Impact of Paternal Depression on Child Neurodevelopmental Outcomes and Disorders

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ABSTRACT

Objective: To explore paternal depression (before, during, and after pregnancy) and its association with neurodevelopmental disorders in children.

Data Sources: A systematic, English-language review was conducted in PubMed, PubMed Central, MEDLINE, Web of Science, BIOSIS Previews, and SciELO. All relevant literature published from inception to March 31, 2021, was included. The MeSH terms used in the search included *paternal behavior*, *fathers*, or *father-child relations* in the context of depression, postpartum depression, and neurodevelopmental disorders.

Data Extraction: The PICOS (Population, Intervention, Comparison, Outcomes, and Study design) tool was used to enhance reporting of the findings. Twenty-six articles were included in the review.

Results: Paternal depression during the perinatal period resembles maternal perinatal depression. Early paternal depression has considerable emotional, behavioral, and developmental impacts on their children. Genetic endowment and environmental factors induced by paternal depression-related behaviors may lead to adverse neurodevelopmental outcomes.

Conclusions and Relevance: The findings suggest that paternal depression negatively influences neurodevelopmental disorders in the offspring.

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Neurodevelopmental disorders (ND) are disturbances or delays in obtaining skills in various developmental areas such as motor, social, language, and cognition.[1] They are a leading cause of morbidity in children in the United States, causing great suffering for patients and their families and placing a higher economic burden on society.[2] About 15% of children and adolescents aged 3 to 17 years in the United States are affected by NDs such as attention-deficit/hyperactivity disorder (ADHD), learning disabilities, intellectual disability, cerebral palsy, autism, seizures, stuttering or stammering, moderate to profound hearing loss, blindness, and other developmental delays.[3] Males have twice the prevalence compared to females.[4] There is an overlap in the presentation of different NDs.[1,5]

Several studies[6–8] have assessed maternal psychiatric disorders such as major depressive disorder (MDD) and their impact on children's socioemotional and cognitive development and behavioral problems. However, minimal evidence is available regarding paternal psychiatric disorders and their impact on children's early psychosocial and behavioral development.[9]

There is mounting evidence that early paternal depression may have considerable emotional, behavioral, and developmental effects on children.[9–15] This review aims to explore paternal depression (before, during, and after pregnancy) and its association with neurodevelopmental disorders in children and to identify those infants and children most at risk of developing NDs due to paternal depression.

METHODS

A literature search was conducted in PubMed, PubMed Central, MEDLINE, Web of Science, BIOSIS Previews, and SciELO databases for relevant articles published from inception to March 31, 2021. We used keywords including Medical Subject Headings (MeSH) terms *paternal behavior*, *fathers*, or *father-child relations* in the context of "Depression," "Depressive Disorder," "Depression, Postpartum," "Depressive Disorder, Treatment-Resistant," OR "Depressive Disorder, Major," and "Neurodevelopmental Disorders."

A total of 997 articles were identified. The authors (S.A., B.S., S.J.) independently searched the literature and reconciled any differences to determine the final article count for this qualitative synthesis. After removing 570 duplicates, 427 articles were screened by reading the titles and abstracts of

Clinical Points

- Paternal depression in any stage of a child's development has a negative impact.
- An association exists between paternal mental health and depressive symptoms and neurodevelopmental disorders in infants and children.
- Minimal research to date has targeted paternal mental health during the perinatal period.

the articles. Eighteen non-English non-human studies were excluded. Further, we reviewed 409 full-text articles beyond the title and abstract; 384 articles did not meet the inclusion/exclusion criteria for this review. Differences among the reviewers (S.A., B.S., S.J.) about inclusion or exclusion of articles were resolved after in-depth discussion and were independently verified by another author (K.S.).

This study complied with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.[16] Therefore, we considered the final count of 25 articles[17–41] (Figure 1) for the qualitative synthesis (Table 1). We used the PICOS (Population, Intervention, Comparison, Outcomes, and Study design) tool to enhance reporting of systematic review findings: participants (children), interventions (paternal depression), comparison (placebos or without placebos), outcomes (child's neurodevelopmental outcomes or psychiatric disorders), and study design (prospective, case-control, longitudinal, or cross-sectional).

Inclusion Criteria

1. Original prospective, case-control, longitudinal, or cross-sectional.
2. Studies that evaluated the impact of paternal depression on a child's neurodevelopment.
3. Publication type: only peer-reviewed journal publications.

Exclusion Criteria

1. Study design: studies such as case reports, poster abstracts, narrative reviews, systematic reviews, or unpublished doctoral theses.
2. Publication type: non–peered-reviewed articles.
3. Studies not focused on the topic of the review.
4. Research studies including participants other than humans.
5. Articles published in non-English languages.

Mechanism of Action

Andrade[42] stated that genetic and environmental factors induced by paternal depression–related behaviors might increase the probability of adverse neurodevelopmental outcomes. Therefore, like maternal mental health, paternal mental health during pregnancy is equally essential and needs to be addressed accordingly.

RESULTS

MDD is a common psychiatric disorder and can result in severe impairments that could interfere with or limit one's ability to carry out major life activities.[19] MDD is a leading cause of disability worldwide and a chief contributor to the overall global burden of disease.[43] MDD is associated with a considerable economic burden, with an estimated increase of 21.5% of the economic impact (in the United States, $173.2–$210.5 billion) between 2005 and 2010.[44] In 2017, approximately 7.1% of all US adults aged ≥ 18 years had at least one major depressive episode, with a higher prevalence among females (8.7%) in contrast to males (5.3%).[9,45] Research has shown that genetic, biological, and environmental features contribute to the observed gender disparities in MDD.[46] Certain forms of depression-related problems such as premenstrual dysphoric disorder, postpartum depression, and postmenopausal depression and anxiety associated with changes in ovarian hormones could contribute to the increased prevalence in women.[45] The communication styles of individuals with depression have significant consequences for those with the disorder and can affect the well-being of others, mainly the children of depressed parents.[10]

Paternal Depression

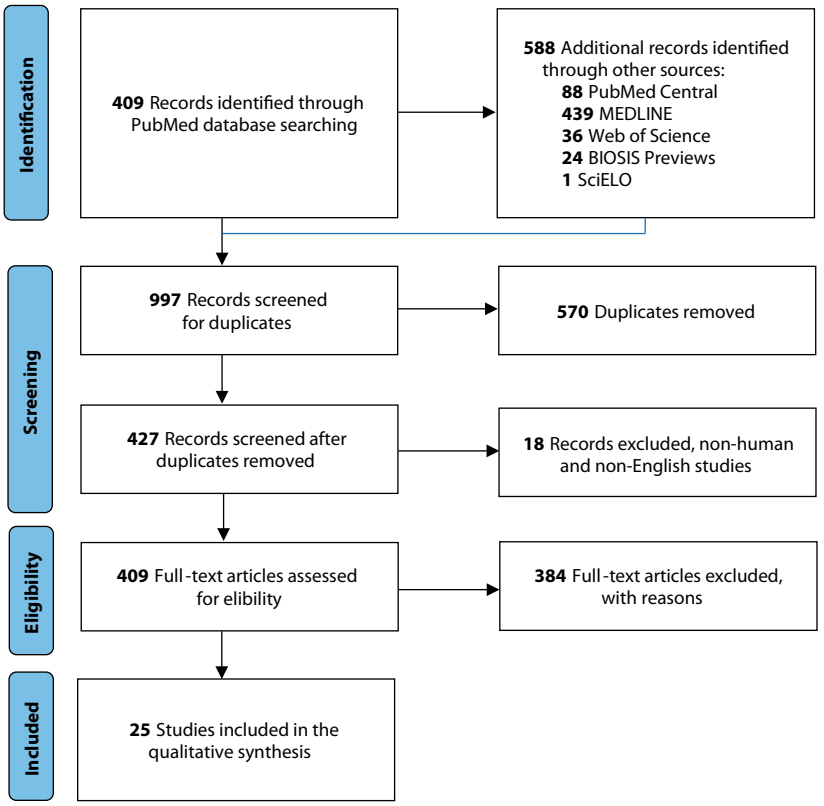
Depression was evident in about 10% of men during the prenatal and postpartum periods and was comparatively higher in the 3- to 6-month postpartum period.[11] Paternal depression during the first postpartum year in the community varies from 4% to 25.5%.[46] Several potential risk factors can contribute to paternal depression during the postnatal period, such as a history of depression in either parent, marital conflict, low socioeconomic status, and unintended pregnancy.[14,47] Prenatal and postnatal maternal depression are reliably the most significant risk factors for depression in fathers after childbirth.[48–50] The incidence rate of paternal depression among men whose spouses are having postpartum depression is as high as 24%–50%.[19,51] Paternal depression before, during, and after pregnancy is associated with increased offspring risk of autism spectrum disorder (ASD) and ADHD.[42] Paternal depression during the postnatal period is also strongly associated with increased rates of oppositional defiant disorder (ODD) or conduct disorder (CD) and increased rates of social difficulties in their children.[14]

Paternal depression appears to be associated with behavioral and peer relationship problems. In contrast, maternal depression is associated with a broader spectrum of child disturbances.[14] For example, severe paternal depression is associated with increased aggression in children from 0 to 4 years of age and delays in behavioral, emotional, and social development in children aged 4 to 5 years.[30,42]

ADHD, ODD, and CD

A study by Flouri et al[40] used the 6-item Kessler Psychological Distress Scale to assess paternal depression.

Figure 1. Flowchart Showing Search Results for Qualitative Synthesis



They found a clinically significant association between paternal psychological distress and emotional problems and hyperactivity in boys that was higher than that of girls. Another study[35] found that the severity of paternal psychological distress showed a small association with behavioral difficulties in children: B = 0.19 (95% confidence interval [CI], 0.15–0.23), emotional difficulties: B = 0.22 (95% CI, 0.18–0.26), and social functioning: B = 0.12 (95% CI, 0.07–0.16).

Another study[39] investigated the association of paternal cyclothymic disorder with ODD symptoms and child CD symptoms of ADHD as assessed by parent and teacher-reported behavior questionnaires, respectively. Paternal cyclothymic disorder was associated with parent-rated ODD (β = 0.09, *P* = .011) and teacher-rated CD (β = 0.07, *P* = .012) scores. The Turkish version of the Temperament Evaluation of the Memphis, Pisa, Paris, San Diego Autoquestionnaire was used to assess paternal depression. This questionnaire covers 5 temperament dimensions: depressive, cyclothymic, hyperthymic, irritable, and anxious temperaments.[39]

Similarly, a study[38] found that paternal ADHD was associated with child ADHD symptoms at age 3 and that management of paternal ADHD can help with the child's ADHD symptoms. However, another study[26] found that depression and anxiety in fathers was not an independent predictor for child ADHD symptoms.

Autism

Autism is a developmental disorder defined by impaired social interaction, communication, and behavior. Parental postnatal depression was associated with emotional and behavioral problems in children at age 3 ½ years (adjusted odds ratio [OR] = 2.09; 95% CI, 1.42–3.08) and was a risk factor for conduct problems in boys (OR = 2.66; 95% CI, 1.67–4.25).[18] In addition, other studies have reinforced the association between paternal depression and the risk of ASD and ADHD (OR = 1.68; 95% CI, 1.42–1.99).[41]

Socioemotional Development

Paternal mental health problems were found to be directly related to social withdrawal in infants (OR = 4.6).[21] Children living with a father suffering from depression or other mental illness were found to have a 33%–70% increased risk of developing emotional or behavioral problems.[31] Infants of depressed fathers displayed increased crying and hyperactivity. Such infants also had an increased risk of developmental and behavioral disorders.[31] In another study,[52] school-age children with depressed fathers were found to have double the risk for psychiatric disorders. Parental psychopathology also influences socioemotional development outcomes in children. Paternal ADHD and depression cause increased externalizing and internalizing symptoms in children, thus affecting their overall functioning.[36]

Table 1. Results of the 25 Articles Used for the Qualitative Synthesis

Author	Type of Study	Sample Size	Gender	Age	Result
Mezulis et al,[17] 2004	Longitudinal cohort	350 Mothers, fathers, and children	48% Boys 52% Girls	Data not provided	Paternal depression during a child's infancy exacerbated the effect of maternal depression. This moderating effect was limited to depressed fathers spending medium to high amounts of time caring for their infants, which could play a role later in the child's behavior problems.
Ramchandani et al,[18] 2005	Longitudinal cohort	8,431 Fathers 11,833 Mothers 10,024 Children	Data not provided	Data not provided	Depression in fathers during the postnatal period was associated with adverse emotional and behavioral outcomes in children aged 3–5 y (aOR = 2.09; 95% CI, 1.42–3.08) and an increased risk of conduct problems in boys (aOR = 2.66; 95% CI, 1.67–4.25).
Davé et al,[19] 2008	Cross-sectional study	248 Biological father and mother dyads	Data not provided	Data not provided	Children of fathers with a major depressive syndrome were almost 9 times more likely to have consulted a health professional for speech and language problems (aOR = 8.67; 95% CI, 1.99–37.67; *P* = .004) and 7 times more likely to have consulted for externalizing behavior problems (aOR = 6.98; 95% CI, 1.00–48.76; *P* = .05).
Ramchandani et al,[20] 2008	Longitudinal prospective cohort	13,351 Mothers 12,884 Fathers 10,024 Children	Data not provided	Data not provided	Fathers who were depressed in both the prenatal and postnatal periods had children who had the highest risks of subsequent psychopathology, measured by total problems at age 3½ years (OR = 3.55; 95% CI, 2.07–6.08) and psychiatric diagnosis at age 7 y (OR = 2.54; 05% CI, 1.19–5.41). It was also observed that children whose fathers had postnatal depression had higher rates of conduct problems at age 3½ y (OR = 2.14; 95% CI, 1.22–3.72), but it did not hold true for prenatal depression.
Mäntymaa et al,[21] 2008	Cross-sectional study	350 Mothers, fathers, and children	48% Boys 52% Girls	Data not provided	Mother's high level of depressive symptoms (OR = 6.1; 95% CI, 1.2–9.8; *P* = .03) and father's perceived moderate or poor mental health (OR = 4.6; 95% CI, 1.1–19.8; P = .04) during the preceding year both independently increased the infant's risk of withdrawal.
Hadley et al,[22] 2008	Cross-sectional study	431 Children	Data not provided	3–24 mo	No relationship was found between paternal symptoms of mental disorders and child development.
Daniels et al,[23] 2008	Case-control study	1,227 Children cases 30,693 Controls	77% Boys 33% Girls	Data not provided	Parents of children with autism were more likely to have been hospitalized for a mental disorder. Among mothers, depression (OR = 1.7; 95% CI, 1.0–2.6) and neurotic and personality disorder and other nonpsychotic disorders (OR = 1.7; 95% CI, 1.3–2.2) were associated with increased risk of autism among the children, which did not hold true for fathers.
Ghanizadeh et al,[24] 2008	Cross-sectional study	81 Children 79 Mothers 72 Fathers	Data not provided	Age (y) mean ± SD (range): Children = 8.7 ± 3.07 (5–15) Mothers = 40.1 ± 7.4 (21–53) Fathers = 34.6 ± 7.1 (30–62)	The rate of major depressive disorder in mothers and fathers of children with ADHD was 48.1% and 43.0%, respectively.
Petitclerc et al,[25] 2009	Longitudinal prospective cohort	1,942	Data not provided	Data not provided	Postnatal depressive symptoms experienced by the mother (OR = 1.71; 95% CI, 1.03–2.84) and the father (OR = 2.02; 95% CI, 1.10–3.71) were independent predictors of chronic trajectory of disregard to rules.
Segenreich et al,[26] 2009	Longitudinal cohort	36 Parent cases (21 mothers, 15 fathers) 30 Controls (18 mothers, 12 fathers) 26 Children cases 31Controls	Data not provided	Children age (y) mean (range): Cases = 12 (10–13) Controls = 12 (9–14)	No relationship was observed between paternal symptoms and children with ADHD. This study observed the prevalence of anxious and depressive symptoms in mothers of children with ADHD, and these symptoms could be independent of presence of ADHD and impairments associated with ADHD.
Dietz et al,[27] 2009	Longitudinal study	101 Mother-toddler dyads	57 Boys 44 Girls	Data not provided	The presence of paternal psychopathology (67% of fathers had mood or anxiety disorder including depressive disorder) and mother's history of depression were significantly associated with toddlers' externalizing behavior problems (*B* = 11.49, SE = 4.16), $t_{100} = 2.76$, *P* < .01 and internalizing behavior problems (*B* = 12.54, SE = 4.03, $t_{100} = 3.177$, *P* < .01).

(continued)

Table 1 (continued).

Author	Type of Study	Sample Size	Gender	Age	Result
Pemberton et al,[28] 2010	Longitudinal cohort	351 Children	43% Girls	Data not provided provided	Adoptive father (AF) depressive symptoms at 9 mo of child age was a marginally significant predictor of child externalizing symptoms (β = 0.11, $P < .10$). In addition, AF antisocial behavior marginally at 9 mo (β = 0.10, $P < .10$) and significantly at 18 mo (β = 0.09, $P < .05$) predicted AF depressive symptoms.
Fletcher et al,[29] 2011	Prospective study	2,620 Two–biological-parent families	Data not provided	1st wave of data collection = 3–19 mo 2nd wave = 2–3 y 3rd wave = 4–5 y	Early paternal depression was a significant predictor of behavioral difficulties (OR = 3.34; 95% CI, 3.06–3.65) and low development and well-being score (OR = 2.70; 95% CI, 2.44–2.98).
Weitzman et al,[30] 2011	Cross-sectional study	21,993 Children	11,187 Boys 10,806 Girls	5–17 y	Paternal depressive symptoms (aOR = 1.72; 95% CI, 1.33–2.23) and mental health problems were independently associated with increased rates of child emotional or behavioral problems after controlling for confounders.
Vidair et al,[31] 2011	Cross-sectional study	801 Mothers 182 Fathers 848 Children	581 (68.5%) Boys 267 (31.5%) Girls	Age (y) mean (SD): Children = 10.43 (3.19); range, 6–17 Mothers = 38.87 (7.97) Fathers = 42.95 (8.56)	This study observed no significant association between paternal symptoms and a child's functioning.
Callender et al,[32] 2012	Prospective	245 Children with parents	127 Boys 118 Girls	Children were assessed at the age of 3 y at time T1 and at the age of 5½ y at time T2	Paternal depressive symptoms were associated with higher levels of externalizing problems after accounting for maternal depressive symptoms (β = 0.18, $P = .01$).
Hanington et al,[33] 2012	Cross-sectional study	14,541 Parents and children	Data not provided	Data not provided	A strong relationship between postnatal maternal (OR = 2.79; 95% CI, 2.30–3.40) and paternal (OR = 2.20; 95% CI, 1.47–3.28) depression predicted total child problems at age 42 months. Antenatal maternal (OR = 2.43; 95% CI, 2.03–2.91) and paternal (OR = 2.34; 95% CI, 1.70–3.23) depression each predicted later total problems in children.
Kvalevaag et al,[34] 2013	Cross-sectional study	31,663 Children 31,663 Fathers	14,662 Boys 14,041 Girls	Data not provided	Fathers's depressive symptoms were assessed by self-report (HSCL) in week 17 or 18 of gestation. [The HSCL-25 is a symptom inventory to measure symptoms of anxiety and depression in a person.] The study found a slight positive association between fathers' psychological distress and children's behavioral difficulties (B = 0.19; 95% CI, 0.15–0.23), emotional difficulties (B = 0.22; 95% CI, 0.18–0.26), and social functioning (B = 0.12; 95% CI, 0.07–0.16).
Van Batenburg-Eddes et al,[35] 2013	Prospective	2,280 at Generation R 3,442 at ALSPAC	Data not provided	Mean maternal age: 32 y at Generation R 29 y at ALSPAC	Paternal depression was associated with a higher risk of child attention problems (OR = 1.11; 95% CI, 1.00–1.24). However, after adjusting for confounding factors, there was little statistical evidence that it substantially affected the child.
Breaux et al,[36] 2014	Longitudinal cohort	199 Children and their parents	Data not provided	Age mean ± SD at initial screening at first home visit when child was ≥ 3 y old: Children = 44.54 ± 3.18 (range, 37.50–50.30) mo Mothers = 32.79 ± 6.36 Fathers = 36.45 ± 7.54	Maternal ADHD and Cluster A symptoms and paternal ADHD and depression/anxiety symptoms were predictors of child functioning.
Gutierrez-Galve et al,[37] 2015	Longitudinal cohort	13,351 Mothers 12,884 Fathers 13,796 Singletons and first-born twins	Data not provided	Data not provided	The study found a significant effect of paternal depression postnatally on total child psychological problems at 42 mo with total effect of 0.168 (95% CI, 0.133–0.202; $P < .001$) and 0.130 at 81 mo (95% CI, 0.098–0.161; $P < .001$) of age.
Breaux et al,[38] 2017	Longitudinal study	258 Children	138 Boys 120 Girls	Age mean (SD) = 44.13 (3.39) mo	Both family history of ADHD (ADHD-β = 0.15, SE = 0.06, $P = .02$; ODD-β = 0.16, SE = 0.07, $P = .02$) and paternal comorbid psychopathology (ADHD-β = 0.25, SE = 0.09, $P = .01$; ODD- β = 0.34, SE = 0.09, $P < .001$) predicted later child ADHD and ODD symptoms. The paternal psychopathology included depression, anxiety, and antisocial symptoms

(continued)

Table 1 (continued).

Author	Type of Study	Sample Size	Gender	Age	Result
Bilgiç et al,[39] 2018	Cross-sectional study	542 Treatment-naive children with ADHD and their biological parents 593 Parents	436 (80.4%) Boys 106 (19.6%) Girls	Age (y) mean ± SD (range): Children = 9.4 ± 2.8 (6–18) Mothers = 34.9 ± 5.9 (24–54) Fathers = 38.6 ± 6.3 (28–62)	Turkish version of TEMPS-A was used to assess paternal depression. It covers 5 temperament dimensions: depressive, cyclothymic, hyperthymic, irritable, and anxious temperaments. This study found that paternal cyclothymic temperament had an increased effect on parent-rated ODD (β = 0.09, *P* = .011) and teacher-rated CD (β = 0.07, *P* = .012) symptoms of ADHD children.
Flouri et al,[40] 2019	Longitudinal cohort	13,442	Data not provided	Data not provided	The 6-item Kessler Psychological Distress Scale was used to assess paternal depression, which is termed paternal psychological distress. The study found that paternal psychological distress predicted hyperactivity (Coeff = 0.019*, SE = 0.004), conduct (Coeff = 0.012*, SE = 0.003), emotional (Coeff = 0.010*, SE = 0.003), and peer problems (Coeff = 0.009**, SE = 0.003) in domains of child problem behavior that were examined, after adjusting for maternal psychological distress and confounding. Total difficulties Coeff = 0.048*, SE = 0.009.
Chen et al,[41] 2020	Cohort	708,515 Father-mother-child triads	371,498 (2.4%) Boys 337,017 (47.6%) Girls	Data not provided	Paternal and maternal depression occurring in the pre-pregnancy, perinatal, and postnatal periods was significantly associated with subsequent ADHD and ASD in the offspring, with HRs between 1.42 (95% CI, 1.35–1.49 for maternal) and 2.25 (95% CI, 2.09–2.41 for paternal). Also, the chronicity and additive effect of paternal and maternal depression were related to increased risks of offspring ADHD and ASD. The effects of maternal depression were stronger than the effects of paternal depression for offspring ADHD (HR = 1.35; 95% CI, 1.27–1.45) and ASD (HR = 1.23; 95% CI, 1.05–1.46) risks.

Abbreviations: ADHD = attention-deficit/hyperactivity disorder, aOR = adjusted odds ratio, ASD = autism spectrum disorder, CD = conduct disorder, HR = hazard ratio, HSCL = Hopkins Symptom Checklist, ODD = oppositional defiant disorder, OR = odds ratio, TEMPS-A = Temperament Evaluation of the Memphis, Pisa, Paris, and San Diego Autoquestionnaire. *$P < .05$. **$P < .01$.

However, Hadley et al[22] found no clinically significant relation between paternal mental health and child development. This relation is essential independently. Thus, in families in which parents have mental health issues, their infants should be screened for social withdrawal. If social withdrawal is observed in an infant, the parents should be screened for mental health issues as well.[21]

Behavior Problems

A study[28] demonstrated that adoptive fathers with depressive symptoms when their child was 9 months old was a risk factor for child externalizing symptoms ($P < .10$). Additionally, antisocial behavior in children marginally at 9 months ($P < .10$) and significantly at 18 months ($P < .05$) was a predictor of depressive symptoms in adoptive fathers.[28] Parental depression in the postnatal period is an independent predictor of disruptive behaviors in children (OR = 2.02; 95% CI, 1.10–3.71).[25] Paternal depressive symptoms were associated with greater externalizing problems after accounting for maternal depressive symptoms (β = 0.18, *P* = .01) in a study by Callender et al.[32]

Laurent et al[53] studied the link between child adversity, developmental stability of the hypothalamic-pituitary-adrenal axis, and behavioral problems in adopted kids. Parental psychopathology and stress were related to unstable evening cortisol levels, resulting in externalizing symptoms. However, Van Batenburg-Eddes et al[35] found little evidence of the impact of paternal depression on children when adjusting for confounding factors.

Speech and Language Impairment

A study[19] revealed that children (aged 4–6 years) of fathers with MDD were 9 times more likely to have speech and language problems (adjusted OR = 8.67; 95% CI, 1.99–37.67; *P* = .004) and 7 times more likely to have externalizing behaviors (adjusted OR = 6.98; 95% CI, 1.00–48.76; *P* = .05).

Other Mental and Psychological Outcomes

Both maternal and paternal depression have adverse child outcomes. Marital conflict mediates paternal and maternal depression and child outcomes and is an independent risk. Paternal depression was found to predict total child problems when assessed at age 42 months (OR = 2.20; 95% CI, 1.47–3.28).[33] Also, paternal symptoms were positively associated with the diagnosis of behavioral issues in children, though the association was not clinically significant.[31]

Gutierrez-Galve et al[37] studied the direct and indirect effect of paternal depression on children's psychological problems. They found that paternal depression indirectly mediates a child's psychological problems by causing marital conflict and a stressful home environment. It also causes maternal depression and mental health issues, which

affect childcare. Lastly, paternal depression causes a lack of involvement in childcare and parenting. The total effect of paternal depression on a child's psychological problems was 0.168 at age 42 months (95% CI, 0.133–0.202; $P < .001$) and 0.130 at age 81 months (95% CI, 0.098–0.161; $P < .001$).[37]

A study by Dietz et al[27] compared the impact of maternal depression on a toddler in the presence or absence of paternal psychopathology. The authors[27] observed that children had more behavioral problems when their mothers had MDD after childbirth and when fathers met the criteria for a psychological illness. Another study[20] found that paternal depression in the prenatal and postnatal periods is more likely to cause problems in children at age 3 ½ years (OR = 3.55) and psychiatric diagnosis at age 7 years (OR = 2.54). However, there was little change in these associations when controlling for maternal depression and other potential confounding factors.[20]

The moderating effect of paternal depression on maternal depression and child outcomes was explored in a study by Mezulis et al.[17] Paternal depression exacerbated the impact of maternal depression when the father spent a medium to high amount of time with the infant.[17]

Discussion

In this review, we studied the effect of paternal depression on child outcomes. We found that paternal depression in any stage of a child's development has a negative impact. It affects the child directly and indirectly by causing unfavorable environmental factors for a child's development and growth. The mental health of fathers, especially MDD in fathers, is associated with the increased distress of infants, affecting their socioemotional development. Children of depressed fathers have shown behavioral disruptions such as externalizing and internalizing behaviors, ADHD, ODD, and CD. There is an increased incidence of ASD in children of fathers with depression. Paternal depression has been shown to impact speech and language development. We found an association between paternal mental health and depressive symptoms and neurodevelopmental disorders in infants and children, which adversely impacts their lives and ability to function. This association is not necessarily causative and might be due to common underlying antecedents. Additionally, paternal mental health issues lead to low income, causing poor maternal and infant health.

Paternal mental well-being during prenatal and postnatal care is essential. Both expectant mothers and fathers should be screened for marital conflicts and depression during antenatal care visits at maternity clinics. The couple should be educated on the importance of well-being. Families at risk should be supported and provided access to resources to prevent neurodevelopmental disorders in children.

The collective evidence from this systematic review showed the direct positive relation of paternal depression with mental health and neurodevelopmental disorders in children. This relation was evident in prenatal, antenatal, postnatal, and early childhood phases of development. In addition to the direct effect of paternal depression on a child's health, there is also an indirect effect on maternal mental health, resulting in poor care of the infant. Depression in fathers causes a hostile home environment and dysfunctional family dynamics, which is detrimental to a child's mental and physical health. This impact through the home environment was investigated in a study[28] in which adoptive fathers' depression was found to be related to the children's behavioral outcomes. The results of this review could aid in the design of future research studies exploring paternal mental health outcomes. This review may also encourage maternal health providers, pediatricians, and school counselors to screen mothers and children who are at higher risk for neurodevelopmental problems due to paternal mental health.

CONCLUSION

Treatment of paternal depression could prevent long-term critical effects on a child's behavior and social and emotional development.[29] However, minimal research to date has targeted paternal mental health during the perinatal period.[54]

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