ORIGINAL ARTICLE | BREASTFEEDING

Association of Voluntary Legal Paternity and Breastfeeding Duration and Exclusivity in a Sample of Mothers in New York State, United States

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ABSTRACT

Background and Objective: Globally, father engagement is deemed an important factor in mothers' breastfeeding practices. In the U.S., the role of the father in breastfeeding is understudied. This study examines the association between voluntary legal paternity and maternal breastfeeding outcomes.

Methods: Using data from a modified Pregnancy Risk Assessment Monitoring System survey (Monroe County, NY, 2015-2017) linked to New York State's birth certificate data, we assessed breastfeeding outcomes (exclusivity and duration) by voluntary legal paternity (VLP) establishment. We examined breastfeeding duration (breastfeeding cessation at 13 weeks or less) and exclusive breastfeeding (at 13 weeks) among mothers whose infants had VLP (i.e., married, acknowledgment at birth), and those who had no-VLP (i.e., a court-mandated Paternity Affidavit or no legal paternity established). Univariate analyses were conducted, with additional variables (parental demographics, maternal social and clinical) included subsequently. The backward elimination method was used to determine the set of covariates to adjust in the model.

Results: Of the 1,753 mothers initiating breastfeeding, 1,364 had VLP and 389 had no-VLP established. Mothers of infants with a no-VLP were more likely to be Black (29.49%), Hispanic (17.74%), have lower income (80.21%), have lower-education levels (44.73%) and were more likely to be <30 years old (61.7%), and had higher levels (14.4%) of reported traumatic stress before and during the most recent pregnancy. Among mothers initiating breastfeeding, those with no-VLP had a higher risk of breastfeeding cessation at 13 weeks (OR: 2.06; 95% CI, 1.25-3.42) after adjusting for maternal resilience, social support, hospital breastfeeding support, pre-pregnancy BMI, paternal age, and paternal education; and higher risk of breastfeeding cessation at 13 weeks (OR:1.46; 1.01-2.09).

Conclusion and Implications for Translation: Voluntary legal establishment of paternity is associated with maternal breastfeeding outcomes. Screening of mothers may include legal paternity status as a

further indication of the need for additional breastfeeding support, especially among socio-economically disadvantaged populations.

1. Introduction

1.1. Background of the Study

The benefits of breastfeeding for both the child and the mother are well documented, with effects including improved immune system[1] and lower risk of adulthood obesity for the infant,[2] and lower risk for breast and ovarian cancers for the mother.[3,4] The World Health Organization recommends exclusive breastfeeding of infants for the first 6 months, except mothers with certain conditions such as human immunodeficiency viruses (HIV) who are not on monitored treatment.[5] While breastfeeding initiation rates in the U.S. have been on the rise for the past 10 years, from 76.1% to 83.8% from 2009 to 2016,[6] achieving exclusivity has been challenging. The proportion of American women who breastfed exclusively for the first 3 months has remained steady at 48% in 2016.[6] Exclusive breastfeeding rates are highest in the first month of a baby's life (65%) and decrease as the infant reaches three to six months.

The reasons for the decrease in exclusive breastfeeding are multiple, including social factors such as women returning to work, or lack of social support. Social support has been identified as an important factor in women's decision to breastfeed and their ability to continue breastfeeding for longer durations.[7] Globally, fathers' support has been recognized as an important influencer on breastfeeding practices.[8,9] When mothers seek advice regarding breastfeeding, the opinion of the father often has the greatest influence.[8,9] Research findings indicate that if fathers are not engaged or do not support mothers' decision to breastfeed, women will more often formula-feed as an alternative.[8] Studies from multiple countries also suggest that a father's influence not only impacts the mother's decision whether to breastfeed but also the duration.[5,9-11]

The role of fathers in maternal and infant health has been widely recognized and breastfeeding promotion programs often involve fathers.[12] Nevertheless, the importance of the establishment of legal paternity has not widely been examined in the context of breastfeeding and warrants further assessment. Legal paternity has been linked to paternal rights and responsibilities, and psychosocial and financial support for the child and the mother.[11,13] Across the globe, establishing paternity has been an important part of social norms and often relies on fathers' willingness to recognize a pregnancy or child. With the establishment of written records, having a fathers' name on a birth registry or certificate has become necessary to provide children legal access to paternal benefits and resources. Yet, in many countries, mothers continue to struggle to provide for their children because either paternity is not legally established, or there exist no legal systems to hold fathers accountable for their children. As a result, mothers and children constitute the highest proportion of persons living in poverty,[14] placing infants at higher risk of not being breastfed exclusively for reasons related to poverty (e.g., maternal nutrition, maternal work requirements).

In the U.S., legal paternity may be established at delivery at the hospital, or later at government agencies when initiated by either the mother or the father of the infant.[15,16] Results of establishing paternity include the child having the father's name on the birth certificate, becoming eligible for benefits through their fathers (e.g., health insurance, social security, inheritance) even if parents are unmarried, being able to access paternal genetic history to identify inherited health defects, and obtaining the

rights to financial support and visitation orders.[16] Given the high rate of non-marital childbearing in the U.S. (39.6% in 2018), especially among minoritized groups (Hispanic, 51.8%; Black non-Hispanic: 69.4%, in 2018),[17] legally establishing paternity has become more important for ensuring fathers' rights and responsibilities. Research has shown that fathers who voluntarily establish paternity at birth tend to be more involved in their children's lives and more likely to support their children financially, compared with fathers who establish paternity later or not at all.[17] In many high-income countries (U.S., Canada, United Kingdom, for example) legally established paternity in unmarried couples can be voluntary (on the birth certificate or at later acknowledgment by both parents or the father); or it may be court-mandated (at the request of the mother, for example) most often using a Deoxyribonucleic Acid (DNA) test. Voluntary establishment of paternity is not merely symbolic of fathers' acknowledged and legal connection to their children but may also correspond to greater involvement.

1.2. Objectives of the Study

In the U.S., while breastfeeding promotion programs often involve fathers,[12] very little evidence has been provided on the association between fathers' involvement, engagement and support, and breastfeeding practices. Our study objective was to explore the relationship between voluntary legal paternity (VLP) establishment and breastfeeding duration and exclusivity. The survey gathered county-specific, population-based data on maternal attitudes and experiences before, during, and after pregnancy for births occurring between November 2015 and October 2017. The Monroe County Mothers and Babies Health Survey (MBHS) includes the core questions asked on the Centers for Disease Control version (6.0) and the New York State Pregnancy Risk Assessment Monitoring System survey (PRAMS). A variety of questions relevant to public health surveillance and quality improvement were also included for the benefit of the Monroe County Department of Public Health. The core questions cover prenatal care, obstetric history, risk behaviors, physical abuse, contraception, and early infant development and health status.[18] Most

of these questions have been previously validated, thus are deemed reliable.[19] The survey was beta-tested at two stages with five and 10 members of the target population prior to full-scale implementation with edits made accordingly (e.g., cleaned up typos, addressed problems with skip patterns, modified questions that confused respondents, eliminated a few questions, and determined that the survey was too challenging to do on a telephone but should instead be completed on a computer or a hardcopy be requested). Completed surveys were linked with birth certificate variables.

2. Methods

2.1. Sampling

The sampling frame included all mothers with a live birth both delivering and residing in Monroe County in a 24-month period. The survey was available via mailings and electronically on the Research Electronic Data Capture (REDCap; Vanderbilt University, 2004) survey software. The survey was made available in English and Spanish, languages spoken by the majority in the County. Approximately 80 surveys were returned per month. This was consistent with recent local experience surveying postpartum mothers.

The subjects included in this study's analyses were mothers who reported initiating breastfeeding (1,753 [93%] of 1,879), defined as having at least breastfed one time between the delivery date and the survey date spanning across 24 months.

2.2. Study Variables

2.2.1. Voluntary legal paternity (VLP) established

The independent variable of this study was voluntary legal paternity (VLP) established at birth or later through a Paternity Affidavit. No-voluntary legal paternity (no-VLP), including those with a court-mandated Paternity Affidavit, and those without any paternity established at all, was considered to be non-exposure. For infants of married parents and/or fathers who voluntarily established legal paternity at the time of delivery or later, the father's name is either on the infant's Birth Certificate or the Paternity Affidavit was voluntarily sought later and

recorded in the birth certificate data. In New York State, when needed, a request for legal paternity establishment through a Paternity Affidavit can be made via the court system by either parent. For our analyses, mothers were grouped into (1) those where the father voluntarily established legal paternity at delivery or later through an Affidavit (VLP; n=1,364, coded 0), and (2) those who had a non-voluntary (i.e., a court-mandated Paternity Affidavit) or had no legal paternity established (no-VLP, n=389, coded 1).

2.2.2. Breastfeeding outcomes

The two main dependent variables in this study were (1) *breastfeeding cessation* at 13 weeks and (2) *exclusive breastfeeding* at 13 weeks. These two variables were calculated and cross-validated from the survey question *"Has your baby ever had any formula?"* and survey items regarding the use of infant-fed food and drinks (e.g., what does your baby drink/eat now, what drinks/beverages/foods have you EVER (even one time) given your baby and how often, if you gave formula and what you did when you left the hospital). For breastfeeding exclusivity, the calculation adjusted for the formula used in the hospital. These main dependent variables were treated as binary (1 = presence of any or exclusive breastfeeding at 13-weeks).

2.2.3. Other variables

Demographics and health behavior variables included several binary variables: race, Hispanic ethnicity, marital status, born in the U.S. or not, residence in high poverty zip code and prenatal vitamin use, pre/during pregnancy tobacco use, intention to be pregnant, parity, method of delivery and traumatic stress during and right after pregnancy. As described below, several other variables were collapsed into binary options or three categories given the small sizes of some categories, such as maternal age (<30 yrs. vs ≥ 30 yrs.), paternal age (<30 yrs. vs ≥ 30 yrs.), maternal education (high school or less vs some college or above), paternal education (high school or less vs some college or above), maternal race (Black vs white vs other), Income status (low vs non-low), pre-pregnancy BMI (underweight and healthy vs overweight vs obese). Other variables (i.e., hospital breastfeeding support, social support, maternal resilience score) were calculated, treated as continuous or ordinal. For details of the calculation of each variable, please see Appendix 1.

2.3. Statistical Analysis

All variables were statistically tested to evaluate their p values against the exposure [voluntary legal paternity, VLP] and the outcome variables [breastfeeding cessation or exclusive breastfeeding at 13 weeks] using the Chi-square test. Logistic regression was used to investigate the association between voluntary legal paternity establishment and breastfeeding outcomes. For each breastfeeding outcome, we created four models. The first model included the univariate association between no-VLP and breastfeeding (cessation or exclusive) at 13 weeks. The second model adjusted for maternal age, education, income, and race. The third model adjusted for the above as well as resilience, hospital support, and social support. The fourth model used backward selection technique forcing in legal paternity establishment (i.e., forcing the method to keep legal paternity establishment status [VLP/no-VLP] within the model). All statistical analyses were performed with SAS version 9.4 (SAS Institute, Cary, NC).

2.4. Ethical Approval

The University of Rochester Research Subjects Review Board (RSRB) classified the Monroe County Mothers and Babies Health Survey as surveillance and quality improvement. Therefore, IRB oversight was not required for data collection. However, approval was obtained from the University RSRB for these secondary data analyses.

3. Results

3.1. Sociodemographic Characteristics

The original sample size based on the combined dataset was 1,879 women with a live birth between November 2015 and October 2017. Among them, 1,753 initiated breastfeeding. With the exception of the place of birth, prior parity, and method of delivery, all other variables were significantly associated with the legal establishment of paternity as well as the two breastfeeding outcomes (p<0.05) (Table 1).

Table 1. Maternal Characteristics by Voluntary Legal Establishment of Paternity and Breastfeeding Outcome Status

Demographics	Voluntary Legal Paternity (VLP) #(N=1364)	No-Voluntary Legal Paternity (N=389)	P-value	Stopping EXCLUSIVE breastfeeding at 13 weeks (N=1418)	Continuing EXCLUSIVE breastfeeding at 13 weeks (N=335)	P-value	Stopping ANY breastfeeding at 13 weeks (N=517)	Continuing ANY breastfeeding at 13 weeks (N=1236)	P-value
Maternal Characteristics									
Age (BC)			<.0001			0.0056			<.0001
Age<20 yr.	2 (0.15)	21 (5.4)		23 (1.62)	0 (0)		13 (2.51)	10 (0.81)	
Age 20-<30 yr.	400 (29.33)	219 (56.3)		520 (36.67)	99 (29.55)		226 (43.71)	393 (31.8)	
Age 30-<40 yr.	915 (67.08)	133 (34.19)		825 (58.18)	223 (66.57)		259 (50.1)	789 (63.83)	
Age 40 yr. and up	47 (3.45)	16 (4.11)		50 (3.53)	13 (3.88)		19 (3.68)	44 (3.56)	
Education (BC + survey)			<.0001			<.0001			<.0001
High school or less	118 (8.65)	174 (44.73)		277 (19.53)	15 (4.48)		165 (31.91)	127 (10.28)	
Some college or above	1246 (91.35)	215 (55.27)		1141 (80.47)	320 (95.52)		352 (68.09)	1109 (89.72)	
Race (BC + survey)			<.0001			<.0001			<.0001
Other	130 (9.59)	49 (13.14)		160 (11.48)	19 (5.67)		64 (12.67)	115 (9.4)	
White	1184 (87.32)	214 (57.37)		1091 (78.26)	307 (91.64)		359 (71.09)	1039 (84.89)	
Black	42 (3.1)	110 (29.49)		143 (10.26)	9 (2.69)		82 (16.24)	70 (5.72)	
Ethnicity (BC + survey)			<.0001			0.0032			<.0001
Hispanic or Latino	60 (4.4)	69 (17.74)		117 (8.25)	12 (3.58)		60 (11.61)	69 (5.58)	
NOT Hispanic or Latino	1304 (95.6)	320 (82.26)		1301 (91.75)	323 (96.42)		457 (88.39)	1167 (94.42)	
Marital Status (BC + survey)			<.0001			<.0001			<.0001
Single, separated, divorced, or widowed	12 (0.89)	209 (54.43)		211 (15.03)	10 (2.99)		120 (23.72)	101 (8.19)	
Married or in a committed relationship	1343 (99.11)	175 (45.57)		1193 (84.97)	325 (97.01)		386 (76.28)	1132 (91.81)	
Income Status (BC)			<.0001			<.0001			<.0001
Low income	239 (17.52)	312 (80.21)		503 (35.47)	48 (14.33)		257 (49.71)	294 (23.79)	
Non-Low income	1125 (82.48)	77 (19.79)		915 (64.53)	287 (85.67)		260 (50.29)	942 (76.21)	
US Born (BC)			0.0001			0.1850			0.7152
Non-US born	166 (12.17)	21 (5.4)		158 (11.14)	29 (8.66)		53 (10.25)	134 (10.84)	
US born	1198 (87.83)	368 (94.6)		1260 (88.86)	306 (91.34)		464 (89.75)	1102 (89.16)	

(Contd...)

Table 1. (Continued)

Demographics	Voluntary Legal Paternity (VLP) # (N=1364)	No-Voluntary Legal Paternity (N=389)	P-value	Stopping EXCLUSIVE breastfeeding at 13 weeks (N=1418)	Continuing EXCLUSIVE breastfeeding at 13 weeks (N=335)	P-value	Stopping ANY breastfeeding at 13 weeks (N=517)	Continuing ANY breastfeeding at 13 weeks (N=1236)	P-value
Pre-pregnancy BMI (BC)			<.0001			<.0001			<.0001
Underweight and Healthy	727 (54.7)	147 (38.99)		648 (47.02)	226 (68.9)		188 (37.68)	686 (56.84)	
Overweight	338 (25.43)	90 (23.87)		357 (25.91)	71 (21.65)		122 (24.45)	306 (25.35)	
Obese	264 (19.86)	140 (37.14)		373 (27.07)	31 (9.45)		189 (37.88)	215 (17.81)	
Residence in high poverty Zip Code (BC)			<.0001			<.0001			<.0001
No	1158 (84.9)	193 (49.61)		1060 (74.75)	291 (86.87)		339 (65.57)	1012 (81.88)	
Yes	206 (15.1)	196 (50.39)		358 (25.25)	44 (13.13)		178 (34.43)	224 (18.12)	
Positive Health Behavior (survey)†			<.0001			0.0001			<.0001
No	155 (11.36)	123 (31.62)		248 (17.49)	30 (8.96)		158 (30.56)	120 (9.71)	
Yes	1209 (88.64)	266 (68.38)		1170 (82.51)	305 (91.04)		359 (69.44)	1116 (90.29)	
Tobacco Use (BC)†			<.0001			0.0001			<.0001
No	1314 (96.76)	302 (77.84)		1292 (91.37)	324 (97.59)		439 (85.08)	1177 (95.69)	
Yes	44 (3.24)	86 (22.16)		122 (8.63)	8 (2.41)		77 (14.92)	53 (4.31)	
Intention To Be Pregnant (survey)			<.0001			<.0001			<.0001
No	264 (19.82)	223 (60.76)		422 (30.94)	65 (19.4)		170 (36.72)	317 (25.65)	
Yes	1068 (80.18)	144 (39.24)		942 (69.06)	270 (80.6)		293 (63.28)	919 (74.35)	
Parity (BC)			0.3389			0.0027			0.2059
No	580 (42.52)	176 (45.24)		636 (44.85)	120 (35.82)		211 (40.81)	545 (44.09)	
Yes	784 (57.48)	213 (54.76)		782 (55.15)	215 (64.18)		306 (59.19)	691 (55.91)	
Method of Delivery (BC)			0.4575			<.0001			<.0001
C-section	388 (28.47)	103 (26.55)		427 (30.16)	64 (19.1)		185 (35.85)	306 (24.78)	
Spontaneous, forceps mid, forceps low/outlet	975 (71.53)	285 (73.45)		989 (69.84)	271 (80.9)		331 (64.15)	929 (75.22)	
Vitamin Use (BC)†			<.0001			<.0001			<.0001
No	285 (21.41)	206 (55.98)		428 (31.38)	63 (18.81)		184 (39.66)	306 (24.86)	
Yes	1046 (78.59)	162 (44.02)		936 (68.62)	272 (81.19)		280 (60.34)	928 (75.14)	

(Contd...)

Table I. (Continued)

Demographics	Voluntary Legal Paternity (VLP) # (N=1364)	No-Voluntary Legal Paternity (N=389)	P-value	Stopping EXCLUSIVE breastfeeding at 13 weeks (N=1418)	Continuing EXCLUSIVE breastfeeding at 13 weeks (N=335)	P-value	Stopping ANY breastfeeding at 13 weeks (N=517)	Continuing ANY breastfeeding at 13 weeks (N=1236)	P-value
Traumatic Stress (survey)†			<.0001			0.0352			0.0452
No	1327 (97.29)	333 (85.6)		1335 (94.15)	325 (97.01)		481 (93.04)	1179 (95.39)	
Yes	37 (2.71)	56 (14.4)		83 (5.85)	10 (2.99)		36 (6.96)	57 (4.61)	
EXCLUSIVE Breastfeeding (survey)			<.0001			<.0001			<.0001
Stopping at 13 weeks	1055 (77.35)	363 (93.32)		1418 (100)	0 (0)		516 (99.81)	902 (72.98)	
Continuing at 13 weeks	309 (22.65)	26 (6.68)		0 (0)	335 (100)		1 (0.19)	334 (27.02)	
ANY Breastfeeding (survey)			<.0001			<.0001			<.0001
Cessation at 13 weeks	322 (23.61)	195 (50.13)		516 (36.39)	1 (0.3)		517 (100)	0 (0)	
Continuing at 13 weeks	1042 (76.39)	194 (49.87)		902 (63.61)	334 (99.7)		0 (0)	1236 (100)	
Social Support (survey)†			<.0001			<.0001			<.0001
0 (Lowest)	27 (1.98)	29 (7.46)		52 (3.67)	4 (1.19)		33 (6.38)	23 (1.86)	
1	118 (8.65)	110 (28.28)		211 (14.88)	17 (5.07)		113 (21.86)	115 (9.3)	
2	90 (6.6)	56 (14.4)		129 (9.1)	17 (5.07)		47 (9.09)	99 (8.01)	
3	290 (21.26)	85 (21.85)		315 (22.21)	60 (17.91)		126 (24.37)	249 (20.15)	
4 (Highest)	839 (61.51)	109 (28.02)		711 (50.14)	237 (70.75)		198 (38.3)	750 (60.68)	
Hospital Support (survey)			<.0001			<.0001			<.0001
Low	185 (13.56)	101 (25.96)		270 (19.04)	16 (4.78)		195 (37.72)	91 (7.36)	
High	1179 (86.44)	288 (74.04)		1148 (80.96)	319 (95.22)		322 (62.28)	1145 (92.64)	
Resilience (survey)			0.0053			0.0014			<.0001
Low	381 (29.88)	134 (37.75)		439 (33.61)	76 (23.46)		185 (41.2)	330 (27.94)	
Medium	492 (38.59)	108 (30.42)		461 (35.3)	139 (42.9)		141 (31.4)	459 (38.87)	
High	402 (31.53)	113 (31.83)		406 (31.09)	109 (33.64)		123 (27.39)	392 (33.19)	
Paternal Characteristics									
Paternal Age (BC)			<.0001			0.0123			<.0001
Age<25 yr.	20 (1.47)	52 (16.1)		66 (4.88)	6 (1.8)		38 (8.02)	34 (2.8)	
Age 25-<35 yr.	835 (61.22)	162 (50.15)		807 (59.65)	190 (56.89)		288 (60.76)	709 (58.45)	
Age 35 yr. and above	509 (37.32)	109 (33.75)		480 (35.48)	138 (41.32)		148 (31.22)	470 (38.75)	

(Contd...)

Table 1. (Continued)

Demographics	Voluntary Legal Paternity (VLP) # (N=1364)	No-Voluntary Legal Paternity (N=389)	P-value	Stopping EXCLUSIVE breastfeeding at 13 weeks (N=1418)	Continuing EXCLUSIVE breastfeeding at 13 weeks (N=335)	P-value	Stopping ANY breastfeeding at 13 weeks (N=517)	Continuing ANY breastfeeding at 13 weeks (N=1236)	P-value
Paternal Education (BC)			<.0001			<.0001			<.0001
High school or less	192 (14.23)	160 (55.75)		318 (24.37)	34 (10.27)		172 (37.97)	180 (15.22)	
Some college or above	1157 (85.77)	127 (44.25)		987 (75.63)	297 (89.73)		281 (62.03)	1003 (84.78)	

VLP refers to Voluntary Legal Paternity; No-VLP refers to No-Voluntary Legal Paternity, including those having a court-mandated Paternity Affidavit and those with no legal paternity established. (BC) indicates that the variable was extracted from the birth certificate; (BC+survey) indicates that the variable was extracted from the birth certificate and cross-validated with the survey; (survey) refers to a variable extracted from the survey † **Tobacco Use** refers to tobacco use before or during pregnancy; **Positive Health Behavior** refers to positive behavior in diet, exercise, dental care aspects 12 months before pregnancy; **Vitamin Use** refers to multivitamin, prenatal vitamin, or folic acid vitamin use a month before the pregnancy; **Traumatic Stress** refers to stressful events during pregnancy or the first month postpartum, including experience of being homeless, being in a physical fight, having a spouse or partner in jail, or someone close having a problem with drinking; **Social Support** refers to the level of support from friends or family in terms of lending/borrow money or material items, trading services, and being able to talk at any time).

Demographic characteristics for women by their infant's legal paternity status and breastfeeding outcomes are described in Table 1. Mothers of children without voluntary legal paternity (i.e., no legal paternity established, or court-ordered paternity affidavit) were more likely to be younger, less educated, non-white, Hispanic, and of low income. These mothers were also more likely to stop any breastfeeding and to not exclusively breastfeed at 13 weeks.

3.2. Voluntary Legal Paternity Establishment and Breastfeeding Outcomes

The univariate model results showed that having no-VLP was associated with 3.25 (95% CI, 2.57 to 4.11) times the crude odds of breastfeeding cessation at 13 weeks (Table 2 Model 1) and with 4.09 (95% CI, 2.69 to 6.21) times the crude odds of not exclusively breastfeeding at 13 weeks (Table 3 Model 1). The multivariable logistic regression is presented in Table 2-3 Model 2-3. The backward selection results demonstrated that having no-VLP was associated with 1.457 (95%CI 1.014 to 2.095) times the odds of breastfeeding cessation at 13 weeks adjusting for maternal resilience, pre-pregnancy BMI, positive health behavior, tobacco use, hospital breastfeeding support, paternal age, and paternal education. These results also showed a 2.06 (95% CI, 1.25 to 3.42) times the odds of not exclusively breastfeeding at 13 weeks adjusting for maternal resilience, pre-pregnancy BMI, social support, hospital support, paternal age, and paternal education (Table 3).

4. Discussion

4.1. Discussion

This study's goal was to assess whether legal paternity established voluntarily is associated with breastfeeding duration and exclusivity. Legal paternity acknowledgment is a universal concept and especially problematic in countries with no legal mechanism for child support for unmarried or divorced mothers raising their children. When there is no legal recourse to hold fathers accountable for their children, the burden falls on the mothers to care for their needs. This is evidenced globally, as lone mothers with children account for the highest

Table 2. Association between No-Voluntary Legal Paternity and Breastfeeding Cessation (i.e., Stopping ANY Breastfeeding) at 13 Weeks

Variable	Odds Ratio	95% Confidence Limits	
Model 1. Breastfeeding Cessation at 13 Weeks, Univariate Analysis			
No-VLP vs VLP#	3.251	2.571	4.112
Model 2. Breastfeeding Cessation at 13 Weeks, Adjusting for Maternal Demographics			
No-VLP vs VLP#	1.617	1.192	2.192
Age<30 yr. vs Age≥30 yr.	1.097	0.864	1.393
Education High School or Less vs Some college or above	2.286	1.662	3.144
Race Black vs White	1.36	0.914	2.024
Race Other vs White	1.004	0.698	1.445
Income Status Low vs non-Low	1.62	1.202	2.182
Model 3. Breastfeeding Cessation at 13 Weeks, Adjusting for Maternal Demographics, Resilience, Hospital breastfeeding Support, and Social Support			
No-VLP vs VLP#	1.718	1.219	2.422
Age<30 yr. vs Age≥30 yr.	1.242	0.956	1.613
Education High School or Less vs Some college or above	1.853	1.286	2.669
Race Black vs White	1.26	0.805	1.972
Race Other vs White	0.781	0.512	1.192
Income Status Low vs non-Low	1.251	0.89	1.758
Resilience Low vs High	1.391	1.026	1.886
Resilience Medium vs High	0.975	0.72	1.32
Social Support (continuous)	0.928	0.825	1.044
Hospital Support (continuous)	0.735	0.689	0.785
Model 4. Breastfeeding at 13 Weeks, Adjusting for Variables Selected from Backward Selection Process*			
No-VLP vs VLP#	1.457	1.014	2.095
Resilience Low vs High	1.385	0.997	1.925
Resilience Med vs High	1.005	0.723	1.395
Hospital Support (continuous)	0.731	0.679	0.786
Pre-Pregnancy BMI Obese Vs Healthy And Underweight	2.775	2.025	3.801
Pre-Pregnancy BMI Overweight Vs Healthy And Underweight	1.376	0.996	1.901
Positive Health Behavior No vs Yes	1.649	1.135	2.398
Pre/During Pregnancy Tobacco Use Yes vs No	1.832	1.118	3.002
Paternal Age 25-<35 yr. vs Age<25 yr.	1.182	0.593	2.356
Paternal Age 35 yr. and above vs Age<25 yr.	0.779	0.383	1.585
Paternal education High school or less vs Some college or above	2.091	1.501	2.913

*The final variables in this table were backward selected with the forced-in requirement for the paternity establishment variable and with the P value of stay of 0.1 from the pool of the following variables: mother age, education, race, income status, hospital support, social support, and resilience, as well as ethnicity, marital status, pre-pregnancy BMI, high poverty zip code, positive health behavior, tobacco use, intention to be pregnant, traumatic stress, vitamin use, paternal age, and paternal education.

VLP refers to Voluntary Legal Paternity; No-VLP refers to no-Voluntary Legal Paternity, including those having a court-mandated Paternity Affidavit and those with no legal paternity established.

rates of poverty.[14] The voluntary nature of the legal paternity status may serve as a proxy for initial engagement and acceptance of responsibility for caring for the child. It is important to note that some parents purposefully choose to not legally report paternity for various reasons, yet the fathers are engaged and support their families. In the U.S., these may include undocumented immigrants and families in need of social services reserved for single mother households.[20]

Table 3. Association between No-Voluntary Legal Paternity and Exclusive Breastfeeding Cessation (i.e., Stopping EXCLUSIVE Breastfeeding) at 13 Weeks

Variable	Odds Ratio	95% Confidence Limits	
Model 1. Exclusive Breastfeeding Cessation at 13 Weeks, Univariate Analysis			
No-VLP vs VLP#	4.089	2.693	6.209
Model 2. Exclusive Breastfeeding Cessation at 13 Weeks, Adjusting for Maternal Demographics			
No-VLP vs VLP#	2.134	1.325	3.436
Age<30 yr. vs Age≥30 yr.	0.994	0.756	1.307
Education High School or Less vs Some college or above	2.492	1.391	4.463
Race Black vs White	1.739	0.832	3.635
Race Other vs White	1.692	1.017	2.815
Income Status Low vs non-Low	1.526	1.037	2.247
Model 3. Exclusively Breastfeeding at 13 Weeks, Adjusting for Maternal Demographics, Resilience, Hospital breastfeeding Support, and Social Support			
No-VLP vs VLP#	2.335	1.401	3.892
Age<30 yr. vs Age≥30 yr.	0.998	0.752	1.324
Education High School or Less vs Some college or above	1.962	1.064	3.619
Race Black vs White	1.347	0.632	2.867
Race Other vs White	1.399	0.821	2.385
Income Status Low vs non-Low	1.273	0.846	1.915
Resilience Low vs High	1.252	0.893	1.755
Resilience Medium vs High	0.895	0.667	1.202
Social Support (continuous)	0.84	0.721	0.98
Hospital Support (continuous)	0.864	0.796	0.939
Model 4. Exclusive Breastfeeding Cessation at 13 Weeks, Adjusting for Variables Selected from Backward Selection Process*			
No-VLP vs VLP#	2.065	1.247	3.420
Resilience Low vs High	1.220	0.857	1.737
Resilience Med vs High	0.820	0.603	1.115
Social Support (continuous)	0.819	0.702	0.956
Hospital breastfeeding Support (continuous)	0.834	0.762	0.913
Pre-pregnancy BMI obese vs healthy and underweight	3.187	2.100	4.836
Pre-pregnancy BMI overweight vs healthy and underweight	1.487	1.087	2.036
Paternal Age 25-<35 yr. vs Age<25 yr.	1.212	0.433	3.393
Paternal Age 35 yr. and above vs Age<25 yr.	0.809	0.288	2.273
Paternal Education High school or less vs Some college or above	1.751	1.130	2.713

*The final variables in this table were backward selected with the forced-in requirement for the VLP variable and with the P value of stay of 0.1 from the pool of the following variables: mother age, education, race, income status, hospital BREASTFEEDING support, social support, and resilience, as well as ethnicity, marital status, pre-pregnancy BMI, high poverty zip code, positive health behavior, tobacco use, intention to be pregnant, traumatic stress, vitamin use, paternal age, and paternal education.
#VLP refers to Voluntary Legal Paternity; No-VLP refers to no-Voluntary Legal Paternity, including those having a court-mandated Paternity Affidavit and those with no legal paternity established.

Our findings indicate that voluntary legal paternity is positively associated with breastfeeding duration and exclusivity. In our sample, mothers of infants with no legal paternity established or with a court-ordered paternity affidavit tended to be younger, of Black race, Hispanic, and of lower educational and income levels. This finding is noteworthy given that in the U.S., despite the overall national increase in initiation, duration and exclusivity, breastfeeding rates are lowest in populations of disadvantaged socio-economic background.[6]

Our findings indicate that, overall, not having a voluntarily established legal paternity is associated with lower rates of breastfeeding cessation up to 13 weeks and exclusively breastfeeding at 13 weeks. To our knowledge, no study has examined breastfeeding outcomes and legal paternity establishment in the U.S. Nonetheless, our findings are similar to research examining maternal breastfeeding behaviors and fathers' support or engagement.[21] Studies have found an association between breastfeeding non-initiation or cessation with fathers not being engaged, not providing financial support and not acknowledging the pregnancy.[22-23] Conversely, there has been evidence that financial and psychosocial support from the father plays a role in the mother's decision to breastfeed and leads to increased breastfeeding duration and exclusivity.[6,24]

When legal paternity is not established, mothers may be less likely to receive psychosocial and financial support from the father of the child. Studies have indicated that mistimed or unplanned pregnancies render it challenging to receive psychosocial support from the father and lead to less optimal maternal breastfeeding behaviors.[25] Similarly, mothers who indicate less paternal engagement and financial support also initiate breastfeeding less, and if they do, for shorter durations than mothers who report higher paternal engagement.[23,26] Researchers have proposed social support from other sources as a potential mechanistic (i.e., either mediational or moderational) effect in reducing the negative effects of fathers' lack of support on maternal behaviors, including maternal decision to breastfeed.[27] In our study, we examined the role of breastfeeding support from the hospital and social support from sources other than the infant's father among our sample of mothers of infants with a no-VLP compared with those with VLP. We found that the greater the hospital and social support, the higher the likelihood a mother would continue exclusive breastfeeding regardless of the infant's legal paternity status. Similarly, for breastfeeding cessation, the greater the hospital breastfeeding support, the higher the likelihood a mother would continue breastfeeding regardless of the infant's legal paternity status. These results indicate that hospital support and maternal social support are important for increasing optimal breastfeeding outcomes.

In addition to external support, studies have identified maternal resilience as a potential determinant of maternal behaviors.[28,29] Resilient mothers have been found to be more adaptive and have a higher rate of overall self-efficacy as compared to mothers with lower resilience.[30] These higher levels of resilience have been associated with fewer maternal risk behaviors such as not drinking alcohol and smoking cessation.[27] The findings from our study indicate that mothers with lower resilience had a higher likelihood of breastfeeding cessation, regardless of demographics and legal paternity status.

4.2. Strengths and Limitations of the Study

While the survey invitation was sent to all new mothers with a usable mailing address, the respondents represent a convenience sample. Using survey response (yes/no) as the outcome variable, we conducted an automated stepwise logistic regression to determine which variables were important predictors of response. These predictors were used to adjust for non-response in multivariable models in order to provide relative effect estimates that are representative of Monroe County over the study period. Survey responses, including breastfeeding outcomes, were self-reported and subject to the associated limitations such as social desirability response bias. The survey was sent at four to five months postpartum, which could introduce recall bias. Since this is a secondary analysis, not all variables of interest were available. Finally, assessing differences in breastfeeding outcomes between those with court-mandated paternity affidavit compared with those with no legally established paternity was not possible given the sample size, but warrants further examination. Nevertheless, to our knowledge, this study is the first study to explore the relationship between voluntary legal paternity and breastfeeding outcomes in the U.S.

5. Conclusion and Implications for Translation

Establishing legal paternity is an important step toward infants benefiting from paternal physical engagement, economic support, and positive influence on maternal breastfeeding practices. Our findings indicate that breastfeeding duration and

exclusivity may be associated with whether or not legal paternity was established voluntarily, given that mothers of infants with a no-VLP had lower odds of either any or exclusively breastfeeding at 13 weeks. Social support and hospital support were determinants of improved breastfeeding outcomes regardless of paternity establishment status, suggesting potential areas for intervention development to improve breastfeeding duration especially in the U.S., and exclusive breastfeeding among women globally. This study's findings further support the importance of voluntary legal paternity establishment in promoting the health of infants through breastfeeding.

Compliance with Ethical Standards

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Key Messages

► Mothers of infants with legal paternity not voluntarily established (i.e, mandated by a court of law) or not established at all, tended to be younger, Black, Hispanic, and of lower educational and income levels.

► Having legal paternity not voluntarily established is associated with lower rates of any breastfeeding up to 13 weeks and exclusively breastfeeding at 13 weeks.

► Voluntary legal paternity establishment is associated with optimal maternal practices of exclusivity and a longer duration of breastfeeding.

► Greater hospital breastfeeding support and social support increase the likelihood a mother would continue exclusive breastfeeding regardless of the infant's legal paternity status.

► Similarly, for breastfeeding cessation, the greater the hospital support, the higher the likelihood a mother would continue breastfeeding regardless of the infant's legal paternity status.

► Low maternal resilience was associated with mothers having a higher likelihood of breastfeeding cessation.

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Appendix 1: Details of the Operationalization of the Variables in the Models

Maternal and paternal age was calculated using the parent's birth date minus the infant birth date, converted into years. This calculated variable was collapsed as <30 yrs. vs ≥ 30 yrs. in subsequent analyses.

Maternal and paternal education used both survey responses and birth certificate data to cross-validate before collapsing the original 6 levels into a binary response (i.e. High school or Less vs Some college or above).

Maternal race was similarly cross-validated collapsing the original 6 levels into 3 (White vs Black vs Other); 2 dummy coded race variables (Black vs White; Other race vs White) were used in the regression analyses.

Income status used data from the birth certificate to create a binary variable. Low-income status was defined as those with a Medicaid-funded delivery and/or prenatal enrolment into WIC (Special Supplemental Nutrition Program for Women, Infants, and Children). Non-low-income status included women who did not participate in WIC prenatally or have Medicaid-funded delivery.

Pre-pregnancy BMI was collapsed into three categories: Underweight/Healthy, Overweight and Obese. Pre-pregnancy positive health behavior (yes/no) was based on a yes answer to any of the three questions about healthy behaviors such as dental care, diet and exercise in the 12 months preceding pregnancy.

A Hospital breastfeeding support variable was created based on the sum of scores (Yes=1; No=0) of 9 survey questions regarding breastfeeding support provided at the birth hospital. Examples of these survey questions include, "hospital staff gave me information about breastfeeding", "my baby stayed in the same room with me at the hospital", and "I breastfed in the first hour my baby was born." This continuous variable has a possible score of a 0-9-point score.

The social support variable was the sum of the responses selected for the questions "Do you have close friends or family members" you can: Lend or borrow money from; Lend or borrow things from; Trade services with; and, Talk to any time. This variable had 5 levels ranging from 0 to 4 and was treated as an ordinal variable in the analyses.

Maternal resilience score was calculated as the sum of 15 of the 16 resilience-related survey questions. Questions on the survey were a 16-item scale that was based on the 25-item resilience scale.[19] The sum of scores (total possible score of 64) were collapsed into tertiles, with each group similar in size: Low resilience (N=515, mean score=42.5), Medium resilience (N=600, mean score=48.3) and High resilience (N=515, mean score=55.8).