

Effects of Timing of Birth and Pandemic-Related Experiences on Mother-Infant Bonding During the COVID-19 Pandemic

Sharon Ettinger^{1,4}, Margaret H. Kyle², Morgan Firestein³, Maha Hussain², Jennifer Barbosa³, Vanessa Babineau¹, Dani Dumitriu^{2,3}, Catherine Monk^{1,3}

¹Department of Obstetrics and Gynecology Research, Columbia University Vagelos College of Physicians and Surgeons, New York, NY; ²Department of Pediatrics, Columbia University Vagelos College of Physicians and Surgeons and New York-Presbyterian, New York, NY; ³Department of Psychiatry, Columbia University Vagelos College of Physicians and Surgeons, New York, NY; ⁴Department of Psychological and Brain Sciences, Drexel University, Philadelphia, PA

Introduction

- Maternal stress and postpartum bonding difficulties were elevated during the first year of the COVID-19 pandemic^{1,2,3,4}.
- However, less is known about the psychological risks for mother-infant dyads who gave birth later in the pandemic.
- The current study aims to examine whether (1) timing of birth (TOB) during the COVID-19 pandemic predicted maternal-reported postpartum bonding difficulties at 4 months postpartum, (2) maternal postpartum stress mediated this effect, and (3) prenatal pandemic-related experiences mediated the effect between TOB and postpartum bonding difficulties.

Hypotheses

- Timing of birth during the pandemic will negatively predict postpartum bonding scores such that later birth predicts lower scores of bonding difficulties at 4 months postpartum.
- Maternal perceived stress at 4 months postpartum will significantly mediate the association between timing of birth and postpartum bonding scores.
- Pandemic-related experiences during pregnancy (ex. Uncertainty about the future, social disruptions) will significantly mediate the association between timing of birth and postpartum bonding.

Funding

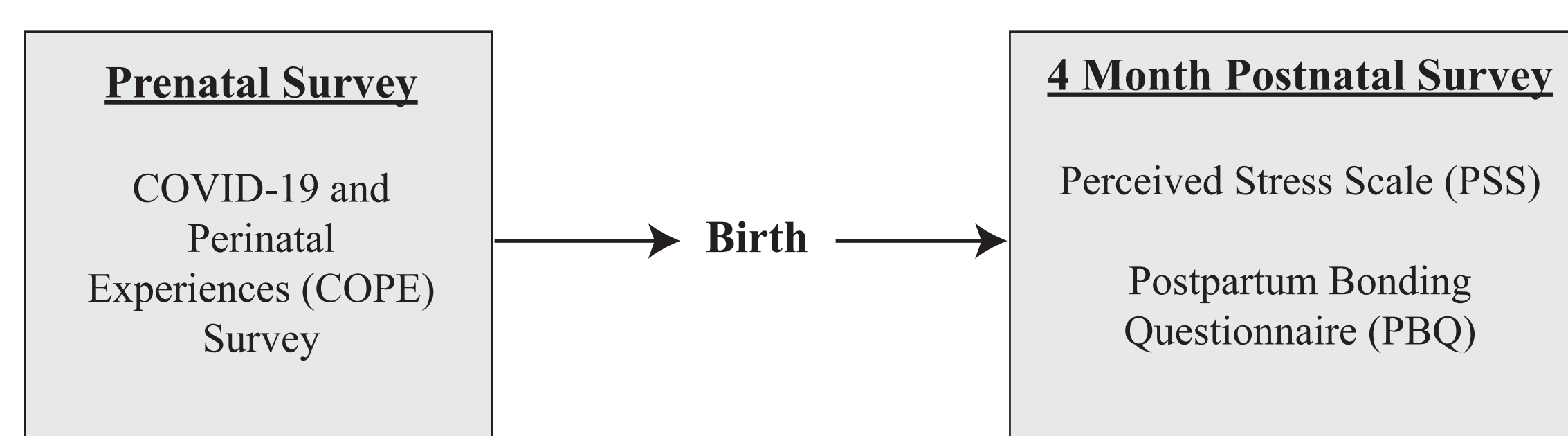
This study was supported by NIMH grant R01 MH126531, awarded to Drs. Dani Dumitriu, Catherine Monk, and Rachel Marsh.



Methods

- $N = 114$ mother-infant dyads who gave birth between June 2020 through October 2021 completed prenatal and 4-month postnatal surveys as part of the COVID-19 Mother Baby Outcomes (COMBO)⁵ Initiative at Columbia University.
- The prenatal survey included an adapted version of the COVID-19 Perinatal Experiences (COPE)⁶ survey to assess prenatal pandemic-related experiences.
- The 4-month survey consisted of the Perceived Stress Scale (PSS)⁷ and the Postpartum Bonding Questionnaire (PBQ)⁸ to measure maternal stress and maternal-reported bonding difficulties, respectively.

Figure 1. Timeline of COMBO Data Collection



- Timing of birth (TOB) was coded by birth month and year on a scale from 1-17, with 1 corresponding to the earliest month, June 2020. Maternal age, ethnicity, race, and medical coverage, and baby biological sex were pulled from medical records and included as covariates.
- All statistical analyses were conducted in SPSSv28. Mediation analyses were conducted with SPSS Processing v4.0 by Andrew F. Hayes.
- Note: Bonding scores were based on the general impairment subscale of the PBQ.

Results

Figure 2. Adjusted Regression Analysis Summary for Predicting General Postpartum Bonding Impairment

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.431 ^a	.185	.140	3.256

a. Predictors: (Constant), MomAge, Baby_Sex_recod, DOB_mon, Mom_Race, Mom_Ethn, Med_Cov

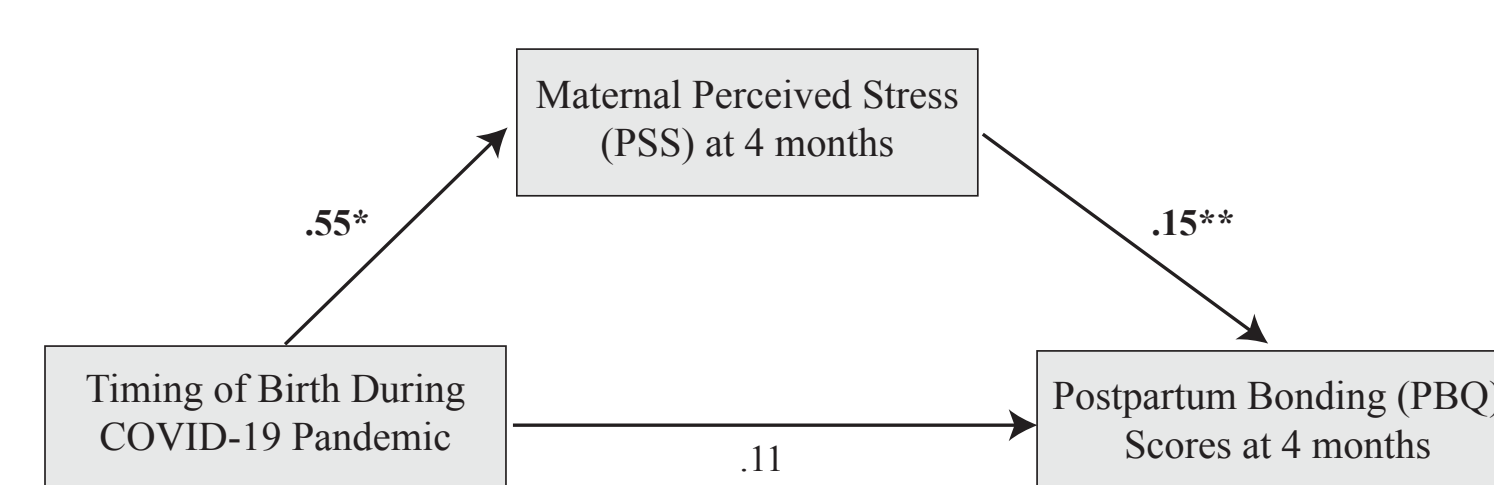
ANOVA ^a								
Model	Regression	Residual	Total	Sum of Squares	df	Mean Square	F	Sig.
1				256.210	6	43.035	4.060	.001 ^b
				1134.070	107	10.599		
				1392.281	113			

a. Dependent Variable: pbqMPB
b. Predictors: (Constant), MomAge, Baby_Sex_recod, DOB_mon, Mom_Race, Mom_Ethn, Med_Cov

Coefficients ^a							
Model		Unstandardized Coefficients		Standardized Coefficients		t	Sig.
		B	Std. Error	Beta	t		
1	(Constant)	2.209	2.332			.948	.345
	DOB_mon	-.186	.091	-.197	2.055	.042	
	Baby_Sex_recod	-.561	.618	-.080	-.909	.365	
	Mom_Ethn	-.948	.891	-.133	-1.064	.290	
	Mom_Race	.176	.290	.068	.608	.544	
	Med_Cov	1.648	.986	.230	1.671	.098	
	MomAge	-.009	.066	-.014	-.136	.892	

a. Dependent Variable: pbqMPB

Figure 3. Significant Mediation Model for PSS in Effect of Timing of Birth on Postpartum Bonding



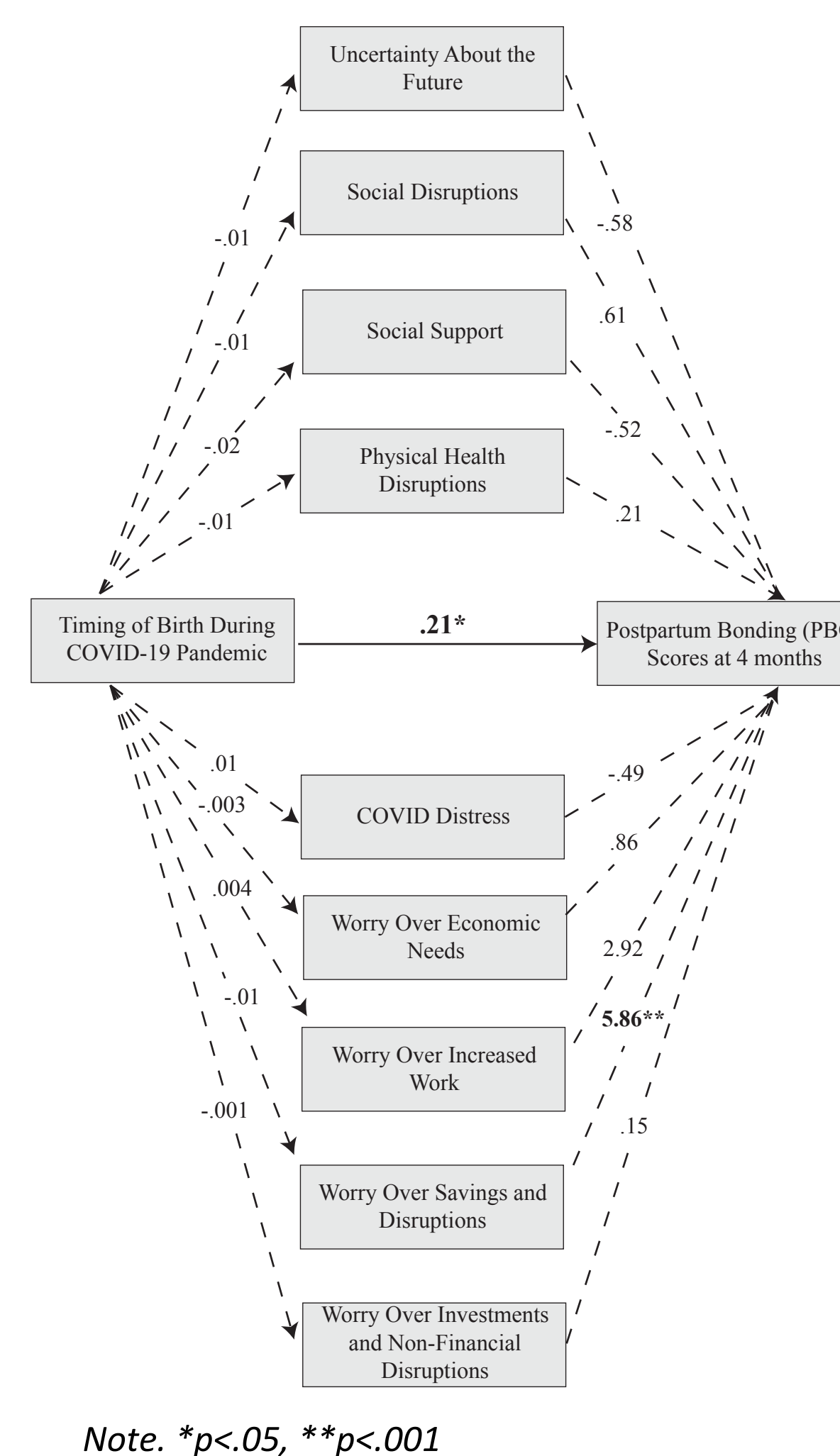
Note. * $p < .05$, ** $p < .001$

- In an adjusted linear regression, TOB significantly positively predicted PBQ at 4 months ($\beta = .20, p = .04$) such that later birth predicted slightly higher bonding difficulty scores (Figure 2).
- The effect of TOB on postpartum bonding difficulty was significantly mediated by perceived stress at 4 months postpartum, $b = .08, 95\%BCa CI[0.01, 0.16]$ (Figure 3).
- No pandemic-related experiences captured by the COPE subscales mediated the relationship between timing of birth and postpartum bonding at 4 months (Figure 4).

Table 1. Sample Characteristics ($N = 114$)

	n	M (SD) or %
Maternal Age (years)		32.44 (5.58)
Infant Sex		
Female	49	43.0%
Male	65	57.0%
Medical Coverage		
Commercial	69	60.5%
Medicaid	45	39.5%
Maternal Ethnicity		
Not Hispanic or Latina or Spanish Origin	67	58.8%
Hispanic or Latina or Spanish Origin	47	41.2%
Maternal Race		
White	56	50.0%
Black or African American	15	13.2%
Asian	7	6.1%
American Indian or Alaska Nation	1	0.9%
Other Combinations Not Described	34	29.8%

Figure 4. Mediation Results for Pandemic-Related Experiences (COPE Subscales)



Note. * $p < .05$, ** $p < .001$

Discussion

- Findings partially supported Hypothesis 1. TOB significantly predicted bonding at 4 months postpartum, but later birth predicted higher, rather than lower, bonding difficulty scores.
- Women who gave birth later in the pandemic may have been at higher risk for postpartum bonding difficulties and subsequent adverse developmental outcomes for the mother-infant dyad.
- Although maternal stress emerged as a significant mediator (Hypothesis 2), this effect could not be explained by prenatal pandemic-related experiences (Hypothesis 3).
- Further research is needed to discern whether birth during the pandemic conferred risk for bonding difficulties through specific pandemic-related stressors or through a general effect of pandemic fatigue or burnout on maternal mental health.
- These findings highlight the need for increased support for maternal mental health and the mother-infant relationship during the residual waves of the COVID-19 pandemic.

References

- Fernandes, D. V., Canavarro, M. C., & Moreira, H. (2021a). Postpartum during COVID-19 pandemic: Portuguese mothers' mental health, mindful parenting, and mother-infant bonding. *Journal of Clinical Psychology, 77*(9), 1997-2010. <https://doi.org/10.1002/jclp.23130>
- Fernandes, D. V., Canavarro, M. C., & Moreira, H. (2021b). The role of mothers' self-compassion on mother-infant bonding during the COVID-19 pandemic: A longitudinal study exploring the mediating role of mindful parenting and parenting stress in the postpartum period. *Infant Mental Health Journal, 42*(5), 621-635. <https://doi.org/10.1002/imhj.21942>
- Iyengar, U., Jaiprakash, B., Haitsuka, H., & Kim, S. (2021). One Year Into the Pandemic: A Systematic Review of Perinatal Mental Health Outcomes During COVID-19. *Front Psychiatry, 12*, 674194. <https://doi.org/10.3389/fpsyt.2021.674194>
- Kornfield, S. L., White, L. K., Waller, R., Njoroge, W., Barzilay, R., Chaiyachati, B. H., Himes, M. M., Rodriguez, Y., Riis, V., Simonette, K., Elovitz, M. A., & Gur, R. E. (2021, Oct). Risk And Resilience Factors Influencing Postpartum Depression And Mother-Infant Bonding During COVID-19. *Health Affairs (Millwood), 40*(10), 1566-1574. <https://doi.org/10.1377/hlthaff.2021.00803>
- Columbia University. COVID-19 Mother Baby Outcomes Study. <https://www.ps.columbia.edu/COMBO>
- Thomason, M. E., Graham, A., VanTieghem, M.R. (2020). The COPE-IS: Coronavirus Perinatal Experiences - Impact Survey.
- Lee, E.-H. (2012, 2012/12/01). Review of the Psychometric Evidence of the Perceived Stress Scale. *Asian Nursing Research, 6*(4), 121-127. <https://doi.org/10.1016/j.anr.2012.08.004>
- Brockington, I. F., Fraser, C., & Wilson, D. (2006, Sep). The Postpartum Bonding Questionnaire: a validation. *Archives of Womens Mental Health, 9*(5), 233-242. <https://doi.org/10.1007/s00737-006-0132-1>