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on Early Childhood
Development

Maternal depression

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Synthesis

How important is it?

A mother's responsive and sensitive care is crucial for children's optimal development. Yet, 13% of women in developed countries (and a higher prevalence in developing countries) experience depressive symptoms either during and/or after pregnancy. Maternal depression, also known as perinatal depression, encompasses various mood disorders that occur during pregnancy or postpartum. Depressed mothers are more likely to be inconsistent, lax and disengaged with their child. This dysfunctional parenting is of particular concern during children's early years when they are the most dependent on their mother's stimulation. As a result, these parenting practices may contribute or predispose children to multiple early developmental problems. Maternal depression is now recognized as a great societal concern, and intervention approaches are needed to prevent or diminish its negative impact on infant's development.

What do we know?

There is an overall consensus suggesting that maternal depression is associated with children's developmental problems including impaired socio-emotional, cognitive and behavioural functioning.

Socio-emotional functioning

Children of depressed mother are more likely to 1) express negative affect, 2) have difficulty controlling their anger, 3) have an insecure attachment, 4) have poorer interpersonal skills, and 5) experience an elevated stress level.

Cognitive functioning

As well, children of depressed mothers usually 1) show less advanced language development, 2) have lower academic skills, 3) have a lower self-esteem, and 4) show other cognitive vulnerabilities to depression or other disorders.

Behavioural functioning

At the behavioural level, children of depressed mothers are characterized as 1) having increased sleep problems, 2) being less cooperative, 3) having difficulty controlling their aggression, and 4) being inactive. They are also at heighten risk of developing internalizing (e.g., depression) and externalizing (e.g., aggressive behaviour) problem behaviours in comparison to children of non depressed mothers.

Children express these developmental problems in varying degrees. Family context and bi-directional influences, such as children's temperamental characteristics and health status, may lessen or worsen the impact of maternal depression on children's development. As an example, paternal involvement can reduce the negative impact of maternal depression on children's internalizing behaviours. In contrast, interparental conflicts predict maladjustment in children with a depressed mother.

What can be done?

To improve children's developmental outcomes, prevention and intervention approaches should focus on improving the quality of mother-infant interactions.

As a preventive measure, education about the beneficial effect of a healthy pregnancy should be available to parents (especially new parents). Effective skills, best child-rearing practices, and discipline should be emphasized to better prepare them for their parenting role. Women with histories of depression might especially benefit from these preventive interventions when they are considering pregnancy, in order to help reduce the likelihood of maternal depression.

Currently, the research evidence for improving mother-child interaction quality favours interventions that improve parenting skills. Evidence suggests that home visits by community workers/nurses enhance maternal sensitivity and attachment security in children. As well, considering that paternal involvement can reduce the impact of maternal depression in children's functioning, support and encouragement by other family members should be offered to the mother.

Although intervention approaches have indicated improvements in children's development, it is important to keep in mind that there are wide variations in outcomes in children exposed to maternal depression. None of the interventions (e.g., home visiting or family therapy) have the same effect on all children. Policy makers should therefore value the importance of flexibility in treatment and policy.

Maternal Depression and its Relation to Children's Development and Adjustment

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Introduction

Depression is one of the most common mental health disorders, especially common during women's childbearing years.[1,2] Maternal depression is related to child outcomes as early as birth and across later developmental periods. Accordingly, maternal depression is a significant and relatively common risk factor during early childhood. A pressing goal for research is to understand developmental trajectories and processes underlying relations between maternal depression and children's development.

Subject

Maternal depression is demonstrated to contribute to multiple early child developmental problems, including impaired cognitive, social and academic functioning.[3-6] Children of depressed mothers are at least two to three times more likely to develop adjustment problems, including mood disorders.[3] Even in infancy, children of depressed mothers are more fussy, less responsive to facial and vocal expressions, more inactive and have elevated stress hormones compared to infants of non-depressed mothers.[7,8] Accordingly, the study of child development in the context of maternal depression is a great societal concern and has been a major research direction for early childhood developmental researchers for the past several decades.

Problems

Whereas relations between maternal depression and children's adjustment problems are well-documented, many questions remain about the mechanisms underlying these associations. These questions are at the heart of any possible clinical implications of research in this area, including prevention and treatment. For example, how and why is maternal depression related to children's development and adjustment? Why do some children of depressed mothers develop symptoms of psychopathology or impaired functioning, whereas others do not?

There are many challenges for identifying and testing causal processes, such as ensuring sufficiently sophisticated models and research designs to guide study of multiple, and often interrelated, processes. The challenge of ensuring adequate conceptualization, measurement and assessment also pose potential pitfalls and limitations, including the requirements for longitudinal research to optimally test causal hypotheses.

Investigators have met these challenges by advancing multivariate risk models. For example, Goodman and Gotlib posited several, inter-related, classes of mechanisms, including (a) heritability, (b) exposure to environmental stressors, including increased family dysfunction, (c) exposure to their mothers' negative cognitions, behaviours, or affect, and (d) dysfunction of neuroregulatory mechanisms.[9] Illustrating one of these pathways, depressed pregnant women may experience neuroendocrine abnormalities (e.g., increased stress hormones, reduced blood flow to the fetus) which may lead to dysfunction of neuroregulatory mechanisms among infants, increasing their vulnerability for depression or other disorders.

Research context

In the context of studies of early child development, the study of disruption in family functioning as contributors to early child development outcomes has emerged as a focal area of investigation. Even when study is limited to family processes as influences, multivariate risk models find support.[9-12] For example, Cummings and Davies[13] presented a framework for how multiple disruptions in child and family functioning and related contexts are supported as pertinent to associations between maternal depression and early child adjustment, including problematic parenting, marital conflict, children's exposure to parental depression, and related difficulties in family processes.[10,11] A particular focus of this family process model is identifying and distinguishing specific response processes in the child (e.g., emotional insecurity; specific emotional, cognitive, behavioral or physiological responses) that, over time, account for normal development or the development of psychopathology.[10]

Key Research Questions

At this point, many key research questions need to be addressed by the study of longitudinal relations between maternal depression, hypothesized family and child response processes, and multiple child outcomes. Tests may include investigations of explanatory process models or studies of trajectories or pathways of development. Goals include identifying underlying family

and child processes linking maternal depression and child development, how do these processes work together and change over time, child gender differences in effects, and the role of child characteristics.

Recent Research Results

Parenting has long been the focus of research of family processes that may contribute to child outcomes. Studies have shown repeatedly that maternal depression is linked with less optimal parenting and less secure mother-child attachment.[5,15,16] Depressed mothers are more likely to be inconsistent, lax, withdrawn or intrusive, and ineffective in their parenting and child discipline behaviour. Inadequate parenting and lower quality parent-child relationships, in turn, are related to increased risk for maladjustment among children.

Although marital conflict has long been linked with the effects of maternal depression, the study of this topic continues to be relatively neglected. At the same time, recent evidence continues to support that interparental conflict is a robust influence on child outcomes, even when compared to parenting in community samples.[14]

Extensive research documents links between marital conflict and child maladjustment in families with maternal depression. In contexts of maternal depression, marital conflicts are characterized by lower positive verbal behaviour, sad affect, increased use of destructive conflict tactics, and lower likelihood of conflict resolution.[17,18] Interparental conflict is a robust predictor of children's functioning across multiple domains, including socio-emotional outcomes, cognitive functioning and academic success.[19]

Studies are explicitly testing family processes, including interparental conflict, as mediators or moderators between maternal depression and children's outcomes. The findings show that maternal depression is related to increased interparental conflict and relationship insecurity, more family-level conflict and overall family functioning. Disruptions in these family processes, in turn, are related to higher levels of children's psychological distress and adjustment problems.[20-24] The role of child characteristics in the association between maternal depression and children's development is also under investigation, including children's temperament and physiological responses to stress.[5, 25]

Research Gaps

There are still many gaps that need to be addressed. First, further study of the role of interparental conflict in the effects associated with maternal depression is needed, especially distinguishing between forms of conflict. For example, quite different effects on children have been linked to constructive, destructive and depressive interparental conflicts.[26] Second, longitudinal research across different developmental periods is needed to understand the short-term and long-term consequences of maternal depression for family functioning and children's development. Third, it is important for studies to distinguish between clinical and subclinical levels of maternal depression.[10] Similarly, the impact of the characteristics of maternal depression requires further investigation; depression is a heterogeneous disorder, and the timing, chronicity and number of episodes of maternal depression may influence relations between maternal depression and child adjustment. Fourth, although research has focused on maternal depression, the effect of paternal depression deserves further consideration, including examining relations when both parents are depressed.[5] Fifth, further study of child characteristics, such as temperament, sex, genetics and physiological regulation warrant consideration. Lastly, research should aim for more specificity with regard to child outcomes. For example, why do some children develop impaired social competence in the context of maternal depression, whereas other children develop symptoms of depression?

Conclusions

Maternal depression is related to a wide range of child outcomes, and the effects continue from birth into adulthood. Children of depressed mothers are two to three times more likely to develop a mood disorder, and are at increased risk for impaired functioning across multiple domains, including cognitive, social and academic functioning, and poor physical health. At the same time, many children of depressed mothers develop normally. Therefore, the key research goal is to understand the pathways and processes through which maternal depression affects children. Disruptions to family processes, including parenting problems and interparental conflict, are documented as pathways through which maternal depression affects children. Evidence that family processes may account for links between maternal depression and child development is promising from a treatment and intervention standpoint, in that family processes can be more easily targeted and altered than other mediating processes (e.g., heritability).

Implications for parents, services and policy

Policy-makers and clinicians should work together to make services, such as screenings for pregnant women and mothers, readily available.[6] Programs aimed at reducing disruptions to family functioning are one avenue for decreasing children's risk for psychopathology. Parents, clinicians and policymakers should be sensitive to the fact that comprehensive programs are needed that not only treat mothers' depression but also offer family-level services. For example, depressed mothers could be provided with parent education classes to teach them effective skills and best practices for child rearing and discipline. Families with a depressed parent can partake in educational classes that teach constructive ways to handle conflict, that is, how to handle conflict in ways that promote problem-solving and conflict resolution. As more research on moderating factors is conducted, prevention and treatment efforts can be better targeted to those most at risk. Such comprehensive efforts that work together with mothers, children and families will certainly have a long-lasting and important impact on children's development.

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Maternal Depression and Children's Adjustment in Early Childhood

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Introduction

Sensitive, responsive care from parents is necessary for young children's optimal development. During infancy, parents provide primarily for infants' basic needs for sustenance, protection, comfort, social interaction and stimulation; by toddlerhood, as children begin to walk and talk, parents must also set age-appropriate limits on exploration while encouraging cognitive, social and language development.[1] The challenges of parenting young children are best met when the mother has adequate emotional support and help with child care and is emotionally stable herself. However, a relatively large proportion of young women of childbearing age also experience depressive symptoms severe enough to compromise their ability to provide optimal parenting.[2, 3]

Subject

Depression, reflected in prolonged sadness and feelings of despair, is associated with less engaged, stimulating and proactive parenting, and with a range of social and cognitive problems in young children during infancy, toddlerhood and the preschool years.[4] Because young children are so dependent on their mothers for cognitive stimulation and social interaction, they are more likely to be vulnerable to the impact of maternal depression than school-age children or adolescents.

Problems

Many women may experience the "baby blues" immediately after childbirth, due to the hormonal and other physical changes that accompany pregnancy, labor, delivery and the immediate postpartum.[3] However in some new mothers, depression continues beyond the postpartum period or emerges at the same time that she is getting to know her baby. More prolonged and severe depressive episodes occurring during the child's early years are of particular concern when they interfere with parenting.[2,3,4]

Maternal depression may be associated with a history of prior depressive episodes, with poverty, single parenthood, marital difficulties, or a decline in social support.[4,5,6] Pregnancy and delivery complications, infant health problems, or infant irritability and colic can also trigger depressive symptoms in vulnerable women.[6] Young children often bear the brunt of maternal depression and, when the depression is also associated with marital stress and low social support, the effects on young children may be exacerbated. In addition, some infants and toddlers may be more vulnerable than others to the effects of maternal depression, depending upon their temperamental characteristics, health status and the availability of alternative caregivers.[4,5]

Research Context

Numerous studies have followed clinically-depressed women with young children as well as large community samples of mothers who report elevated depressive symptoms. These longitudinal studies have used interview and maternal report measures to track the course of maternal depression, observational measures of parenting and mother-child interaction to assess specific aspects of parenting and the mother-child relationship, and outcome measures focused on children's social-emotional and cognitive development, school readiness and overall adjustment.[4]

Key Research Questions

Questions for future research focus on identifying factors that explain the links between maternal depression and children's adjustment problems. For example, to what degree are children's adjustment difficulties explained by biological risk factors, maternal parenting behavior, other family factors, or their combination?[4,5]

Because not all children with depressed mothers show later problems, research must also examine risk and protective factors that are associated with different patterns of early child development and adjustment.[4,5] For example, are children whose mothers have a family history of depression or who were depressed before or during pregnancy at especially high risk for adjustment difficulties? Does the timing of the depression matter during the first few years of the child's life? In two-parent families, can an involved father protect a young child from the potential negative effects of maternal depression? In the absence of a supportive father, can other adults provide support to mother and baby, thereby mitigating the effects of maternal depression? Why are some mothers able to be responsive and sensitive, despite their depression? Characteristics of the depression and of the family context may allow us to identify some children who are at higher

risk for adjustment difficulties than others when their mother is depressed.

Child and family characteristics may also intensify each other leading either to poorer or better adjustment. For example, some irritable infants or infants with birth complications and neonatal health problems may be more vulnerable to the impact of maternal depression; concerns about a difficult or sick infant may in turn affect maternal mood, aggravating both maternal symptoms and infant difficulties. This may be especially so when the mother feels less competent in caring for her baby. In contrast, a mother with an easygoing infant may feel better about herself and her success as a mother, and if she has social support from a partner, she may provide sensitive care to her baby despite her depression. These questions about risk and protective factors also have implications for early intervention for depressed women and their young children and for prevention programs that might be geared to women who appear to be at high risk for depression during their child's early years.[4,5,6,7]

Recent Research Results

Research indicates that depressed mothers, especially when their depression is chronic, are less sensitive with their infants and toddlers, play with and talk to their children less, and provide less supportive and age-appropriate limit setting and discipline than non-depressed mothers.[4,8,9] When mothers report more chronic depressive symptoms, their children are more likely to evidence insecure attachment relationships with them, show less advanced language and cognitive development, be less cooperative, and have more difficulty controlling anger and aggression.[8,9] Lower levels of maternal sensitivity and engagement explain some of these findings. However, sensitive parenting can be protective when mothers are depressed.[8,9] When depression occurs together with financial strains and high levels of stressful life events, the effects on children can be more serious and debilitating.[8,10]

Research Gaps

We understand a good deal about the risk factors that are associated with maternal depression and poor child adjustment. New research needs to emphasize psychosocial approaches to the prevention of depression in high risk women and to the treatment needs of depressed mothers and their families.[4,7,11] Most studies of treatment have focused primarily on the mother's depression, relying on medication or individual psychotherapy,[12] rather than on the mother's needs more broadly, including her relationship with her baby and the role of the father (or other

responsible adult) in providing emotional support and practical help with child care. Both naturalistic and intervention studies are, therefore, needed to provide clearer guidelines on factors that protect mothers from becoming depressed and protect young children from the effects of maternal depression.

Intervention approaches, such as nurse home visitors, which have been used successfully in other high risk contexts,[13] may be an effective intervention for postpartum women. Women with a prior history of depression or who are facing multiple health-related or psychosocial stresses might be especially good candidates for home visits. Interventions that combine a focus on the mother's depression and the mother-child relationship[7] may also be important in infancy and especially in toddlerhood, as children become more challenging in their drive for autonomy and a sense of self.

Conclusions

Depression is quite common in childbearing women and when it is severe and prolonged, maternal depression can take a toll on the mother-child relationship and the young child's social, emotional and cognitive development. More serious and chronic depression in mothers is usually associated with a range of other risk factors including a family and personal history of depression; marital, financial, health or other stresses; and health, delivery or developmental problems in the baby. However, when depressed mothers have adequate social support and are able to focus on their babies, their children may be protected from the negative effects of maternal depression.

Implications for parents, services, and policy

Policy makers and front-line service providers, particularly pediatricians, nurses and obstetricians, need to be made aware of the impact of postpartum and other depressions in mothers with young children. Programs that help new mothers and fathers prepare for the parenting role, especially with a first child, and provide support and encouragement for new parents may prevent depression onset or lessen symptoms. Father involvement has certainly increased in the last 15 years, but programs that encourage paternal involvement in child care and parenting may still be needed in some communities. Treatment programs, including nurse home visitors and interventions that target not only the mother's depression, but the child and family' also need to be more widely available. At the same time, mothers who experience a brief postpartum reaction should be reassured and supported, as for most, symptoms will be short-lived. Thus, health care providers need to be aware of the early course of maternal depressive symptoms and be able to

suggest appropriate interventions when warranted.

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Perinatal Depression and Children: A Developmental Perspective

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Introduction

Perinatal depression in mothers, defined as depression occurring during pregnancy or postpartum, is of concern for all who are involved with such families. These concerns derive from common understandings of the essential role both a healthy pregnancy and mothers' warm responsive care play in fetal and infant development and how depression might interfere. Emerging research reveals the effects of perinatal depression on the psychological development of infants and young children of depressed mothers, with a focus on vulnerabilities to the later development of psychopathology and likely mechanisms. Although many questions remain, some conclusions can be drawn about the effects of perinatal depression on child development and the implications for parents, service providers and policy makers.

Subject

Depression is common, especially in women. During pregnancy, rates of major depressive episodes, as defined by the *Diagnostic and Statistical Manual of Mental Disorders*, Fourth Edition (DSM-IV), range from 10-17%[1-3] with significant variability among estimates.[4] Additionally, one meta-analysis estimated that postpartum major or minor depression occurs in as many as 19.2% of women with the more narrowly defined major depression estimated to occur in 7.1% of new mothers.[4] Antenatal depression occurs in similar rates as in the postpartum period, rates which are not significantly different from rates in non-pregnant or postpartum women. Finally, given that antenatal depression is one of the strongest predictors of postnatal depression,[5] many children are exposed both during fetal and infant development.

Problems

From a developmental perspective, timing of exposure to maternal depression is an important consideration, especially in terms of particular risks to development, resiliencies that the children

would be able to bring to bear, and the mechanisms by which those risks are likely to be transmitted. Of particular concern is that early on, children of depressed mothers may develop vulnerabilities to later depression or other problems. Antenatal depression may not only alter development of stress-related biological systems in the fetus, but may also increase risk of obstetrical complications.[6] Postnatal depression may also be an early life stressor given known associations with lower levels of sensitive, responsive care needed for infants' development of health attachment relationships, emotional regulation skills, interpersonal skills and stress response mechanisms.[7] Early life stressors, such as those that might be associated with maternal depression, can influence brain development, which continues at a rapid pace at least for several years after birth.[8] Problems in any of these aspects of development may disrupt the earliest stages of socio-emotional and cognitive development, predisposing to the later development of depression or other disorders.

Research Context

Research on the development of children exposed to perinatal depression emerges from the body of work which considers the broader context within which perinatal depression is embedded, including comorbidities (e.g., anxiety and/or substance use), correlates (e.g., marital distress), and the broader environment (e.g., economic stressors).

Key Research Questions

Researchers have focused their questions on the effects of antenatal or postnatal depression on infant and later development, with a few examining the combined effect of both. Essential questions that have been addressed include: (a) effects of antenatal, postnatal, or dual exposures on infant and later development (b) primary mechanisms or mediators that help explain those effects (c) moderators of those associations such that some children are at greater risk than others. Goodman and Gotlib's integrative model has served as an organizing framework for much of this work.[9]

Recent Research Results

Consistent with theorized mechanisms, antenatal depression has been found to be associated with newborns' neurobehavioural regulation, including their ability to attend to visual and auditory stimuli and overall alertness, as measured by the Neonatal Behavioral Assessment Scale.[10,11] Other adverse outcomes noted for these newborns are higher levels of fussing/crying and more sleep

problems[12] (with sleep problems persisting through 18 and 30 months of age)[13] greater frontal electroencephalogram (EEG) asymmetry,[14] higher *cortisol* and lower *dopamine*,[15] and lower *vagal tone*,[15] although the latter association was no longer in 24 week-old infants.[16] Studies of infant temperament have found specific associations between prenatal depression earlier in pregnancy and negative affectivity.[17] Finally, antenatal depression is associated with elevations in both externalizing and internalizing problems in 30-month-old boys,[19] and increased externalizing but not internalizing problems in both sexes at 8 to 9 years of age.[18] Despite much theorizing and support from the animal literature for a role of cortisol as a mediator of the associations between antenatal depression and infant and child outcomes, support has been inconsistent and primarily indirect. First, associations between depression and cortisol in pregnancy were not found in one large population based cohort study[20] and may only be significant in the presence of antidepressant medication[21] or co-morbid anxiety.[22] Second, studies that tested either direct associations between antenatal maternal cortisol levels on infant or child outcomes or the mediational role of antenatal cortisol in associations between antenatal depression and outcomes yield mixed findings and typically have relied on small samples.[23] Postpartum depression has been associated with a range of problems in infants' and young children's development. Associated outcomes include negative infant temperament,[24] insecure attachment,[25] cognitive and language development difficulties,[26] lower self-esteem and other cognitive vulnerabilities to depression in five year olds,[27] and poorer peer relations in early childhood.[28]

The primary mechanisms implicated in associations between postnatal depression and young children's development have been problems in parenting and high stress levels, both of which have strong associations with depression in women.[7,29] Depression interferes with the qualities of parenting known to be associated with infants' and young children's healthy development, as it is associated with parenting likely experienced as stressful by children (e.g., unresponsive/disengaged, hostile/critical or unpredictable). Support has been accumulating for parenting and stress/adversity as mediators of associations between postnatal depression and problems in child development.[30]

Given that antenatal depression for many women is followed by postnatal depression, many children are dually exposed. The few studies designed to test the potential added burden of postnatal depression on infants already showing vulnerabilities in association with antenatal depression have found that antenatal depression was uniquely predictive of outcomes described here, even after accounting for postnatal depression.[16,17]

Research Gaps

Although research now supports a broad range of outcomes associated with perinatal depression, many unanswered questions remain. Longitudinal studies are needed to test the specific mechanisms that may explain these associations, such as prenatal health behaviours (smoking, alcohol, drug use, poor weight gain), *constricted uterine placental blood flow*, fetal neurobehavioural profile (e.g., heart rate), and obstetrical outcomes (e.g., low birth weight). Similarly, more studies are needed to reveal which children of perinatally depressed parents are more or less likely to develop problems, whether explained by parent characteristics, such as the severity of depression or comorbid conditions, child characteristics such as gender, or contextual factors such as poverty. Also important to study as potential moderators are genetic *polymorphisms* implicated in depression. Overall, more studies are needed from a developmental perspective that include multiple time points of measures of perinatal depression, and that test transactional processes such as how child factors can contribute to the development and maintenance of depression in mothers.

Conclusions

Perinatal depression is associated with infants' and young children's problems in multiple aspects of functioning, increasing their vulnerability for the later development of depression and other disorders. Problems range from affective and interpersonal functioning to EEG and *neuroendocrine* abnormalities. Although most of the perinatal literature has focused on postnatal depression, studies that also measured antenatal depression suggest that antenatal depression may partially explain some effects previously attributed to postnatal depression. Both parenting qualities and stressful environments are at least partial mechanisms in pathways from postnatal depression to young children's problems in development. Conclusions cannot yet be drawn about mechanisms to explain associations between antenatal depression and young children's problems. Transactional processes help to explain negative cascades such as an antenatally depressed mother who gives birth to a fussy baby, who then challenges an already vulnerable mother, who then might be more likely to experience a postnatal depression. Although not reviewed here, depression, including perinatal depression, is often preventable and treatable.

Implications for Parents, Services and Policy

The findings have implications for parents in helping them to understand that perinatal depression must be taken seriously, recognized and treated. Women with histories of depression might benefit from preventive interventions when they become or consider becoming pregnant, to prevent the likelihood of a perinatal depression. Family members can be helpful in identifying early signs of perinatal depression and helping minimize barriers to care, including practical and belief-related barriers. Service providers who work with pregnant and postpartum women play key roles in being able to not only identify perinatal depression, but, equally importantly, to facilitate prompt and effective treatment. A range of pharmacological[31] and nonpharmacological treatment options are available.[32] A recent report issued from the National Research Council and Institute of Medicine of the National Academies has multiple recommendations for policy makers.[33]

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Maternal Depression

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Introduction

Maternal depression poses a significant burden, both to the individual and to the broader relational context.[1,2,3,4] When a mother is struggling with depression, important relationships are likely to suffer as well. Research has documented the pernicious effects of maternal depression on the marital relationship,[5,6] parenting,[7,8,9] and the mother-child relationship.[10,11,12] Furthermore, these effects are not simply limited to the period during which the mother is depressed. The long-term effects of maternal depression extend to poor child outcomes,[13,14] divorce,[15] and even the perpetuation of this cycle with future generations.[16,17] Because depression is particularly prevalent during women's childbearing years, and because it is a highly recurrent disorder, the public health significance of understanding and adequately treating maternal depression is high.

Subject

Approximately 33% of women will suffer from depression by the age of 65.[18] Mothers who suffer from depression are subsequently more at risk for developing an insecure attachment with their children,[19,20,21] often engage in dysfunctional parenting,[7,8] and their children are at heightened risk for developing both internalizing and externalizing behaviour problems.[22,23] Despite these risks, it is important to note that maternal depression does not deterministically culminate in adverse outcomes for offspring and children have been shown to evidence positive development, including secure attachments to their depressed mothers.[24]

Problems

Research on maternal depression and its effects on the family continues to face numerous challenges.

- Issues related to maternal depression and to the adaptation of offspring have not been *consistently* examined across investigations. However, extant research has demonstrated how certain fine-grained experiences of maternal depression (e.g., timing during offspring

development,[25,26] severity[27]) can eventuate in very different child outcomes.

- Historically, investigations focused on main effects models that sought simply to determine whether offspring were adversely affected and in what developmental domains. Examinations of processes and mechanisms contributing to outcome are less prevalent.
- The adverse outcomes associated with maternal depression are not unique to depression, raising questions as to whether it is depression per se, or rather specific aspects of parenting that contribute to negative child development.
- Far less attention has been directed to the bi-directional influences that may maintain or exacerbate maternal depression. For example, if a child has an emotional disorder or illness, then the mother's depression may be more difficult to treat.[28]
- While there are exceptions,[29,30] far too little effort has been directed to preventing the adverse effects of maternal depression on children.

Research Context

Due to the wide-ranging effects of maternal depression, research on the phenomenon must address many domains. Beyond studies of the direct effects of maternal depression on parenting, the marital relationship, and child outcomes, there have been many process- oriented studies to examine, for example, how maternal depression might affect mother-child interactions or the development of mother-infant attachment security.[31] Recent studies of maternal depression also have addressed the interaction of children's genotypes and environmental influences to determine potential mechanisms through which families in which the mother is suffering from depression are affected.[32] In addition, intervention studies have been used to identify both effective treatments for maternal depression and its sequelae.[33] Such studies have been integral to understanding the mechanisms through which maternal depression affects other members of the family. It is important to note that an increasing number of studies of maternal depression have incorporated fathers in order to capture more fully the dynamic processes that co-occur with a mother's depression.[34]

Key Research Questions

Given the diversity of mechanisms and moderators that contribute to varied outcomes in children who have been exposed to maternal depression, it is increasingly important that investigations incorporate a multiple-levels-of-analysis perspective into understanding the effects of maternal

depression on children.[35] Such an approach requires attention to psychological, neurobiological, genetic and contextual factors. Given the high degree of co-morbidity between depression and other mental disorders, increased effort needs to be directed toward understanding how co-morbidity affects children of depressed mothers. Additionally, models of intervention and assessments of their efficacy need to be developed with economically, racially, and ethnically diverse populations. Investigations that examine the complex transactions that occur across ecological systems (individual, family, school, neighbourhood) and that contribute to adaptive versus maladaptive outcomes in offspring of depressed mothers also are needed.

Recent Research Results

Increasingly, research on maternal depression has incorporated paternal influences on the effects of the disorder. Given the relative paucity of fathers in clinical research,[36] the inclusion of fathers provides a fuller depiction of how maternal depression can affect the family system. Meta-analytic research on psychopathology in mothers versus fathers suggests that maternal depression is more closely related to children's internalizing, but not externalizing problems than when fathers are suffering from depression.[37] Furthermore, when paternal psychopathology is present, maternal depression is significantly associated with toddlers' externalizing and internalizing behaviour problems.[38] In contrast, paternal involvement in infancy has been shown to moderate the relation of maternal depression and child internalizing behaviour.[35] More recently, paternal involvement in the family unit has been shown to moderate the association between maternal depression and family cohesion. Specifically, when fathers show greater sensitivity, low intrusiveness, and increased engagement with children, the effect of maternal depression on family cohesion appears to be dampened.[34]

Recent research has examined the mechanisms through which maternal depression affects the family.[9,39] With regard to the fundamental infant-caregiver attachment relationship, data suggest that attachment security mediates the relation between depressive symptoms and negative parental representations.[40] In addition, maternal depression has been found to moderate the relation between attachment insecurity and the impact of home-visiting programs for at-risk mothers and infants.[41]

Recent studies also have demonstrated the effects maternal depression can have on child behaviour outcomes. Reductions in maternal depression resulting from intervention have led to improvements in both child externalizing and internalizing problem behaviour after accounting for

the potential mediating effects of positive parenting.[42] More recent research also has demonstrated the transactional effects of maternal depression, such that a bidirectional relationship has been identified between maternal depression and child irritability[43] and child oppositional behaviour,[44] with the latter relation mediated by child inhibitory control. In addition, maternal depression has been shown to affect children's physiology.[45,46]

In light of ongoing research highlighting racial and ethnic disparities in mental health challenges and access to care,[47,48] there is a subset of research on maternal depression examining patterns, effects, and treatment of maternal depression in the context of race and ethnicity. Specifically, families of color have been demonstrated to disproportionately experience discrimination,[49] racism,[50] poverty,[51] more limited access to healthcare,[52] and poor pregnancy outcomes.[53] However, in the context of maternal depression specifically, there have been mixed results regarding risk for depression among mothers across racial and ethnic groups. Some studies suggest that Black and Hispanic mothers are at lower risk for the experience of depression relative to their white counterparts.[54] Conversely, other empirical work has demonstrated elevated rates of depression among racial and ethnic minority mothers.[55,56,57]

Research Gaps

Despite progress in recent years with respect to understanding the mechanisms and processes through which maternal depression affects children, gaps in the literature remain. In particular, theoretically guided and developmentally informed investigations that consider the complexity associated with understanding the processes through which maternal depression influences children are needed. Specifically, multiple-levels-of-analysis approaches will lead to a more complete depiction of child development in the context of maternal depression.[37] Utilization of molecular genetic methods, neuroimaging techniques and stress reactivity paradigms, in conjunction with psychological variables, will enhance the understanding of both heightened risk and resilience in offspring of depressed mothers. The incorporation of such an approach into the design and evaluation of preventive interventions is particularly important, as these methods will not only increase our understanding of the mechanisms through which interventions operate effectively, but also will shed light on the theory-driven models that are associated with healthy and pathological outcomes.[58,59]

Conclusions

In summary, maternal depression poses a significant burden, not only to the individual affected, but also to the family system and to society more generally. Current research on maternal depression has broadened its scope from the main effects of the disorder to how it interacts and affects the larger family system. Intervention studies demonstrate that depression in mothers can be effectively treated and that its deleterious effects on significant relationships in the family and child outcomes can be mitigated and reversed. Currently, more sophisticated research methods are being used to examine how mothers' vulnerability to depression interacts with the broader environment, how the disorder might impact both the mothers' and the child's neurophysiology, and how families, and in particular children, can demonstrate resilience in the face of maternal depression. Given the stigma mothers may experience as a result of their depression and the increased likelihood of mothers being affected by the disorder, future work that addresses a mother's sense of such stigma and her access to treatment is critical.

Implications for Parents, Services, and Policy

Research coalesces to highlight the potentially pernicious effects that maternal depression may exert not only on the individual, but also on the child, family and broader social ecology. Therefore, it is critical that the stigmatization that prevents women from being screened for and receiving mental health services when a depressive disorder is present be addressed.[60] Often depression is detected in primary care settings and, as such, it is critical that practitioners recognize and address the magnitude of the problem. When treatment is provided, all too often the broader context within which a woman resides is not considered and it is rare that outreach to other family members is provided. Investigations have shown that treating maternal depression is not sufficient for addressing adverse effects on children.[61] This is particularly troublesome because we know that effective prevention strategies are available.[29] Given the extensive research that has highlighted the role that parenting plays with respect to child outcome, assessments of parenting skills and the provision of interventions targeted to the child's developmental level might be particularly effective in ameliorating the negative effects associated with maternal depression. Finally, policy advocates and insurance companies need to recognize the benefit of providing prevention to children with depressed mothers rather than waiting until a child exhibits a diagnosable mental disorder.

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Treatment of Postpartum Depression

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Introduction

Maternal postnatal depression (PND) is common with a prevalence in the developed world of around 13%[1] and a far higher prevalence in some developing world contexts.[2,3,4] There is a considerable body of evidence attesting to the fact that PND limits a mother's capacity to engage positively with her infant, with several studies showing that PND compromises child cognitive, behavioural and emotional development.[5] It has proved difficult to predict PND antenatally[6] and, in any event, preventive interventions have largely proved ineffective.[7] Research and clinical attention has, therefore, been focused on the treatment of manifest PND.

Subject

PND is now recognized, by virtue of the distress caused to mothers, as well as the wider adverse impact on the family, as a significant public health issue. There has, therefore, in recent years, been considerable interest in the development and evaluations of treatments for PND, and there have been several randomized controlled trials. A careful evaluation of the findings of this body of research is important to the provision of services to mothers with PND and their children, as well as to the elucidation of causal processes.

Problems

Most studies of the treatment of PND have been concerned with its impact on maternal mood. Correspondingly, few studies have examined the impact of treatment on the quality of the mother-child relationship and the associated risks to child development. There are, therefore, problems in evaluating the clinical significance of the research findings beyond the narrow concern of maternal mood.

Research Context

There are several well conducted naturalistic studies of the impact of PND on the mother-child relationship, and the architecture of parenting disturbances in this context is now well understood; similarly, the evidence on the consequences of PND for child development is detailed and robust.[5] There have also been several randomized controlled trials of the impact of treatment on PND.[7,8] However, the treatment trials have almost all had limited follow up and have principally been concerned with the impact on maternal mood rather than on the quality of the mother-child relationship and child development outcome.

Key Research Questions

1. Does the provision of specific treatment for PND produce a better outcome in terms of improvement in maternal mood than no treatment or 'treatment as usual'?
2. Are certain forms of treatment of PND better than others at improving maternal mood?
3. Do treatments of PND improve the quality of the mother-child relationship?
4. Do treatments of PND benefit child developmental progress (and, if so, is this by virtue of their impact on the mother-child relationship)?

Recent Research Results

The bulk of the research on treatment has concerned the efficacy of *psychotherapeutic interventions*. A review of several randomized control trials[9] concluded that both specific psychological treatments and more generic psychosocial interventions were moderately effective at improving maternal mood, and they were similarly beneficial. A recent meta-analysis of psychotherapeutic interventions for PND (including cognitive behavioural therapy (CBT), social support, interpersonal therapy, non-directive counselling, and psychoanalytic therapy) similarly concluded that these forms of treatment are moderately effective.[8] Both reviews highlighted the short-term nature of most trials and their brief follow-ups.

Limited data are available on the role of p*harmacological intervention.* An early UK study[10] found similar benefit from Selective serotonin reuptake inhibitors – SSRI (fluoxetine), counselling, or the drug plus counselling. Notably, more than half the women approached for this study declined to participate, primarily because of reluctance to take medication. A small Canadian study of the treatment of PND with comorbid anxiety[11] found similar levels of improvement for another SSRI (paroxetine) alone, and for the drug plus CBT. There is a need to further evaluate the role of antidepressant medication in the treatment of PND,[12] especially when the disorder has become

chronic. The possibility of drug transmission to the infant via breastfeeding is a source of concern.[13]

A critical question regarding the treatment of PND concerns the extent to which treatment effects are reflectedin *improvements in mother-infant relationships and infant developmental outcomes*. Few studies have specifically addressed this issue.[14,15] A large scale randomized control trial (RCT) comparing CBT, counselling and psychoanalytic therapy with routine care found that, while all active treatments were moderately effective in treating depression and brought about short term benefits in the quality of the mother-infant relationship, there was limited evidence of benefit to infant outcome; and effects (including those on maternal mood) were not apparent at follow-up.[16,17] Similarly, a recent RCT found that, although interpersonal psychotherapy was effective in treating maternal depression, there was no benefit in terms of observed mother-infant interactions, infant negative emotionality, and infant attachment security.[18]

A related approach has been to focus more directly on *improving parenting*. For example, Cicchetti et al.[19,20] examined the impact of providing a prolonged psychotherapy (average 57 weeks) to depressed mothers which focused on promoting positive maternal attachment representations and mother-infant interactions. They found a benefit for child attachment and cognitive development. There have also been studies of briefer interventions in the postpartum period, focusing on improving mother-infant interactions; and beneficial effects have been reported for interactive coaching[21] and infant massage.[22,23] Further, relationship facilitation, based on maternal administrations of a neonatal assessment (the Neonatal Behavioral Assessment Scale – NBAS), produced improved infant communication and state organization at one month.[24] A longer-term intervention delivered as part of a large RCT in a South African peri-urban settlement, where community workers made home visits designed to improve maternal sensitivity, not only effected significant improvements in parenting but, at follow up, increased the rate of secure infant attachment.[25] Recently a home-based intervention for depressed mothers using video feedback[26] was found to have positive effects both for the quality of the mother-infant relationship and infant attachment. While these findings are encouraging, the extent to which improvements in the quality of the mother-child relationship lead to better long-term child outcomes remains to be demonstrated.

Research Gaps

Although several forms of intervention have proved beneficial for mothers with PND, none has been shown to have enduring effects on maternal mood, and there is limited evidence that any

intervention improves the long-term course of child development. It remains to be demonstrated which particular form of treatment is optimal, although on current evidence, targeting parenting appears to be the most promising strategy. Furthermore, although there are separable forms of parenting disturbance in the context of PND that are in turn associated with particular forms of adverse child outcome, it has yet to be empirically addressed whether particular features of the mother-infant relationship can usefully be addressed in interventions to improve particular child outcomes. In addition, although child outcomes are especially compromised in the context of chronic PND, no study to date has targeted this group of mothers to establish whether an intervention can improve maternal mood and benefit child outcome.

Conclusions

A number of treatments have been shown to be effective in helping mothers with PND recover from their mood disorder, though none has yet to be shown to be superior to any other, and there is no evidence for long-term benefits to maternal mood. Some success has been achieved in improving the quality of mother-infant interactions by targeting parenting difficulties, though studies have tended to be short-term with brief follow up. While the longer term effects of these parenting interventions are not known, evidence is emerging that some may at least prevent poor short-term child outcomes associated with PND. Since adverse child outcomes associated with PND are more likely to occur in the context of chronic or recurrent depression, it is particularly important that this group be identified and targeted for intervention.

Implications for Parents, Services and Policy

Given the high prevalence of PND and its adverse impact on the mother-child relationship and child development, it is important that community services are in place for the early detection and treatment of PND. It is crucial that attention be given in treatment to the quality of the mother-child relationship and that specific therapeutic measures be introduced to help mothers engage optimally with their infants. In high-risk contexts, where depression is more likely to be prolonged or recurrent, it is important that long-term monitoring takes place so that support can be provided responsively and on an ongoing basis.

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Maternal Depression: Comments on Cummings & Kouros; Campbell; Goodman & Rouse; Toth & Peltz; and Cooper, Murray & Halligan

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Introduction

Target reviews in this section, written by leading investigators, offer brief, authoritative accounts of the key research findings in this area and how they might help to influence policy and practice. They do this by articulating a range of clinical research questions, and findings, with sizable implications for the affected individual and family and for society as a whole. There is substantial agreement across reviews concerning what is known and what is not yet clear. Moreover, there is agreement on how these authors conceptualize the task of understanding the impact of maternal depression with how investigators in other areas of behavioural science struggle to understand the impact of risk exposures. Accordingly, if we can manage to resolve some of the practical and strategic issues raised in these reviews – pinpointing the source of individual differences in risk exposure, integrating biological with psychological models and measures, translating scientific understanding to improve detection and treatment – then we will have made an advance that will generalize to other multi-determined clinical problems.

Research and Conclusions

These reports say little that is disagreeable; more positively, they highlight important lessons for this particular area and for developmental psychological research more broadly. Toth & Peltz's[1] emphasis on the need to account for the multiple biological factors is characteristic of contemporary research protocols; Goodman & Rouse's[2] attention to mechanisms and questions of timing of risk exposure typifies leading research programs on a wide range of topics; Campbell's[3] focus on parenting (shared by other authors) highlights the practical need for theory and clinical intervention to target specific mediators of risk exposure; Cummings & Kouros[4] document the tendency of research studies to over-focus on a particular risk for child outcomes without considering the broader family context; Cooper and colleagues[5] highlight the advantages that

treatment studies provide over observational research designs, and how findings from treatment studies pose further challenges for theory and methods.

The reviews identify findings worth reiterating and expanding, namely, a) the concept of developmental timing, b) challenges in inferring causal connections, c) the need to incorporate biological models.

a. *Developmental timing*. One finding requiring further consideration is that the effect (or presumed effect) of maternal depression on the child is evident even in infancy. That may be a consequence of early appearing genetically-mediated effects (see below). Whether or not genetic factors are at play, however, this observation implies that comprehensive research studies need to begin early in development. Studies starting early in the child's development would, for example, make it possible to track the unfolding developmental dialogue between child and parent that each author discussed or alluded to. In addition, studies including the period of early infancy and childhood would permit a test of whether or not infants are especially sensitive to the effects of disrupted early care, such as often accompanies maternal depression. Experimental studies on animals6 demonstrate that this is so, and there is a clear need to examine if that extends to humans. Importantly, the suggestion that studies commence in early infancy follows not from the evidence that there are particular effects of maternal depression in infancy, but rather from the need to test that possibility. For example, in the case of maternal postpartum depression, the case for early exposure as having particular impact is far from certain.[7,8]

   There are, in fact, many problems that derive from not knowing enough about the role of developmental timing – the hypothesis that there are certain periods in the child's development when she/he is particularly vulnerable to the impact of maternal depression. Many studies contribute provocative findings but are unable to resolve this debate. For example, if the effects of maternal depression are observable in the first months of age, then one might wonder if parental caregiving quality were a likely causal factor (i.e., is it likely that the impact of parental care would have taken hold on the child's development by that point? We don't yet know.). A practical expression of this scientific question is whether or not there are optimal periods to intervene. For example, interventions for depressed mothers with young children have been undertaken, and may result in improvements in child-parent attachment.[9] So far as we can tell, there does not yet seem to be a point (e.g., child age) after which interventions for parent-child relationships or child outcomes are demonstrably ineffective.

b. *Causal inference*. Exposure to maternal depression will almost certainly mean exposure to a host of other factors that will also compromise child development (even if they were not combined with maternal depression); many of these are noted in the target articles. Maternal depression may therefore be conceptualized as a proxy variable, as with poverty, parental divorce/remarriage, and many other risks that dominate research on child development and psychopathology. Indeed, given that, by its nature, maternal depression increases the risk for other adversities (and results from other adversities), it is reductionist to account for a specific effect of maternal depression. That does not mean that maternal depression is not a worthy target for research or treatment, but rather that observational studies simply do not have adequate leverage for disentangling inherently tangled effects.

   One example of this is paternal depression. There is some suggestion in the reviews that paternal depression has been ignored; the effect of that is potentially severe. Assortative mating for psychiatric disorder – the tendency for women with psychological disorder to pair with men with psychological disorder and vice versa – is well-known and confounds research and clinical efforts focusing on only one or the other partner. Moreover, a recent study showed that even in the postpartum period, a period of risk conventionally ascribed only to women, the risk for depression is elevated in men.[10] A separate study demonstrated that paternal postpartum depression predicted child adjustment problems independently of maternal postpartum depression.[11] Nevertheless, most studies of maternal postpartum depression make no mention of paternal postpartum depression, or consider the broader family setting.

   The intervention study design should be seen as especially valuable because it offers far greater leverage for testing causal hypotheses. For example, several studies[12,13] suggest that changes in maternal depression (induced through intervention) had positive “down stream” effects on child outcomes; that implies a far firmer link than associations obtained from observational studies.

c. *Biological models*. Many contributors noted that an exclusive focus on behavioural outcomes in the child is limiting. If there are behavioural effects, then there must also be biological effects. There is at present no compelling organizational model that would point to one or other focus for biologically-focused research on the impact of maternal depression, but many candidates exist, as noted. A recent longitudinal study is notable because it expanded research on maternal symptoms well beyond behavioural outcomes and their underlying causes. That study linked maternal symptoms with illness and specific markers of immune functioning in the child.[14] If parental depression could be linked in a causal way to child’s

immunological or cardiovascular health (and we are not there yet), then the public health impact of parental depression would be substantial, and addressing parental depression would then be seen as a focus for all health care providers rather than just those in mental health.

Given the brevity of the reports, it would be inevitable that some important features would be left out or go undeveloped. The most obvious of these is genetics. Many contributors mention genetic factors, but the practical application of this is not particularly straight-forward. Twin and adoption studies provide some additional leverage for detecting genotype-environment interplay. Molecular genetic studies are arguably easier and cheaper to perform, although the challenge here is in knowing what the specific risk *allele* is doing, even if something is detected. And, there is not yet robust evidence that genetic factors predict treatment response. These are important caveats for future research. Nonetheless, it is instructive that genetic effects are reliably included in contemporary studies. Relevant studies show that genetic factors may be associated with parenting behaviours.[15] and that parenting effects on the child may depend on the child's genetic make-up.[16] That complements the extensive evidence that maternal depression is under some degree of genetic control. It would be unusual if the pervasive (although perhaps not extensive) role of genetics as described above were not evident in the causal chain linking maternal depression to child outcomes.

Implications for Development and Policy

One of the more important but most complex implications for policy concerns the extent of individual differences in human development. Simply put, there is wide variation in children's responses to stresses, even where there is a focus on a specific exposure, such as maternal depression, and even when that exposure is extreme, as in the case of institutional rearing.[17] That can be seen in the current collection of papers in the authors' efforts to qualify most findings that were reported, and allude to such factors as children's temperament, cognitive sophistication or any of a number of other factors that might influence why some children may respond worse than others. Even if maternal depression were a monolithic exposure – and surely it is not – the effects on children would be diverse because of the varying cognitive, genetic, and other sources of vulnerabilities in the children.

Wide variation in outcomes in children exposed to a particular risk implies that there will be wide variation in response to any particular evidence-based intervention – whether it is family therapy

or home visiting. That is why there is so much focus in intervention studies on the question, “what works for whom?”, or what is referred to in the research literature as “moderators” of treatment outcome. The explicit message is that no particular intervention will work for everyone; not all participants will respond clinically to evidence-based interventions. That presents a complex and perhaps unwelcome story that is difficult to convey swiftly to a lay audience and it is, of course, awkward for moving forward on policy. We need to be prepared for the inevitable finding that an intervention (clinical or policy) is certain to have varying effects – it may be brilliant for some, irrelevant for others, and possibly counter-productive in still others. It may be that the movement toward individualized medicine, which follows naturally and logically from genetic research, will provide a metric for targeting and tailoring interventions. But, we are not there yet. Flexibility in treatment and in policy, for example, with regard to a range of possible interventions, is a key take-home message.

A second implication is the need to focus on population-level estimates of risk and adjustment, a topic not much covered in these reviews. Unfortunately, research shows how difficult population-level change is to achieve, and the number of studies that qualify as informative in this regard is small.[18] Furthermore, despite a concerted research efforts for many years, there has not been a documented drop in maternal depression or child adjustment problems; in contrast, claims have been made about an epidemic of childhood depression, although that is not based on sound evidence.[19] A goal of policy may therefore be to commission efforts to understand how successes in individual treatment studies and advances in research do not make healthier populations.

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