

# Maternal mental health and children oral health: a literature review



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## Abstract

**Aim** Recently, serious considerations regarding mental health conditions and their impact on the whole organism have been made. This area is still quite unknown within the dental community, despite the potential impact these conditions can have on both oral care and health.

Previous studies have concluded that both pregnant women and mothers have been found to be particularly sensitive to the risk of developing mental disorders such as anxiety and major depression. There is a very high possibility for the children of these mothers to experience neglect and disregard due to the development of these conditions, which will negatively affect their behavioural and physical growth as a result.

This impact stretches into oral health as well, as these children have been reported to be more inclined to develop early childhood caries, bruxism, and after-birth enamel defects, in addition to illnesses like diabetes and disabilities.

**Materials and methods** A literature search was conducted in Pubmed, Medline, and Scopus for the keywords 'maternal depression', 'oral health' and 'children', combined with 'AND' or 'OR' Boolean Operators.

**Results** Ten studies with observational design (cohort and cross sectional) and their corresponding literature review articles were included. Of these, 4 were cross-sectional studies, 3 were cohort studies, 1 was a review and 2 were secondary analysis. Table 1 clusters and briefly unfolds all of them.

**Conclusion** The results of the present literature suggest a strong connection between maternal mental disorders and poor children's oral care, and as a result, dental professionals should be extremely careful when treating and communicating with these patients.

## Introduction

According to the World Health Organization (WHO), depressive disorders are common mental disorders involving sadness, loss of interest and pleasure, feelings of guilt or low self-esteem, disturbed sleep or appetite and poor concentra-

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tion [World Health Organization, 2008]. Nowadays, about 450 million people suffer from such conditions, placing mental disorders among the leading causes of health problems and disability worldwide [World Health Organization, 2001]. Over one in four women, during reproductive age, are affected by mental disorders [Vesga-Lopez et al., 2008]. Greater depression incidence is detectable in mothers of disabled children as well as adolescent mothers [D'Alessandro et al., 2014; Paglia et al., 2015]. Teenage pregnancies are considered a public health issue, especially in the poorer regions of the planet, where the frequency is rather high; in some countries, such as Brazil, the percentage reaches 19% [Paglia et al., 2022; Martins et al., 2014].

It has been clearly demonstrated that mental disorders can have a negative impact on the oral health status of adults, with an increase in dental caries and greater tooth loss [Kisely et al., 2008]. It has also been shown that poor maternal mental health has a negative effect on the health and development of the child, including oral health-related quality of life [Aiuto et al., 2020]. Mothers with anxiety disorders or depression have a prevalence of impact higher than 90% on child's oral health-related quality of life compared to mothers without these conditions; this impact is heightened when both conditions are present [Costa et al., 2017a; Paglia, 2021]. It has been stated that psychological disorders may influence the frequency of dental visits and tooth brushing at home [Kavanaugh et al., 2006], as well as the prevalence of dental caries [Goettems et al., 2021].

Indeed, when anxiety leads to fear of the dentist in mothers, they are more likely to avoid dental visits for themselves and their children [Da Costa et al., 2015]. In addition, when socioeconomic conditions are poor, these conditions are accentuated: difficult socioeconomic conditions may predispose to both oral disease and mental illness [Knoblauch et al., 2019; Finlayson et al., 2007a]. When there is a lack of adequate

| Reference               | Country | Aims/purpose                                                                                                                                                                       | Methodology           | Key findings and results                                                                                                                        |
|-------------------------|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| Finlayson et al. (2007) | USA     | To investigate the relationship between maternal cognitive, behavioural and psychosocial factors and brushing practices in low-income African-American preschool children.         | Cross sectional study | Several factors were associated with young children's brushing practices. Intervening on these factors could help foster healthy dental habits. |
| Finlayson et al. (2007) | USA     | To examine how several specific maternal health beliefs, behaviours, and psychosocial factors relate to young children's ECC status in a lower-income African-American population. | Cross sectional study | Maternal psychosocial and traditional factors were associated with ECC among preschool-aged children.                                           |
| Pinto et al. (2017)     | Brazil  | To investigate the relationship between maternal depression and childhood caries in a cohort study of adolescent mothers.                                                          | Cross sectional study | Children from mothers with major depressive disorder with negative caries experience presented a high caries prevalence.                        |
| Costa et al. (2017)     | Brazil  | To investigate the influence of depressive and anxiety symptoms in young mothers in relation to their children's oral health-related quality of life.                              | Cross sectional study | Poorer children's oral health-related quality of life was associated with maternal depression and anxiety.                                      |
| Costa et al. (2017)     | Brazil  | To investigate the relationship of maternal depression and anxiety with children's dental fear.                                                                                    | Cohort study          | Children's dental fear was positively associated with mother's presenting depression and caries experience.                                     |
| Knoblauch et al. (2019) | Germany | To identify those maternal psychopathological symptom burdens with relevant association with ECC.                                                                                  | Cohort study          | Several psychopathological symptom burdens are linked to ECC, however, socioeconomic status has the strongest influence.                        |
| Gomes et al. (2020)     | Brazil  | To assess the association between maternal mental disorders and children's oral health.                                                                                            | Review                | Anxiety had a positive association with dental caries.                                                                                          |
| Auger et al. (2020)     | Canada  | To estimate the association between maternal mental disorders and dental caries.                                                                                                   | Cohort study          | Maternal mental disorders before or during pregnancy are associated with the risk of childhood caries.                                          |
| Alade et al. (2021)     | Nigeria | To determine the association of maternal psychosocial factors with ECC among children in Nigeria.                                                                                  | Secondary analysis    | The only significant association was between the prevalence of caries in the mother and the children.                                           |
| Tsuchiya et al. (2021)  | Japan   | To determine the association between maternal postpartum depression and lower toothbrushing frequency in children aged two years.                                                  | Secondary analysis    | Participants with persistent postpartum depression showed the highest relative risk for lower toothbrushing frequency in children.              |

**TABLE 1** Literature articles included in the present review, with their main features and purposes, ordered by date.

parental care, childhood neglect creates a direct pathway towards the development of oral problems up to the onset of ECC [Bhatia et al., 2014; Paglia, 2019].

Therefore, the aim of the present review is to investigate the association between maternal mental disorders and children's oral health conditions.

## Methods

### 2.1 Review Question

The question of research was as follows: Is there a correlation between maternal mental health and children's oral health?

### 2.2 Inclusion and exclusion criteria

Ten studies with observational design (cohort and cross-sectional) and their corresponding literature review articles

were included. Of these, 4 were cross-sectional studies, 3 were cohort studies, 1 was a review and 2 were secondary analysis. Table 1 clusters and briefly unfolds all of them.

The studies have investigated the association between women with maternal mental disorders and oral health of their children from ages zero to 12 years. The exposure considered was the mental illness of the mother, and studies that included parents or a caregiver other than the mother were not included.

### 2.3 Search strategies and data collection

The reference database used for this review was PubMed. A comprehensive literature search was carried out for the keywords 'maternal depression', 'oral health' and 'children' using the Boolean operator 'and' and 'or' to combine these words. Only papers in English were considered.

Independent title and abstract reviews were carried through

by the authors for the purpose of including or cutting out potentially appropriate articles. Furthermore, independent full article reviews were completed on the articles considered from the initial search to assess their relevance to the research question.

After exclusion for duplicates and titles, 21 articles were considered, but only 10 were accepted after reading the full-text.

## Results

Of the references initially identified in the electronic database, after screening for title and abstract, 21 articles were found to be read in full-text. Of these, 11 were excluded, resulting in 10 accepted articles for the present review. As the data was very heterogeneous, a meta-analysis was not possible.

Table 1 summarises the collected data. The seven included studies were published from 2007 to 2021 and were conducted in six different countries: Brazil [Aiuto et al., 2020; Costa et al., 2017a; Pinto et al., 2017; Costa et al. 2017b], USA [Finlayson et al., 2017a; Finlayson et al., 2017b], Germany [Knoblauch et al., 2019], Canada [Auger et al., 2020], Nigeria [Alade et al., 2021] and Japan [Tsuchiya et al., 2021].

The children's age distribution between the studies was quite variable: while young children, between 2–3 or 3–4 years old, were included in some studies [Costa et al., 2017a; Knoblauch et al., 2019; Pinto et al., 2017; Costa et al., 2017b], others included a wider range, going up to 12 years old in some cases [Aiuto et al., 2020; Finlayson et al., 2017a; Auger et al., 2020].

In terms of maternal mental health, most studies investigated more than one mental problem [Aiuto et al., 2020; Costa et al., 2017a; Knoblauch et al., 2019; Finlayson et al., 2017a; Costa et al., 2017b; Finlayson et al., 2017b; Alade et al., 2021], one study considered the presence of Major Depressive Disorder (MDD) [Pinto et al., 2017] and another considered the presence of maternal postpartum depression [Tsuchiya et al., 2021]. When more than one mental disorder was reported, depressive and anxiety disorders were usually the most frequently cited. Other specific disorders mentioned were stress disorders, bipolar disorder, schizophrenia, delusional disorders and personality disorders.

As investigated outcome, two studies examined oral health in general [Aiuto et al., 2020] and oral health-related quality of life [Costa et al., 2017a], two studies investigated the presence of dental caries [Pinto et al., 2017; Auger et al., 2022], one the presence of dental fear [Pinto et al., 2017], three the presence of early childhood caries (ECC) [Knoblauch et al., 2019; Finlayson et al., 2017a; Alade et al., 2021] and the last two studies focused on toothbrushing frequency [Finlayson et al., 2017b; Tsuchiya et al., 2021].

## Discussion

### 4.1 Maternal mental health

In Europe, 10.05% of women went through major depression in 2001 [Ayuso-Mateos et al., 2001].

Regarding mothers, recent studies suggest that the prevalence of depressive disorders is reasonably high. Evidence reveals that mothers have a greater tendency than fathers to experience an intense stress condition, due to their distinct levels of child responsibilities [Dellve et al., 2006]. McGrath et al. [2008] estimated that in 2008, in the USA, the num-

ber of women with children who suffered from depression, increased from 10% to 42%; and the number of depressed pregnant women reached 38%. The Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) considers a disorder diagnosable when symptoms occur one or more times during a period of two or more weeks. Some of the recurrent signs of illness are loss of interests and pleasure, troubles sleeping, fatigue, eating disorders, apathy, feelings of worthlessness [Costa et al., 2017b].

The risk of mental conditions is often increased by specific circumstances. Specifically, developing countries count for the largest number of teenage mothers [Paglia, 2022], who have been found to be much more likely to present deeper and more frequent depression episodes when compared to older mothers [Paglia, 2019].

Furthermore, an Italian study stated that major depressive symptoms affect 53% of the mothers of children with disabilities and for 18% of them, the risk of illness is 100% [D'Alessandro et al., 2014].

### 4.2 Poor behaviors and habits

Depressive symptoms have been reported as a cause of inadequate oral care, inducing improper health-related behaviours. These habits have a direct impact on the health of the oral cavity and its components [Dos Santos et al., 2017].

The most common consequences are low frequency of tooth brushing, infrequent oral check-ups and treatments, and poor attention to nutrition. A study performed in 2017 involving 115 pregnant women in London, found that over 60% of the participants were not aware of the fact that sugar-free diets and fluoride applications could help prevent tooth decay [Auger et al., 2020].

Moving on, diagnoses of mental illnesses often come along with prescriptions for specific medicines, such as antidepressants and anxiolytics. Benzodiazepines are well-known for causing gingivitis and xerostomia, which may promote the onset of burning mouth syndrome and bacterial proliferation.

In particularly tough situations, smoking, drinking and drugs are used to cope with stress, depression and other disorders. Tooth decay has a significant advancement rate under these circumstances and has the potential to affect the oral health of other family members.

### 4.3 Impact on children oral health

The repercussions of maternal disorders on children's lives are often undervalued and hardly ever considered. On one hand anxious mothers manifest intrusive behaviours towards their infants, and on the other hand depressed mothers tend to isolate themselves from social interactions and live in a state of lethargy and disinterest. Both conditions can impact the child's life, denying them physiological, mental, and physical growth [Costa et al., 2017b]. The effects of maternal depression on children's health have been studied, and children of depressed mothers have been found to have a higher rate of accidents, such as a higher number of hospital admissions [Casey et al., 2004].

These effects also have consequences for oral health. Several studies investigated the correlation between child neglect and early childhood caries (ECC) presence. ECC is defined as the presence of one or more decayed, missing, or filled tooth surfaces in any primary tooth in a child 71 months of age or younger [American Academy, 2014]. Recent research confirmed that the children of caries-free mothers with major depressive disorders have a risk of developing caries that is

four times higher compared to children of caries-free mothers with no mental disorders [Costa et al., 2017a].

In a Canadian longitudinal study including 800,000 infants with a long-term follow-up (up to 12 years), children of mentally ill mothers had a risk 70% higher of having dental caries that needed to be treated at the hospital, juxtaposed to those whose mothers with good mental health [Auger et al., 2022]. In 2015, the American Academy of Pediatric Dentistry declared the straightforward connection between the mother's oral health and their baby's chance of having dental problems [American Academy of Pediatric Dentistry, 2014].

Women diagnosed with mental conditions are frequently found to have a poor diet, as sugary products are consumed to repress their emotions. These same products are usually given to their children as a form of reward or incentive to behave [D'Alessandro et al., 2014]. A statistically significant correlation was found between the children's dmft/DMFT values and mothers' risk of depression. The risk of maternal depression is statistically correlated with prevalence of caries and sugar consumption in children.

#### 4.4 A biological point of view

Not only are kids of depressed mothers more prone to dental problems, but mental disorders during pregnancy have been proven to affect caries susceptibility.

Primary teeth enamel starts to form during the 14th week of gestation. If the process is disturbed by external factors, ameloblasts have a great chance of being obstructed, which will prevent the proper thickening and hardening of the enamel. The outcomes of this imbalance are enamel defects such as hypoplasia (quantitative deficit) and hypomineralisation (qualitative deficit resulting in discoloration and softening of the enamel) of primary and permanent teeth [Auger et al., 2020].

An Iraqi cross-sectional study of 823 children assessed how maternal psychological stress during pregnancy increased the odds of hypomineralised enamel defects threefold in their children [Ghanim et al., 2013]. Furthering this, maternal disorders can also be carriers of chronic childhood illnesses associated with caries and teeth disruption like diabetes and developmental disabilities [Foster et al., 2005].

#### Conclusion

The present review investigated the possible association between maternal mental disorders and children's oral health. Our findings suggest a consistent correlation between the two, with a greater percentage of oral diseases in children whose mothers had mental problems.

Dentists and paediatricians should be aware of this and should instruct mothers on the importance of oral and dental healthcare. On the other hand, public health should promote early management of mothers' mental health, especially in cases of teenage and socio-economically disadvantaged mothers, in order to ensure children's health.

#### Statements and Declarations

Authors state that they don't have any financial or non-financial interest directly or indirectly related to the present work.

#### Authors' contribution:

Ludovichetti Francesco Saverio: Design of the work; Data analysis and interpretation; critical revision of the article; final approval of the version to be published. Zambon Giulia and Zerman Nicoletta: Drafting of the article; critical revision

of the article; final approval of the version to be published. Signoriello Anna Giulia: Drafting of the article; final approval of the version to be published. Zuccon Andrea and Lucchi Patrizia: critical revision of the article; final approval of the version to be published. Stellini Edoardo: critical revision of the article; final approval of the version to be published. Mazzeni Sergio: critical revision of the article; final approval of the version to be published.

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