allow providers to identify women for focused, multilevel efforts to enhance breastfeeding rates.

Significance

Why was the study conducted? To understand ways to potentially improve breastfeeding rates in women after their first delivery, we explored the psychosocial and sociodemographic factors that contributed to a woman's intention to breastfeed.

What does this study add to what is already known? In addition to several sociodemographic characteristics, women who had higher scores on the Pregnancy Experiences Scale- hassle intensity ratio were less likely to intend to exclusively breastfeed. This report may be one of the first studies to associate the validated Pregnancy Experiences Scale with breastfeeding intention, finding that women are less likely to breastfeed if they experience more intense the hassles during pregnancy.

Keywords

Breastfeeding, breastfeeding intention, nulliparous women, pregnancy experience scale, psychosocial measures

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Introduction

Breastfeeding has multiple health benefits for infants and mothers and economic benefits for families and society. Breastfed infants have decreased risk of infections, including gastrointestinal diseases, sepsis, wheezing respiratory tract infections, necrotizing enterocolitis, meningitis, retinopathy and urinary tract infections.(Dewey, Heinig, & Nommsen-Rivers, 1995; Furman, Taylor, Minich, & Hack, 2003; Hylander, Strobino, Pezzullo, & Dhanireddy, 2001; Levy et al., 2009; Schanler, Shulman, & Lau, 1999; Victora et al., 2016; Wright, Holberg, Martinez, Morgan, & Taussig, 1989) Breastfed infants have decreased long-term risks of childhood cancers and Crohn's disease.(Kwan, Buffler, Abrams, & Kiley, 2004; Rodriguez-Palmero, Koletzko, Kunz, & Jensen, 1999) They also have a lower incidence of obesity and type 2 diabetes mellitus.(Victora et al., 2016) Furthermore, there is a positive association between breastfeeding and both brain maturation and scores on intelligence tests.(Agho et al., 2016; Mortensen, Michaelsen, Sanders, & Reinisch, 2002)

Short-term benefits to women who breastfeed include increased caloric expenditure resulting in faster postpartum weight loss.(Victora et al., 2016) Studies also associate multiple long-term benefits from breastfeeding including lower risks for cardiovascular disease (including hypertension and hyperlipidemia), type 2 diabetes, ovarian cancer and breast cancer.(Gunderson et al., 2018; Horta, Loret de Mola, & Victora, 2015; Schwarz et al., 2009; Victora et al., 2016)

Societal benefits of breastfeeding include decreased infant feeding costs and health care expenses.(Shakya et al., 2017; Victora et al., 2016) Formula costs approximately $1000 per year per infant which places a high financial burden on parents and community resources. Additionally, low rates of breastfeeding result in approximately $3 billion in additional health care costs in the United States.(Centers for Disease Control and Prevention, 2019)

63   The American Academy of Pediatrics (AAP) and World Health Organization recommend

64 that infants be exclusively breastfed for six months unless there is a

65 contraindication.(WHO/UNICEF, 2014) However, despite this recommendation, only 38% of

66 infants worldwide and only one in four infants in the United States are exclusively breastfed for

67 six months.(Centers for Disease Control and Prevention, 2019; WHO/UNICEF, 2014)

68 Understanding factors associated with breastfeeding may help directed

69 interventions, but there are few data available in the United States that detail factors

70 associated with a woman's intention to breastfeed, particularly with her first baby. Although

71 some research has shown that women are more likely to breastfeed if they are better educated,

72 have higher incomes, or if their own mothers had breastfed,(Noble, Pregnancy, & Childhood,

73 2001; Victora et al., 2016) there may be many other factors, including psychosocial

74 considerations, that may impact breastfeeding intention and success. Therefore, the objective of

75 this study was to examine multiple contributors, including psychosocial factors, associated with a

76 woman's intention to breastfeed her first child.

77

78   **Methods**

79   This study was a secondary analysis of a large prospective cohort study in pregnant

80 women. The "Nulliparous Pregnancy Outcomes Study: monitoring mothers-to-be" (nuMoM2b)

81 project recruited 10,038 nulliparous women with singleton pregnancies from eight U.S. medical

82 centers between 2010 and 2013 with the objective of identifying risk factors and predictors of

83 adverse pregnancy outcomes. Detailed methods of the nuMoM2b study are reported

84 elsewhere.(Haas et al., 2015) In brief, women in the nuMoM2b cohort were recruited in the first

85 trimester and had study visits in the 1st (V1: gestational age 6 weeks 0 days to 13 weeks 6 days),

86   2nd (V2: gestational age 16 weeks 0 days to 21 weeks 6 days), and early 3rd (V3: gestational age

87   22 weeks 0 days to 29 weeks 6 days) trimesters, and at the time of delivery (V4). During study

88   visits, multiple questionnaires and psychosocial instruments were completed and biological

89   specimens were obtained.(Haas et al., 2015) All women provided informed consent and the study

90   was approved by each site's local Institutional Review Board.

91   At delivery (V4), women were asked about their intention to breastfeed, with possible

92   outcomes of 'breastfeed only,' 'breastfeed and bottle feed,' 'bottle feed only,' or 'I don't know.'

93   If for some reason a woman did not complete this question during the delivery interview, but the

94   feeding intent was detailed in the medical record, this information was collected by record

95   abstraction instead. Breastfeeding intent responses mirrored breastfeeding practice at discharge.

96   To assess factors associated with breastfeeding intention, we utilized data from multiple

97   sources during the study. Factors obtained at V1 included: age, maternal body mass index (BMI),

98   self-reported race and ethnicity, poverty level, educational level, and whether the pregnancy was

99   planned (based on the question: "Was this pregnancy planned?"). Poverty level was categorized

100   according to income and household size relative to the 2013 federal poverty guidelines.

101   Estimated gestational age at birth and route of delivery were obtained from chart abstraction.

102   Tobacco use was obtained at V4 ("Did you smoke any tobacco products in the month before

103   your delivery?").

104   Psychosocial factors evaluated included: depression (Edinburgh Perinatal Depression

105   Scale (EPDS), V3)(Cox, Chapman, Murray, & Jones, 1996), perceived stress (Cohen Perceived

106   Stress Scale (PSS), V1)(Cole, 1999), social support (Multidimensional Scale of Perceived Social

107   Support, V1)(Zimet, Powell, Farley, Werkman, & Berkoff, 1990), perceived anxiety (Spielberger

108   Trait Anxiety Subscale, V1)(Spielberger, 1983), resilience (Connor-Davidson Resilience Scale,

109 V2)(Connor & Davidson, 2003) and perceived pregnancy experience (Pregnancy Experience

110 Scale (PES), V3)(DiPietro, Christensen, & Costigan, 2008). Characteristics of the psychosocial

111 measures in the overall cohort have been presented elsewhere.(Bann et al., 2017; Grobman et al.,

112 2016)

113 For the Pregnancy Experience Scale-brief version, women were asked to review a

114 list of items that could be uplifting aspects of pregnancy (i.e. discussion about baby names,

115 visits to her provider, thinking about the baby's appearance, how much the baby is moving) and

116 a list of items that could make her feel unhappy, negative, or upset (i.e. getting enough

117 sleep, normal discomforts of pregnancy, her weight, body changes, and thinking about her labor

118 and delivery) and to quantify on a scale of 0 to 3 either how uplifted/happy or how

119 hassled/unhappy they made her feel. The a ratio of hassles to uplifts was calculated first by

120 totaling the total number of answers a woman gave marking "Quite a bit" or "A great deal" for

121 items in each domain. The PES-Hassle frequency ratio was the ratio of the number of hassles to

122 the number of uplifts; thus, values less than 1 indicated that the woman rated the frequency of

123 her pregnancy-specific uplifts higher than her experience of pregnancy-specific hassles. The

124 PES-Hassle intensity ratio was similar but was the ratio of the intensity of hassles to uplifts.

125 Descriptive statistics were used to describe participant characteristics and psychosocial

126 scales according to three "intention to breastfeed" subgroups: breastfeed only, breastfeed and

127 bottle feed, and bottle feed only. Pairwise comparisons were conducted using a Student's t-test

128 for continuous variables and the chi-square test for categorical variables with a Šidák correction

129 to keep familywise error at 0.05, since there are three comparisons. All scales were assessed for

130 normality, and the Wilcoxon-rank sum test is reported for non-normal distributions.

131   As intention to breastfeed is ordinal in nature, a cumulative logit model was initially used

132 to assess factors associated with intention to breastfeed. However, this model failed the

133 assumption of proportionality for multiple variables; thus, we opted to fit two logistic regression

134 models with outcomes of (breastfeed only vs. breast and bottle feed/bottle feed only) and

135 (breastfeed only/breast and bottle feed vs. bottle feed only). Additionally, we accounted for

136 possible correlation of outcomes among women from the same study site by using a generalized

137 linear mixed model (GLMM) fit with maximum likelihood that included a random site effect for

138 center.(Brown & Prescott, 2015) Model results reported include parameter estimates, standard

139 errors, odds ratios and associated 95% confidence intervals. In addition, the Intraclass

140 Correlation Coefficient (ICC) was obtained from the estimated random effect due to study site,

141 assuming the underlying response (intention to breastfeed) represented a continuous variable.

142 An ICC close to zero would indicate that the outcome does not depend on study site. To

143 additionally estimate the proportion of site-to-site variability that is explained by the participant

144 and psychosocial factors, a model with only the random site effect was also fit. P-values < 0.05

145 were considered statistically significant. All analyses were conducted in SAS V9.4 (SAS

146 Institute Inc., Cary, NC).

147

Results

149   A total of 6,443 (69.5%) of the enrolled women from nuMoM2b had complete data on all

150 measures and outcomes for this analysis. Of the original enrolled participants, 592 women were

151 excluded due to responding "I don't know" with regards to intention to breastfeed in V4 and the

152 inability to obtain the information from chart abstraction. Another 2,238 women were excluded

153 due to missing psychosocial scales and/or other covariates.

154   Table 1 displays participant characteristics for women in the three breastfeeding intention

155   groups. Women who intended to exclusively breastfeed were older, had lower mean BMI at V1,

156   and delivered at a later mean gestational age than the other two groups. The racial/ethnic

157   distribution of women in the exclusive breastfeeding group was more prominently Non-Hispanic

158   white (71.1%) compared to the other breastfeeding intention groups (p<0.0001). While 80.6% of

159   Non-Hispanic white women intended to exclusively breastfeed, 53.5% of Non-Hispanic black

160   women, 70.8% of Hispanic women, and 75.0% of Other women intended to exclusively

161   breastfeed (p<0.001). Conversely, 23.1% of black women intended to only bottle feed their

162   infants, compared to 6.3% of white women, 4.6% of Hispanic women, and 7.5% of Other

163   women (p<0.001). Many women intended to use both breast and bottle feeding to provide their

164   baby's nutrition. Women intending to exclusively breastfeed had more education and a higher

165   income than those intending to both breast/bottle feed and those intending to bottle feed only

166   (p<0.001).

167   Women who reported that the pregnancy was unplanned were more likely to report

168   intention to exclusively bottle feed (64.1%) versus exclusively breastfeed (32.6%, p<0.001).

169   Tobacco use in the month prior to delivery was higher in the bottle feed only group (12.1%)

170   when compared to the rates in the exclusive breastfeed and breast/bottle feed groups (≤3%,

171   p<0.001)

172   Scores for psychosocial scales increased or decreased across the three

173   groups with the mean of each scale for the breast/bottle feed group typically falling between the

174   means for the other two groups (Table 2). Overall, women who intended to exclusively

175   breastfeed reported lower scores for depression, perceived stress, anxiety, and have both a lower

176   hassle frequency ratio and hassle intensity ratio. Outcomes of perceived social support and

177 resilience were highest in women who intended to exclusively breastfeed. These scales were all

178 significantly different between the bottle feed only and exclusively breastfeed groups (p-value <

179 0.05), although between-group differences for the exclusive breastfeed group and the breast and

180 bottle feed group were similar for perceived social support (p-value = 0.05) and the PES-Hassle

181 frequency ratio (p-value = 0.13). Also, there was not a significant difference between the breast

182 and bottle feed group and the bottle feed only group for depression (p-value = 0.07), perceived

183 social support (p-value = 0.11), resilience (p-value = 0.30), or hassle frequency ratio (p-value

184 0.14).

185   The logistic regression models included all participant characteristics in Table 1 and

186 psychosocial scales in Table 2 with the exception of the PES-Hassle frequency ratio. The PES-

187 Hassle frequency and intensity ratios were highly correlated (Spearman's rho = 0.54), and the

188 PES-Hassle frequency ratio did not significantly differ for two of the three between group

189 comparisons; thus, only the PES-Hassle intensity ratio was included in the multiple logistic

190 regression models.

191   For the logistic regression model of intending to exclusively breastfeed, the participant

192 and psychosocial characteristics explain approximately 61% of the site-to-site variability. For

193 the regression model of the bottle feed only vs other groups, 64% of the site-to-site variability

194 was explained by the participant and psychosocial scales.

195   From Table 3, factors associated with the intention to exclusively breastfeed only from

196 the logistic regression include older age, lower BMI, higher gestational age at delivery,

197 race/ethnicity, poverty level, education level, and not using tobacco products the month before

198 delivery. More specifically, non-Hispanic white women had twice the odds of exclusively

199 breastfeeding when compared to Non-Hispanic black women (OR = 2.04, 95% CI 1.67-2.50) and

200   Hispanic mothers had 1.6 times higher odds of exclusively breastfeeding when compared to

201   Non-Hispanic black mothers (OR = 1.62, 95% CI 1.28-2.06).

202   The PES-Hassle intensity ratio was the only psychosocial scale that was associated with

203   the intention to exclusively breastfeed in the multiple logistic regression model; thus, women

204   who rate their experience of pregnancy-specific hassles more intense than uplifts were less likely

205   report intention to exclusively breastfeed. (Table 3) Factors associated with the intention to

206   either exclusively breastfeed or breast and bottle feed (i.e., any breastfeeding intent vs. no

207   breastfeeding intent) were similar to those found for the outcome of exclusive breastfeeding

208   intent. In this model, reporting that the pregnancy was planned was associated with any

209   breastfeeding intent. No psychosocial scales were significantly associated with the outcome of

210   any breastfeeding intent.

211

Discussion

213

214   In this large cohort of nulliparous women, 92% stated the intention to breastfeed to some

215   degree, with 75.9% stating the intention to exclusively breastfeed. The rates identified for the

216   nuMoM2b cohort are similar to other US cohorts.(Sutherland, Pierce, Blomquist, & Handa,

217   2012) Factors associated with the intent to exclusively breastfeed included higher maternal age,

218   lower BMI, non-black race/ethnicity, higher income, higher attained education, not using
       tobacco, and lower PES-Hassle intensity ratio.

219   Consistent with other studies, we found that non-Hispanic black women have lower rates

220   of intended breastfeeding than their counterparts.(Centers for Disease Control and Prevention,

221

222

223 2019; Robinson, Garnier-Villarreal, & Hanson, 2018) This finding is concerning because non-

224 Hispanic black infants have 2.2 times the infant mortality rate, are 3.2 times more likely to die

225 from complications related to low birth weight and have twice the rate of sudden infant death

226 syndrome than non-Hispanic whites.(United States Department of Health and Human Services,

227 2010) Breastfeeding is associated with a 36% decrease in SIDS.(Victora et al., 2016) Thus, one

228 potential method to address the disparities in infant mortality could be to work on improved

229 breastfeeding rates in non-Hispanic black women. For women who identify as non-Hispanic

230 black programs and services in addition to standard antenatal care

231 can help increase breastfeeding initiation.(Robinson et al., 2018)

232

233

234   Enhancing breastfeeding intention and continuation rates for women who are

235 socioeconomically or racially marginalized can be complex, as there are a multitude of factors

236 that can influence breastfeeding practices.(Johnson, Kirk, Rosenblum, & Muzik,

237 2015; Temple Newhook et al., 2017) From a public health perspective, it is important to

238 understand and target policies to reduce disparities in breastfeeding rates.(Dubois & Girard,

239 2003; Smith James, 2017) As the barriers experienced by women are complex and multiple, a

240 more thorough understanding of contributors to breastfeeding intention, including psychosocial

241 and environmental influencers, is needed. Poor outcomes in these groups reinforce the need for

242 an integrative approach to address the complexity of interrelated barriers women experience

243 across layers of the social ecological system.(Johnson et al., 2015)

244   Of the psychosocial measures in the multivariable analysis, only the PES-Hassle intensity

245 ratio being low predicted an intention to exclusively breastfeed. This ratio measures the hassles

246 or frustrations during pregnancy compared to uplifting or positive experiences. Thus, women

247 experiencing more intense hassles over the course of their pregnancy might be less inclined to

248 breastfeed the infant. This may be due to an overall perception of pregnancy as a more negative

249 experience rather than a more positive one. Further exploration regarding individual components

250 of the PES which may contribute more to breastfeeding intention or other outcomes is warranted.

251 We are unaware of other studies in the United States where these psychosocial measures were

252 linked to breastfeeding intention in nulliparous women. A study by McManus et al. noted in 114

253 primiparous women that those with a more uplifts than hassles in pregnancy were more likely to

254 have longer breastfeeding duration, which correlated to improved infant health.(McManus,

255 Khalessi, Lin, Ashraf, & Reich, 2017) While some of the other psychosocial measures were not

256 statistically significantly associated with the outcome of exclusive breastfeeding intention in the

257 multivariable model, several were close (p<0.10). These measures could potentially be used as

258 screening tools during prenatal care to help identify women who might need additional

259 encouragement to breastfeed. More work is needed to assess how these measures associate with

260 breastfeeding longevity in the cohort.

261   The AAP recommends exclusive breastfeeding for at least 6 months with continued

262 breastfeeding and supplemental foods for up to one year.(Victora et al., 2016) One study

263 evaluated a sample population which was deemed representative of all races in the United States

264 and found that 71% of infants received some form of breastmilk which is consistent with *Healthy*

265 *People 2020's* report that in 2006, 74% of infants were breastfed in some form.(Davis, Li,

266 Adams-Huet, & Sandon, 2018; United States Department of Health and Human Services, 2010)

267 Data from *Healthy People 2020* further notes that only 33.6% of infants are exclusively breastfed

268 until 3 months and this further decreases to 14.1% by 6 months. They state a goal of having at

269   least 25.5% of infants exclusively breastfed through 6 months. Given the high rate of

270   breastfeeding intention in this cohort, it is reassuring that more than 92% intend to breastfeed

271   their infants in some capacity postpartum.

272   Future studies should focus on ways to potentially overcome not only the

273   sociodemographic characteristics of women who do not intend to breastfeed, but also include

274   evaluations of psychosocial and other factors that occur during pregnancy that can contribute to

275   intense hassles. Using mixed methods approaches to understand motivations and barriers to

276   address will be crucial to understanding the complex contributors to breastfeeding intention.

277   Additional studies can then focus on antenatal interventions and support for women which may

278   reduce hassles and improve breastfeeding intention.

279   Strengths of this cohort are the large number of women who were followed prospectively

280   and had not only rigorously collected and adjudicated pregnancy characteristics data, but also

281   had a multitude of validated psychosocial instruments administered. This amount of data allowed

282   for analysis of multiple potential contributors to breastfeeding intention, starting with pre-

283   pregnancy information and including situations that occurred during the pregnancy.

284   The nuMoM2b cohort study was subject to the typical limitations of this type of study

285   design.(Haas et al., 2015) We only analyzed nuMoM2b participants who answered every

286   question and survey measure completely. Approximately 45% of nuMom2b participants were

287   not included in our analysis because they were missing one or more of the outcome or

288   psychosocial variables. However, this is one of the larger cohorts and was

289   characterized prospectively beginning in the first trimester that included a multitude of

290   psychosocial measures for nulliparous women. Women with missing data were similar to those

291   analyzed. Even with the large number of instruments, some domains, such as attachment, were

292   not captured. Given the independent association of PES-Hassle ratios with exclusive

293   breastfeeding, exploration of a woman's attachment to her developing baby could enhance

294   understanding of this relationship. It has been documented that attachment and bonding to the

295   developing infant during pregnancy can influence postpartum behaviors.(Pearson, Lightman, &

296   Evans, 2011) Additionally, exploring which intense hassles have the strongest relationship to

297   breastfeeding intention can be explored. A cross-sectional survey showed that life stressors and

298   hassles, particularly financial, are associated with earlier cessation of breastfeeding.(Dozier,

299   Nelson, & Brownell, 2012)

300   There are some other limitations in the information that was collected during the study.

301   For example, an Indonesian study found that women who were aware of breastfeeding

302   recommendations and understood the infant and maternal health benefits of breastfeeding had

303   stronger intentions to exclusive breastfeed.(Nuzrina, Roshita, & Basuki, 2016) NuMoM2b

304   participants were not asked about their level of understanding of current breastfeeding

305   recommendations or if they had previous knowledge of the health benefits of breastfeeding.

306   Women were not asked about the breastfeeding education they received during the prenatal

307   period. This study also did not ask participants about cultural or social norms of breastfeeding. A

308   previous study found that women were more likely to breastfeed if their mother's had

309   breastfed.(Nuzrina et al., 2016) Studies in the U.S. note that providing women education about

310   the health benefits of breastfeeding and community-based support programs improves rates of

311   exclusive breastfeeding.(Keitt, Reis-Reilly, Fuller-Sankofa, & Carr, 2018) As thoughts about

312   breastfeeding intentions may be established before pregnancy occurs, this report is also limited in

313   that it did not ask about intention to breastfeed at V1 or what may have contributed to those

314   intentions. These can be incorporated into future studies. We also did not use a validated scale

315   for infant feeding intention or detailed questions about employment. This simplified question

316   was asked instead to minimize burden on the woman in the postpartum time frame. Additionally,

317   due to this, we did not ask follow-up questions about reasons behind their intentions or outside

318   influences on their intention, such as plans to return to work.

Conclusions for Practice

320   In conclusion, nulliparous women were more likely to intend to breastfeed if they were

321   older and of higher socioeconomic status. While most psychosocial measures were not

322   independently associated with breastfeeding intention, having lower intensity of experiencing

323   hassles in comparison to uplifts in pregnancy predicted greater odds of

324   intending to exclusively breastfeed. Additionally, as women who smoked in the month prior to

325   delivery were more likely to bottle feed, early recognition and services for women who use

326   tobacco during pregnancy to encourage breastfeeding may be warranted. Breastfeeding support

327   must come from multiple levels including: legal and policy directives, contextual and multilevel

328   preconception and antenatal education, improvement in women's work provisions for lactation

329   space, employment conditions that remove breastfeeding barriers, and better health-care

330   services.(Centers for Disease Control and Prevention, 2019; Johnson et al., 2015; Rollins et al.,

331   2016) Overcoming barriers and problematic social determinants of health, particularly for Non-

332   Hispanic black women, may help improve breastfeeding rates.(U.S. Department of Health and

333   Human Services Office of Minority Health, 2019)

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Table 1

Table 1: Characteristics of the breastfeeding intention groups

Variable N = 6443	A)Breast feed only (N = 4890, 75.9%)	B)Both breast and bottle feed (N = 1040, 16.1%)	C)Bottle feed only (N = 513, 8.0%)	P-Value* A & B vs. C	P-Value* B & C vs. A	P-Value* A vs. C
Age Mean(SD)	27.90 (5.2)	26.52 (5.7)	24.19 (5.7)	<0.001	<0.001	<0.001
BMI Mean(SD)	25.79 (5.8)	27.02 (6.8)	27.99 (7.4)	<0.001	0.04	<0.001
Race or Ethnicity				<0.001	<0.001	<0.001
Non-Hispanic white	3475 (71.1%)	564 (53.2%)	270 (52.6%)			
Non-Hispanic black	370 (7.6%)	162 (15.7%)	160 (31.2%)			
Hispanic	616 (12.6%)	214 (20.6%)	40 (7.8%)			
Other	429 (8.8%)	100 (9.6%)	43 (8.4%)			
Poverty				<0.001	<0.001	<0.001
>200% of fed poverty level	3291 (67.3%)	520 (50%)	175 (34.1%)			
100-200% of fed poverty level	543 (11.1%)	145 (13.9%)	55 (10.7%)			
<100% of fed poverty level	450 (9.2%)	146 (14.0%)	115 (22.4%)			
Refused	606 (12.4%)	229 (22.0%)	168 (32.8%)			
Education				<0.001	<0.001	<0.001
High school or less	1416 (28.9%)	458 (43.8%)	336 (65.1%)			
Bachelor degree or less	2120 (43.2%)	402 (38.4%)	130 (25.2%)			
Master's degree and higher	1367 (27.9%)	186 (17.8%)	50 (9.7%)			
Was this pregnancy planned?				<0.001	<0.001	<0.001
Yes	3295 (67.4%)	575 (55.3%)	184 (35.9%)			
No	1595 (32.6%)	465 (44.7%)	329 (64.1%)			
Was this delivery by C-section?				<0.001	0.35	0.31
Yes	1255 (25.7%)	339 (32.6%)	148 (28.8%)			
No	3635 (74.3%)	701 (67.4%)	365 (71.2%)			
Did you smoke any tobacco products in the month before delivery?				0.06	<0.001	<0.001

Yes	100 (2.0%)	31 (3%)	62 (12.1%)			
No	3786 (77.4%)	827 (79.5%)	356 (69.4%)			
Refused	1004 (20.6%)	182 (17.5%)	95 (18.5%)			
Gestational age at the time of delivery Mean (SD)	39.02 (2.0)	38.67 (2.2)	38.70 (1.8)	<0.001	0.99	0.001

Data are reported as n (%) unless noted otherwise.

The three columns of comparisons denote the groups that were combined, versus the other group. For instance the first P value column shows the comparison of women who intend to do any breastfeeding (A&B) versus women who intend to only bottle feed (C). The final column only compares women intending to exclusively breastfeed (A) versus women who intend to only bottle feed (C).

*P-values obtained from t-test or chi-square test. All P-values are adjusted for the 3 comparisons with a Šidák correction.

Table 2

Table 2: Descriptive comparison for behavioral scales by breastfeeding intention group

Variable N = 6443	A)Breast feed only (N = 4890, 75.9%)	B)Both breast and bottle feed (N = 1040, 16.1%)	C)Bottle feed only (N = 513, 8.0%)	P-Value* A & B vs. C	P-Value* B & C vs. A	P-Value* A vs. C
Edinburgh Depression Scale Mean (SD) [Range 0-24. Higher values = more negative feelings/experiences]	5.32 (3.9)	5.87 (4.2)	6.45 (4.9)	<0.001	0.07	<0.001
Perceived Social Support Mean (SD) [Range 12-84. Higher values = higher agreement]	74.97 (13.8)	73.85 (13.9)	72.25 (14.9)	0.05	0.11	<0.001
Connor Davidson Resilience Scale Mean (SD) [Range 0-100. Higher values = higher resilience]	79.54 (11.0)	78.17 (11.7)	77.06 (13.4)	0.001	0.30	<0.001
Spielberg State-Trait Anxiety Scale Mean (SD) [Range 20-74. Higher values = higher anxiety]	33.61 (8.5)	34.47 (8.8)	36.25 (9.6)	0.01	0.001	<0.001
Cohen's Perceived Stress Scale Mean (SD) [Range 0-39. Higher values = higher stress]	11.00 (6.1)	11.96 (6.4)	12.96 (7.0)	<0.001	0.02	<0.001
Pregnancy Experience Scale Median (Range)						
PES-hassle frequency ratio	0.70 (0.1-8)	0.70 (0.1-6)	0.75 (0.1-5)	0.13**	0.14**	0.003**
PES-hassle intensity ratio	0.56 (0.33-2.22)	0.59 (0.33-2.17)	0.63 (0.33-1.82)	<0.001**	0.01**	<0.001**

Data are reported as mean (standard deviation)

The three columns of comparisons denote the groups that were combined, versus the other group. For instance the first P value column shows the comparison of women who intend to do any breastfeeding (A&B) versus women who intend to only bottle feed (C). The final column only compares women intending to exclusively breastfeed (A) versus women who intend to only bottle feed (C).

*P-values obtained from t-test. All P-values are adjusted for the 3 comparisons with a Šidák correction. **P-values obtained from Wilcoxon rank sum test.

Table 3

Table 3: Logistic Regression predicting breastfeeding intention

Variable	Odds of intending to do any breastfeeding (Breast feed only or bottle/breast feed) compared to intending to only bottle feed (reference group)			Odds of intending to exclusively breastfeed (compared to intending to either bottle feed only or breast and bottle feed)		
	Model AUC = 0.777 , N = 6443			Model AUC = 0.692 , N = 6443		
	OR_1	95% CI	P-value	OR_1	95% CI	P-value
Age [v1]	1.054	1.03-1.08	0.0001	1.022	1.01-1.04	0.01
BMI [v1]	0.974	0.96-0.99	0.0002	0.974	0.97-0.98	<0.001
Gestational age at delivery [c]	1.027	0.98-1.08	0.25	1.065	1.03-1.10	<0.001
Race or Ethnicity [v1]						
Non-Hispanic black		Reference			Reference	
Non-Hispanic white	1.577	1.20-2.07	0.001	2.041	1.67-2.50	<0.001
Hispanic	3.241	2.16-4.86	<0.001	1.624	1.28-2.06	<0.001
Other	1.594	1.08-2.35	0.02	1.560	1.20-2.03	0.001
Poverty [v1]						
>200% of Fed poverty level	1.374	0.96-1.96	0.08	1.497	1.19-1.88	0.001
100-200% of Fed poverty level	1.685	1.17-2.43	0.01	1.244	0.98-1.58	0.07
<100% of Fed poverty level		Reference			Reference	
Refused	1.047	0.78-1.40	0.77	0.939	0.76-1.16	0.57
Education [v1]						
Master's degree and higher	2.505	1.66-3.78	<0.001	1.701	1.36-2.14	<0.001
Bachelor degree or less	1.874	1.42-2.48	<0.001	1.309	1.11-1.55	0.002
High school or less		Reference			Reference	
Planned pregnancy [v1]						
Yes	1.293	1.02-1.64	0.03	1.119	0.97-1.30	0.13
Tobacco use [v4]						
Yes	0.472	0.33-0.68	<0.001	0.644	0.47-0.88	0.01
No		Reference			Reference	
Refused	1.049	0.81-1.36	0.05	1.303	1.11-1.53	0.002
Edinburgh Depression Scale [v3]	0.977	0.95-1.01	0.18	0.979	0.96-1.001	0.07

Perceived Social Support [v1]	0.993	0.99-1.00	0.07	0.996	0.99-1.001	0.08
Connor Davidson Resilience scale [v2]	1.004	0.995-1.01	0.40	1.006	1.00-1.01	0.05
Spielberg State-Trait Anxiety Scale [v1]	0.995	0.98-1.01	0.50	1.005	0.996-1.02	0.27
Cohen's Perceived Stress Scale [v3]	1.012	0.99-1.04	0.28	1.005	0.99-1.02	0.52
PES-hassle intensity ratio [v3]	0.725	0.48-1.09	0.12	0.707	0.55-0.92	0.01
Random effect Estimate(SE)	0.1913 (0.1124)			0.0682 (0.0397)		
ICC	0.0550			0.0203		

Note: V1 (gestational age 6 weeks 0 days to 13 weeks 6 days), V2 (gestational age 16 weeks 0 days to 21 weeks 6 days), V3 (gestational age 22   weeks 0 days to 29 weeks 6 days), V4 (at time of delivery) – Variables obtained at Visits 1, 2, 3, 4 respectively. C – Variables obtained from chart abstraction.