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Effects of the COVID-19 Pandemic on Health Behaviors and Mental Health during Pregnancy: A Systematic Review

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Abstract

The Coronavirus pandemic had many negative impacts on healthcare. During the COVID-19 pandemic, specialist care providers closed their offices to reduce transmission. Maternal healthcare was severely impacted. Mothers were unable to receive the prenatal and perinatal care they needed. Other specialist care, such as mental healthcare was severely impacted as well. There was also a lack of prenatal care occurring due to offices being closed. There is an established link between anxiety, depression, emotional eating, and Gestational weight gain. Gestational Weight Gain is associated with a higher prevalence of behavioral health conditions that were exacerbated by the COVID-19 pandemic.

Keywords: COVID-19, Pandemic, Gestational Weight Gain, Behavior Health Factors

Introduction

A Healthy Pregnancy is defined as a pregnancy that lasts the full nine months(New York State Department of Health, n.d). The baby is born at least five and a half pounds and has no birth defects (New York State Department of Health, n.d.). The mother also has no pregnancy issues other than morning sickness(New York State Department of Health, n.d.). There are many factors that contribute to a healthy pregnancy. One of those factors is weight gain (Michigan Medicine, 2020). Gestational Weight Gain has been defined as the weight a woman gains during her pregnancy (American College of Obstetricians and Gynecologists, n.d..). Gestational Weight Gain is the body's natural response to accommodate the growing fetus ("Factors associated with gestational weight gain: A cross-sectional survey," 2018).

There are different weight gain guidelines for women of different BMIs. An underweight woman is recommended to gain 28-40 pounds(American College of Obstetricians and Gynecologists, n.d.). A woman with a Normal weight is recommended to gain 25-35 pounds(American College of Obstetricians and Gynecologists, n.d.). An overweight woman is recommended to gain 15-25 pounds(American College of Obstetricians and Gynecologists, n.d.). An obese woman is recommended to gain 11-20 pounds(American College of Obstetricians and Gynecologists, n.d.). Gestational Weight Gain becomes unhealthy when a woman gains weight outside of the recommended parameters. High Gestational Weight Gain predisposes you to medical conditions. These medical conditions include Gestational Diabetes, Preeclampsia, and Preterm birth (Michigan Medicine, 2020).

Covid-19 was first identified by the WHO in December 2019 and was classified as a global pandemic on March 11, 2020 ("COVID-19 and your health," 2021). As of Dec 22, 2021, Covid-19 was still classified as a global pandemic("COVID-19 and your health," 2021). Covid-19 has caused an overall increase in the presence of mental health disorders ("Symptoms of anxiety or depressive disorder and use of mental health," 2021). Specifically, reported anxiety and depression symptoms increased from 36.4 % to 41.5% ("Symptoms of anxiety or depressive disorder and use of mental health," 2021). Anxiety and Depression are the most commonly reported mental health disorders in pregnant women ("Prevalence of anxiety and depression among pregnant women during the COVID-19 pandemic: A meta-analysis," 2021). A common symptom of Anxiety and Depression comorbidity is overeating and unhealthy eating habits (Cecchetto et al., 2021).

The purpose of this study was to understand the effects of the COVID-19 pandemic on health behaviors and mental health and how it affects gestational weight gain during pregnancy. This scoping review was conducted according to the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Statement.

Methods

Selection

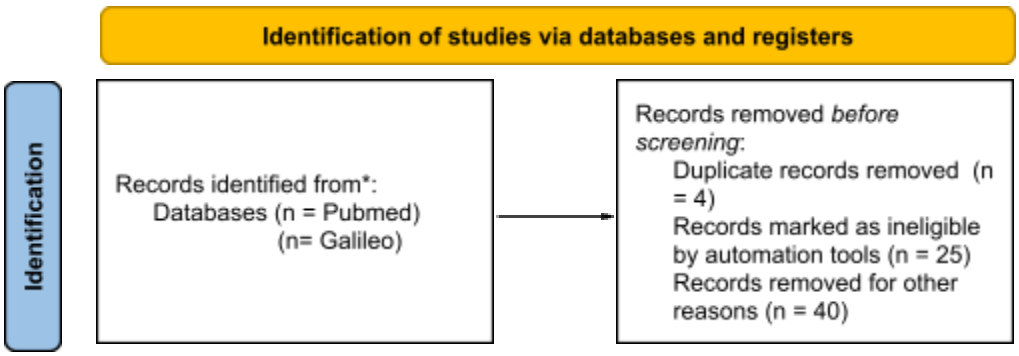
Studies were selected based on multiple criteria. The databases used to collect articles were Galileo and PubMed.The basic filter criteria were articles were: no more than 2 years old, full text available online, and peer-reviewed. The key search terms were:

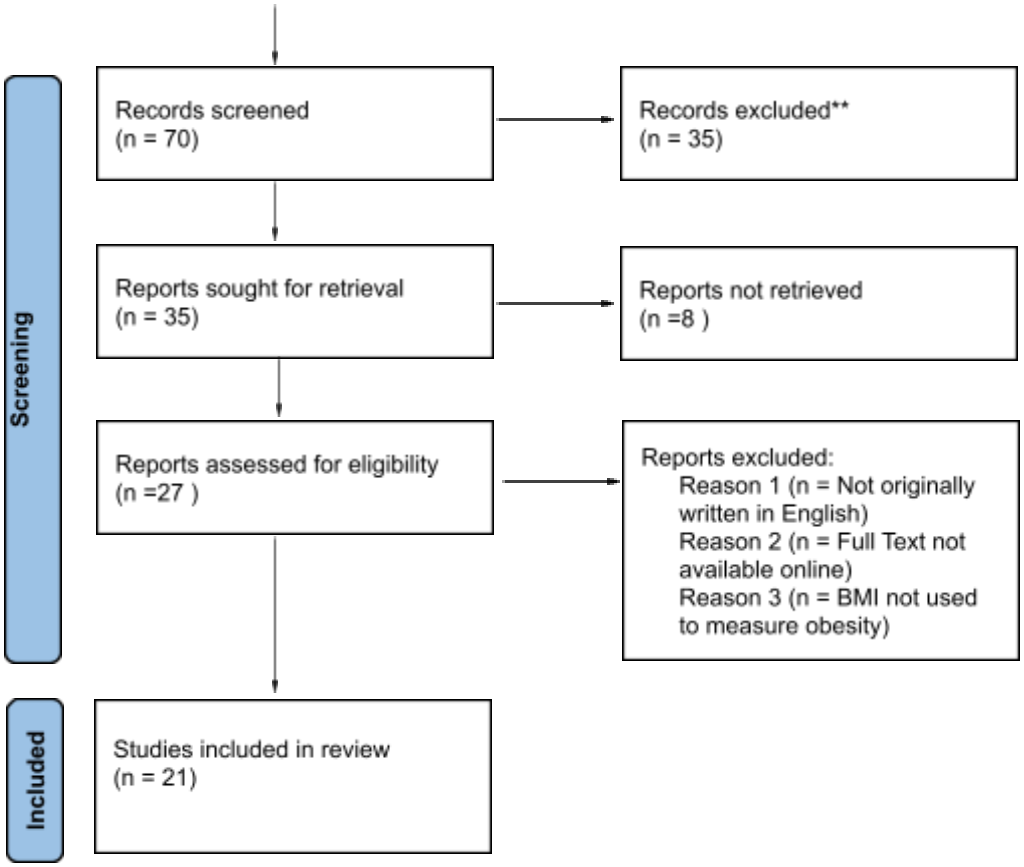
Covid-19, Gestational Weight Gain, Behavior Health Factors: depression, anxiety, smoking, stress, and Maternal Mental Health. The inclusion criteria were: the article was written in English, the full text of the article was available online, and the article uses BMI to measure obesity. The exclusion criteria were: the article was not written in English, the full text of the article was not available online, and the article does not use BMI to measure obesity.

PRISMA was used to organize the filtering of the articles. PRISMA is an organizational method used to explain why certain articles are selected over others. The two components of PRISMA are a flowchart and a checklist. PRISMA was developed in 2005 by a group of 29 review authors(Liberati et al., 2009). It is primarily used for Meta-Analyses and Systematic Reviews (Liberati et al., 2009).

A keyword search was performed in both PubMed and Galileo databases. After a preliminary filter under the criteria of; the article is less than 2 years old, the article is peer-reviewed, and free full text; there were 70 articles left. 35 articles were excluded due to being inapplicable to the topic. 8 articles were unable to be retrieved from the 35 remaining articles. 6 more articles were excluded from the review based on the criteria of; an article not originally written in English, full text not available online, and the article does not measure obesity on the BMI scale.

PRISMA





Synthesis of Findings

A total of 139 articles were identified in the preliminary search. 70 were screened, 35 were retrieved, and 27 were assessed for eligibility. 21 total articles were included in the review. 7 articles were retrieved from Galileo and 14 were retrieved from PubMed. The articles were retrieved over the course of the Fall of 2021 and the Spring of 2022. The articles included systematic reviews, meta-analyses, and primary data collection.

The incidence of high gestational weight gain was higher during the COVID-19 pandemic (Du, et al., 2021;Kirchengast, Hartmann.,2021;Zhang et al., 2020). The COVID-19 pandemic exacerbated the already higher rate of anxiety and depression found in pregnant women(Ceulemans et al., 2021;Koltar et al ., 2021). There are many factors

that are believed to have contributed to the increase in gestational weight gain. Among these factors is an increase in social isolation, anxiety, depression, and emotional eating due to the COVID-19 pandemic (Badon et al., 2019; Zhang et al., 2020). As a result, an association between the COVID-19 pandemic and an increased rate of gestational weight gain was found(Du, et al., 2021; Zhang et al., 2020).

The COVID-19 pandemic produced many negative mental health outcomes. An increase in both anxiety and depression occurred (Almeida, et al., 2020; Goyal, Selix., 2021; Hossain, et al., 2020).Anxiety and depression are linked to gestational weight gain(Athar , et al., 2021;Benham, et al., 2021). Six of the articles found that anxiety, depression, and emotional eating are associated with gestational weight gain(Athar , et al., 2021; Badon et al., 2019; Braig et al., 2020;Ceulemans et al., 2021;Eichler et al.,b 2021; Feng et al., 2021; Zhang et al., 2020). 8 of the articles found that the rate of anxiety, depression, and emotional eating increased during the COVID-19 pandemic(Almeida, et al., 2020;Ceulemans et al., 2021;Eichler et al.,b 2021;Goyal, Selix., 2021;Hossain, et al., 2020; Koltar et al ., 2021; Ruyak, Kivlighan., 2021;Zhang et al., 2020). 4 articles found that the rate of gestational weight gain increased during the COVID-19 pandemic(Ceulemans et al., 2021; Du, et al., 2021;Kirchengast, Hartmann.,2021; Zhang et al., 2020). As a result of this information, it was found that there was an association between behavioral health factors, the COVID-19 pandemic, and an increase in the rate of gestational weight gain (Ceulemans et al., 2021; Du, et al., 2021;Feng et al., 2021;Kirchengast, Hartmann.,2021;).

Discussion

Pregnant women already have higher rates of mental health issues, especially, anxiety and depression when compared to other people (Ceulemans et al., 2021). The Covid-19 pandemic has exacerbated this problem even more. (Koltar et al ., 2021; Ruyak, Kivlighan., 2021). Research shows that anxiety has been linked to unintentional weight gain which could lead to other chronic diseases and complications during pregnancy(Athar, et al., 2021; Feng et al., 2021; Eichler et al.,b 2021). The COVID-19 pandemic is not the first time isolation led to a decline in maternal health. During the SARS outbreak from 2002 to 2004, there was an increase in depressive symptoms, maternal attachment, and anxiety (Köhler-Dauner, et al, 2022). Children also suffered mental health consequences such as an increase in depressive symptoms and poor social development (Köhler-Dauner, et al, 2022).

Unfortunately, there were inadequate resources present to treat anxiety and depression during the COVID-19 pandemic(Almeida, et al., 2020; Goyal, Selix., 2021) which disproportionately affected women from vulnerable populations (Ruyak, Kivlighan., 2021; Hossain, et al., 2020; Zhang et al., 2020). The COVID-19 pandemic has also resulted in limited access to healthcare. Specialist offices such as OBGYNs, therapists, and pediatricians closed and reduced their patient intake. As a result, a gap in healthcare occurred (Goyal, Selix., 2021). Maternal healthcare, mental healthcare, and other types of specialty care saw a decrease in overall care provision (Ruyak, Kivlighan., 2021).

Providers did utilize telemedicine during the lockdown period, but it was overall reviewed as ineffective in providing the level of care needed by many patients (Colbert,

G. B, et al, 2020). Patients reported feeling as though their needs were not met and no attempt was made to address the problem(Colbert, G. B, et al, 2020). Social connections also suffered during the COVID-19 pandemic. Due to isolation, pregnant women were unable to access the social support they needed. Social support from friends and family is necessary during the pre and postnatal period. Isolation can lead to an increase in anxiety and depression(Ceulemans et al., 2021;Koltar et al ., 2021).

Some of the lessons learned from this pandemic are that we need to be better prepared in the areas of policy, communication between providers, maternal health education, and improved healthcare technology. Telemedicine is a great platform, but it has many barriers such as cost, effectiveness, and accessibility. (Colbert, et al., 2020) Accessibility to healthcare also needs to be improved. Minority and poor populations suffered more during the pandemic due to a lack of healthcare accessibility (Colbert, et al., 2020). Besides, improvements need to be made in the areas of health education, knowledge of resources, and quality of care.

Some of the limitations of this review are no primary data collection, and the information is primarily based on US studies so the results might not be globally applicable. Besides, all of the information related to the impacts of COVID-19 is recent. It has yet to be completely explored. There continues to be a plethora of new information being pushed out relating to the COVID-19 pandemic and prenatal and perinatal health.

Further research is needed in regards to the full scope of the effects the COVID-19 pandemic had on mental health and in the areas of the impacts of virtual healthcare and telehealth.

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Appendix

Appendix A: Prisma Checklist

Section and Topic	Item #	Checklist item	Location where item is reported
TITLE			
Title	1	Effects of the COVID-19 Pandemic on Health Behaviors and Mental Health on Gestational Weight Gain during Pregnancy: A Systematic Review	1
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	3
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	4
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	5
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	5
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	5
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	5
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record	5

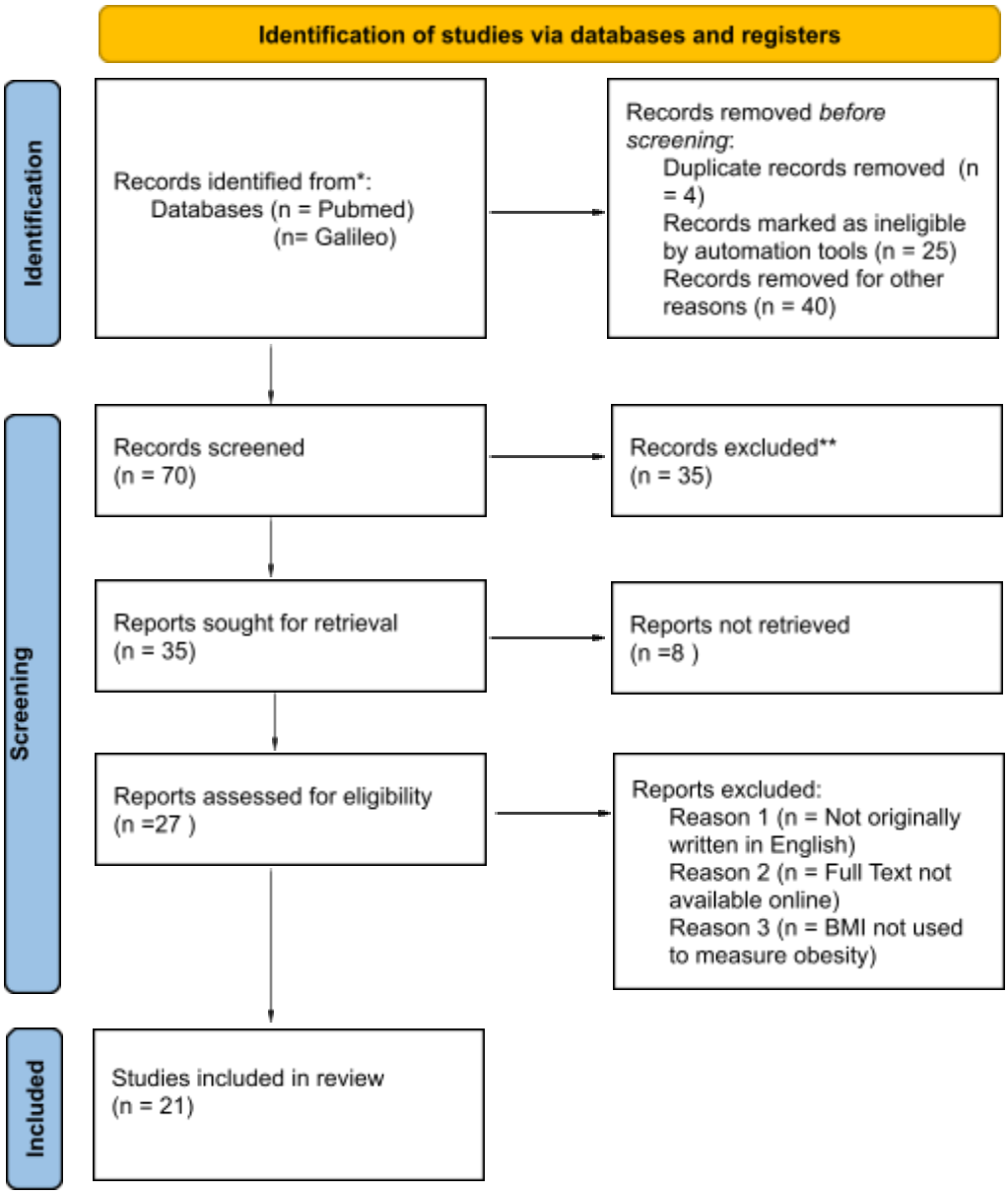
Section and Topic	Item #	Checklist item	Location where item is reported
		and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	5
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	6
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	6
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	5
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	n/a

Section and Topic	Item #	Checklist item	Location where item is reported
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	n/a
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	n/a
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	6
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	n/a
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	n/a
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	n/a
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	n/a
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	n/a
RESULTS			
Study selection	16a	Describe the results of the search and selection process, from the number	

Section and Topic	Item #	Checklist item	Location where item is reported
		of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	7
Study characteristics	17	Cite each included study and present its characteristics.	7
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	n/a
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	n/a
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	n/a
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	n/a
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	8
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	8
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	n/a

Section and Topic	Item #	Checklist item	Location where item is reported
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	8
DISCUSSION			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	9
	23b	Discuss any limitations of the evidence included in the review.	10
	23c	Discuss any limitations of the review processes used.	10
	23d	Discuss implications of the results for practice, policy, and future research.	10
OTHER INFORMATION			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	n/a
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	n/a
	24c	Describe and explain any amendments to the information provided at registration or in the protocol.	n/a
Support	25	No funding was provided to complete this review.	n/a
Competing interests	26	There are no competing interests.	n/a
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	19

Appendix B: Prisma Diagram



Appendix C: Article Matrix

Galileo
PubMed

Article APA Citation	Article Title	In-text citation	Methods	Results/conclusions
Ceulemans, M., Foulon, V., Ngo, E., Panchaud, A., Winterfeld, U., Pomar, L., Lambelet, V., Cleary, B., O'Shaughnessy, F., Passier, A., Richardson, J. L., Hompes, T., & Nordeng, H. (2021). Mental health status of pregnant and breastfeeding women during the COVID-19	Mental health status of pregnant and breastfeeding women during the COVID‐19 pandemic—A multinational cross‐sectional study	(Ceulemans et al., 2021)	Cross-sectional/ web-based study.	A high rate of anxiety and depression has been seen in pregnant women.

pandemic-A multinational cross-sectional study. *Acta obstetricia et gynecologica Scandinavica*, *100*(7), 1219–1229. https://doi.org/10.1111/aogs.14092				
Kotlar, B., Gerson, E., Petrillo, S., Langer, A., & Tiemeier, H. (2021). The impact of the COVID-19 pandemic on maternal and	The Covid 19 outbreak: Maternal Mental Health and Associated Factors	(Koltar et al ., 2021)	Online survey	The incidence of mental disorders in pregnant women during the pandemic period was much higher than that during the pre-pandemic period

perinatal health: a scoping review. *Reproductive health*, *18*(1), 10. https://doi.org/10.1186/s12978-021-01070-6				
Goyal, D., & Selix, N. W. (2021). Impact of COVID-19 on Maternal Mental Health. MCN. The American journal of maternal child nursing, 46(2), 103–109. https://doi.org/10.1097/NMC.00	Impact of COVID-19 on Maternal Mental Health	(Goyal, Selix., 2021)	Systematic review	Determined that anxiety and depression were higher during the Covid-19 pandemic and that there were inadequate resources to suffice.

0000000000069 2				
Zhang, J., Zhang, Y., Huo, S., Ma, Y., Ke, Y., Wang, P., & Zhao, A. (2020). Emotional Eating in Pregnant Women during the COVID-19 Pandemic and Its Association with Dietary Intake and Gestational Weight Gain. *Nutrients*, *12*(8), 2250. https://doi.org/10.3390/nu12082	Emotional Eating in Pregnant Women during the COVID-19 Pandemic and Its Association with Dietary Intake and Gestational Weight Gain	Zhang et al., 2020	Retrospective study	This study revealed that EE occurred in a proportional number of pregnant women during the COVID-19 pandemic and that women living in severely affected areas who were strongly worried about the pandemic and who had lower physical activity levels had a higher tendency of EE. Mediated by craving certain food, EE was associated with excess GWG

250				
Kirchengast, S., & Hartmann, B. (2021). Pregnancy Outcome during the First COVID 19 Lockdown in Vienna, Austria. International journal of environmental research and public health, 18(7), 3782. https://doi.org/10.3390/ijerph18073782	Pregnancy Outcome during the First COVID 19 Lockdown in Vienna, Austria	(Kirchengast, Hartmann.,2021)	Retrospective medical record study	Gestational weight gain, however, was significantly higher during the lockdown months. Furthermore, gestational weight gain was significantly associated with birth weight and gestational length.
Almeida, M., Shrestha, A. D., Stojanac, D., & Miller, L. J.	The impact of the COVID-19 pandemic on women's mental	(Almeida, et al., 2020)	Lit and narrative review	The COVID-19 pandemic may have exacerbated gender-linked mental

(2020). The impact of the COVID-19 pandemic on women's mental health. *Archives of women's mental health*, *23*(6), 741–748. https://doi.org/10.1007/s00737-020-01092-2	health			health challenges.
Hossain, M. M., Tasnim, S., Sultana, A., Faizah, F., Mazumder, H., Zou, L., McKyer, E., Ahmed, H. U., & Ma, P. (2020). Epidemiology of	Epidemiology of mental health problems in COVID-19: a review	(Hossain, et al., 2020)	Lit review	COVID-19 is a global public health emergency with enormous impacts on mental health. This narrative review found that individuals affected in the pandemic may have a high epidemiological burden of depression, anxiety

mental health problems in COVID-19: a review. F1000Research, 9, 636. https://doi.org/10.12688/f1000research.24457.1				disorders, stress, panic attack, somatization disorder, sleep disorders, emotional disturbance, PTSD symptoms, suicidal behavior, and many more mental health problems. Moreover, a wide range of demographic and psychosocial factors are associated with mental health problems during this pandemic that highlights some people who are especially vulnerable to those adverse outcomes.
Ruyak, S. L., & Kivlighan, K. T. (2021). Perinatal Behavioral	Perinatal Behavioral Health, the COVID-19	(Ruyak, Kivlighan., 2021)	Lit review	The behavioral health status of the United States is far worse than that of other countries.

Health, the COVID-19 Pandemic, and a Social Determinants of Health Framework. JOGNN: Journal of Obstetric, Gynecologic & Neonatal Nursing, 50(5), 525–538. https://doi.org/10.1016/j.jogn.2021.04.012	Pandemic, and a Social Determinants of Health Framework.			Pregnancy and the postpartum period represent a time of great risk. Critically, COVID-19 disproportionately affects the vulnerable population of pregnant women, further escalating the risk of adverse health outcomes for women and their infants.
Du, M., Yang, J., Han, N., Liu, M., & Liu, J. (2021). Association between the	Association between the COVID-19 pandemic and the risk for adverse	(Du, et al., 2021)	Retrospective cohort study	During the COVID-19 pandemic, more women manifested either insufficient or excessive gestational weight gain; and the risk of premature

COVID-19 pandemic and the risk for adverse pregnancy outcomes: a cohort study. BMJ Open, 11(2), e047900. https://doi.org/10.1136/bmjopen-2020-047900	pregnancy outcomes: a cohort study			rupture of membranes and fetal distress was also higher during the pandemic.
Badon, S. E., Hedderson, M. M., Hyde, R. J., Quesenberry, C. P., & Avalos, L. A. (2019). Pre- and Early Pregnancy Onset Depression and Subsequent Rate	Pre- and Early Pregnancy Onset Depression and Subsequent Rate of Gestational Weight Gain	(Badon et al., 2019)	Screening of women at 6 and 20 weeks both in women w/ and w/out depression	Women with prepregnancy onset depression may be at higher risk for GWG both below and above recommendations. Women with early onset prenatal depression may be at slightly higher risk for GWG rate above

of Gestational Weight Gain. *Journal of women's health (2002)*, *28*(9), 1237–1245. https://doi.org/10.1089/jwh.2018.7497				recommendations.
Braig, S., Logan, C. A., Reister, F., Rothenbacher, D., & Genuneit, J. (2020). Psychosocial stress and longitudinally measured gestational weight gain throughout	Psychosocial stress and longitudinally measured gestational weight gain throughout pregnancy: The Ulm SPATZ Health Study	(Braig et al., 2020)	cohort	Stress and anxiety are associated with a higher rate of GWG

pregnancy: The Ulm SPATZ Health Study. Scientific reports, 10(1), 1996. https://doi.org/10.1038/s41598-020-58808-8				
Eichler, J., Schmidt, R., Hiemisch, A., Kiess, W., & Hilbert, A. (2019). Gestational weight gain, physical activity, sleep problems, substance use, and food intake as proximal risk	Gestational weight gain, physical activity, sleep problems, substance use, and food intake as proximal risk factors of stress and depressive symptoms during pregnancy	(Eichler et al.,b 2021)	Regression analyses on baseline population	GWG associated with stress, lack of sleep, and depressive symptoms

factors of stress and depressive symptoms during pregnancy. BMC pregnancy and childbirth, 19(1), 175. https://doi.org/10.1186/s12884-019-2328-1				
Feng, Y. Y., Yu, Z. M., van Blyderveen, S., Schmidt, L., Sword, W., Vanstone, M., Biringer, A., McDonald, H., Beyene, J., & McDonald, S. D. (2021).	Gestational weight gain outside the 2009 Institute of Medicine recommendations: novel psychological and behavioral factors associated with	(Feng et al., 2021)	Survey of a group of women measuring behavioral and physical health factors	Identified behavioral health factors associated with an increased risk on GWG

Gestational weight gain outside the 2009 Institute of Medicine recommendations: novel psychological and behavioral factors associated with inadequate or excess weight gain in a prospective cohort study. BMC pregnancy and childbirth, 21(1), 70. https://doi.org/10.1186/s12884-021-03555-5	inadequate or excess weight gain in a prospective cohort study			

Al-Hassany, L., Wahab, R. J., Steegers, E. A. P., Jaddoe, V. W. V., & Gaillard, R. (2020). Smoking cessation in early-pregnancy, gestational weight gain and subsequent risks of pregnancy complications. EUROPEAN JOURNAL OF OBSTETRICS & GYNECOLOGY AND REPRODUCTIVE BIOLOGY, 253, 7–14.	Smoking cessation in early-pregnancy, gestational weight gain and subsequent risks of pregnancy complications	(Al-Hassany , et al., 2021)	Self-reported data, cross sectional survey	We observed that smoking cessation in early-pregnancy was not associated with a higher period-specific or total gestational weight gain, as compared to continued smoking during pregnancy

https://doi.org/10.1016/j.ejogrb.2020.07.040				
Vehmeijer, F. O. L., Balkaran, S. R., Santos, S., Gaillard, R., Felix, J. F., Hillegers, M. H. J., El Marroun, H., & Jaddoe, V. W. V. (2020). Psychological Distress and Weight Gain in Pregnancy: a Population-Based Study. International Journal of Behavioral Medicine, 27(1),	Psychological Distress and Weight Gain in Pregnancy: a Population-Based Study	(Vehmeijer, et al., 2020)	Population based prospective cohort study	No behavioral health factors were associated with GWG, anxiety was associated with inadequate GWG

30–38.				
Benham, J. L., Booth, J. E., Donovan, L. E., Leung, A. A., Sigal, R. J., & Rabi, D. M. (2021). Prevalence of and risk factors for excess weight gain in pregnancy: a cross-sectional study using survey data. *CMAJ open*, *9*(4), E1168–E1174. https://doi.org/10.9778/cmajo.20200276	Prevalence of and risk factors for excess weight gain in pregnancy: a cross-sectional study using survey data	(Benham, et al., 2021)	cross -sectional survey of self reported data	Risk factors for excess gestational weight gain were lower education level, white or Indigenous identity, smoking, mood disorder, anxiety disorder and Canadian citizenship.

Athar, U., Daud, N., Khan, W. A., Khalid, A., & Gill, S. I. (2021). Caught Between External Pressures and Internal Battles: Psychosocial Factors Affecting Gestational Weight Gain - A Scoping Review. Cureus, 13(2), e13487. https://doi.org/10.7759/cureus.13487	Caught Between External Pressures and Internal Battles: Psychosocial Factors Affecting Gestational Weight Gain - A Scoping Review	(Athar , et al., 2021)	Systematic review	Based on our findings, GWG is influenced by certain psychosocial factors, including, but not limited to, intimate partner violence, lack of social support and recognition, financial distress, household food insecurity, chronic stress and depression related to pregnancy, eating pathologies, and low self-esteem.
Haddad, C., Bou Malhab, S., Sacre, H., &	Smoking and COVID-19: A Scoping Review	(Haddad, et al., 2021)	Systematic review	Higher smoking prevalence since Covid-19 pandemic

Salameh, P. (2021). Smoking and COVID-19: A Scoping Review. Tobacco Use Insights, 1–9. https://doi.org/10.1177/1179173X21994612				
Maloney, S. F., Combs, M., Scholtes, R. L., Underwood, M., Kilgalen, B., Soule, E. K., & Breland, A. B. (2021). Impacts of COVID-19 on cigarette use, smoking behaviors, and	Impacts of COVID-19 on cigarette use, smoking behaviors, and tobacco purchasing behaviors	(Maloney, et al., 2021)	Online multi step study, survey, analyses of responses	There may be an increase in cigarette and e-cigarette use due to Covid-19. Smoking keeps people calm.

tobacco purchasing behaviors. Drug and alcohol dependence, 229(Pt B), 109144. https://doi.org/10.1016/j.drugalcdep.2021.109144				
Hegaard, H. K., Rom, A. L., Christensen, K. B., Broberg, L., Høgh, S., Christiansen, C. H., Nathan, N. O., de Wolff, M. G., & Damm, P. (2021). Lifestyle Habits among	Lifestyle Habits among Pregnant Women in Denmark during the First COVID-19 Lockdown Compared with a Historical Period-A Hospital-Based	(Hegaard , et al. 2021)	Cross sectional study	Women who were pregnant during the first national lockdown in Denmark due to the COVID-19 pandemic changed their lifestyle habits in early pregnancy, with a lower level of exercise and a lower level of binge drinking compared to

Pregnant Women in Denmark during the First COVID-19 Lockdown Compared with a Historical Period-A Hospital-Based Cross-Sectional Study. International journal of environmental research and public health, 18(13), 7128. https://doi.org/10.3390/ijerph18137128	Cross-Sectional Study			women who were pregnant the year before.