



Article

Prevalence and Factors Associated with Impaired Maternal–Infant Bonding among Mothers Attending Young Child Clinic in Kampala, Uganda

Phionah Tukamushabe ¹, Tom Denis Ngabirano ¹, Joyce Nankumbi Okonya ¹ and Melissa A. Saftner ^{2,*} 

¹ Department of Nursing, Makerere University, Kampala P.O. Box 7072, Uganda;

ptukamushabe@jrcr.org.ug (P.T.); tom.ngabirano@mak.ac.ug (T.D.N.); joyce.nankumbi@mak.ac.ug (J.N.O.)

² School of Nursing, University of Minnesota, Minneapolis, MN 55455, USA

* Correspondence: msaftner@umn.edu; Tel.: +1-218-726-8934

Abstract: Impaired maternal–infant bonding can have a negative impact on the mother–infant relationship, affecting the social, emotional, and cognitive development of a child. In Uganda, there is a paucity of literature on impaired maternal–infant bonding. This quantitative, cross-sectional study aimed to determine the prevalence and factors associated with impaired maternal–infant bonding. Postnatal mothers ($n = 422$) attending the Young Child Clinic at Kawempe National Referral Hospital participated in the study. Maternal–infant bonding was measured using the Postpartum Bonding Questionnaire (PBQ). Participants with a score ≥ 13 on the PBQ were considered to have impaired maternal–infant bonding. The prevalence of impaired maternal–infant bonding among mothers was 45% (190/422). Logistic regression was used to determine factors associated with impaired maternal–infant bonding. Unmarried mothers (AOR = 2.05, 95% [CI = 1.03–4.09], $p = 0.041$), unplanned pregnancy (AOR = 5.19, 95% [CI = 3.07–8.82], $p < 0.001$), first-time mothers (AOR = 2.46, 95% [CI = 1.37–4.43], $p = 0.003$), female infant (AOR = 1.80, 95% [CI = 1.13–2.86], $p = 0.013$), mothers with no/low education levels (AOR = 2.29, 95% [CI = 1.05–4.50], $p = 0.036$), and those who delivered post term (AOR = 2.49, 95% [CI = 1.10–5.67], $p = 0.028$) were more likely to have impaired maternal–infant bonding. Nurses and midwives in postnatal care should include maternal–infant bonding within their client’s assessment and provide supportive mother-centered care. Interventions to improve maternal–infant bonding should be created and implemented in clinical practice.

Keywords: mother–infant bonding; postnatal care; Uganda; nursing; midwifery care



Citation: Tukamushabe, P.; Ngabirano, T.D.; Okonya, J.N.; Saftner, M.A. Prevalence and Factors Associated with Impaired Maternal–Infant Bonding among Mothers Attending Young Child Clinic in Kampala, Uganda. *Int. J. Environ. Res. Public Health* **2024**, *21*, 665. <https://doi.org/10.3390/ijerph21060665>

Academic Editor: Shaonong Dang

Received: 1 April 2024

Revised: 16 May 2024

Accepted: 20 May 2024

Published: 23 May 2024



Copyright: © 2024 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

Mother–infant bonding was first described five decades ago as an emotional tie between a mother and baby [1]. Others have since described it as an affective connection or passionate tie between the mother and her infant [2,3]. Maternal–infant bonding is characterized by emotional warmth and affection between the mother and the infant [4]. It is considered to be the basis for the child’s later attachment and sense of self [4]. The development of this bond begins during intrauterine life and continues throughout the child’s life [5]. However, the first year of life has been identified as a vital time period for maternal–infant bonding [6].

A strong bond between mother and infant is important for the overall well-being and growth of the child, improving both physical and psychological development [6,7]. This bond plays a pivotal role in fostering social and emotional growth, as well as enhancing cognitive abilities in the child [8]. Moreover, nurturing positive maternal–infant relationships creates healthy interpersonal connections throughout the child’s life, facilitating smoother interactions with others and equipping them with essential parenting skills for the future [3]. Additionally, a robust maternal–newborn relationship significantly influences the mother’s mental well-being and her approach to parenting [8,9].

The disruption of mother–infant bonding affects the infant’s social, emotional, behavioral, and cognitive development [10]. Poor bonding is associated with complications including failure to thrive, psychosocial disorder, separation anxiety disorder, avoidant personality disorder, delinquency, and learning problems [10,11]. The prevalence of bonding problems among mother–infant dyads has been reported in studies conducted in the Global North and South and varies greatly from 4 to 45% [2,11–15].

The factors associated with impaired maternal–infant bonding among mothers from developing countries are not well documented. Given the impact of impaired postnatal maternal–infant bonding on the future health and development of the child, it is essential to examine the factors associated with impaired bonding in order to identify and support mothers who are at an increased risk of bonding problems. This study aims to determine the prevalence and factors associated with impaired maternal–infant bonding in the postnatal period.

2. Materials and Methods

2.1. Study Design and Setting

A quantitative descriptive, cross-sectional study was conducted to determine the prevalence and factors associated with impaired maternal–infant bonding among postnatal women and infants at the Young Child Clinic (YCC) at Kawempe National Referral Hospital. Kawempe Hospital is a national referral, clinical, training, and research hospital. The hospital has a 200-bed capacity and is located in Kawempe Division, one of the five administrative units of the Kampala Capital City Authority. The hospital is located approximately 5 km north of Mulago National Specialized Referral Hospital, along the Kampala–Gulu Highway. This location is approximately 8 km north of the central business district of the city. The hospital offers free services in obstetrics and gynecology, pediatrics, adolescent health, and HIV/AIDS care. The YCC is an outpatient clinic located within Kawempe National Referral Hospital which offers immunization services for infants, health education and referral services for postnatal mothers. The YCC operates from Monday to Friday with nurses and midwives, seeing over 200 mother–infant dyads weekly.

2.2. Study Sample

The study population included all mothers who had given birth to live babies in the previous 14 weeks and had infants receiving care from the YCC. Participants were recruited as they brought their newborn to the YCC for immunizations as per the National immunization schedule. Mothers below 18 years old were considered emancipated minors and included in the study. The study excluded mothers whose babies required higher levels of pediatric care for medical conditions (e.g., failure to thrive, congenital conditions) and those who did not understand Luganda or English.

The study participants were consecutively recruited in the study, a sampling procedure in which every participant meeting the inclusion criteria is recruited until the required sample size is achieved [16]. Consecutive recruitment reduces selection bias, maintains high response rate, and ensures equitable access to recruitment opportunities for all eligible individuals [16]. Every mother who met the inclusion criteria was given an opportunity to participate in the study. The number of study respondents was obtained using Kish’s formula [17]. When accounting for a 10% non-response rate, 422 participants were required to complete the study.

2.3. Study Variables

The dependent variable examined was maternal–infant bonding, which was measured using the Postpartum Bonding Questionnaire (PBQ). The independent variables examined included sociodemographic factors such as a woman’s age, level of education, employment status, marital status, time spent with the baby, and social support; maternal factors included parity, still births, planned pregnancy, antenatal attendance, type of delivery,

birth complications, and skin-to-skin contact; and infant factors included sex, birth weight, gestational age, condition at birth, current weight, age, illness, and breastfeeding status.

2.4. Data Collection Tools

Data were collected via a structured questionnaire with two sections. Section one contained sociodemographic, maternal, and infant factors. Section two included the PBQ, which is a 25-item survey designed to detect mothers at risk for bonding disorders [18,19]. The PBQ was specifically chosen to measure mother–infant bonding in this study because it is a commonly used measure that has been shown to be reliable and valid across different countries, languages, and cultures [11,14,19–25]. In Africa, it has been used in Egypt [15] and Ethiopia [2].

The PBQ has four subscales measuring quality of the maternal–infant bond, rejection and pathological anger towards the baby, infant-focused anxiety, and risk of abuse. The items are rated by the mother on a six-point scale. Each item is scored between 0 and 5; negatively phrased items are rescored. The scores from the 25 items are summed to produce the maternal–infant bonding score. Total scores range from 0 to 125, with a higher score indicating a bonding disorder [18]. In the current study, we used a cut-off score of 13 to categorize mothers as having impaired maternal–infant bonding. This cut-off was based on a previous study that used similar cut-offs [14].

2.5. Data Collection Procedure

The study was approved by the School of Health Science Research and Ethics Committee (MAKSHSREC-2022-280). Administrative approval was granted by Kawempe National Referral Hospital and the YCC in-charge. The researchers approached mothers at the YCC who had completed their immunization visits with their infants and explained the study's purpose, risk, and benefits. Written informed consent was secured from mothers who were willing to participate in the study. After securing written informed consent, the research team member and participant moved to a private room in the clinic and the research team member administered the questionnaire, which took, on average, 40 min.

2.6. Data Analysis

The data were entered into Excel, cleaned, and analyzed using STATA version 16 software. There were no missing data. Descriptive statistics of sociodemographic, maternal, and infant characteristics were computed. Categorical variables were reported using frequency and proportions. Continuous variables were summarized using median, mean, and standard deviation.

The individual items on the PBQ were summed for each participant to compute the total maternal–infant bonding score. Descriptive statistics (range, mean, standard deviation) were obtained for all items and subscales of the PBQ. To assess the internal reliability of the PBQ, Cronbach's alpha was computed. To determine the prevalence of impaired maternal–infant bonding, mothers with scores ≥ 13 on the PBQ were computed as a percentage of the total number of participants.

Logistic regression was used to determine association between the various independent variables and impaired maternal–infant bonding, using odds ratio (OR) and 95% confidence interval at bivariate and multivariate analysis. At the bivariate analysis level, factors with p -value ≤ 0.05 and plausible variables were included in the multivariate model. A p -value of ≤ 0.05 was considered significant for the final model.

3. Results

The study aimed to determine the prevalence and factors associated with impaired maternal–infant bonding among 422 mothers attending YCC at Kawempe Hospital.

3.1. Sociodemographic Characteristics

The mean age of respondents was 26.2 years. More than three-quarters were married or living with a partner, and slightly more than half had a secondary level of education. Of the 181 mothers who were employed, more than half reported taking their babies with them to work. Fifteen percent reported that they had no support with caring for the baby (Table 1).

Table 1. Sociodemographic characteristics.

Variable	Frequency (n)	Percent (%)	Mean (\pm SD)
Age			
15–24	179	42.4	26.2 (\pm 5.57)
25–34	202	47.9	
35 and above	41	9.7	
Marital status			
Never married	43	10.2	
Married/Living together	355	84.1	
Separated or divorced	24	5.7	
Level of education			
No education	17	4.0	
Primary	115	27.3	
Secondary	230	54.5	
Tertiary	60	14.2	
Mother's employment status			
Employed	181	42.9	
Not employed	241	57.1	
Type of employment			
No employment	241	57.1	
Self-employed or business	127	30.1	
Civil servant	54	12.8	
Takes baby with her to workplace			
Yes	107	59.1	
No	74	40.9	
Maternal support for baby care			
None	65	15.4	
Husband or partner	282	66.8	
Others	75	17.8	

3.2. Maternal Characteristics

The average number of pregnancies for participants was two. Approximately 60% ($n = 255$) reported the pregnancy as unplanned and 73% ($n = 397$) of participants reported attending the antenatal clinic between four and seven times during the pregnancy. The majority ($n = 301$) of births were spontaneous vaginal deliveries, 99.5% of all births occurred in a health facility, and just more than a third ($n = 158$) reported complications during delivery. A small number ($n = 53$) never put the babies on the chest after delivery (Table 2).

Table 2. Maternal characteristics.

Variable	Frequency (n)	Percent (%)	Mean (SD)
Parity			2.07 (± 1.32)
1	210	49.8	
≥2	212	50.2	
Ever lost a child			
Yes	61	14.5	
No	361	85.5	
Intended pregnancy			
Yes	167	39.6	
No	255	60.4	
Antenatal clinic visits			5.75 (± 1.65)
<4 visits	25	5.9	
4–7 visits	397	73.0	
≥8 visits	89	21.1	
Place of delivery			
Home	2	0.5	
Public Hospital	381	90.3	
Private Hospital	39	9.2	
Mode of delivery			
Vaginal	301	71.3	
Caesarean	121	28.7	
Pregnancy complication			
None	264	62.6	
Complication	158	37.4	
Skin-to-skin contact			
Immediately	284	67.3	
First 24 h	85	20.1	
Never	53	12.6	

3.3. Infant Characteristics

The mean age of the babies was 8 weeks. Slightly less than a half ($n = 196$) of the respondents gave birth to male babies. The majority of infants were born at term ($n = 363$) and more than three-quarters ($n = 358$) indicated that they exclusively breastfed their babies. The average weight at birth was 3.06 kg (Table 3).

Table 3. Infant characteristics.

Variable	Frequency (n)	Percentage (%)	Mean (SD)
Age of baby in weeks	422	100	8.86 (± 3.47)
Sex of baby			
Female	226	53.6	
Male	196	46.2	
Preferred sex			
Female	356	84.4	
Male	66	15.6	
Condition of baby at birth			
Preterm	25	5.9	
Full term	363	86.0	
Post term	34	8.1	

Table 3. Cont.

Variable	Frequency (n)	Percentage (%)	Mean (SD)
Weight at birth in kg			3.07 (\pm 0.54)
Below 2.5	37	8.8	
2.5–3.5	293	69.4	
Above 3.5	92	21.8	
Baby cried immediately at birth			
Yes	400	94.8	
No	22	5.2	
Baby taken to NICU after birth			
Yes	49	1.6	
No	373	88.4	
Baby hospitalized since discharge			
Yes	8	1.9	
No	414	98.1	
Method of feeding baby after birth			
Exclusively breast fed	358	84.8	
Both	64	15.2	
Baby breast fed in the first hour after birth			
Yes	291	69.0	
No	131	31.0	
Sleep with baby in the same bed			
Yes	416	98.6	
No	6	1.4	

3.4. Maternal–Infant Bonding

Maternal–infant bonding was measured using the PBQ. The overall Cronbach’s alpha of the PBQ in this study was 0.81, indicating good internal consistency. The total participant scores ranged from 0 to 82, with a mean score of 12.47 and median of 12. Mothers with scores \geq 13 were categorized as having impaired bonding. More than 4 in 10 (45%) mothers experienced impaired bonding. Descriptive statistics for the PBQ including subscales are noted in Table 4.

Table 4. Postpartum Bonding Questionnaire results.

Postpartum Bonding Questionnaire	Number of Items	Mean	Standard Deviation	Median	Range
Subscale 1 (quality of maternal bond)	12	6.86	5.1	07	0–46
Subscale 2 (rejection and anger)	07	2.36	3.30	02	0–28
Subscale 3 (infant-focused anxiety)	04	3.24	1.84	03	0–12
Subscale 4 (incipient abuse)	02	0.01	0.84	00	0–01
Total Item Score	25	12.47	9.03	12	0–82

3.5. Association between Demographic Factors and Impaired Maternal–Infant Bonding among Mothers Attending the YCC at Kawempe Hospital

Bivariate analysis was completed to identify the sociodemographic factors associated with impaired maternal–infant bonding among mothers attending the YCC (Table 5). Young mothers (age 15–24) were more likely to report bonding problems compared with women aged 25–34 (OR = 1.61, 95% CI = 1.07–2.42, p = 0.021). Mothers who were not married or living with a partner were more likely to report concerns with bonding (OR = 2.96, 95% CI = 1.70–5.14, p < 0.001). Mothers with no formal education or primary school only experienced more bonding issues than those with tertiary education (OR = 3.07, 95% CI = 1.60–6.62, p = 0.001). Mothers who were not taking babies with them to work had about 4 times greater odds of bonding problems compared to those who were taking their babies with them to work (OR = 3.76, 95% CI = 2.01–7.05, p < 0.001) and those with

no support had 81% greater odds of developing bonding problems compared to those who had support from their husbands and other people (OR = 1.81, 95% CI = 1.07–3.05, $p = 0.027$).

Table 5. Association between sociodemographic factors and maternal–infant impaired bonding.

Variable	Normal Bonding	Impaired Bonding	Odds Ratio (95% CI)	<i>p</i> -Value
Age				
25–34	122 (60.4)	80 (39.6)	Ref	
15–24	87 (48.6)	92 (51.4)	1.61 (1.07–2.42)	0.021
35 and above	23 (56.1)	18 (43.9)	1.19 (0.61–2.35)	0.609
Marital status				
Married/living together	210 (59.2)	145 (40.8)	Ref	
Not married	22 (32.8)	45 (67.2)	2.96 (1.70–5.14)	<0.001
Education level				
Tertiary	42 (70.0)	18 (30.0)	Ref	
Secondary	133 (57.8)	97 (42.2)	1.70 (0.92–5.89)	0.088
No education/primary	57 (43.2)	75 (56.8)	3.07 (1.60–6.2)	0.001
Job status				
Yes	107 (59.1)	74 (40.9)	Ref	
No	125 (51.9)	116 (47.1)	1.34 (0.91–1.98)	0.139
Take baby to work (<i>n</i>= 181)				
Yes	77 (72.0)	30 (28.0)	Ref	
No	30 (40.5)	44 (59.5)	3.76 (2.01–7.05)	<0.001
Baby support				
Husband/other	203 (57.3)	151 (42.6)	Ref	
None	29 (42.6)	39 (57.4)	1.81 (1.07–3.05)	0.027

Bold: statistically significant with $p < 0.05$

3.6. Association between Maternal Factors and Impaired Maternal Bonding among Mothers Attending the YCC

First-time mothers had greater odds of developing bonding problems compared to those who had delivered before (OR = 1.89, 95% [CI = 1.28–2.78], $p = 0.001$). Mothers reporting an unplanned pregnancy had 6 times greater odds of developing bonding problems compared to those who had planned for the pregnancy (OR = 6.16, 95% [CI = 3.92–9.70], $p < 0.001$). Surprisingly, those who delivered by caesarean section had decreased odds of developing bonding problems compared to those who had a spontaneous vaginal delivery (OR = 0.64, 95% [CI = 0.413–0.98], $p = 0.041$) and mothers who had complications during delivery also had lower odds of developing bonding problems compared to those who did not have any complications (OR = 0.66, 95% [CI = 0.44–0.98], $p = 0.041$). Table 6 describes the maternal factors associated with impaired maternal–infant bonding.

Table 6. Association between maternal factors and impaired maternal–infant bonding.

Variable	Normal Bonding	Impaired Bonding	Odds Ratio (95% CI)	<i>p</i> -Value
Parity				
≥2	133 (62.7)	79 (37.3)	Ref	
1	99 (47.1)	111 (52.9)	1.89 (1.28–2.78)	0.001
Lost a child				
No	199 (55.1)	162 (44.9)	Ref	
Yes	33 (54.1)	28 (45.9)	1.04 (0.60–1.80)	0.882

Table 6. Cont.

Variable	Normal Bonding	Impaired Bonding	Odds Ratio (95% CI)	p-Value
Planned pregnancy				
Yes	133 (79.6)	34 (20.4)	Ref	
No	99 (38.8)	156 (61.2)	6.16 (3.92–9.70)	<0.001
Antenatal visits				
≥4	214 (53.9)	183 (46.1)	Ref	
<4	18 (72.0)	7 (38.0)	0.54 (0.19–1.11)	0.084
Mode of delivery				
Vaginal	156 (51.8)	145 (49.1)	Ref	
Caesarean	76 (62.8)	45 (37.2)	0.64 (0.41–0.98)	0.041
Complications				
None	135 (51.1)	129 (48.9)	Ref	
Complication	97 (61.2)	61 (38.8)	0.66 (0.44–0.98)	0.041
Carried baby on chest				
Immediately	145 (51.1)	139 (49.9)	Ref	
First 24 h	45 (52.9)	40 (47.1)	0.93 (0.57–1.51)	0.760
Never	42 (79.3)	11 (20.7)	0.27 (0.14–0.55)	<0.001

Bold: statistically significant with $p < 0.05$.

3.7. Association between Infant Factors and Impaired Maternal Bonding among Mothers Attending the YCC

Mothers who delivered female infants had a greater likelihood of poor maternal–infant bonding compared to those who delivered male infants (OR = 1.73, 95% [CI = 1.19–2.57], $p = 0.005$). Mothers who gave birth to post term newborns had 2 times greater odds of bonding problems compared to those who gave birth to term babies (OR = 2.07, 95% [CI = 1.01–4.27], $p = 0.048$). Exclusive breastfeeding or breastfeeding within the first hour was not significantly associated with maternal–infant bonding. Table 7 describes the association between infant factors and maternal–infant bonding.

Table 7. Association between infant factors and impaired maternal–infant bonding.

Variable	Normal Bonding	Impaired Bonding	Odds Ratio (95% CI)	p-Value
Age of the baby				
≤8 weeks	115 (50.9)	111 (49.1)	Ref	
>8 weeks	117 (59.6)	79 (40.4)	0.70 (0.46–1.03)	0.070
Sex of the baby				
Male	122 (62.2)	72 (37.8)	Ref	
Female	110 (48.7)	116 (51.3)	1.74 (1.18–2.57)	0.005
Sex preferred				
Yes	201 (56.5)	155 (43.5)	Ref	
No	31 (47.0)	35 (53.0)	1.46 (0.86–2.48)	0.156
Condition of the baby				
Full term	204 (56.2)	159 (43.8)	Ref	
Preterm	15 (60.0)	10 (40.0)	0.86 (0.37–1.95)	0.711
Post term	13 (38.2)	21 (61.8)	2.07 (1.01–4.27)	0.048
Baby weight at birth				
<2.5 kg	23 (62.2)	14 (37.8)	Ref	
2.5–3.5 kg	146 (49.8)	147 (50.2)	1.65 (0.82–3.34)	0.160
>3.5 kg	63 (68.5)	29 (36.5)	0.76 (0.34–1.68)	0.492

Table 7. Cont.

Variable	Normal Bonding	Impaired Bonding	Odds Ratio (95% CI)	p-Value
Baby cried at birth				
Yes	214 (54.5)	182 (45.5)	Ref	
No	14 (63.6)	8 (36.4)	0.68 (0.28–1.67)	0.404
Baby taken to ICU				
Yes	30 (61.2)	19 (38.8)	Ref	
No	202 (54.2)	171 (45.8)	1.33 (0.73–2.46)	0.351
Forms of feeding				
Exclusive breastfeeding	190 (53.1)	168 (46.9)	Ref	
Bottle/breastfeeding	42 (65.6)	22 (34.4)	0.59 (0.34–1.03)	0.065
Breastfed within first hour				
Yes	153 (52.2)	139 (47.8)	Ref	
No	80 (61.1)	51 (38.9)	0.70 (0.46–1.06)	0.092

Bold: statistically significant with $p < 0.05$.

3.8. Multivariate Analysis of Independent Variables and Impaired Maternal–Infant Bonding

A logistic regression model was developed to assess the factors associated with impaired maternal–infant bonding for the variables that had a $p \leq 0.05$. Age, marital status, level of education, baby support, planned pregnancy, parity, mode of delivery, birth complications, skin-to-skin contact, sex of the baby, and gestational age of the baby were included in multivariate analysis. This model explained 20% of variability (adjusted $r^2 = 0.20$) in maternal–infant bonding.

Table 8 describes the findings of the multivariate analysis. Unmarried mothers had 2 times greater odds of developing bonding problems compared to those who were married/living with a partner (AOR = 2.05, 95% [CI = 1.03–4.09], $p = 0.041$); those with unplanned pregnancy had 5 times greater odds of developing bonding problems (AOR = 5.19, 95% [CI = 3.07–8.82], $p < 0.001$). The odds of developing infant bonding problems were more than two times higher among first-time mothers compared to mothers who had had two or more pregnancies (AOR = 2.46, 95% [CI = 1.37–4.43], $p = 0.003$). Mothers with no education or primary level only were more likely to develop maternal–infant bonding issues (AOR = 2.29, 95% [CI = 1.05–4.50], $p = 0.036$). Mothers who delivered female babies had greater odds of developing bonding problems compared to those who delivered males (AOR = 1.80, 95% [CI = 1.13–2.86], $p = 0.013$) and those who delivered post term were more likely to experience bonding issues compared to those who delivered at term (AOR = 2.49, 95% [CI = 1.10–5.67], $p = 0.028$).

Table 8. Factors associated with impaired maternal–infant bonding.

Variable	Normal Bonding	Impaired Bonding	Odds Ratio (95% CI)	p-Value	Adjusted Odds Ratio (95% CI)	p-Value
Age						
25–34	122 (60.4)	80 (39.6)	Ref		Ref	
15–24	87 (48.6)	92 (51.4)	1.61 (1.07–2.42)	0.021	0.92 (0.50–1.60)	0.693
35 and above	23 (56.1)	18 (43.9)	1.19 (0.61–2.35)			
Marital status						
Married/living together	210 (59.2)	145 (40.8)	Ref		Ref	
Not married	22 (32.8)	45 (67.2)	2.96 (1.70–5.14)	<0.001	2.36 (1.20–4.61)	0.021
Education level						
Tertiary	42 (70.0)	18 (30.0)	Ref		Ref	
Secondary	133 (57.8)	97 (42.2)	1.70 (0.92–3.14)	0.088		
None/primary	57 (43.2)	75 (56.8)	3.07 (1.60–5.89)	0.001	2.29 (1.05–4.50)	0.036

Table 8. Cont.

Variable	Normal Bonding	Impaired Bonding	Odds Ratio (95% CI)	<i>p</i> -Value	Adjusted Odds Ratio (95% CI)	<i>p</i> -Value
Baby support						
Husband/other	203 (57.3)	151 (42.6)	Ref		Ref	
None	29 (42.6)	39 (57.4)	1.81 (1.07–3.05)	0.027	1.02 (0.55–1.91)	0.110
Parity						
≥2	79 (70.0)	39 (30.0)	Ref		Ref	
1	153 (50.3)	151 (49.7)	1.89 (1.28–2.78)	0.001	2.49 (1.40–4.42)	0.002
Planned pregnancy						
Yes	133 (79.6)	34 (20.4)	Ref		Ref	
No	99 (38.8)	156 (61.2)	6.16 (3.92–9.70)	<0.001	5.88 (3.52–9.81)	<0.001
Mode of delivery						
Vaginal	156 (51.8)	145 (49.1)	Ref		Ref	
Caesarean	76 (62.8)	45 (37.2)	0.64 (0.41–30.98)	0.041	1.01 (0.32–3.25)	0.983
Complications						
None	135 (51.1)	129 (48.9)	Ref		Ref	
Complication	97 (61.2)	61 (38.8)	0.66 (0.44–0.98)	0.041	0.63 (0.34–1.15)	0.132
Skin-to-skin contact						
Immediately	145 (51.1)	139 (49.9)	Ref		Ref	
First 24 h	45 (52.9)	40 (47.1)	0.93 (0.57–1.51)			
Never	42 (79.3)	11 (20.7)	0.27 (0.14–0.55)	<0.001	0.81 (0.25–2.68)	0.733
Baby's sex						
Male	122 (62.2)	72 (37.8)	Ref		Ref	
Female	110 (48.7)	116 (51.3)	1.74 (1.18–2.57)	0.005	1.82 (1.15–2.87)	0.010
Gestational age						
Full term	204 (56.2)	159 (43.8)	Ref		Ref	
Preterm	15 (60.0)	10 (40.0)	0.86 (0.37–1.95)			
Post term	13 (38.2)	21 (61.8)	2.07 (1.00–4.27)	0.048	2.49 (1.10–5.67)	0.028

Bold: statistically significant with $p < 0.05$.

4. Discussion

Impaired maternal–infant bonding has implications on the health and well-being of the mother and infant. This study determined the prevalence and factors associated with impaired maternal–infant bonding in a sample of 422 women in Uganda. The prevalence of impaired maternal–infant bonding was 45% and was more likely in first-time mothers, those with low or no education, mothers with an unplanned pregnancy, unmarried mothers, those who gave birth to a female infant, and those who delivered post term.

International studies have found a wide range in the prevalence of maternal–infant bonding disorders [2,11–15]. One study in Egypt found 4.2% of mothers experienced impaired bonding, which is significantly lower than this study [15]. Another study completed in India found bonding disorders in 24% of healthy postpartum mothers, yet found a similar rate of 45% in mothers with a psychiatric disorder [26]. A study in the United States found a comparatively lower rate (23%) of parent–infant bonding disorder in parents with post-traumatic stress disorder and depression [27].

The variation in prevalence of impaired maternal–infant bonding in the postpartum period could be due to the different measurement tools used to assess maternal–infant bonding disorders [28–30]. It may also be attributed to the different cut-off scores used across studies [14,18,26]. Finally, a diversity in setting, language, or culture could lead to differences [11,20,26].

The low-resource context of Uganda may have implications for impaired maternal–infant bonding. In Uganda, there are no established processes for screening mothers for bonding disorders with their babies. The current study identifies a high prevalence of maternal–infant

bonding disorders, which could cause long-term risks to the mother and child including impaired mental and cognitive development of the child. Hence, there is a need to integrate maternal–infant bonding assessment into routine antenatal and postnatal care.

Mothers with high social or economic strain may have a decreased ability to establish strong maternal–infant bonds. This strain may be exacerbated if the mother does not have social support. In this study, not being married or living with a partner was associated with impaired maternal–infant bonding. This may be due to single mothers having a larger burden of childrearing or societal stigma, impacting the bonding process. In Uganda, there is a taboo against sex outside of marriage. Furthermore, mothers might not have planned for the pregnancy or lacked support from the family to meet the costs of raising a child, which may impact attachment [31–33]. The findings are consistent with Figueiredo et al.'s study which found unmarried mothers had a worse emotional connection with their infants [34] and Joas and Mohler who found married women had improved maternal–infant bonding [35]. However, it contradicts findings from Lehnig et al. which noted that married women had a higher risk of developing bonding problems [36]. Two studies performed in Turkey have found no significant association between marital status and impaired maternal–infant bonding [7,37].

The study findings revealed that level of education was significantly associated with maternal–infant bonding. Mothers with primary or no education were 2 times more likely to develop bonding problems compared to those with higher levels of education. This is in agreement with studies carried out in Ethiopia that revealed that mothers with low or no education had poor bonding towards their babies [2]. The findings contradict other studies that showed that low education was significantly related to positive postnatal bonding [6,36,38,39]. Other studies have not shown a significant difference between level of education and impaired maternal infant bonding [7].

In this study, age had no significant association with impaired maternal–infant bonding. This does not reflect findings from two studies that found that young mothers may be more likely to have impaired bonding with their infant [37,40]. Conversely, other studies found that impaired maternal–infant bond was higher in older mothers [7,39]. In this study, employment status had no significant association with impaired maternal–infant bonding; this is contrary to studies conducted in Ethiopia and Saudi Arabia that showed mothers who were unemployed had poor bonding with their babies [2,41].

In this study, maternal factors such as parity and whether or not the pregnancy was planned had a significant association with impaired maternal–infant bonding. The results show that women who had unplanned pregnancy had almost 6 times greater odds of developing bonding problems with their babies than those who had planned to get pregnant. Nakano et al. note that unplanned pregnancy may create negative feelings towards the fetus during pregnancy which may extend to after birth [13]. This agrees with Rossen et al.'s work that found unplanned pregnancy was associated with impaired maternal–infant bonding [31]. On the other hand, women with planned pregnancies have more feelings of closeness and tenderness toward their fetuses in pregnancy; this has been reported to be predictor of higher bonding in the postpartum period [31,42,43]. The findings of this study are contrary to other studies that found no significant relationship between planned or unplanned pregnancy and maternal–infant bonding [15,44–46]. Tichelman et al. argued that there was no significant association between planned pregnancy and maternal–infant bonding and, thus, having an unplanned pregnancy would not prevent a mother from developing positive feelings towards her child [45].

Findings in this study indicate that first-time mothers were two times more likely to develop impaired bonding compared to mothers who had delivered two or more times. The transition to motherhood can be a stressful time given the new demands and responsibilities of parenting [24]. First-time mothers may be anxious and feel less confident about taking care of their babies [13,32]. This is in agreement with other studies that showed higher bonding impairment in first-time mothers than mothers who already had other children [13,24,44]. Similar to other studies, other maternal factors like mode of delivery,

antenatal attendance, birth complications, and skin-to-skin contact had no significant effect on maternal–infant bonding [2,45,47]. However, it should be noted that two previous studies showed that skin-to-skin contact between mother and baby enhances maternal–infant bonding [6,47].

The current results showed that there was a statistically significant relationship between impaired bonding and the sex of the baby. Mothers who gave birth to female infants had almost 2 times greater odds of developing bonding problems compared to those who gave birth to males. This agrees with a study carried out in Egypt where poor bonding was more prevalent in mothers who had females [15]. Conversely, a study performed in Saudi Arabia showed that poor bonding was more common in mothers who had male infants [44]; Daglar and Nur found no significant association between sex and maternal–infant bonding [7]. Our study indicates that mothers may have a preference for the sex of the child. This is consistent with findings from one study that noted there is a strong cultural preference in Uganda for male children [48]. It would be important for nurses and midwives to query mothers postnatally about their feelings about the sex of their infant. A mother who delivers a baby of the non-preferred sex should be offered counseling and support in developing bonds with their baby.

Findings in this study show that mothers who delivered post term babies were twice as likely to develop bonding problem compared to mothers who had term babies. Other infant factors like weight and feeding type were not significantly associated with impaired maternal–infant bonding in this study. This is consistent with other studies [40,44,49,50]. Conversely, a study completed in Ethiopia found a significant relationship between not breastfeeding and impaired maternal–infant bonding [2]. The postnatal period is a sensitive time and can impact the emotional bond between mothers and their infant [51]. Therefore, mothers should be assessed for bonding problems and supported in forming a good and healthy bond with their babies.

Strengths and Limitations

The strengths of this study include using the PBQ, a valid and reliable tool which showed an acceptable internal consistency in this study. The tool was available in two languages to allow for data collection from different patient demographics. The large sample size provided stronger and more reliable results with a small margin of error. The study will provide a baseline knowledge in informing policy in Uganda and for future studies.

Limitations of this study include the study design. The cross-sectional design does not allow participants to be followed up to determine if bonding scores changed over time. Additionally, participants may have felt pressure to answer based on social desirability. This bias was reduced by ensuring the anonymity and confidentiality of participants. Finally, the study was conducted in a large urban hospital; hence, generalizability may be limited.

5. Conclusions

Nurses and midwives in antenatal and postnatal care should include maternal–infant bonding within their client’s assessment and provide supportive mother-centered care. Nurses and midwives are encouraged to promote individual factors that enhance maternal–infant bonding and also give timely management to mothers found to be at risk for impaired maternal–infant bonding. Guidelines and interventions to improve maternal–infant bonding should be created and implemented in clinical practice. This will require additional research and investment in understanding intervention best practices. However, given the findings of this study, screening at-risk mothers for impaired bonding could be a way to identify and provide support to new parents.

The findings of this study highlight the importance of maternal–infant bonding. Incorporating the routine assessment of maternal–infant bonding during the antenatal and postnatal period may enable early identification of mothers at risk of bonding problems.

Healthcare workers should be trained on proper assessment and treatment to ensure timely management to support the mother–infant bond.

Replication of the same study in different regions of Uganda, both in rural and urban areas, to compare and validate the present study findings is recommended. Future research should consider the association between postnatal depression and anxiety and maternal–infant bonding, and longitudinal studies to assess the long-term impact of impaired maternal–infant bonding.

Author Contributions: Conceptualization, P.T., T.D.N. and J.N.O.; methodology, P.T. and T.D.N.; software, T.D.N.; validation, P.T., T.D.N., J.N.O. and M.A.S.; formal analysis, P.T., T.D.N. and M.A.S.; investigation, P.T., T.D.N. and J.N.O.; resources, P.T.; data curation, P.T.; writing—original draft preparation, M.A.S.; writing—review and editing, M.A.S., P.T. and T.D.N.; visualization, T.D.N. and M.A.S.; supervision, T.D.N., J.N.O., and M.A.S.; project administration, P.T.; funding acquisition, P.T. All authors have read and agreed to the published version of the manuscript.

Funding: This research was supported by the Fogarty International Center of the National Institutes of Health under award number 1R25TW011213. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki, and approved by the Institutional Review Board, School of Health Science Research and Ethics Committee (MAKSHSREC-2022-280).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data are available upon request to the corresponding author.

Acknowledgments: We gratefully acknowledge the clinicians and staff at the Kawempe Young Child Clinic who supported the recruitment efforts for this study.

Conflicts of Interest: The authors declare no conflicts of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript; or in the decision to publish the results.

References

1. Klaus, M.H.; Kennell, J.H. *Maternal-Infant Bonding: The Impact of Early Separation or Loss on Family Development*; Mosby: St. Louis, MO, USA, 1976; 260p.
2. Hailemeskel, H.S.; Kebede, A.B.; Fetene, M.T.; Dagnaw, F.T. Mother-Infant Bonding and Its Associated Factors Among Mothers in the Postpartum Period, Northwest Ethiopia, 2021. *Front. Psychiatry* **2022**, *13*, 893505. [[CrossRef](#)] [[PubMed](#)]
3. Hill, R.; Flanagan, J. The Maternal–Infant Bond: Clarifying the Concept. *Int. J. Nurs. Knowl.* **2020**, *31*, 14–18. [[CrossRef](#)] [[PubMed](#)]
4. Bicking Kinsey, C.; Hupcey, J.E. State of the science of maternal–infant bonding: A principle-based concept analysis. *Midwifery* **2013**, *29*, 1314–1320. [[CrossRef](#)]
5. Petri, E.; Palagini, L.; Bacci, O.; Borri, C.; Teristi, V.; Corezzi, C.; Faraoni, S.; Antonelli, P.; Cargioli, C.; Banti, S.; et al. Maternal–foetal attachment independently predicts the quality of maternal–infant bonding and post-partum psychopathology. *J. Matern.-Fetal Neonatal Med.* **2018**, *31*, 3153–3159. [[CrossRef](#)]
6. Mazúchová, L.; Kelčíková, S.; Maskalová, E.; Malinovská, N.; Grendár, M. Mother-infant bonding and its associated factors during postpartum period. *Kontakt* **2021**, *23*, 126–132. [[CrossRef](#)]
7. Daglar, G.; Nur, N. Level of mother-baby bonding and influencing factors during pregnancy and postpartum period. *Psychiatr. Danub.* **2018**, *30*, 433–440. [[CrossRef](#)]
8. Planalp, E.M.; Braungart-Rieker, J.M. Trajectories of Regulatory Behaviors in Early Infancy: Determinants of Infant Self-Distracton and Self-Comforting. *Infancy* **2015**, *20*, 129–159. [[CrossRef](#)]
9. Johnson, K. Maternal-Infant Bonding: A Review of Literature. *Int. J. Childbirth Educ.* **2013**, *28*. [Internet]. Available online: <https://go.gale.com/ps/i.do?id=GALE%7CA344155224&sid=googleScholar&v=2.1&it=r&linkaccess=abs&issn=08878625&p=AONE&sw=w&userGroupName=anon~6e8f4fc4&aty=open-web-entry> (accessed on 21 July 2022).
10. Galeshi, M.; Mirghafourvand, M.; Alizadeh-Sharajabad, F.; Sanaati, F. Predictors of Mother-Child Bonding. *Hayat* **2016**, *22*, 13–26.
11. Garcia-Esteve, L.; Torres, A.; Lasheras, G.; Palacios-Hernández, B.; Farré-Sender, B.; Subirà, S.; Valdés, M.; Brockington, I.F. Assessment of psychometric properties of the Postpartum Bonding Questionnaire (PBQ) in Spanish mothers. *Arch. Women's Ment. Health* **2016**, *19*, 385–394. [[CrossRef](#)]
12. Chandra, P.; Desai, G.; Reddy, D.; Thippeswamy, H.; Saraf, G. The establishment of a mother-baby inpatient psychiatry unit in India: Adaptation of a Western model to meet local cultural and resource needs. *Indian J. Psychiatry* **2015**, *57*, 290–294. [[CrossRef](#)] [[PubMed](#)]

13. Nakano, M.; Upadhyaya, S.; Chudal, R.; Skokauskas, N.; Luntamo, T.; Sourander, A.; Kaneko, H. Risk factors for impaired maternal bonding when infants are 3 months old: A longitudinal population based study from Japan. *BMC Psychiatry* **2019**, *19*, 87. [[CrossRef](#)] [[PubMed](#)]
14. Torres-Giménez, A.; Roca-Lecumberri, A.; Sureda, B.; Andrés-Perpiña, S.; Palacios-Hernández, B.; Gelabert, E.; Farré-Sender, B.; Subirà-Álvarez, S.; García-Esteve, L. External Validation and Test-Retest Reliability of Postpartum Bonding Questionnaire in Spanish Mothers. *Span. J. Psychol.* **2021**, *24*, e47. [[CrossRef](#)] [[PubMed](#)]
15. Elwadood, A.M.M.A.; Rizk, S.A.; Hafez, S.K.M. Factors Associated With Postpartum Maternal Infant-Bonding. *Int. J. Nov. Res. Healthc. Nurs.* **2020**, *7*, 318–336.
16. Frerichs, R.R. Rapid Surveys [Internet]. 2008. Available online: https://www.ph.ucla.edu/epi/rapidsurveys/RScourse/RSbook_ch3.pdf (accessed on 5 August 2022).
17. Kish, L. *Survey Sampling*; John Wiley and Sons, Inc.: New York, NY, USA, 1965.
18. Brockington, I.F.; Fraser, C.; Wilson, D. The Postpartum Bonding Questionnaire: A validation. *Arch. Women's Ment. Health* **2006**, *9*, 233–242. [[CrossRef](#)] [[PubMed](#)]
19. Van Bussel, J.C.H.; Spitz, B.; Demyttenaere, K. Three self-report questionnaires of the early mother-to-infant bond: Reliability and validity of the Dutch version of the MPAS, PBQ and MIBS. *Arch. Women's Ment. Health* **2010**, *13*, 373–384. [[CrossRef](#)] [[PubMed](#)]
20. Kaneko, H.; Honjo, S. The Psychometric Properties and Factor Structure of the Postpartum Bonding Questionnaire in Japanese Mothers. *Psychology* **2014**, *05*, 1135–1142. [[CrossRef](#)]
21. Ohashi, Y.; Kitamura, T.; Sakanashi, K.; Tanaka, T. Postpartum Bonding Disorder: Factor Structure, Validity, Reliability and a Model Comparison of the Postnatal Bonding Questionnaire in Japanese Mothers of Infants. *Healthcare* **2016**, *4*, 50. [[CrossRef](#)]
22. Reck, C.; Klier, C.M.; Pabst, K.; Stehle, E.; Steffenelli, U.; Struben, K.; Backenstrass, M. The German version of the Postpartum Bonding Instrument: Psychometric properties and association with postpartum depression. *Arch. Women's Ment. Health* **2006**, *9*, 265–271. [[CrossRef](#)] [[PubMed](#)]
23. Siu, B.W.M.; Ip, P.; Chow, H.M.T.; Kwok, S.S.P.; Li, O.L.; Koo, M.L.; Cheung, E.F.C.; Yeung, T.M.H.; Hung, S.F. Impairment of Mother-Infant Relationship: Validation of the Chinese Version of Postpartum Bonding Questionnaire. *J. Nerv. Ment. Dis.* **2010**, *198*, 174–179. [[CrossRef](#)] [[PubMed](#)]
24. Suetsugu, Y.; Honjo, S.; Ikeda, M.; Kamibeppu, K. The Japanese version of the Postpartum Bonding Questionnaire: Examination of the reliability, validity, and scale structure. *J. Psychosom. Res.* **2015**, *79*, 55–61. [[CrossRef](#)] [[PubMed](#)]
25. Thekrallah, F.; AlRyalat, S.A.; Qatawneh, A.; AlQadri, E.; Melhem, D. Assessment of Psychometric Properties of the Postpartum Bonding Questionnaire (PBQ) in Jordanian Mothers. *Res. Health Sci.* **2019**, *4*, 221. [[CrossRef](#)]
26. Vengadavaradan, A.; Bharadwaj, B.; Sathyanarayanan, G.; Durairaj, J. Frequency and correlates of mother-infant bonding disorders among postpartum women in India. *Asian J. Psychiatry* **2019**, *44*, 72–79. [[CrossRef](#)] [[PubMed](#)]
27. Parfitt, Y.M.; Ayers, S. The effect of post-natal symptoms of post-traumatic stress and depression on the couple's relationship and parent-baby bond. *J. Reprod. Infant Psychol.* **2009**, *27*, 127–142. [[CrossRef](#)]
28. Brockington, I.F.; Oates, J.; George, S.; Turner, D.; Vostanis, P.; Sullivan, M.; Loh, C.; Murdoch, C. A Screening Questionnaire for mother-infant bonding disorders. *Arch. Women's Ment. Health* **2001**, *3*, 133–140. [[CrossRef](#)]
29. Condon, J.T.; Corkindale, C.J. The assessment of parent-to-infant attachment: Development of a self-report questionnaire instrument. *J. Reprod. Infant Psychol.* **1998**, *16*, 57–76. [[CrossRef](#)]
30. Taylor, A.; Atkins, R.; Kumar, R.; Adams, D.; Glover, V. A new Mother-to-Infant Bonding Scale: Links with early maternal mood. *Arch. Women's Ment. Health* **2005**, *8*, 45–51. [[CrossRef](#)]
31. Rossen, L.; Hutchinson, D.; Wilson, J.; Burns, L.; AOlsson, C.; Allsop, S.; Elliott, E.J.; Jacobs, S.; Macdonald, J.A.; Mattick, R.P. Predictors of postnatal mother-infant bonding: The role of antenatal bonding, maternal substance use and mental health. *Arch. Women's Ment. Health* **2016**, *19*, 609–622. [[CrossRef](#)]
32. Kim, S.; Bang, K.S.; Jeong, Y.; Lee, G.; Shin, D.A.; Kim, M. The experience of unmarried mothers raising their children in residential facilities: A phenomenological qualitative study. *BMC Women's Health* **2022**, *22*, 274. [[CrossRef](#)]
33. Uganda Bureau of Statistics and ICF International. *Uganda Demographic and Health Survey 2011* [Internet]; Kampala, Uganda, 2012. Available online: <https://dhsprogram.com/pubs/pdf/fr264/fr264.pdf> (accessed on 12 September 2023).
34. Figueiredo, B.; Costa, R.; Pacheco, A.; Pais, Á. Mother-to-Infant Emotional Involvement at Birth. *Matern. Child Health J.* **2009**, *13*, 539–549. [[CrossRef](#)]
35. Joas, J.; Möhler, E. Maternal Bonding in Early Infancy Predicts Childrens' Social Competences in Preschool Age. *Front. Psychiatry* **2021**, *19*, 687535. [[CrossRef](#)] [[PubMed](#)]
36. Lehnig, F.; Nagl, M.; Stepan, H.; Wagner, B.; Kersting, A. Associations of postpartum mother-infant bonding with maternal childhood maltreatment and postpartum mental health: A cross-sectional study. *BMC Pregnancy Childbirth* **2019**, *19*, 278. [[CrossRef](#)] [[PubMed](#)]
37. Korukcu, O. Identification of Factors Affecting Mother-Infant Bonding in Advanced Maternal Age. *LOJNHC* **2018**, *1*. [Internet]. Available online: <http://www.lupinepublishers.com/nursing-journal/fulltext/identification-of-factors-affecting-mother-infant-bonding-in-advanced-maternal-age.ID.000102.php> (accessed on 21 March 2024). [[CrossRef](#)]
38. Dubber, S.; Reck, C.; Müller, M.; Gawlik, S. Postpartum bonding: The role of perinatal depression, anxiety and maternal-fetal bonding during pregnancy. *Arch. Women's Ment. Health* **2015**, *18*, 187–195. [[CrossRef](#)] [[PubMed](#)]

39. Kinsey, C.B.; Baptiste-Roberts, K.; Zhu, J.; Kjerulff, K.H. Birth-related, psychosocial, and emotional correlates of positive maternal-infant bonding in a cohort of first-time mothers. *Midwifery* **2014**, *30*, e188–e194. [[CrossRef](#)] [[PubMed](#)]
40. Bieleninik, L.; Lutkiewicz, K.; Cieślak, M.; Preis-Orlikowska, J.; Bidzan, M. Associations of Maternal-Infant Bonding with Maternal Mental Health, Infant's Characteristics and Socio-Demographical Variables in the Early Postpartum Period: A Cross-Sectional Study. *Int. J. Environ. Res. Public Health* **2021**, *18*, 8517. [[CrossRef](#)] [[PubMed](#)]
41. Gosadi, I.M.; Daghreeri, H.H.; Madkhali, J.M.; Mokhasha, A.I.; Athwani, Z.A.; Ageeli, M.H.; Bahri, A.A.; Gosadi, G.M. Factors Associated with Mothers' Care of Their Newborns in Saudi Arabia. *Ann. Glob. Health* **2019**, *85*, 105. [[CrossRef](#)] [[PubMed](#)]
42. Brockington, I. Maternal rejection of the young child: Present status of the clinical syndrome. *Psychopathology* **2011**, *44*, 329–336. [[CrossRef](#)]
43. Darvishvand, M.; Khalesi, Z.B.; Rahebi, S.M. Mother-infant relationship and its Predictors. *JBRA Assist. Reprod.* **2022**, *26*, 68–72. [[CrossRef](#)] [[PubMed](#)]
44. Abbas, S.; Turkistani, M.; Al-Gamdi, A.; Alzahrani, S.; Alzahrani, A.; Helmy, F. Factors associated with postnatally maternal-infant attachment in taif, Saudi Arabia. *Saudi J. Health Sci.* **2018**, *7*, 127.
45. Tichelman, E.; Westerneng, M.; Witteveen, A.B.; Van Baar, A.L.; Van Der Horst, H.E.; De Jonge, A.; Berger, M.Y.; Schellevis, F.G.; Burger, H.; Peters, L.L. Correlates of prenatal and postnatal mother-to-infant bonding quality: A systematic review. *PLoS ONE* **2019**, *14*, e0222998. [[CrossRef](#)]
46. Yarcheski, A.; Mahon, N.E.; Yarcheski, T.J.; Hanks, M.M.; Cannella, B.L. A meta-analytic study of predictors of maternal-fetal attachment. *Int. J. Nurs. Stud.* **2009**, *46*, 708–715. [[CrossRef](#)]
47. Phillips, R. The Sacred Hour: Uninterrupted Skin-to-Skin Contact Immediately After Birth. *Newborn Infant Nurs. Rev.* **2013**, *13*, 67–72. [[CrossRef](#)]
48. Mubuuke, A.G. An exploratory study of the views of Ugandan women and health practitioners on the use of sonography to establish fetal sex. *Pan Afr. Med. J.* **2011**, *9*, 36.
49. Delavari, M.; Mohammad-Alizadeh-Charandabi, S.; Mirghafurvand, M. The relationship between maternal-fetal attachment and maternal self-efficacy in Iranian women: A prospective study. *J. Reprod. Infant Psychol.* **2018**, *36*, 302–311. [[CrossRef](#)]
50. Hairston, I.S.; Handelzalts, J.E.; Lehman-Inbar, T.; Kovo, M. Mother-infant bonding is not associated with feeding type: A community study sample. *BMC Pregnancy Childbirth* **2019**, *19*, 125. [[CrossRef](#)] [[PubMed](#)]
51. Widström, A.M.; Brimdyr, K.; Svensson, K.; Cadwell, K.; Nissen, E. Skin-to-skin contact the first hour after birth, underlying implications and clinical practice. *Acta Paediatr.* **2019**, *108*, 1192–1204. [[CrossRef](#)] [[PubMed](#)]

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.