



Length of Maternity Leave Impact on Mental and Physical Health of Mothers and Infants, a Systematic Review and Meta-analysis

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Accepted: 8 September 2022 / Published online: 12 April 2023

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Abstract

Background Recent legislative decisions in the United States have encouraged discussion about national parental leave programs. Currently, over 47% of the United States workforce is female. However, the United States is the only nation of the 37 member countries in the Organization for Economic Co-Operation and Development (OECD) to have no national requirement for maternity leave. The first few months of a child's life are vital to their physical and mental development. Likewise, a gradual return to pre-partum functioning is important for a newly postpartum woman. While it has been shown that maternity leave positively impacts various measures of maternal and infant mental and physical health, we lack consensus on the optimal length of paid or unpaid maternity leave. Accordingly, we conducted a systematic review and meta-analysis to evaluate the optimal length of paid or unpaid maternity leave to encourage maternal and infant mental and physical health in the United States.

Methods A systematic review and meta-analysis were conducted to synthesize and critically evaluate the current research investigating the association between maternity leave and maternal and infant mental and physical health using the Preferred Reporting in Systematic Reviews and Meta-Analyses guidelines. Databases EMBASE, PsycInfo, and PubMed were searched using specific inclusion and exclusion criteria. Methodological Index for Non-Randomized Studies scale assessed the methodological quality of the included eligible studies. The magnitude of heterogeneity between-study was tested using The Cochrane χ^2 test and the Moran's I^2 statistic. Possible publication bias was assessed through the funnel plot and the Egger regression test. A p-value of <0.10 will be considered as an indication for the existence of potential publication bias. All statistical analyses were carried out with Stata software version 15.

Results A total of 21 studies were analyzed. It was found that longer maternity leave may decrease rates of maternal mental and physical health complaints. It was also found that longer maternity leave leads to more positive mother–child interactions, decreased infant mortality, and longer periods of breastfeeding.

Conclusion Maternity leave of 12 weeks or more confers the greatest benefit for mothers and their infants.

Significance

What is already known about this topic? It is known that maternity leave enhances maternal and infant mental and physical well-being. A recent comprehensive review article outlined the importance of political policy to support national paid maternity leave in the United States.

What does this study add? This study is a quantitative analysis to assess the optimal length of maternity leave to address these important maternal and infant outcomes.

Introduction

Recent legislative decisions in the United States have encouraged discussion about national parental leave programs. Currently, over 47% of the United States workforce is female (“Women in the Workforce,” n.d.). However, the United States is the only nation of the 37 member countries in the Organization for Economic Co-Operation and

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Development (OECD) to have no national requirement for paid or unpaid maternity leave. Estonia offers the longest full-paid maternity leave of 85 weeks and Australia and New Zealand offer the shortest amount of full-paid leave time at 8 weeks (Length of Maternity Leave, Parental Leave and Paid Father-Specific Leave, n.d.). The Family Medical Leave Act (FMLA) of 1993 in the United States provides certain employees 12 weeks of unpaid, job-protected leave. FMLA time may be taken for the birth of a child, adoption or foster care processes, personal medical issues, or care of a family member. If a pregnant woman experiences any complications during pregnancy, she must use her FMLA time during pregnancy which decreases her job-protected leave time after the birth of her child.

To meet requirements of the FMLA, individuals must work at a company with 50 or more employees, have worked for the employer for at least 12 months with a cumulative total of 1250 h worked, and work at a location where the company employs 50 or more employees within 75 miles (Family and Medical Leave Act | U.S. Department of Labor, n.d.). In 2018, only 10% of all businesses in the private sector met these FMLA-requirements but employed 59% of private sector employees. Only 56% of all US employees meet FMLA qualifications and only 16% of the FMLA-eligible workforce take leave each year. For those that did take leave, 34% of them did not receive any form of payment (Gloria Sherman, 2019). Beginning October 1, 2020, the Federal Employee Paid Leave Act (FEPLA) offers 12 weeks of paid parental leave to federal employees. These employees must still meet the requirements outlines above for FMLA and guarantees 12 weeks of full paid leave (Gloria Sherman, 2019).

Financial strain from unpaid leave disproportionately impacts lower-income families. 54% of those with an average household income of \$62,000 or less report receiving no pay while on FMLA compared to 18% of those with a household income greater than \$62,000. Many individuals report difficulty making ends meet during unpaid leave time: cutting expenditures, using savings (either intended for leave or other purposes), delaying bill payments, obtaining loans, or relying on public assistance. More than one-third of all workers taking FMLA report cutting their leave time short because of the significant financial burden (Federal Employee Paid Parental Leave Act, 2013).

It is known that the first months of a child's life are vital to their mental and physical wellbeing. For example, rapid brain development occurs with a child's brain growing by 1% every day for the first three months of life (Wessel, 2019). Nurturing and responsive parenting is essential for proper brain development. Allowing women to take leave time without worry about financial or job security can positively impact child development. Stressors in early childhood can even lead to disruption in neurological, immunological,

and metabolic processes (Robinson et al., 2017). An example of an early childhood stressor is a lack of secure emotional attachment to parent or caregiver (Audage & Middlebrooks, 2008) which can result from insufficient bonding time due to decreased parental leave. Breastfeeding, another benefit of maternal leave, has also been shown to enhance the mother–child bond (Krol & Grossmann, 2018).

In the postpartum period, a woman experiences significant mental and physical changes. Rapid hormonal changes following the delivery of the child predisposes women to experience heightened responses to stressors. 1 in 8 women will experience postpartum depression (Depression Among Women, 2020). Similarly, many women will experience low sleep duration and quality in the first few months following the birth of a child. Lack of sleep can further predispose a woman to experience symptoms of depression and anxiety (Creti et al., 2017). Return to regular daily activities can be difficult following birth, exacerbating depression and further hindering the recovery process.

A recent comprehensive review article outlines the importance of a national paid maternity leave policy in the United States to enhance maternal and infant mental and physical well-being (Van Niel et al., 2020). This study used only qualitative analyses to assess the data. In our study, we will expand upon their data to quantify the association between length of maternity leave and maternal and infant mental and physical health. We conducted a systematic review and meta-analysis to evaluate for the optimal length of maternity leave to enhance mental and physical well-being for women and their children.

In this study, outcomes for maternal mental health include postpartum depression, stress, and burnout. Outcomes for maternal physical health include the ability to complete activities of daily living. Infant mental health outcomes include maternal-child bonding and attachment style. Infant physical health outcomes include length of breastfeeding, pediatrician visits, and immunization status.

Methods

Data Sources and Search Strategy

We conducted a systematic literature search using electronic databases PubMed, Scopus, EMBASE and PsycINFO in December 2020. The search strategy was designed to include all published articles which dealt with the association between length of maternity leave and maternal and infant mental and physical health to accomplish the study objective. We applied various combinations of Boolean operators by using the following keywords for our search: [“child mental health” OR “mother child bonding” OR “attachment” OR “breastfeeding” OR “pediatrician visits”

OR “childhood immunizations” OR “infant morbidity” OR “infant mortality” OR “developmental milestones” “maternal mental health OR “maternal sleep disturbances” OR “maternal depression” OR “maternal anxiety” OR “maternal postpartum functioning” OR “postpartum sexual functioning” AND (“paid family leave” OR “paid maternity leave” OR “maternity leave”)]. As this study is a systematic review of the literature, it does not contain individual participant or patient data and is not based on clinical study. This study was not registered, and a protocol was not prepared.

Study Selection

Studies were eligible for inclusion if they met the following criteria: (1) originally published in English language; (2) include full information on the association either between child mental/physical health and paid family/maternity leave or between maternal mental/physical health and paid family/maternity leave; and (3) published as original investigation. The exclusion criteria for studies are as follows: (1) published in other than English language; (2) published as review, guideline, commentary, letter to the editor; (3) published as case reports with smaller numbers. Methods to assess bias in individual studies included using an established protocol for study identification and careful appraisal of each study prior to inclusion in the systematic review.

Data Extraction and Quality Assessment

An Excel data collection sheet was developed to extract all relevant information from the included eligible studies. Study characteristics involving last name of the first author of the study; year of publication; country of publication; sample size (total number of patients/subjects); average age (standard deviation/inter-quartile range); average BMI (standard deviation/inter-quartile range); paid maternity leave; period/length of maternity leave; race/ethnicity; educational status, locality (rural/urban); family type (nuclear/combined); status of any comorbidity (existing chronic illness and physical health problem such as ability to complete daily living activities) of the woman; existing mental health problems of the woman (postpartum depression, anxiety, stress, and sleep disorders); existing physical health issues of the newborn/infant; existing mental health issue of the newborn/infant; current physical health of the woman (ability to complete activities of daily living and restoration of sexual function), current mental health problems of the woman (postpartum depression, anxiety, stress, and sleep disorders), current physical health problems of the newborn/infant (pediatrician visits, immunization status, breastfeeding status, and infant morbidity and mortality) and current mental health problems of the newborn/infant (maternal

child bonding, attachment, and achievement developmental milestones).

Statistical Analysis

STATA v.15 was used for statistical analysis. After careful data cleaning, a total of 21 studies between 1997 and 2020 were included in the analysis. We focused on overall depression status given the length of maternity leave, depression status specifically in short maternity leaves, any other form of mental illness given the length of maternity leave, and breast feeding associated with length of maternity leave. Odds ratios (OR) and 95% confidence intervals (CI) were used to describe the overall differences between depressed and non-depressed participants. A 95% confidence interval (CI) and p-values were calculated for each outcome. For certain studies where only frequencies were presented the OR, standard error (SE), and 95% confidence interval were calculated manually. OR were considered statistically significant at a p-value < 0.05. The magnitude of heterogeneity between-study was tested using The Moran’s I^2 statistic (Dwivedi, 2017). A value of more than 50% of I^2 will be known as significant heterogeneity. All statistical analyses were carried out with Stata software version 15 (StataCorp. 2017. Stata Statistical Software: Release 15. College Station, TX: StataCorp LLC).

Results

We identified 485 studies using the previously outlined search strategy. After initial screening with inclusion criteria and removing duplicates, 315 articles remained. A second screening for original investigation excluded an additional 282 articles. 12 of the remaining 33 articles were excluded due to insufficient data or irrelevance. The remaining 21 articles were analyzed. Flow of information is presented in the PRISMA diagram in Fig. 1. PRISMA checklist can also be found for this manuscript as Table 1.

The most common weakness among the studies used in this analysis was the lack of standardized reporting for some variables of interest, particularly among the mental health categories. For example, many clinicians use the Edinburgh Postnatal Depression Scale to assess for postpartum depression. However, not all studies that look at postpartum depression used this scale. This lack of standardization leads to the heterogeneity seen in the data. Study characteristics are summarized in Table 2. Racial and ethnic groups identification were not included in many of the included studies. Without this data, we cannot assess any differences in health outcomes in mothers or infants between racial and ethnic groups, especially in historically marginalized communities.

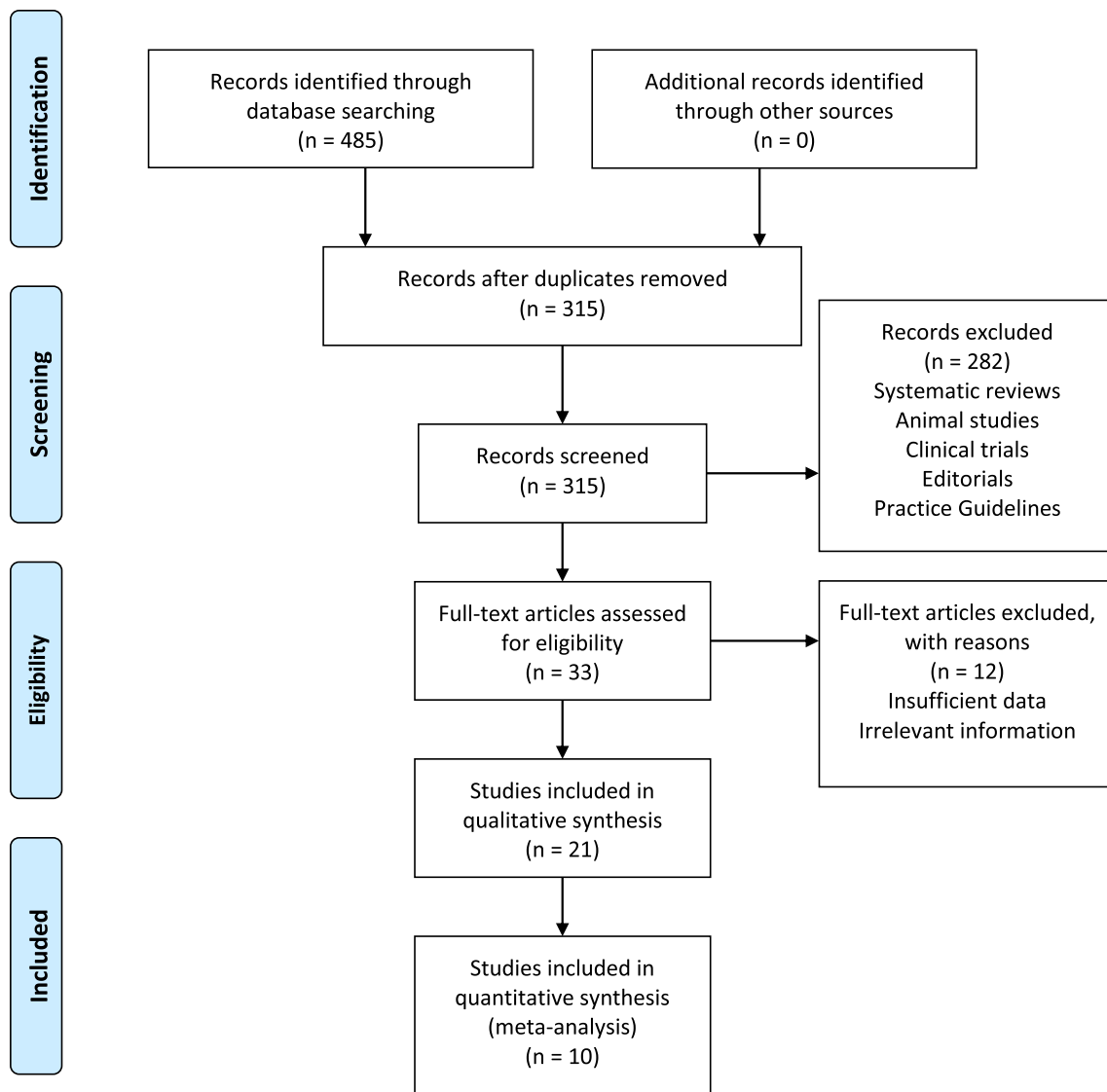


Fig. 1 Prisma flow diagram of included studies

Maternal Mental Health

Maternal mental health complications in this study include postpartum depression, stress, and burnout. We found seven articles addressing maternal mental health in relation to length of maternity leave. It is found that maternity leave of 8–12 weeks, in comparison to 6 weeks or less, is associated with lower rates of negative maternal mental health. Interestingly, one study (Kornfeind & Sipsma, 2018), found that for women taking 12 weeks or less of maternity leave, each week is associated with decreased rates of postpartum depression. However, for those taking 12 weeks of leave or more, additional leave time is not associated with less depressive symptoms. Another study by Dagher in 2014, found similar results using a benchmark of 6 months (Dagher et al., 2014). Overall, individuals with 8

to 12 weeks of maternity leave are less likely to experience depressive symptoms and burnout and more likely to have greater perceptions of support.

Our analysis (Figs. 2, 3) revealed that length of maternity leave is associated with lower levels of depression, OR 0.76 (0.52–1.11), and any maternal mental health condition, OR 0.87 (0.46–1.61). While these data do not hold statistical significance, clinical significance may be present. These results reflect the lack of homogeneity in the published literature.

Maternal Physical Health

Maternal physical health parameters in this study included rehospitalization after birth, self-rated physical health, and ability to participate in activities of daily living. We found three studies addressing maternal physical health in relation

Table 1 PRISMA 2020 checklist

Section and Topic	Item #	Checklist item	Location where item is reported
TITLE			
Title	1	Identify the report as a systematic review	Page 1
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist	Page 1–2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge	Page 4
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses	Page 4
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses	Page 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	Page 5
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used	Page 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 and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process	Page 5
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	Page 5–6
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	Page 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	Page 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	Page 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	Page 6
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))	Page 5–6
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions	–
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses	Page 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	Page 6
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression)	Page 7
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results	–
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases)	–
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome	Page 6
RESULTS			

Table 1 (continued)

Section and Topic	Item #	Checklist item	Location where item is reported
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram	Figure 1
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded	–
Study characteristics	17	Cite each included study and present its characteristics	Table 1
Risk of bias in studies	18	Present assessments of risk of bias for each included study	Page 5
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	Figures 2 and 3
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies	–
	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	Page 7–9
	20c	Present results of all investigations of possible causes of heterogeneity among study results	Page 7–9
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results	Page 7–9
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed	–
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed	Page 7–9
DISCUSSION			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence	Page 10–11
	23b	Discuss any limitations of the evidence included in the review	Page 11
	23c	Discuss any limitations of the review processes used	Page 11
	23d	Discuss implications of the results for practice, policy, and future research	Page 11
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	Page 5
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared	Page 5
	24c	Describe and explain any amendments to information provided at registration or in the protocol	NA
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review	Page 12
Competing interests	26	Declare any competing interests of review authors	Page 12
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	NA

From: Page et al. (2021). For more information, visit: <http://www.prisma-statement.org/>

to length of maternity leave. Women that had paid leave of any duration are 51% less likely to be re-hospitalized for any reason in the year following birth. Additionally, those that took leave are found to be 1.8× more likely to engage in exercise. One Australian study looked at postpartum health of women before and after the enactment of a paid leave policy. This study showed that women had higher self-reported physical health after the enactment of the policy

(Hewitt et al., 2017). Re-entry into the workplace in the postpartum period can be difficult, as assessed by Falletta et al. (2020). This study indicates that individuals with any length of maternity leave are associated with better self-reported physical health within the first month of work re-entry.

Table 2 Included studies

Study	Country	Population	Study design	Measures	Main findings
Maternal mental health (PPD, stress, anxiety) Kornfeind and Sipsma (2018)	USA	177 mothers from a national survey who returned to work full-time after having a baby	Cross-sectional	Length of maternity leave and experiencing postpartum depressive symptoms	Overall, duration of maternity leave was not significantly associated with experiencing postpartum depression symptoms (odds ratio [OR], 0.90; 95% confidence interval [CI], 0.80–1.01). This effect, however, varied by duration of maternity leave. Among women who took maternity leaves of 12 weeks or less, every additional week of leave was associated with a lesser odds of experiencing postpartum depressive symptoms (OR, 0.58; 95% CI, 0.40–0.84). Among women who took maternity leaves longer than 12 weeks, leave duration was not associated with postpartum depression symptoms (OR, 0.97; 95% CI, 0.73–1.29)
Shumbusho et al. (2020)	USA	214 surveys collected from military women if they had delivered a baby while on active duty in the last 20 years	Cross-sectional	Maternity Leave Length Impact on Breastfeeding and Postpartum Depression	The overall rate of postpartum depression was 13.5%. Among women who had 6 weeks versus 12 weeks of maternity leave, 16.1% versus 9.5% reported postpartum depression, $p = 0.11$

Table 2 (continued)

Study	Country	Population	Study design	Measures	Main findings
Dagher et al. (2014)	USA	A total of 575 women completed all 4 surveys. Telephone interviews conducted at 6 weeks, 12 weeks, 6 months, and 12 months postpartum. All women were employed and > 18 yrs	Cross-sectional within a prospective cohort	Data on the dependent and explanatory variables were collected using telephone interviews at six weeks, twelve weeks, six months, and twelve months after childbirth. The Edinburgh depression scale was given at each interview. The question ‘How long were you on leave after the baby was born, including any part-time leave’ was also asked	Therefore, on average, in the first postpartum year every additional day of leave results in a decrease in postpartum depressive symptoms until six months postpartum. After six months, the relationship reverses and every additional day of leave results in an increase in postpartum depressive symptoms. However, we acknowledge that while we measured leave continuously, we measured postpartum depression at discrete intervals; thus there is a possibility that the relationship between leave duration and postpartum depression symptoms may not be continuous
Stack et al. (2018)	USA	214 medical residents at an academic institution	Cross-sectional	Survey was sent to female residents at a large academic medical center on their experiences with maternity leave, the impact of personal and program factors on length of leave, reasons for delaying childbearing, and measures of wellbeing	Compared to those with less than 8 weeks of maternity leave, a much higher proportion of residents with 8 weeks or more of leave reported breastfeeding for at least 6 months. They were also more likely to have negative postpartum depression and burnout screens, greater perceptions of colleague and program director support, and greater satisfaction with childbearing during training. These findings were not statistically significant, likely due to the small sample size

Table 2 (continued)

Study	Country	Population	Study design	Measures	Main findings
Stack et al. (2019)	USA	804 medical residents at 6 different academic institutions	Cross-sectional	Voluntary, anonymous survey to female residents at 78 programs, in 25 unique specialties, at 6 institutions. Survey items included personal, partner, and child demographics, and logistics of leave, including whether leave was paid or vacation or sick leave was used. Outcomes were maternity leave length; duration of breastfeeding; burnout and postpartum depression screens; perceptions of support; and satisfaction with length of leave, breastfeeding, and childbearing during residency	Resident-reported measures of well-being are stratified by ≤ 6 weeks versus > 6 weeks of maternity leave. Both groups achieved high rates of reaching 6 months of breastfeeding and had similar rates of negative postpartum depression and burnout screens and positive emotional support
Sinai et al. (2012)	Israel	50 families. 25 with mothers on maternity leave and 25 with mothers returning to work	Cross-sectional study to assess for leave status. Sleep logs and parenting stress index	Effect of maternity leave on overall stress and sleep quality	Mothers not on maternity leave (those that had returned to work) were less likely to describe increased stress about their infants sleep patterns than mothers that remained at home on maternity leave
Maternal physical health (activities of daily living)					
Jou et al. (2018)	USA	700 women	Retrospective study of cross-sectional survey data from listening to mothers	Effect of paid leave vs unpaid leave on mother and child health	Women that took paid maternity leave of any duration were 51% less likely to be rehospitalized in the year after birth. 1.8X more likely to have success in managing stress and engaging in exercise
Hewitt et al. (2017)	Australia	2347 mothers prior to paid parental leave policy and 3268 mothers after paid parental leave policy enactment	Cross sectional surveys before and after enactment of national paid parental leave policy	Effect of a national paid parental leave policy on mother's health postpartum	Mothers had significantly higher levels of self-rated physical health after the initiation of a national paid parental leave policy

Table 2 (continued)

Study	Country	Population	Study design	Measures	Main findings
Falletta et al. (2020)	USA	249 women employed at a mid-western university that had given birth in the last 5 years	Cross-sectional	Re-entry into the workplace after childbearing and its impacts on maternal well-being and job outcomes	We observed that even after controlling for demographic variables and mental health symptoms during the first month of return to work, length of maternal leave and physical complications were significant predictors of overall health in the first month of work reentry. Compared with those who took leave of six weeks or less, only those who took 17 weeks or greater were associated with significantly increased odds of reporting better overall health within the first month of work reentry, OR 14.552 (95% CI 4.934–42.918, $p < 0.0001$)
Infant Physical Health (Pediatrician visits, immunization status, breastfeeding, morbidity/mortality)					
Ruhm (2000)	Europe	9 European nations with changes in leave policies during study period	Retrospective econometric analysis between countries	Paid vs unpaid leave association with infant mortality	Additional 10 weeks of paid maternity leave in these countries resulted in a 4.5%–6.6% decrease in expected post-natal deaths
Tanaka (2005)	USA and International	18 OECD Countries	Retrospective analysis of longitudinal data	Impact of paid maternity leave of child health	Paid leave resulted in decreased infant, post-natal, and child mortality rates by 2.6%, 4.1%, and 3%, respectively
Heymann et al. (2011)	International	Paid leave and infant mortality in 141 countries	Retrospective analysis of global policy data and infant mortality data	Duration of paid leave vs parameters of child health	An increase in 10 weeks of paid maternity leave significantly associated with 10% lower infant and neonatal mortality and decrease in child mortality
Choudhury and Polachek (2019)	USA	174,000 immunized babies	Retrospective study of survey data from the CDC national immunization study	Rate of late immunization before and after the California paid leave act	Significant decrease in late immunizations for infants after the enactment of the California paid leave act
Guendelman et al. (2009)	USA	770 mothers	Retrospective cohort comparison study	Breastfeeding in working and nonworking women	Paid leave of <6 weeks was associated with 4× increase in failure to establish breastfeeding in the first month

Table 2 (continued)

Study	Country	Population	Study design	Measures	Main findings
Xiang et al. (2016)	Australia	2300 mothers	Prospective randomized telephone survey of women up to one year after birth in the setting of a national paid parental leave program	Timing of return to work and breastfeeding patterns	Women resuming work within 6 months of childbirth or those that worked more than 20 h weekly were less likely to be breastfeeding at 6 months than those that did not return to work
Mirkovic et al. (2016)	USA	National survey	Data from 2006 to 2010 US National Survey of family growth	Association between paid maternity leave and breastfeeding initiation and breastfeeding at 6 months	Employed women who received 12 or more weeks of paid maternity leave were more likely to initiate breastfeeding and be breastfeeding at 6 months
Appelbaum et al. (2011)	USA	500 employed mothers	Cross sectional survey analysis with coded interviews	Women who used the California paid leave act vs those that did not	Working women who used the paid leave in California doubled their duration of breastfeeding compared to those that did not take the paid leave
Mirkovic et al. (2014)	USA	1172 women from the Infant Feeding Practices Study II, a longitudinal cohort study	Multivariable logistic regression was used to assess the relationship between maternity leave duration and return-to-work status (<6 weeks/FT, <6 weeks/PT, 6 weeks-3 months/FT, 6 weeks-3 months/PT, not working by 3 months) and meeting a mother's intention to breastfeed at least 3 months	Leave duration and return-to-work status and meeting mother's intention of breastfeeding at least 3 months	28.8% of mothers did not meet their intention to breastfeed at least 3 months. Odds of not meeting intention to breastfeed at least 3 months were higher among mothers who returned to work FT before 3 months (<6 weeks/FT: adjusted odds ratio 2.25, 95% confidence interval 1.23–4.12; 6 weeks-3 months/FT: adjusted odds ratio 1.82, 95% confidence interval 1.30–2.56), compared with mothers not working at 3 months
Infant mental health (Maternal-Child bonding, attachment, achievement of developmental milestones)					
Kochanska et al. (1997)	USA	570 pregnant women and 550 partners	Prospective cohort using videotaped interaction analysis	Assessment of videotaped behavior between mother-child and association with length of maternity leave	Shorter maternity leave associated with more negative maternal-child interactions
Baker and Milligan (2010)	Canada	Variable, based on measure	Cross-sectional surveys	Behavior and intellectual measures in children aged 7–12 months and 13–24 months before and after increased leave duration from 6 to 12 months	Doubling maternity leave time did not significantly impact child development including motor or social development at 1–2 years of age

Table 2 (continued)

Study	Country	Population	Study design	Measures	Main findings
Plotka and Busch-Rossnagel (2018)	USA	3850 mothers in ECLS-B	Randomized, retrospective path-survey analysis using ECLS-B data	Duration of leave vs NCATS and TAS-45 scores	Duration of maternity leave significantly correlated with positive mother-child interactions leading to secure attachment, empathy, and later academic success

Infant Physical Health

Infant physical health parameters included infant mortality, hospitalizations, immunization status, and breastfeeding. Maternity leave is associated with lower rates of infant and child mortality. A European study found that an additional 10 weeks of maternity leave resulted in a 4.5–6.6% decrease in expected post-natal deaths (Ruhm, 2000). Another study conducted in the USA and other OECD countries found that any length of paid maternity leave is associated with a 4.1% decrease in post-natal mortality, 2.6% decrease in infant mortality and 3% decrease in child mortality (Tanaka, 2005). Similarly, an international study found a 10% lower infant and neonatal mortality with a 10 week increase in paid maternity leave (Heymann et al., 2011). The California Paid Leave Act, which provides financial assistance for six to eight weeks was passed in 2004. After the passage of this act, there was significant decrease in late immunizations for infants in California. Women that had 12 weeks or more of leave are more likely to initiate breastfeeding and maintain breastfeeding for at least 6 months (Mirkovic et al., 2016). Our analysis (Fig. 4) revealed that infants born to mothers with shorter maternity leave times are less likely to breast-feed for at least 6 months OR 1.49 (0.81–2.75).

Infant Mental Health

Infant mental health parameters included maternal-child attachment and achievement of childhood milestones. A cohort study using videotaped analysis of maternal-child interactions revealed that shorter maternity leaves, defined as 6 weeks or less, are associated with more negative maternal-child interactions (Kochanska et al., 1997). Another study found that length of maternity leave is significantly correlated with more positive maternal infant interactions, and eventually lead to higher rates of secure attachment, higher empathy, and academic success (Plotka & Busch-Rossnagel, 2018). One survey assessing the impact between maternity leave and infant developmental milestones found no significant difference in milestone achievement between various lengths of maternity leave (Baker & Milligan, 2010).

Discussion

The association between maternity leave length and impact on maternal and infant outcomes is a complex phenomenon. While each maternal-child dyad is different, it is known that the first few weeks of life are vital to the health of mother and infant. The nuanced discussion of maternity leave encompasses discussions of workplace culture and national politics. The United States remains the only OECD country to have no national requirement for paid maternity leave.

Fig. 2 Forest plot of overall depression status given the length of maternity leave

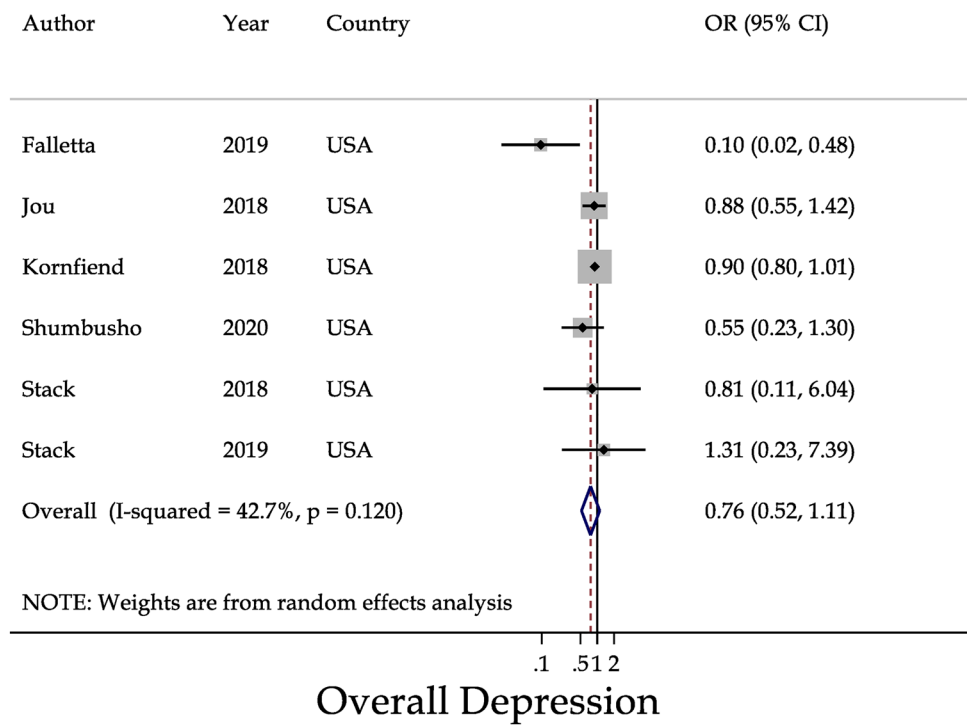
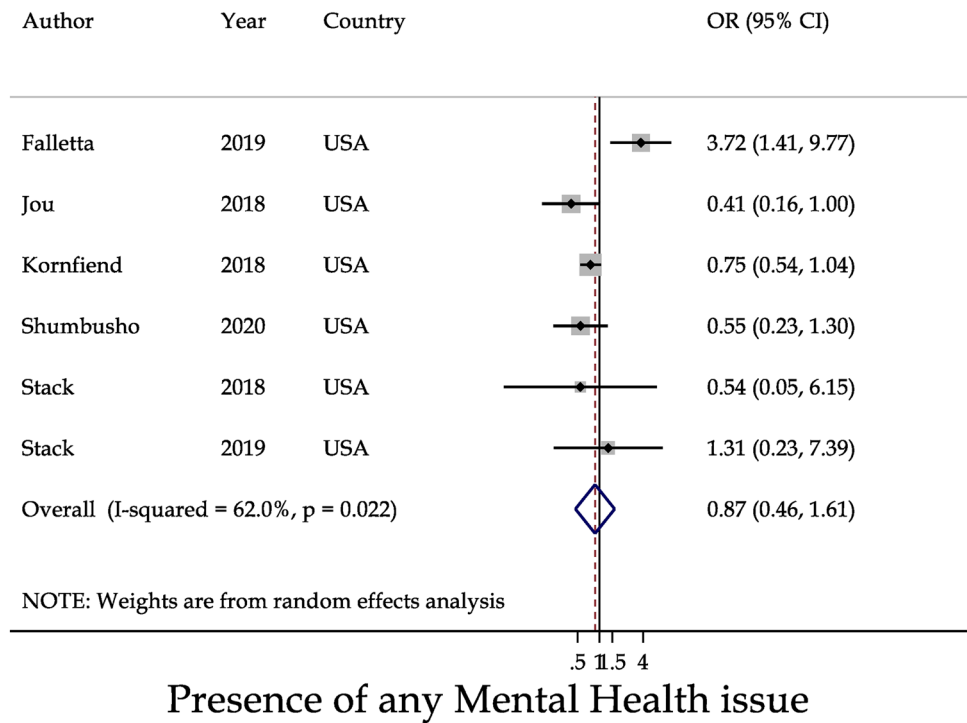


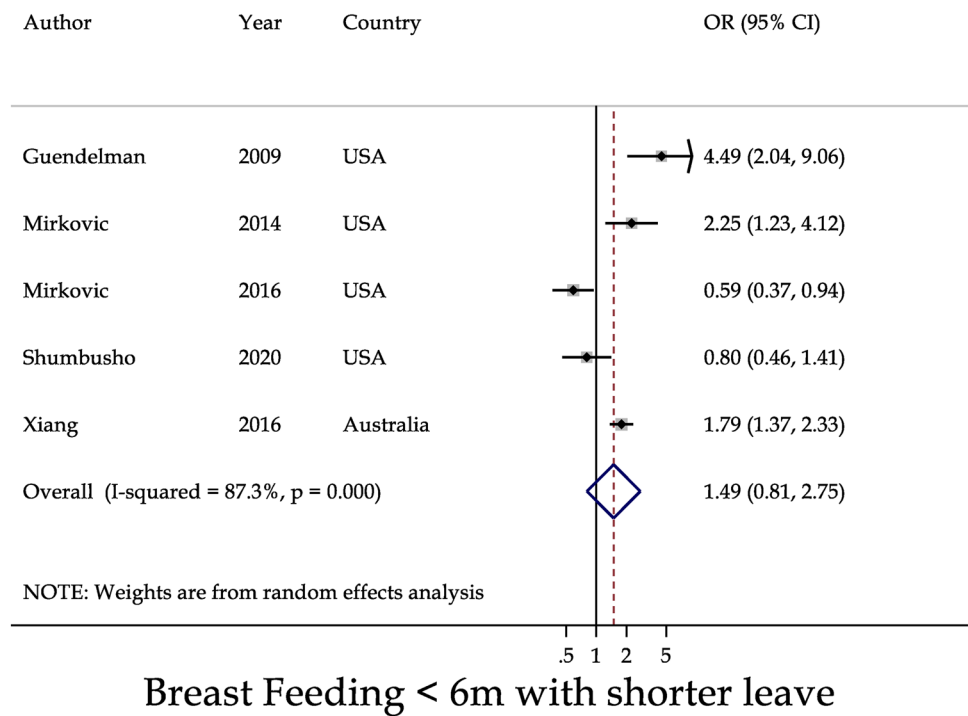
Fig. 3 Forest plot of presence of any mental health issue given the length of maternity leave



This can lead to many unintended consequences in the realm of maternal-child health, including outcomes as dire as increased infant mortality. Our descriptive analysis revealed that longer maternity leave of 8–12 weeks, as compared to 6 weeks or less, may be correlated with better outcomes in

maternal and child mental and physical health outcomes. While our analysis did not reveal statistically significant results, the data may be clinically significant. Longer maternity leave may lead to lower levels of maternal depression and longer periods of breastfeeding. The lack of research

Fig. 4 Forest plot of breast-feeding status given the length of maternity leave



NOTE: Weights are from random effects analysis

into this area, coupled with the lack of standardized reporting for these outcomes highlights the need for additional investigations in this area.

Despite data to substantiate the benefits of parental leave, many United States citizens do not enjoy the same parental leave benefits of those in other developed countries. The stipulations of mandated parental leave do not apply to many United States citizens. This demonstrates the need for policy changes in the US regarding parental leave. Grassroots organizations such as Moms Rising advocate for parental leave in the United States. These organizations fund research and governmental lobby to encourage family-friendly policies in the United States. A recent study by Moms Rising, in conjunction with Duke University, demonstrates that paid family leave is associated with better health for women and infants, as well as a more positive impact on the economy (Rowe-Finkbeiner et al., 2016).

Recently, there has been an increased interest surrounding family leave and childcare, shifting policies within the United States. The Build Back Better proposal initially included a universal family leave policy, but it failed to be enacted (President Biden Announces the Build Back Better Framework, 2021). This reflects the complicated nature of enacting laws in the United States but may be the first step towards change. Healthcare practitioners and public health professionals can use this information to advocate for family-centered policies at a local and national level. Understanding the changes that women and infants endure during the first weeks following childbirth are vital to creating a healthier country.

One limitation of this study is the lack of universal scales that yield data to objectively measure outcomes. The universal use of available validated scales, such as the Edinburgh Postnatal Depression Scale, could be useful to mitigate this limitation. Additionally, outcome measurements in some of the analyzed studies are subjective. This highlights the need for additional standardized scales in this realm of medical research. The lack of homogeneity in the current published literature illustrates the need for further study, including development of a comprehensive data set to include parental leave parameters and prospective research on these topics.

Conclusion

Further study is needed to determine a statistically significant quantitative link between the length of maternity leave and the impacts on maternal and infant mental and physical health. Standardized data gathering in primary studies addressing these topics will aid in further research used to guide local and national policies. Based on the data seen in this review, maternity leave of at least 12 weeks would confer the greatest benefit for mother and child.

Author Contributions Each author listed on the paper provided adequate assistance. Primary author, MDW performed the identification of studies, data extraction, and initial manuscript authorship. CH wrote various parts of the manuscript and ensured all bibliography was correct. LA completed all statistical analysis. SB provided guidance for statistical interpretation and manuscript edits.

Funding No funding received for this project.

Data Availability All relevant data has been included with the manuscript. If the journal or reviewers would like the copy of the raw extracted data prior to statistical analysis, that can be made available.

Code Availability STATA 15 was used for analysis.

Declarations

Conflict of interest The authors have no conflicts of interest to state. The authors have no affiliations to disclose and no financial support or funding for this review. There are no conflicts of interest to report.

Ethical Approval Not applicable.

Consent to Participate Not applicable.

Consent for Publication Not applicable.

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