

Systematic Review

Social Factors and the Risk of Postpartum Depression during the COVID-19 Pandemic: A Systematic Review

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Academic Editor: Michael H. Dahan

Submitted: 15 June 2023 Revised: 15 July 2023 Accepted: 31 July 2023 Published: 9 October 2023

Abstract

Background: To investigate the effects of social factors including social support and social restriction on postpartum depression (PPD) during the COVID-19 pandemic. **Methods:** We conducted a systematic review with PubMed and Web of Science from 1 January 2020 to 1 April 2023. Articles focusing on social factors and PPD during COVID-19 pandemic were investigated. Newcastle-Ottawa Scale and the Agency for Healthcare Research and Quality Scale were used to evaluate quality of literatures. **Results:** We included 31 articles (22 cross-sectional studies and 9 cohort studies) with good quality. Edinburgh Postnatal Depression Scale (EPDS) was used as the preferred measure for defining PPD. Social support reduced the prevalence of developing PPD by 30%–40%. Social restriction increased the risk of PPD but there was lack of evidence or effective scales to define restriction. **Conclusions:** We found that social support acted as an important protective factor for PPD during the COVID-19 pandemic and that social restriction increased the risk of PPD. EPDS may be an optimal choice for researchers to define PPD. Obstetricians should underline social factors for both pregnancy women and their families. The study was registered on PROSPERO (<https://www.crd.york.ac.uk/prospero/>), registration number: CRD42023434485.

Keywords: postpartum depression; social support; social restriction; COVID-19; systematic review

1. Introduction

Postpartum depression (PPD) is a common but under-appreciated psychological disease. In developing countries, 19.8% or more women suffered from depression after childbirth; a systematic review of 56 studies from 291 countries/territories showed a relatively high comorbidity rate of 17.7% for PPD [1]. The Diagnostic and Statistical Manual, Revision 4, identifies 4 weeks after birth as a separator for “postnatal morbidity”, while the International Statistical Classification of Diseases and Related Health Problems, Revision 10, classifies mental disorders beginning within 6 weeks after delivery as “puerperal-related” [2]. If not identified, PPD may lead to serious consequences, causing harm to the mother and her family.

Social support is a multidimensional concept which broadly refers to the emotional, instrumental or informational assistance that is received from others [3], and is considered to be one of the most effective protective factors against PPD [4]. During the COVID-19 pandemic, maternal perceived social support varied due to epidemic restrictions or other reasons. Social restriction refers to a measure implemented by a government or organization to limit the mobility and liberties of individuals or groups in response to specific social issues or crisis, and has been shown to have a strong correlation with PPD. It affects household income,

relationships with family and partners, social support, all having the ability to change the prevalence of PPD [5,6]. Existing research on social support is well-documented and aligns with the general perception that adequate social support is effective in alleviating symptoms of PPD or reducing the prevalence [7,8]. However, the effects of social restriction on PPD are still unclear [9–11].

Thus, the aim of this study was to summarize the relationship between social factors, including social support and social restriction, and PPD during the COVID-19 epidemic. Based on these findings, we aim to provide recommendations to professionals working in related fields to reduce the prevalence of PPD.

2. Materials and Methods

We followed the “Preferred Reporting Items for Systematic Reviews and Meta-Analyses” (PRISMA) statement [12] and our study was registered on PROSPERO (<https://www.crd.york.ac.uk/prospero/>) on 14 June 2023 with a registration number CRD42023434485.

2.1 Literature Search and Study Selection

We conducted a comprehensive search in PubMed and Web of Science to identify relevant studies published from 1 January 2020 to 1 April 2023. Our search strategy in-



Table 1. The basic information of 31 selected studies.

Study	Publication date	Region(s)	Participants PPD/total (n%)	Social support	Social restriction	PPD definition
Spinola <i>et al.</i> [10]	2020	Italy	1057/2403 (44%)	√	√	EPDS
Lebel <i>et al.</i> [15]	2020	Canada	653/1987 (33%)	√	×	EPDS
Christie <i>et al.</i> [16]	2022	Australia	NA/139	×	√	DASS-21
Muldoon <i>et al.</i> [17]	2021	Canada	64/216 (30%)	√	√	EPDS
Kinser <i>et al.</i> [18]	2021	USA	NA/524	√	×	BSI
Fallon <i>et al.</i> [19]	2021	UK	24/614 (4%)	√	√	EPDS
Terada <i>et al.</i> [20]	2021	Japan	35/461 (8%)	√	×	EPDS
Gustafsson <i>et al.</i> [24]	2021	USA	175/393 (45%)	√	×	CES-D
Fernandes <i>et al.</i> [21]	2022	Portuguese	67/290 (23%)	√	√	EPDS
Jones <i>et al.</i> [5]	2022	England	268/424 (63%)	√	×	EPDS
Clifton <i>et al.</i> [11]	2022	Australia	NA/454	√	√	DASS-21
Nguyen <i>et al.</i> [22]	2022	Vietnam	NA/868	√	√	EPDS
Kokkinaki <i>et al.</i> [23]	2022	Greek	6/132 (5%)	√	×	EPDS
Goldstein <i>et al.</i> [31]	2023	USA	196/616 (32%)	√	√	EPDS
Howard <i>et al.</i> [8]	2022	USA	328/601 (55%)	√	×	PHQ-9
Lin <i>et al.</i> [25]	2022	USA	NA/1912	√	×	EPDS
Lequertier <i>et al.</i> [6]	2022	Australia	581/2640 (22%)	√	√	EPDS
Gluska <i>et al.</i> [26]	2022	Israel	NA/246	√	×	EPDS
Galletta <i>et al.</i> [9]	2022	Brazil	69/184 (38%)	√	√	EPDS
Manning <i>et al.</i> [27]	2022	Canada	33/98 (34%)	√	×	EPDS
Kolker <i>et al.</i> [28]	2022	Canada	14/55 (25%)	√	×	DASS-21
Liu <i>et al.</i> [29]	2022	USA	NA/429	√	×	CES-D
Meister <i>et al.</i> [30]	2022	German	NA/131	√	√	EPDS
Brik <i>et al.</i> [33]	2022	Spain	173/536 (32%)	√	×	EPDS
Harrison <i>et al.</i> [32]	2022	UK	123/251 (49%)	√	×	EPDS
Tsuno <i>et al.</i> [7]	2022	Japan	160/558 (29%)	√	√	EPDS
Feinberg <i>et al.</i> [34]	2022	California	332/2372 (14%)	√	×	PHQ-4
Liu <i>et al.</i> [35]	2022	USA	76/506 (15%)	√	×	CES-D
Rabinowitz <i>et al.</i> [36]	2023	USA	24/127 (19%)	√	×	DASS-21
Coca <i>et al.</i> [37]	2023	5 areas*	953/3253 (29%)	√	×	EPDS
Sacchi <i>et al.</i> [38]	2023	Italy	NA/643	√	×	EPDS

PPD, postpartum depression; NA, not available; EPDS, Edinburgh Postnatal Depression Scale; PHQ-9, Patient Health Questionnaire-9; PHQ-4, Patient Health Questionnaire-4; DASS-21, Depression Anxiety and Stress Scale-21; BSI, Brief Symptom Inventory; CES-D, Center for Epidemiologic Studies- Depression.

* Brazil, South Korea, Taiwan, Thailand, and UK.

cluded the following query: (postpartum depression) AND COVID-19 AND (social support OR social isolation OR social restriction OR social lockdown). Two authors independently screened the literature for eligibility. Inclusion criteria was as follows: (1) Postpartum women aged 18 or older; (2) Women without any severe complications such as postpartum hemorrhage, preeclampsia or diabetes; (3) Studies evaluating the relationship between social support or social restriction and PPD; (4) Observation studies including cohort studies, case control studies or cross-sectional studies; and (5) Studies in English. Exclusion criteria was as follows. (1) Review studies; (2) Duplicate records found in database; (3) Unavailable full text or data.

2.2 Quality Assessment

Two authors evaluated the quality of included studies with the Newcastle-Ottawa Scale (NOS) [13] for cohort

studies and case-control studies, and the Agency for Healthcare Research and Quality Scale (AHRQS) [14] for cross-sectional studies. With NOS, studies receiving 5 or more scores were considered good quality (total score 9). With AHRQS, studies receiving 6 or more scores were considered good quality (total score 11).

2.3 Data Extraction

Two authors extracted the following information from eligible studies: name of first author, publication date, study region, social factors, sample size, prevalence of PPD and scales on PPD. Main outcome of our study was prevalence or risk of PPD.

2.4 Strategy for Data Synthesis

Since prevalence studies tend to be highly heterogeneous, we did not perform a meta-analysis.

Table 2. Quality of included cohort studies with the Newcastle-Ottawa Scale.

Reference	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Total Score
Brik <i>et al.</i> [33]	0	0	1	0	1	1	1	1	5
Fernandes <i>et al.</i> [21]	1	0	1	0	1	1	1	0	5
Rabinowitz <i>et al.</i> [36]	1	0	1	0	2	1	1	0	6
Manning <i>et al.</i> [27]	1	0	1	0	2	1	1	0	6
Meister <i>et al.</i> [30]	0	0	1	0	1	1	1	1	5
Sacchi <i>et al.</i> [38]	1	0	1	0	1	1	1	0	5
Clifton <i>et al.</i> [11]	1	0	1	0	2	1	1	1	7
Gluska <i>et al.</i> [26]	0	0	1	0	0	1	1	1	4
Gustafsson <i>et al.</i> [24]	0	0	1	0	1	1	1	0	4

If the article mentioned one item, it would mark “1” point, otherwise, it would mark “0”. Total score was the summation of Q1-Q8. Studies receiving 5 or more scores were considered good quality. Q1, Representativeness of the exposed cohort; Q2, Selection of the non-exposed cohort; Q3, Ascertainment of exposure; Q4, Demonstration that outcome of interest was not present at start of study; Q5, Comparability of cohorts on the basis of the design or analysis; Q6, Assessment of outcome; Q7, Was follow-up long enough for outcomes to occur; Q8, Adequacy of follow up of cohorts.

3. Result

3.1 Selection and Quality of Studies

Flow chart of study selection was shown in Fig. 1. The initial literature search yielded 280 records. After removing duplicate publications, we screened the titles and abstracts of 212 papers. We excluded 37 articles that were not directly related to our study. Of the remaining 175 articles, full text of 14 articles was not available. We then applied our exclusion criteria to the 161 available full-text articles. Ultimately, we included 31 articles in our study [5–11,15–38]. The specific details of included studies were presented in Table 1 (Ref. [5–11,15–38]). Among the 31 studies, 9 were cohort studies [11,21,22,27,28,31,32,36,38] and 22 were cross-sectional studies [5–10,15–20,23–26,29,30,33–35,37]. For study quality, we used NOS to assess cohort studies, finding 7 studies with good quality [11,22,28,31,32,36,38], and we used AHRQS to assess cross-sectional studies, finding 22 studies with good quality [5–10,15–20,23–26,29,30,33–35,37]. The details of study evaluation were presented in Table 2 (Ref. [11,21,24,26,27,30,33,36,38]) and Table 3 (Ref. [5–10,15–20,22,23,25,28,29,31,32,34,35,37]) respectively. Furthermore, the quality results showed that all included studies had a low risk of bias.

3.2 Social Factors and PPD

The outbreak of the COVID-19 pandemic in late 2019 has impacted people’s daily lives, particularly mothers. The reported cases of the COVID-19 epidemic and the resulting social restrictions have significantly increased the psychological burden on mothers and led to a noticeable rise in the prevalence of PPD. Information related to social support or social restriction was shown in Table 1.

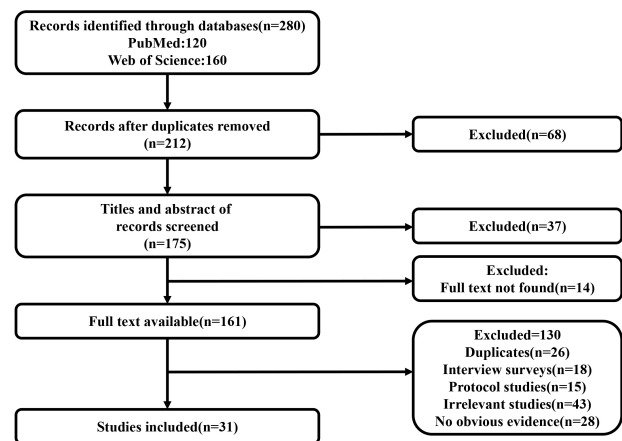


Fig. 1. Flow chart of study selection for inclusion in this systematic review.

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3.2.1 Social Support and PPD

The measurements and associations between social support and PPD were shown in Table 4 (Ref. [5–11,15,17–38]). Most of the literature demonstrated that social support was an important protective factor against PPD. Some articles described social support in general terms without specific categorization [15,20,21,27], while others categorized social support from parents, friends, families and health-care professionals [7,23,32]. Some articles suggested that social support from friends could be more protective than from family members [32]. One article suggested that improved social support could be effective in reducing alcohol and drug abuse [8].

Among the included literatures, the prevalence rate of PPD during COVID-19 was between 5.5% to 54.5%. This was in sizeable contrast when compared to the post-

Table 3. Quality of included cross-sectional studies with the Agency for Healthcare Research and Quality Scale.

References	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Total score
Christie <i>et al.</i> [16]	1	0	1	1	1	1	1	1	1	1	0	9
Fallon <i>et al.</i> [19]	1	0	1	1	1	1	1	1	1	1	0	9
Feinberg <i>et al.</i> [34]	1	0	1	1	1	1	1	1	1	1	0	9
Goldstein <i>et al.</i> [31]	1	0	1	1	1	1	1	1	1	1	0	9
Howard <i>et al.</i> [8]	1	0	1	1	1	1	1	1	1	1	0	9
Jones <i>et al.</i> [5]	1	0	1	1	0	1	1	0	1	1	0	7
Kinser <i>et al.</i> [18]	1	0	1	1	1	1	1	1	1	1	0	9
Kokkinaki <i>et al.</i> [23]	1	0	1	1	1	1	1	1	1	1	0	9
Kolker <i>et al.</i> [28]	1	0	1	1	1	1	1	0	1	1	0	8
Lequertier <i>et al.</i> [6]	1	0	1	1	1	1	1	1	1	1	0	9
Lin <i>et al.</i> [25]	1	0	1	1	1	1	1	1	1	1	0	9
Liu <i>et al.</i> [29]	1	0	1	1	1	1	1	1	0	1	0	8
Liu <i>et al.</i> [35]	1	0	1	1	1	1	1	1	0	1	0	8
Spinola <i>et al.</i> [10]	1	0	1	1	1	1	1	1	1	1	0	9
Tsuno <i>et al.</i> [7]	1	0	1	1	1	1	1	1	1	1	0	9
Coca <i>et al.</i> [37]	1	0	1	1	1	1	1	1	1	1	0	9
Galletta <i>et al.</i> [9]	1	0	1	1	1	1	1	1	1	1	0	9
Harrison <i>et al.</i> [32]	1	0	1	1	1	0	1	0	1	1	0	7
Lebel <i>et al.</i> [15]	1	0	1	1	1	1	1	1	1	1	0	9
Muldoon <i>et al.</i> [17]	1	0	1	1	1	1	1	1	1	1	0	9
Nguyen <i>et al.</i> [22]	1	1	1	1	1	1	1	0	1	1	0	8
Terada <i>et al.</i> [20]	1	0	1	1	1	1	1	1	1	1	0	9

Q1, Define the source of information (survey, record review); Q2, List inclusion and exclusion criteria for exposed and unexposed subjects (cases and controls) or refer to previous publications; Q3, Indicate time period used for identifying patients; Q4, Indicate whether or not subjects were consecutive if not population-based; Q5, Indicate if evaluators of subjective components of study were masked to other aspects of the status of the participants; Q6, Describe any assessments undertaken for quality assurance purposes (e.g., test/retest of primary outcome measurements); Q7, Explain any patient exclusions from analysis; Q8, Describe how confounding was assessed and/or controlled; Q9, If applicable, explain how missing data were handled in the analysis; Q10, Summarize patient response rates and completeness of data collection; Q11, Clarify what follow-up, if any, was expected and the percentage of patients for which incomplete data or follow-up was obtained.

partum women delivering before COVID-19. One article compared the data before and after the COVID-19 outbreak [21]. All articles mentioning social support stated that adequate social support can reduce the prevalence rate of PPD. One article demonstrated that those who reported support through positive social interactions were at a 60% decreased risk of PPD (risk ratio (RR) = 0.40, $p = 0.04$) [28]. Additionally, receiving affectionate support was a possible protective factor against stress (RR = 0.52, $p = 0.04$) [28].

3.2.2 Social Restriction and PPD

Although social restriction during the COVID-19 pandemic was a prominent feature, few articles explored the role in PPD. The impact of social restriction policies varied across regions, leading to diverse findings in the literatures. The measurements and associations between social restriction and PPD were shown in Table 5 (Ref. [6,7,9–11,16,17,19,21,22,30,31]). Among the 31 included articles, 12 were primarily focused on social restriction (Table 1). Some articles reported that mothers had experienced fear

and concerns about the potential impact of the outbreak on their family members, especially their babies [15,18,30]. Additionally, the social restriction policies limited their ability to offline social interactions with friends, leading to increased feelings of isolation [16,32]. Reduced physical activity had also been reported [15,28]. Moreover, the financial situation of families was affected to varying degrees by the COVID-19 pandemic, resulting in additional stressors for mothers [5,17]. Changes in family dynamics, particularly in relationships with partners, was also observed [5,23,30]. Two studies mentioned the impact of partner violence on PPD, which could be attributed to changes in family income and relationships resulting from the COVID-19 pandemic [8,17]. Social distancing may influence maternal PPD levels [19]. In addition, strict COVID-19 related restrictions had a significant impact on improving scores of participants with Edinburgh Postnatal Depression Scale (EPDS) [21]. Some articles emphasized effects of the duration, the number of inmates [39], and the intensity of the social restriction [10]. Other articles highlighted the impact

Table 4. Measurements and associations between social support and PPD.

Preference	Measurement of social support	Social support on PPD
Spinola <i>et al.</i> [10]	MSSS	P
Lebel <i>et al.</i> [15]	SSEQ	P
Muldoon <i>et al.</i> [17]	Self-made scale	P
Kinser <i>et al.</i> [18]	Self-made scale	P
Fallon <i>et al.</i> [19]	MSPSS	U
Terada <i>et al.</i> [20]	MSPSS	P
Gustafsson <i>et al.</i> [24]	MOS-SSS	P
Fernandes <i>et al.</i> [21]	MSPSS	P
Nguyen <i>et al.</i> [22]	PICSS	P
Jones <i>et al.</i> [5]	Self-made scale	P
Clifton <i>et al.</i> [11]	CSI; AQoL-6D	U
Kokkinaki <i>et al.</i> [23]	FACES IV; MSPSS;	U
Lin <i>et al.</i> [25]	MSPSS	U
Howard <i>et al.</i> [8]	ISEL-12; BRFSS	P
Gluska <i>et al.</i> [26]	MSPSS	R
Lequertier <i>et al.</i> [6]	MSPSS	P
Manning <i>et al.</i> [27]	SSEQ	P
Galletta <i>et al.</i> [9]	Self-made scale	P
Kolker <i>et al.</i> [28]	MOS-SSS	U
Liu <i>et al.</i> [29]	MSPSS	U
Meister <i>et al.</i> [30]	Self-made scale	P
Goldstein <i>et al.</i> [31]	Self-made scale	P
Harrison <i>et al.</i> [32]	MSPSS	P
Brik <i>et al.</i> [33]	MOS-SSS	P
Tsuno <i>et al.</i> [7]	Self-made scale	P
Feinberg <i>et al.</i> [34]	MOS-SSS	P
Liu <i>et al.</i> [35]	T-WSSS	P
Rabinowitz <i>et al.</i> [36]	MSPSS	P
Coca <i>et al.</i> [37]	MSSS	P
Sacchi <i>et al.</i> [38]	MSPSS	P

PPD, postpartum depression; U, unclear; R, risk factor; P, protective factor; MSSS, Maternity Social Support Scale; SSEQ, Social Support Effectiveness Questionnaire; MSPSS, Multidimensional Scale of Perceived Social Support; PICSS, Perinatal Infant Care Social Support; AQoL-6D, Assessment of Quality of Life 6D; CSI, Couples Satisfaction Index; FACES IV, Family Adaptability and Cohesion Evaluation Scales IV Package; MOS-SSS, Medical Outcomes Study Social Support Survey; ISEL-12, Interpersonal Support Evaluation List; BRFSS, Colorado Behavioral Risk Factor Surveillance System Violence Screener; T-WSSS, Two-Way Social Support Scale.

of social restriction on reduced physical activity and limited outings [15,16], changes in family relationships [5,23,30], increased social distance from peers [6], and maternal isolation due to reduced communication [19,28].

Other articles described different terminology, such as “social restriction” to indicate restrictions on maternal behavior and life, “social isolation” to emphasize the psychological isolation, and “social lockdown” to highlight the various aspects of maternal life affected by policies in different regions. Overall, most of the included articles concluded that social restriction contributed to an increase in PPD symptoms or prevalence. Subjects in various articles also reported that family economic status, perceived social

support, and relationships with family members were affected by the implementation of social restriction policies. However, one article argued that social restriction could reduce maternal anxiety and the prevalence of PPD [11].

3.3 Scales to Evaluate PPD

Our study revealed that the Edinburgh Postnatal Depression Scale (EPDS) was predominantly utilized as the preferred measure for defining PPD, since EPDS was used in 21 articles (Table 1). The Depression Anxiety and Stress Scale-21 (DASS-21) and the Center for Epidemiologic Studies-Depression (CES-D) scale were also identified as common choices (Table 1). For some studies,

Table 5. Measurements and associations between social restrictions and PPD.

Preference	Q1	Q2	Q3	Q4	Q5	Social restrictions on PPD
Spinola <i>et al.</i> [10]	√					R
Christie <i>et al.</i> [16]		√	√			U
Muldoon <i>et al.</i> [17]	√				√	R
Fallon <i>et al.</i> [19]		√			√	R
Nguyen <i>et al.</i> [22]				√		U
Fernandes <i>et al.</i> [21]		√				R
Clifton <i>et al.</i> [11]		√				P
Meister <i>et al.</i> [30]		√			√	R
Lequertier <i>et al.</i> [6]	√	√				R
Galletta <i>et al.</i> [9]		√	√	√		R
Goldstein <i>et al.</i> [31]	√	√				R
Tsuno <i>et al.</i> [7]		√			√	R

PPD, postpartum depression; U, unclear; R, risk factor; P, protective factor; Q1, impact on economy; Q2, impact on family relations; Q3, impact on activities; Q4, impact on information acquisition; Q5, impact on family care.

Patient Health Questionnaire-9 (PHQ-9), Patient Health Questionnaire-4 (PHQ-4) and Brief Symptom Inventory (BSI) were also used to assess PPD. Unlike social support, there were no specific scales to measure social restriction, resulting in varying descriptions among the articles.

4. Discussion

Social support has been identified as one of the most effective protective factors against PPD. However, the COVID-19 pandemic has further curtailed the social support received by mothers due to factors such as social distancing. Compared to postpartum women who delivered babies before the pandemic, those who delivered during the pandemic were more likely to experience the lack of support from healthcare professionals or family members (10.8% vs. 33.5% or 22.3%, $p < 0.001$) [7]. Thus, we performed a systematic review to assess the effects of social factors, especially social support and social restriction, on risk of PPD. We included 22 cross-sectional studies and 9 cohort studies with most being of good quality. Our systematic review shows that social support is a protective factor for PPD during the COVID-19 pandemic. This is consistent with the conclusions of previous studies [16,40–42]. Our study generally mentioned the role of family relationships in improving PPD [6,7,9,23,30]. A study from Vietnam demonstrated that support from parents-in-law and relatives played an important role in improving maternal psychological state during the pandemic in some cultures with strong family values [22]. However, Harrison *et al.* [32] demonstrated that family support was found to have no effect on PPD in postpartum women and emphasized the positive effect of support from friends. Another study suggested that social support could significantly reduce the effects of alcohol use, stress, and drug use on PPD [8]. Additionally, Hahn-Holbrook *et al.* [43] demonstrated that social support not only directly affected maternal mental health through these aspects but

might also indirectly affect the prevalence of PPD by influencing the levels of adrenocorticotropin-releasing hormone. Overall, the degree of PPD is influenced by social factors related to social support from family members, friends, and family economic status. This reminds us of the ways in which the pandemic could damage maternal mental health and provide remedies for finding necessary and effective interventions. Encompassing all the articles, we found that adequate social support reduced the likelihood of developing PPD by 30% to 40%. In addition, social support could be beneficial in alleviating depressive symptoms in women who were already suffering from PPD.

As one of the most striking features of the pandemic, social restrictions have played a substantial role in affecting maternal mental health. Due to the lack of evidence or an effective scale for defining restriction, our studies included social restriction in a variety of forms, including before and post lockdown comparisons, the number of inmates blocked, and the intensity of lockdowns in regions. This may affect how a woman receives support from family members, socializes with friends, maintains relationships with her baby, chooses the way she goes outdoors, receives news information, gets support from health care providers, and accesses medications easily. The studies we included generally considered social restriction to be a risk factor for PPD. A study investigating the psychological impact of social and psychological changes on mothers found that perceived social changes resulting from the introduction of social restriction measures was not associated with an increased risk of depression or anxiety in the mother, highlighting the psychological impact of keeping social distancing as an increased risk factor for PPD [19]. Christie *et al.* [16] highlighted dietary factors such as fruits and vegetables, as well as the benefits of outdoor exercise in maintaining the mother's physical mood. It is worth noting that while access to information, such as social media,

is an important mean of learning news and communicating during social restrictions, some studies suggested that the presence of social media may have had a negative impact on maternal mental health [9,18], and there is a study suggesting that babies from mothers with more social network support may be more susceptible to COVID-19 [38]. A study from Japan suggested a possible association between PPD and whether to give birth in the home country [7]. This study highlighted the possible effects on maternal PPD due to loss of maternal autonomy, such as isolation from the infant and inability to breastfeed, as demonstrated in other studies we included [25,29,37]. Notably, domestic violence has been shown to be an important risk factor for PPD [44,45]. One study found that social support did not moderate the impact of domestic violence on PPD [8]. Domestic violence may be an important cause of PPD due to the deterioration of family economic conditions due to reduced household income and increased medication use by partners [43]. This also shows that under the impact of socio-economics during the pandemic, families may face greater survival pressure, which will lead to family conflicts. Therefore, we believe that there is also a risk of PPD in spending increased time with partners during the pandemic, and not all mothers with family members can effectively receive support. We found that the primary psychological effects of the pandemic, such as fear of infection in family members or infants, also significantly affected the prevalence and extent of PPD, which was consistent with previous research [46,47]. In addition, Gluska *et al.* [26] had found that as the pandemic progressed, the mental health of women who gave birth during this period continued to deteriorate, which also reminded medical institutions and families to pay attention to the mental health of pregnant patients during the COVID-19 period. Adverse social experiences can damage maternal mental health and may require investigations and increased social media regulation. Finally, it is gratifying to note that in completing this review, we found that with the emergence of the pandemic, research has been a significantly increased on social factors and maternal mental health, especially in 2020. This partly suggests that this issue is being valued more than before the pandemic. These differences can be attributed to the cultural context of different regions and the specific circumstances during the restriction period. While there has been significant research on social support and social restriction as the main factors influencing PPD in the COVID-19 pandemic, it is important to analyze the ways in which they affect the prevalence of PPD in mothers and to draw patterns from these findings in order to provide advice to mothers, their families, and healthcare workers.

For a preferred measure for defining PPD, we may suggest EPDS as the optimal choice as it was used in 21 of the included articles.

It must be acknowledged that this review also has some shortcomings: (1) This review is limited due to the

lack of confounding factors or limited adjustment of confounding factors in some included studies; (2) Studies using different scales to define PPD and the level of social support may have influenced the accuracy of our final conclusions; (3) The included studies were all observational studies, and more evidences is needed; (4) We only searched text in English.

5. Conclusion

We found that social support acted as an important protective factor for PPD during the COVID-19 pandemic and that social restriction increased the risk of PPD. EPDS may be the optimal choice for researchers to define PPD. Obstetricians should underline social factors for both pregnancy women and their families.

Availability of Data and Materials

The data that support the findings of this study are available on request from the corresponding author.

Author Contributions

HC: protocol development, data collection, manuscript writing. BF: protocol development, data collection, manuscript writing. YG: data collection, manuscript writing. WL: data collection, manuscript writing. YZ: data collection, manuscript writing. SL: conception, design and manuscript editing. JZ: protocol development, manuscript editing. All authors contributed to editorial changes in the manuscript. All authors read and approved the final manuscript. All authors have participated sufficiently in the work and agreed to be accountable for all aspects of the work.

Ethics Approval and Consent to Participate

Not applicable.

Acknowledgment

Not applicable.

Funding

This work was supported by Science and Technology Department of Chengdu, Key R&D Support Program (No. 2022-YF05-01551-SN) and Medical Technology Project, Health Commission of Sichuan Province (No. 21PJ051).

Conflict of Interest

The authors declare no conflict of interest.

Supplementary Material

Supplementary material associated with this article can be found, in the online version, at <https://doi.org/10.31083/j.ceog5010203>.

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