COVID-19 Pandemic-Related Perceived Loneliness as a Potential Risk Factor for Worse Outcomes Among People Who are Pregnant or Postpartum

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ABSTRACT

Introduction: People in the perinatal period may be especially susceptible to the effects of social isolation and loneliness. We assessed the COVID-19 pandemic-related impact on loneliness and other outcomes in this population.

Methods: A cross-sectional anonymous survey was completed during August–November, 2020, and January–April, 2021, by people who were pregnant or postpartum in Pennsylvania and Wisconsin, respectively. Wilcoxon rank sum, Fisher exact, or chi-square tests were used to compare mental health, substance use, pregnancy-related and overall health, pandemic's life impact, and social status metrics between 2 groups of respondents: those who screened positive ("Lonely") versus negative ("Not Lonely") for loneliness. Multivariate logistic regression analysis assessed factors associated with Lonely versus Not Lonely status.

Results: Among 613 respondents, 48.8% were categorized as Lonely. Lonely individuals were more likely to be postpartum ($P = 0.01$); nulliparous ($P = 0.04$); have more pregnancy complications ($P = 0.049$); have a diagnosed mood disorder ($P < 0.001$); receive mental health care ($P < 0.001$); have elevated depression ($P < 0.001$), anxiety ($P < 0.001$), and stress ($P < 0.001$) scores; rate their social status as lower ($P < 0.001$); and endorse a worse pandemic-life impact ($P < 0.001$). A multivariate analysis identified that being postpartum (OR 0.59; 95% CI, 0.40-0.87) and having worse depression (OR 1.24; 95% CI, 1.13-1.36), stress (OR 0.41; 95% CI, 0.28-0.60), perceived social status (OR 0.83; 95% CI, 0.73-0.95), and pandemic-life impact (OR 1.79; 95% CI, 1.11-2.93) were associated with the Lonely status.

Conclusions: Early during the COVID-19 pandemic, screening positive for loneliness was associated with a worse biopsychosocial profile and more pregnancy complications among people in the perinatal period. Focusing efforts on preventing loneliness may help improve outcomes critical for maternal-fetal and child health.

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INTRODUCTION

Evidence from recent systematic reviews[1,2] documents the unique impact of the coronavirus disease-2019 (COVID-19) pandemic on people who are pregnant or postpartum. For example, nonessential health care services were altered, suspended, or, in some cases, canceled in an attempt to curb the spread of COVID-19 – especially among subgroups at higher risk for adverse outcomes, such as pregnant people and infants.[3] Medical professionals recommended telehealth for routine prenatal visits, postponement of nonurgent ultrasound appointments, cancellation of hospital tours, and limited access for spouses and other support persons to join patients during clinical visits, including births.[4] Although these efforts were necessary at the time to reduce morbidity and mortality, they also increased stress, anxiety, social isolation, and loneliness,[5,6] particularly among people who were pregnant or postpartum and their families.

Loneliness is a critical public health issue.[7] The detrimental effects of social isolation (ie, an objective lack of interaction with others) and loneliness (ie, the subjective feeling of the absence of a social network or companionship)[8] are well documented as having widespread prevalence.[7] These related yet distinct concepts have been associated with impaired immune responses, increased cortisol release, and

cardiovascular and overall mortality and morbidity and were further exacerbated by the COVID-19 pandemic, as underscored by the US Surgeon General's 2023 Advisory report.[7,8] Changes in family and personal health, responsibilities, lifestyle, and daily activities could make pregnancy and postpartum periods more vulnerable to the effects of social isolation and loneliness and their sequelae.[9] A systematic review by Isaacs et al found that people with high-risk pregnancies or birth complications were at increased risk for loneliness, isolation, fear, guilt, shock, grief, frustration, sadness, and anger, as well as posttraumatic stress disorder (PTSD) and depression.[10]

Overall, prepandemic research on loneliness during pregnancy and postpartum noted associations between loneliness and preterm delivery, low birthweight, and postpartum depression.[8] Studies on the COVID-19-related maternal health also suggested a negative correlation between pandemic-related stress and postpartum mental health.[11] While the growing body of evidence has examined the negative health effects of the COVID-19 pandemic in general, scant research has focused on people who are pregnant or postpartum and residing in both urban and rural communities in geographically different locations of the United States who may be at elevated risk for loneliness and its effects.

Therefore, the goal of this cross-sectional survey study was to explore the impact of pandemic-related restrictions on perceived loneliness and other health determinants and outcomes, including self-reported pregnancy complications, early during the COVID-19 pandemic when the social distancing and isolation had been most enforced. Understanding these factors can provide important insight for better supporting vulnerable perinatal people during future times of crisis in an effort to promote improved maternal and child health outcomes.

MATERIALS AND METHODS

Study methods are detailed elsewhere[11] and briefly summarized below.

Design

Adult pregnant and postpartum patients of 2 large academic health systems were invited to an participate in an online, anonymous, single-time survey inquiring about COVID-19 pandemic-related health and experiences. The survey was administered by 2 separate study sites serving a blend of urban and rural communities, one in south-central Pennsylvania (August 4–November 24, 2020) and another in south-central Wisconsin (January 15–April 15, 2021). Deidentified data from both sites were merged for analyses. The study procedures were approved by each site's Institutional Review Board.

Population

Potentially eligible individuals were identified via an electronic health record (EHR). Inclusion criteria were as follows: adult (18 years or older) patients from the participating health systems, able to read or speak English, and reporting current pregnancy or birth within the prior 6 months. Potential participants were excluded if they had a recent diagnosis of miscarriage or stillbirth.

Across both study sites, invitation letters were sent to a total of 7220 people (4409 in the first and 2811 in the second mailings). In this group, 700 individuals accessed the online survey (9.6% response rate), of which 694 were eligible and 660 (95% of eligible individuals) consented to participate in the survey. The final sample, used for the present analysis, consisted of 613 respondents (200 from Pennsylvania, 413 from Wisconsin; 92.3% of eligible participants) who completed the loneliness-focused study measures.

Survey

The study survey was drawn from prior research[12] and was designed to assess several domains: (1) health and health behaviors; (2) pregnancy and, if relevant, birth and postpartum experiences and outcomes; (3) coping, adjustment, loneliness, emotions, and feelings; (4) social support; (5) economic stability and access to and need for specific resources; (6) the impact of COVID-19 pandemic on health, health behaviors, and life events; and (7) demographic information. The measures were obtained via REDCap, a secure online research electronic data capture platform. The survey included algorithms to identify people in need of resources based on their positive screen for financial insecurity, domestic violence, depressive and anxiety symptoms, substance misuse, or inadequate health care access. The algorithm triggered the provision of "handouts" with relevant resources to those with a positive screen; the full list of all resources also was available to all interested participants.

Measures

The data for the present analysis included perceived loneliness, mental health, substance use, pregnancy-related and overall health, pandemic's life impact, social status, and demographics (eg, age, race, ethnicity, education, marital status).

Perceived loneliness, the primary outcome measure, was assessed by the UCLA 3-Item Loneliness Scale,[13] a tool validated across different populations.[14] This scale consists of 3 questions, with 1-3 Likert scale responses (1 = hardly ever, 3 = often) that yield a summary score ranging from 3 (least lonely) to 9 (most lonely); a score ≥ 6 is considered a "positive screen" for loneliness and a risk factor for worse health/well-being.[15] The Loneliness Scale's total score served as a basis for categorizing the study sample into 2 groups: Not Lonely (score <6) versus Lonely (score ≥ 6).

Mental health components were evaluated in several ways. Perceived stress was assessed by asking a single question: "What is your overall level of stress related to the COVID-19 pandemic?", with Likert scale-based responses from 1 (no stress) to 7 (extreme stress). Depressive and anxiety symptom severity were measured by the validated Edinburgh Postnatal Depression Scale (EPDS),[16]

which uses Likert scale-based responses from 0 (no, not at all) to 3 (yes, all of the time). The EPDS total score measures the severity of depressive symptoms and ranges from 0 to 30; the total score >12 constitutes a positive screen for depressive symptoms. The EPDS questions 3 through 5 comprise the anxiety subscale, with a score >5 constituting a positive screen for anxiety.[16] One question asked about the presence (yes/no) of chronic mental health conditions (mood, anxiety, or other mental health disorders), and another asked about current receipt (yes/no) of treatment for mental health disorders.

Substance use was assessed with several questions about the use of drugs in the last 3 months. For this analysis, we compiled the answers to 4 separate questions asking about the following substances (yes/no): (1) "smoked cigarettes," (2) "used e-cigarettes or vaped," (3) "excessively drinking alcohol," or (4) "regularly using other drugs." With this approach, if a participant answered "yes" to any of these 4 questions, the response was marked as "yes," and if they answered "no" to all the questions, they were marked as answering "no" to substance use.

General Health was assessed by asking about the presence ("check all that apply") of chronic conditions identified as risk factors for COVID-19 complications. The chronic medical conditions included chronic lung disease, moderate-to-severe asthma, heart condition, obesity with body mass index >40 kg/m^2, diabetes, chronic kidney disease on dialysis, liver disease, and immunocompromised status. Therefore, the number of chronic medical conditions per responder could range from zero to 8. The chronic mental health conditions included mood, anxiety, or other mental health disorders, as described above (see mental health).

Table 1. Sample Characteristics by Lonely Versus Not Lonely Status

	Overall n = 613	Lonely n = 299	Not Lonely n = 314	*P* value[a]
Age, years, mean (SD)	31.6 (4.5)	31.2 (4.5)	32.0 (4.4)	0.056
Race, yes, n (%)				0.52
Asian	25 (4.1%)	10 (3.3%)	15 (4.8%)	
Black or African American	10 (1.6%)	3 (1.0%)	7 (2.2%)	
White	529 (86.3%)	261 (87.3%)	268 (85.4%)	
Multiracial[b]	24 (3.9%)	14 (4.7%)	10 (3.2%)	
Other	25 (4.1%)	11 (3.7%)	14 (4.5%)	
Hispanic or Latino ethnicity, yes, n (%)	33 (5.4%)	15 (5.0%)	18 (5.7%)	0.69
Partnered/married, yes, # (%)	575 (93.8%)	277 (92.6%)	298 (94.9%)	0.25
Highest level of education, n (%)				0.86
Some college and above	570 (93.0%)	277 (92.6%)	293 (93.3%)	
High school degree or less	40 (6.5%)	20 (6.7%)	20 (6.4%)	
Perceived social status, mean (SD)	7.0 (1.6)	6.7 (1.7)	7.2 (1.5)	**<0.001**
Pandemic life impact, negative, n (%)	483 (78.8%)	262 (87.6%)	221 (70.4%)	**<0.001**
Pregnancy vs postpartum status, n (%)				**0.005**
Pregnant	300 (48.9%)	129 (43.1%)	171 (54.5%)	
Postpartum	313 (51.1%)	170 (56.9%)	143 (45.5%)	
Nulliparous status, yes	265 (43.2%)	142 (47.5%)	123 (39.2%)	**0.038**
Number of pregnancy complications,[c] mean (SD)	0.7 (0.9)	0.8 (1.0)	0.6 (0.8)	**0.049**
Mental Health				
Mental health disorder,[d] yes, n (%)	188 (30.7%)	121 (40.5%)	67 (21.3%)	**<0.001**
Mental health treatment, yes, n (%)	121 (19.7%)	78 (26.1%)	43 (13.7%)	**<0.001**
Depression (EPDS total score), mean (SD)	7.1 (4.7)	9.0 (4.8)	5.2 (3.8)	**<0.001**
Anxiety (EPDS subscale score), mean (SD)	3.6 (2.2)	4.4 (2.1)	2.8 (2.0)	**<0.001**
Any substance use[e] (past 3 months), yes, n (%)	19 (3.1%)	10 (3.3%)	9 (2.9%)	0.73
No. of chronic medical conditions,[f] mean (SD)	0.2 (0.5)	0.2 (0.5)	0.2 (0.4)	0.48
Perceived stress, score, mean (SD)	4.3 (1.4)	4.8 (1.2)	3.8 (1.4)	**<0.001**

Abbreviation: EPDS, Edinburgh Postnatal Depression Scale.

[a]Wilcoxon rank sum test, Fisher exact test, or chi-square test.

[b]Checked more than 1 race.

[c]Top 5 pregnancy complications (n = 613): elevated blood pressure, hypertension or preeclampsia (n = 88; 14.4%); severe nausea, vomiting, dehydration (n = 64; 10.4%); vaginal bleeding (n = 57; 9.3%); gestational or other diabetes (n = 52; 8.5%); and small fetal size or growth restriction (n = 28; 4.6%).

[d]At least 1 mental health disorder (mood, anxiety or other).

[e]Cigarettes, e-cigarettes, alcohol, and/or other drugs.

[f]Top 5 chronic medical conditions (n = 613): moderate-to-severe asthma (n = 52, 8.5%); obesity with body mass index >40 kg/m^2 (n = 38, 6.2%); immunocompromised status (n = 25, 4.1%); diabetes (n = 3, 2.1%); and chronic lung disease (n = 2, 0.3%).

Pregnancy-related health was evaluated by asking participants about their current obstetrical status (pregnant now vs being within 6 months postpartum) and whether the current/recent pregnancy was their first (nulliparous status) versus not (multiparous status). All participants were asked about complications or medical problems during their pregnancy: "Have you experienced any of the following problems during your pregnancy?" They were instructed to "check all that apply" to the following options: gestational or other diabetes; vaginal bleeding; urinary tract infection; severe nausea, vomiting, or dehydration; cervical cerclage; elevated blood pressure, hypertension, or preeclampsia; placental problems, such as placenta previa or placental abruption; blood transfusion; motor vehicle accident; small fetal size or growth restriction; and large fetal size or macrosomia. The number of complications per responder ranged from 0 to 11.

Pandemic life impact was measured by a single question: "Please indicate the extent to which you view the COVID-19 pandemic as having either a positive or negative impact on your whole life – now and for years to come," with response choices ranging from 1 through 7 (1 = extremely negative impact, 4 = no impact, 7 = extremely positive impact); responses 1 through 3 were considered to signify pandemic's negative life impact.

Perceived social status was assessed with the MacArthur Scale of Subjective Social Status, a validated measure that accounts for economic and social factors and uses 1-10 Likert-scale responses (1 = being "worst off," 10 = being "best off") to assess a person's perceived social rank relative to others in their social/societal group.[17] Perceived socioeconomic status has shown associations with health outcomes across a variety of domains.[18]

Data Analysis

All analyses were performed using R statistical analysis software (R Core Team, Version 4.0.5). Descriptive statistics (mean ± SD or frequencies) were used to characterize the total sample and the Lonely and Not Lonely groups. Bivariate comparisons of all variables were completed using Wilcoxon rank sum, Fisher exact, or chi-square tests. Variables that differed in the bivariate analyses (2-tailed $P < 0.05$) between Lonely and Not Lonely groups were included in a multivariate logistic regression analysis, which yielded odds ratios (OR), 95% confidence intervals, and *P* values to better assess factors associated with the likelihood of screening positive for loneliness. Since the EPDS anxiety subscale score is a part of the total EPDS score, the anxiety subscale score was not included in the multivariate analysis.

RESULTS

Sample Characteristics

The sample (n = 613) consisted predominantly of White (86.3%), non-Hispanic (94.6%), married/partnered (93.8%) individuals with at least some college education (93.0%) who were, on average, 31.6 ± 4.5 years old. Close to half (48.8%) screened positive for loneliness and formed the Lonely group; the remaining respondents (51.2%) formed the Not Lonely group. Approximately half of the sample reported being currently pregnant and nulliparous; one-third reported presence of a mental health disorder diagnosis; and one-fifth noted a receipt of mental health treatment. A small proportion of the respondents (3.1%) reported use of substances (eg, cigarettes, e-cigarettes, or other drugs). The majority (78.8%) noted a negative pandemic life impact and higher social status (7.0 ± 1.6). See Table 1.

The Lonely group had a higher percentage ($P < 0.05$) of nulliparous (47.5%) than multiparous (39.2 %) and postpartum (56.9 %) than pregnant (45.5 %) participants. The Lonely group reported overall worse mental health and well-being ($P < 0.05$) than the Not Lonely group, with a higher average number of reported pregnancy complications (0.8 ± 1.0 vs 0.6 ± 0.8) and more frequent reports of the presence of mental health condition (40.5% vs 21.3 %) and mental health care receipt (26.1% vs 13.7%). The Lonely group also had higher scores of depression (9.0 ± 4.8 vs 5.2 ± 3.8), anxiety (4.4 ± 2.1 vs 2.8 ± 2.0), and perceived stress (4.8 ± 1.2 vs 3.8 ± 1.4); lower perceived social status scores (6.7 ± 1.7 vs 7.2 ± 1.5); and was more likely to report a negative life impact of the pandemic (87.6 % vs 70.4 %). The groups did not statistically significantly differ in demographic characteristics, the average number of reported chronic medical conditions, or the frequency of substance use.

Table 2. Multivariate Analysis: Predictors of the Positive Loneliness Screen (Lonely Group Status)

	Odds Ratio (95% CI)	*P* value[a]
Perceived social status, score	0.86 (0.77 – 0.98)	**0.019**
Pandemic life impact, negative	1.78 (1.10 – 2.90)	**0.020**
Pregnant (vs postpartum)	0.62 (0.42 – 0.90)	**0.013**
Nulliparous, yes	1.27 (0.87 – 1.85)	0.210
Pregnancy complications, number	0.99 (0.80 – 1.22)	0.922
At least 1 mental health diagnosis, yes	1.19 (0.71 – 2.00)	0.503
Mental health treatment, yes	1.21 (0.68 – 2.16)	0.509
Depression (EPDS), total score	1.17 (1.11 – 1.23)	**< 0.001**
Stress, score	1.45 (1.24 – 1.70)	**< 0.001**

Abbreviation: EPDS, Edinburgh Postnatal Depression Scale.
[a]Wilcoxon rank sum test, Fisher exact test, or chi-square test

Factors Associated With Lonely Status

A multivariate logistic regression analysis included all variables that differed in bivariate comparisons between the Lonely and Not Lonely groups (Table 1) to better assess the correlates of a positive screen for loneliness. Those in the Lonely group were more likely to be postpartum than pregnant (OR 0.59; 95% CI, 0.40-0.87) and to have higher EPDS-based depressive symptoms (OR 1.24; 95% CI, 1.13-1.36), stress (OR 0.41; 95% CI, 0.28-0.60), and negative pandemic's life impact (OR 1.79, 95% CI, 1.11-2.93) scores, as well as a lower perceived social status score (OR 0.83; 95% CI, 0.73-0.95). See Table 2.

DISCUSSION

During the first year of the COVID-19 pandemic, among people who were pregnant or postpartum and resided in urban and rural communities of Pennsylvania and Wisconsin, those who screened positively for loneliness versus those with a negative screen reported worse subjective social status and pandemic life impacts, more pregnancy complications, worse depression/anxiety and stress symptoms, and being more likely to have a mood disorder and receive mental health treatment. They were also more likely to be first-time parents and postpartum. These findings are important as they illustrate the associations between perceived loneliness and numerous negative health measures with documented relevance to pregnancy outcomes and the well-being of pregnant/postpartum persons, their families, and children.[19] The fact that first-time mothers seemed to be more affected is also concerning, as early parenthood is the time marked in general by parental worries and increased risk of postpartum depression.[20]

Research Implications

Whether the subjective feeling of loneliness changed for individu-

als before versus during versus after the pandemic is unclear.[21] However, it is possible the pandemic could have served as an extreme exacerbating event that brought to light a condition already experienced during the perinatal period.[21] Although the prepandemic data on loneliness/social isolation in pregnancy are limited, prior studies confirm that the pandemic increased social isolation and, in turn, loneliness in this population.[22] Future research could assess the loneliness and its correlates now, after the acute effects of the COVID-19 pandemic have subsided. Although our study did not include a racially or ethnically diverse sample, existing evidence documents the negative effect of loneliness during the COVID-19 pandemic on maternal mental health, with higher levels of loneliness associated with worse depression,[23] perceived stress, and social supports—particularly for women of color[24]—calling for more research in this population. In turn, an increase in maternal psychiatric distress has been implicated in worse maternal-fetal and child outcomes.[25]

Clinical Implications

People who are pregnant or postpartum are at increased risk for mental health disorders; our results further underscore the need for close monitoring and screening for mental health problems—especially among those experiencing loneliness—and during the times of increased isolation, such as the COVID-19 pandemic. Traditional screening tools used in the perinatal setting include the Patient Health Questionnaire (PHQ)-9[26] and EPDS[16] for depression and the GAD-7[27] for anxiety; screening for loneliness also should be considered. The 3-item Loneliness Scale[13-15] could be a time-saving, cost-effective, and user-friendly addition to the maternal screening toolbox to help identify individuals at higher risk for adverse pregnancy and/or postpartum complications. Referrals to social services early during pregnancy could be considered for individuals who screen positive for loneliness. According to the US Surgeon General's 2023 Advisory,[7] a National Strategy to Advance Social Connection is a critical next step in making strides to strengthen social connections and rebuild community and to enhance our overall health and well-being. The Advisory's agenda is a whole-societal approach, envisioning equitable access and distribution of resources, that will require sustained investment and an evidence-based approach to kindle and renew a sense of shared and common kinship.

Strengths and Limitations

This study was strengthened by the robust sample size and geographic distribution. Sampling from 2 different regions of the US, including from both rural and urban communities, may support the generalizability to the rest of the US population. However, the lack of sample diversity, with the vast majority of respondents identifying as White, non-Hispanic females with a college education, may limit result generalizability to other demographic populations. Although we did not collect demographic details that would allow us to utilize participant-level geocoding and urbanicity status determination, our results are likely applicable to rural residents because the service catchment of the collaborating health systems include robust representation of rural patients in central Wisconsin and south-central Pennsylvania. Our survey included multiple validated surveys targeting specific domains, eg, depression/anxiety and loneliness, that can further increase the generalizability of our findings.

We recognize this study also had important limitations. The survey was administered early during the pandemic (August 2020-April 2021) when mask mandates, online schooling, and remote work were still widely practiced and before COVID-19 vaccines were available to the public. If it had been administered later—especially after the vaccination rollout and social distancing restrictions had been lifted—it could have influenced the findings; it is unknown if the between-group differences would have persisted. Another limitation involved the subjective nature of the clinical and obstetric health reports. Depending on the participant's health literacy, they may have incorrectly reported the pregnancy complications or health problems they experienced. However, the overall readability score of the survey was 6.3, which can be interpreted as a 6th grade reading level, and 93.4% of the sample reported completed high school and had at least some college education.

CONCLUSIONS

Early during the COVID-19 pandemic, many people during their perinatal period screened positively for loneliness, which, in turn, was associated with a worse biopsychosocial profile and more pregnancy complications. Focusing efforts on preventing and mitigating loneliness may help improve outcomes critical for maternal-fetal and child health. Future studies should further assess this relationship—especially any potential causality—and investigate perceived loneliness and its impact on birth outcomes and newborn care, particularly in rural and underserved communities to inform future clinical services, research funding, strategic initiatives, and policy agendas.

Funding/Support: This project was supported by funding from Penn State Social Science Research Institute and Huck Institutes of the Life Sciences and the University of Wisconsin School of Medicine and Public Health. Content is the responsibility of the authors and does not represent the views of the funders.

Financial Disclosures: None declared.

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