Original Article

The Effects of the COVID-19 Pandemic on Postpartum Depression: A Case-Control Study

Selma Hancioglu Aytac
Lecturer Midwife, Istanbul Esenyurt University, Faculty of Health Sciences, Department of Midwifery, Istanbul, Turkiye

Tuba Kizilkaya, PhD
Assistant Professor Midwife, Balikesir University, Faculty of Health Sciences, Department of Midwifery, Balikesir, Turkiye

Correspondence: Selma Hancioglu Aytac, Lecturer Midwife, Istanbul Esenyurt University, Faculty of Health Sciences, Department of Midwifery, Istanbul, Turkiye Email: aytacselma@gmail.com

Abstract
Introduction: There are different results about postpartum depression prevalence rates before and after COVID-19. It is important to recognise the post-COVID-19 effects. This study aimed to identify the postpartum depression levels before and after COVID-19
Methods: Unmatched case-control study was carried out among 51 mothers in the case group and 59 mothers in the control group.
Results: The types of childbirths and differences between these types in the before COVID-19 and After COVID-19 Group. EPDS scores were significantly low in the after COVID-19 Group.
Conclusion: In our study, after-COVID-19 pandemic, postpartum depression decreased. Comprehensive studies can be conducted about postpartum depression prevalence after COVID-19 process.

Keywords: Case-control, COVID-19, Midwifery, Postpartum depression.

Introduction

The COVID-19 pandemic began in late 2019 and there were different impacts on mental health worldwide. Postpartum depression is a crucial perinatal mental health problem and there could be various stressors (Liu, Wang & Wang, 2022). Prevalence of postpartum depression varies between %9.7 and %23.6 Turkiye (Aytac & Yazici, 2020; Cankaya, Yilmaz, Can, *et al.*, 2017) and it was found to be different rates 5.9%-32.7% after COVID-19 (Gok, Atigan & Gok, 2023; Kaydirak, Yilmaz, Demir, *et al.*, 2022; Yoruk, Acikgoz, Turkmen, *et al.*, 2020).

It was explained that the onset of the COVID-19 pandemic included major changes in postpartum care and created different challenges that could negatively affect the mental health of postpartum women (Low, Bono & Azmi, 2024). COVID-19 could be a stress factor for postpartum women (Yilmaz, Kaya, Gunaydın, *et al.*, 2024). It was provided evidence that the COVID-19 pandemic could be associated with an increased prevalence of postpartum depression (Zhang, Wang, Zuo, *et al.*, 2023). It was determined that the rate of postpartum depression during the COVID-19 pandemic was 34%, which was much higher than the rate before the pandemic period (Chen, Li, Xiong, *et al.*, 2022). Also, women who gave birth and went through the postpartum period during the COVID-19 pandemic are expressed as a high-risk and vulnerable group in terms of postpartum depression (Low, Bono & Azmi, 2024). On the other hand, COVID-19 was stated to be a protective factor against postpartum depression in some studies (Goyal & Selix, 2021; Pariente, Wissotzky Broder, Sheiner, *et al.*, 2020; Shorey, Ng & Chee, 2021).

Cesarean section rates were considered as an important parameter during COVID-19 (Eleje, Ugwu, Enebe, *et al.*, 2022; Ferreira, Bolognani, Santana, *et al.*, 2023; Gharacheh, Kalan, Khalili, *et al.*, 2023). With the pandemic, there were different approaches to labor and childbirth processes. In many

studies, cesarean section levels decreased in clinics and raised homebirth rates (Gutschow & Davis-Floyd, 2021; Nelson & Romanis, 2021; Rocca-Ihenacho & Alonso, 2020).

There are different results about the effect of COVID-19 to postpartum depression levels and it was recommended that similar studies be repeated in various centers. Based on this point, our study aimed to compare the level of postpartum depression in the before and after COVID-19 groups.

Methods

Design: In this unmatched case-control study, the case group includes women after the COVID-19 pandemic, and the control group comprises women before the COVID-19 pandemic, which is shown in Figure 1(Ielmini, Casarin, Callegari, *et al.*, 2024).

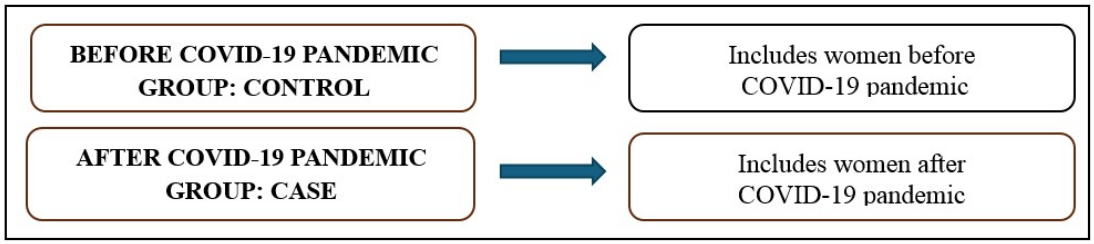

Figure 1. Definition of case and control groups

Setting: The research was conducted in a Family Health Center (ASM) which provides primary health care services in the Fatih district of Istanbul. It is observed that the female population of the Fatih district decreased from 215,421 to 178,967 between 2018 and 2023, when the data of the study were obtained. Fatih district most migration areas and migration gives one regions at the beginning income (Istanbul Provincial Directorate of Migration Management, 2023).

Postpartum follow-ups of mothers with records between January 1, 2018 and February 28, 2023 were scanned retrospectively.

As in many countries, telehealth services were provided in Turkiye during the COVID-19 pandemic. In particular, the "Special Monitoring Module" introduced in the Family Medicine Information System of primary health care services on 07.05.2020 allowed patients to be reached via telemedicine. Patients registered at the Health Center who were diagnosed with COVID-19 and did not require hospitalization and were subject to special monitoring were called every day for 14 days and provided via phone social support (Uludag Informatics, 2020).

Universe, Sample, Sampling Method: For the case-control studies, for example, using the OpenEpi © program of the research, a maximum of 34% joint size calculation was used. The prevalence of postpartum depression was calculated as 102 people at a 90% confidence level with an absolute deviation of 1%. A total of 110 mothers were included in the study.

Data Collection: The socio-demographic characteristics of the women included in the study were recorded in the family medicine information system, their delivery type, whether they had COVID-19, and the face-to-face Edinburgh screening test between the 2nd and 6th weeks after birth. Postpartum Depression Scale (EPDS) information was examined. Literature produced by researchers by examining prepared.

Descriptive Data Form: It includes questions about socio-demographic characteristics, delivery methods and whether they had COVID-19 or not (Ielmini, Casarin, Callegari, *et al.*, 2024; Koyucu & Karaca, 2021).

Edinburgh Postpartum Depression Scale (EPDS): It is a 10-question scale in which the mother is asked to report how she felt during the previous week by marking one of four different options (Cox, Holden & Sagovsky, 1987). Each item is scored between 0-3 and the total score is calculated. EPDS is the most used scale in the screening and evaluation of postpartum depression. Each item is scored

differently. Items 1, 2, and 4 are scored as 0, 1, 2, 3 while items 3, 5, 6, 7, 8, 9 and 10 are scored as 3, 2, 1. The Turkish validity and reliability study was conducted by Engindeniz et al., and the cut-off value was determined as 12 (Engindeniz, Kuey & Kultur, 1996). In our study Cronbach-α was 0.84.

Inclusion and Exclusion Criteria: The case group included mothers who were not receiving psychological treatment in the current period and gave birth between the 37th and 42nd weeks of pregnancy. Pregnant women who had received or were receiving psychological treatment and risky pregnant women were not included. The control group included postpartum women before the COVID-19 pandemic, and it was ensured that it had characteristics parallel to the case group.

Data Analysis: The data obtained from the study were analyzed using SPSS for Windows (version 20.0, Statistical Package for Social Sciences) program. Internal consistency for the scales used in the study was assessed with Cronbach's Alpha reliability coefficient. The distribution of the data was examined according to Skewness / Kurtosis (Kurtosis / Skewness) values and was found to be suitable for normal distribution (George, 2011). Statistics of continuous variables in the study are shown with mean, standard deviation, minimum and maximum values. Descriptive statistics of categorical variables were examined with frequency, percentage and Chi-square test. Independent Two Sample T-test (Independent Sample T-test) was used. The p value was taken as less than 0.05 for the significance level in the study. Bonferroni oxtail For TOC analysis, a p value below 0.01 was taken.

Ethical Consideration: The institutional permission for the study was obtained from the Istanbul Provincial Health Directorate. Ethics committee approval numbered 2023/71 was received from the Balikesir University Non-Interventional Ethics Committee on 04.07.2023.

Results

It examined socio-demographic data like group comparison, age interval, marriage age and education. After COVID-19 group (case) included 59 women and before COVID-19 (control) group was 51. It shows the educational status of the participants in the before and after COVID-19 pandemic periods and the differences between these groups. It reveals that the educational status of the participants showed a significant difference between the before and after COVID-19 groups (Table 1).

During the period before and after the COVID-19 pandemic , the number of pregnancies, the number of abortions , the number of births, the number of living children and the differences between these characteristics are given in Table 2. There is no statistically significant difference between the before and after COVID-19 Group periods in terms of the number of pregnancies. There is a statistically significant difference between the before and after COVID-19 periods in terms of the number of births and the number of living children. In particular, a significant increase was observed in the number of births and the number of living children in the After COVID-19 period (Table 2). There is a significant difference between the Before COVID-19 Group and After COVID-19 Group periods in terms of delivery methods. A significant increase was observed in the normal spontaneous childbirth (NSC) rate in the After COVID-19 Group-19 period, while a significant decrease was observed in the cesarean delivery (CS) rate. These results indicate that the COVID-19 pandemic has a significant impact on delivery methods (Table 2).

The EPDS scores of women were found to be significantly different in the before and after COVID-19 Group. EPDS scores were found to be significantly lower after COVID-19 group. Before and after COVID-19 groups' Edinburgh Postpartum Depression Scores (EPDS) were statistically significant. It was observed that EPDS scores decreased significantly in the after COVID-19 Group (Table 3).

In the after COVID-19 Group, it was shown that most of the participants (54.2%) have had the COVID-19 vaccine, the mRNA vaccine is the most common type (44.1%), and a significant portion (67.8%) have had COVID-19. It is also noteworthy that almost half of the participants (45.8%) have not been vaccinated. This shows that in the After COVID-19 period,

vaccination and disease status are important variables in society (Table 4).

Table 1: Socio-demographic characteristics of women.

Variables (N=110)	Category	Before COVID-19 Group (n=51)		After COVID-19 Group (n=59)		Test Station	
		mean±ss		mean±ss		t *	p
Age of marriage		22.96 ± 4.02		22.46 ± 4.46		0.62	0.54
		n	%**	n	%**	χ2***	p
Age	20-24 years old	9	17.6	7	11.9	6.08	0.11
	25-29 years old	12	23.5	27	45.8		
	30-34 years old	16	31.4	12	20.3		
	Ages 35 and above	14	27.5	13	22.0		
Education Status	Illiterate	1	2.0	0	0.0	11.10	**0.03**
	Primary school-literate	10	19.6	15	25.4		
	Middle school	6	11.8	1	1.7		
	High school	11	21.6	25	42.4		
	University and above	23	45.1	18	30.5		
	No	17	56.7	11	36.7		
Total		51	100	59	100		

* Independent Sample T test, **Column percentage was taken, ***Chi square analysis

Table 2: Obstetrical characteristics of the women

Variables (N=110)	Category	Before COVID-19 Group (n=51)		After COVID-19 Group (n=59)		Test Station	
		Mean±ss		Mean±ss		t *	p
Number of Pregnancies		2.33 ± 1.24		2.2 ± 1.28		0.54	0.59
Number of Births		0.92 ± 0.89		1.92 ± 1.07		-5.24	**0.00**
Number of Abortions		0.43 ± 0.73		0.34 ± 0.69		0.69	0.50
Number of Living Children		0.88 ± 0.86		1.92 ± 1.07		-5.51	**0.00**
		n	%**	n	%**	χ2***	p
Type of Birth	NSC	19	37.3	36	61.0	6.18	**0.01**
	CS	32	62.7	23	39.0		
Total		51	100	59	100		

*Independent Sample T test, **Column percentage was taken, ***Chi square analysis

Table 3: Womens' Edinburgh Postnatal Depression Score characteristics

Variables (N=110)	Category	Before COVID-19 Group (n=51)	After COVID-19 Group (n=59)	Test Station.	
		mean±ss	mean±ss	t *	p
EDPS		7.75 ± 6.81	5.05 ± 4.19	2.53	**0.01**

*Independent Sample T-test.

Table 4. After COVID-19 women's characteristics

Variables (N=59)	Category	After-COVID-19 (n=59)	
		n	%
Vaccination status	Yes	32	54.2
	No	27	45.8
COVID-19 Vaccine Type	mRNA	26	44.1
	Inactive	6	10.2
	None	27	45.8
COVID-19 transmission status	Yes	40	67.8
	No	19	32.2
Total		59	100

Discussion

In our study between case-control group, while age distribution, marriage ages, number of pregnancy pregnancies, number of children and abortion rate were similar between before and after COVID-19 groups. On the other hand, there are differences in parameters. So the study was conducted in an unmatched type.

Our results about childbirth characteristics indicate that the COVID-19 pandemic has a significant impact on birth modes. Cesarean section was lower significantly in the After COVID-19 group. Like this finding in other studies has the same results (Eleje, Ugwu, Enebe, *et al.*, 2022; Inversetti, Fumagalli, Nespoli, *et al.*, 2021). On the other hand, there are some studies in which cesarean section was higher than the before pandemic (Eleje, Ugwu, Enebe, *et al.*, 2022; Ferreira, Bolognani, Santana, *et al.*, 2023; Gharacheh, Kalan, Khalili, *et al.*, 2023; To, Zhu, Terebessy, *et al.*, 2024; Xue, Li, Chen, *et al.*, 2022). These differences between studies may be due to the following reasons like region, women's childbirth fear level, decreasing decreased hospital stay time and expectations of women.

In our study, postpartum depression rates were significantly lower in the after-COVID-19 group. This decrease may be associated with factors such as the mother's ability to focus more on herself and her baby in the post-pandemic period, work-life becoming flexible, and increased time spent at home (Gómez-Salgado, Andrés-Villas, Domínguez-Salas, *et al.*, 2020; Goyal & Selix, 2021).

On the contrary, in a cross-sectional study conducted by Turkgeldi and Yildiz (2021), which included a total of 163 mothers, 73 of whom were before the pandemic and 91 of whom were after the pandemic, it was determined that the pandemic did not affect the incidence of postpartum depression (Turkgeldi & Yildiz, 2021). Additionally, some studies show that increased uncertainty and isolation early in the pandemic may increase postpartum depression, but later in the pandemic, new mothers adapt to the situation and the risk of depression decreases (Goyal & Selix, 2021; Shorey, Ng & Chee, 2021). However, it should be recognized that some circumstances like economic difficulties, increasing health concerns, and social isolation caused by the pandemic increase the

risk of depression in some mothers (Mortazavi & Ghardashi, 2021). The combination of these two opposing effects may cause results to vary between certain groups. These results suggest that the COVID-19 pandemic positively affected postpartum depression scores, that is, a decrease in postpartum depression levels.

It is crucial to gain true information about health care. During pandemic the urgent development of telehealth services was an important need for healthcare providers and women (Kizilkaya & Aytac, 2020). Zhou et al. reported that the greatest positive impact on perceived social support levels during COVID-19 was the use of virtual social support tools and support provided by friends. They recommended implementing and investigating interventions to improve social support and mental health in this population, such as telehealth home support and peer support groups, for current and future pandemics (Zhou, Havens, Starnes, *et al.*, 2021).

In the health institution where our study was conducted, support was provided for special monitoring periods in addition to routine monitoring of postpartum women, which is consistent with the study of Zhou et al. (2021). With this online social support their postpartum depression risk factors could have been decreased.

Conclusion: Postpartum depression is a multifactorial mental health problem during the perinatal period. The COVID-19 pandemic can be a universal risk factor for mothers. Interestingly postpartum depression levels can be lower after the COVID-19 pandemic. For future comprehensive studies about postpartum depression can be conducted to gain deeper insight. Even though there is a before and after-pandemic study, other parameters affecting postpartum depression should also be taken into consideration. Continued prospective cohort studies and interventional studies, can pave the way for better outcomes for postpartum women worldwide.

References

Aytac, S.H. & Yazici, S. (2020) The effect of social support on pregnancy and postpartum depression. *Internation Journal of Caring Sciences*. 13 (1), 746.

Cankaya, S., Yilmaz, S.D., Can, R. & Kodaz, N.D. (2017) The effect of postpartum depression on maternal attachment. *Acıbadem University Health Sciences Journal*. (4), 232–240.

Chen, Q., Li, W., Xiong, J. & Zheng, X. (2022) Prevalence and risk factors associated with postpartum depression during the COVID-19 pandemic: a literature review and meta-analysis. *International Journal of Environmental Research and Public Health*. 19 (4), 2219.

Cox, J.L., Holden, J.M. & Sagovsky, R. (1987) Detection of postnatal depression: development of the 10-item Edinburgh Postnatal Depression Scale. *The British Journal of Psychiatry*. 150 (6), 782–786.

Eleje, G.U., Ugwu, E.O., Enebe, J.T., Okoro, C.C., et al. (2022) Cesarean section rate and outcomes during and before the first wave of COVID-19 pandemic. *SAGE Open Medicine*. [Online] 1020503121221085453. Available from: doi:10.1177/20503121221085453.

Engindeniz, N., Kuey, L. & Kultur, S. (1996) Validity and reliability study for the Turkish version of the Edinburgh Postpartum Depression Scale. In: *Book of Annual Meeting of Psychiatric Association of Turkey*. 1996 Ankara, Turkish Psychiatric Association Press. pp. 51–52.

Ferreira, D.P., Bolognani, C., Santana, L.A., Fernandes, S.E.S., et al. (2023) Impact of the COVID-19 pandemic on births, vaginal deliveries, cesarian sections, and maternal mortality in a brazilian metropolitan area: a time-series cohort study. *International Journal of Women's Health*. [Online] Volume 151693–1703. Available from: doi:10.2147/IJWH.S429122.

George, D. (2011) *SPSS for windows step by step: A simple study guide and reference, 17.0 update, 10/e*. Pearson Education India.

Gharacheh, M., Kalan, M.E., Khalili, N. & Ranjbar, F. (2023) An increase in cesarean section rate during the first wave of COVID-19 pandemic in Iran. *BMC Public Health*. [Online] 23 (1), 936. Available from: doi:10.1186/s12889-023-15907-1.

Gok, S., Atigan, A. & Gok, B. (2023) Frequency of postpartum depression and investigation of related factors. *Journal of Dokuz Eylul University Faculty of Medicine*. 36 (3), 287–295.

Gómez-Salgado, J., Andrés-Villas, M., Domínguez-Salas, S., Díaz-Milanés, D., et al. (2020) Related health factors of psychological distress during the COVID-19 pandemic in

Spain. *International Journal of Environmental Research and Public Health*. 17 (11), 3947.

Goyal, D. & Selix, N.W. (2021) Impact of COVID-19 on maternal mental health. *The American Journal of Maternal/Child Nursing*. 46 (2), 103–109.

Gutschow, K. & Davis-Floyd, R. (2021) The impacts of COVID-19 on US maternity care practices: a followup study. *Frontiers in Sociology*. 6655401.

Ielmini, M., Casarin, J., Callegari, C., Bellini, A., et al. (2024) Pre-pandemic predictivity of anxious-depressive symptoms in post-surgical traumatic distress in hysterectomy for benign disease and covid-19 outbreak: a case-control study. *Journal of Clinical Medicine*. [Online] 13 (11), 3148. Available from: doi:10.3390/jcm13113148.

Inversetti, A., Fumagalli, S., Nespoli, A., Antolini, L., et al. (2021) Childbirth experience and practice changing during COVID-19 pandemic: A cross-sectional study. *Nursing Open*. [Online] 8 (6), 3627–3634. Available from: doi:10.1002/nop2.913.

Istanbul Provincial Directorate of Migration Management (2023) *Press release about immigrant in Istanbul*. [Online]. 2023. Available from: https://istanbul.goc.gov.tr/istanbul-ilinde-bulunan-yabancilar-hakkinda-basin-aciklamasi-18062023 [Accessed: 19 January 2025].

Kaydirak, M., Yilmaz, B., Demir, A. & Oskay, U. (2022) The relationships between prenatal attachment, maternal anxiety, and postpartum depression: A longitudinal study. *Perspectives in Psychiatric Care*. [Online] 58 (2), 715–723. Available from: doi:10.1111/ppc.12841.

Kizilkaya, T. & Aytac, S.H. (2020) Pregnancy and Tele-Health in COVID-19 Pandemic. *Journal of Ege University Faculty of Nursing*. 36 (3), 189–198.

Koyucu, R.G. & Karaca, P.P. (2021) The Covid 19 outbreak: maternal mental health and associated factors. *Midwifery*. 99103013.

Liu, X., Wang, S. & Wang, G. (2022) Prevalence and risk factors of postpartum depression in women: a systematic review and meta-analysis. *Journal of Clinical Nursing*. [Online] 31 (19–20), 2665–2677. Available from: doi:10.1111/jocn.16121.

Low, S.R., Bono, S.A. & Azmi, Z. (2024) Prevalence and Factors of Postpartum Depression During the COVID-19 Pandemic: A Review. *Current Psychology*. [Online] 43 (13), 12084–12101. Available from: doi:10.1007/s12144-022-04181-w.

Mortazavi, F. & Ghardashi, F. (2021) The lived experiences of pregnant women during COVID-19 pandemic: a descriptive phenomenological study. *BMC Pregnancy and Childbirth*. [Online] 21 (1), 193. Available from: doi:10.1186/s12884-021-03691-y.

Nelson, A. & Romanis, E.C. (2021) The Medicalisation of childbirth and access to homebirth in the UK: COVID-19 and beyond. *Medical Law Review*. 29 (4), 661–687.

Pariente, G., Wissotzky Broder, O., Sheiner, E., Lanxner Battat, T., et al. (2020) Risk for probable post-partum depression among women during the COVID-19 pandemic. *Archives of Women's Mental Health*. [Online] 23 (6), 767–773. Available from: doi:10.1007/s00737-020-01075-3.

Rocca-Ihenacho, L. & Alonso, C. (2020) Where do women birth during a pandemic? Changing perspectives on Safe Motherhood during the COVID-19 pandemic. *Journal of Global Health Science*. [Online] 2 (1). Available from: https://openaccess.city.ac.uk/id/eprint/24135/ [Accessed: 19 January 2025].

Shorey, S.Y., Ng, E.D. & Chee, C.Y.I. (2021) Anxiety and depressive symptoms of women in the perinatal period during the COVID-19 pandemic: A systematic review and meta-analysis. *Scandinavian Journal of Public Health*. [Online] 49 (7), 730–740. Available from: doi:10.1177/14034948211011793.

To, T., Zhu, J., Terebessy, E., Borkhoff, C.M., et al. (2024) Mode of delivery and birth outcomes before and during COVID-19–A population-based study in Ontario, Canada. *Plos One*. 19 (5), e0303175.

Turkgeldi, E. & Yildiz, S. (2021) Has the COVID-19 pandemic increased postpartum depression risk? *Medical Journal of Gynecology-Obstetrics and Neonatology*. 18 (3), 951–958.

Uludag Informatics (2020) *NBYS® General practitioner-featured monitoring module*. [Online]. 7 May 2020. Available from: https://uludagbilisim.com/haber/nbys-ah-_-ozellikli-izlem-modulu- [Accessed: 19 January 2024].

Xue, R.-H., Li, J., Chen, L., Li, Z.-Z., et al. (2022) Alternations of cesarean section rates in a non-infected population after the outbreak of COVID-19: a cross-sectional study. *Psychology, Health & Medicine*. [Online] 27 (9), 1877–1883. Available from: doi:10.1080/13548506.2021.1893768.

Yilmaz, T., Kaya, H.D., Gunaydın, S. & Dızaj, P.A. (2024) Postpartum experiences of women during the covid-19 pandemic: A qualitative study. *Journal of Women's Health Nursing*. 10 (2), 75–89.

Yoruk, S., Acikgoz, A., Turkmen, H. & Karlidere, T. (2020) *The prevalence of postpartum depression and the correlation of perceived social support and quality of life with postpartum depression: A longitudinal study*. [Online] Available from: https://dspace.balikesir.edu.tr/xmlui/handle/20.500.12462/11092 [Accessed: 10 January 2025].

Zhang, X., Wang, C., Zuo, X., Aertgeerts, B., et al. (2023) Study characteristical and regional influences on postpartum depression before vs. during the COVID-19 pandemic: A systematic review and meta-analysis. *Frontiers in Public Health*. 111102618.

Zhou, J., Havens, K.L., Starnes, C.P., Pickering, T.A., et al. (2021) Changes in social support of pregnant and postnatal mothers during the COVID-19 pandemic. *Midwifery*. 103103162.