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Review Article

Knowledge, Attitude and Practices of Orthodontists and Paediatric Dentists Regarding Eating Disorders: A Review and Recommendations

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Abstract

Eating disorders (ED) are complex mental health conditions marked by disruptions in eating behaviors, body image, and weight control. These disorders often involve a heightened preoccupation with food, body image, and shape, leading to significant distress and impairment in daily functioning. Typically emerging during the teenage years, EDs can have serious consequences if left undetected, affecting both physical and psychological health. Since orthodontists and pediatric dentists frequently interact with teenage and young adolescent patients, they are uniquely positioned to play a critical role in identifying and managing the oral health impacts associated with these conditions. By recognizing early signs, such as enamel erosion or other oral manifestations, and as their role in overall patient wellbeing entails, dental professionals can contribute to timely diagnosis and interdisciplinary care. In this paper, we explore current findings on this topic, highlighting the importance of our role in early detection, and outlining directions for future research and practice to enhance the wellbeing of ED patients..

Keywords: Eating Disorders; Mental Health; Orthodontists; Pediatric Dentists

Introduction

According to the World Health Organization (WHO), health can be defined as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity”(World Health Organization, no date). This definition emphasises that health encompasses more than just the absence of illness and includes multiple dimensions of well-being. This definition was further elaborated on during the Ottawa Charter for Health Promotion (World Health Organization, 1986), where health was to be considered "a resource for everyday life, not the objective of living." This clearly highlights that health is not merely a static state but a dynamic and ongoing process that enables individuals to realise their full potential and cope with the challenges of life, ultimately reaching their aspirations.

Health is, therefore, not a single item unidimensional concept, but rather a multidimensional highly complex aspect of life, and of those different dimensions, general physical health, oral health& mental health are intricately connected.

Oral health is extensively connected to systemic health, with poor oral health being associated

with several systemic conditions. Notable examples include the relationship between periodontal disease and cardiovascular disease(Kotronia *et al.*, 2021; Del Pinto *et al.*, 2023), the bidirectional association between diabetes and periodontal disease(Păunică *et al.*, 2023), the increased risk of respiratory infections such as pneumonia linked to oral pathogens(Dong *et al.*, 2022), and the link between poor periodontal health and adverse pregnancy outcomes (Nannan, Xiaoping and Ying, 2022).

Similarly, strong connections between mental health issues and systemic conditions have been reported in the literature, highlighting significant implications for overall health and well-being. For instance, mental health disorders are linked to an elevated risk of coronary heart disease (CHD), with symptoms of mental illness being common in CHD patients, potentially exacerbating cardiovascular morbidity and mortality. Both mental illnesses and CHD share underlying causes(De Hert, Detraux and Vancampfort, 2018).

The relationship between oral health and mental health is less explored compared to other health links. Dental anxiety, experienced by nearly half of the dental patients, can escalate into dental phobia, significantly impacting individuals' willingness to seek care(Kisely, 2016). Oral health and aesthetics also influence self-esteem and psychosocial well-being(Militi *et al.*, 2021), while issues like dental decay, tooth loss, and pain are associated with social isolation, potentially worsening mental health(Tiwari *et al.*, 2021).

Conversely, mental health conditions such as depression and anxiety can negatively affect oral health(Kisely *et al.*, 2016). This connection may arise from various factors, including side effects of psychotropic medications (e.g., xerostomia) and reduced attention to oral hygiene among individuals with severe mental illnesses(Cockburn *et al.*, 2017). These interactions highlight the bidirectional influence between mental and oral health, underscoring the need for integrated care approaches.

The elaborate interplay between these three facets impacts overall well-being and quality of life, as shown in Figure 1.

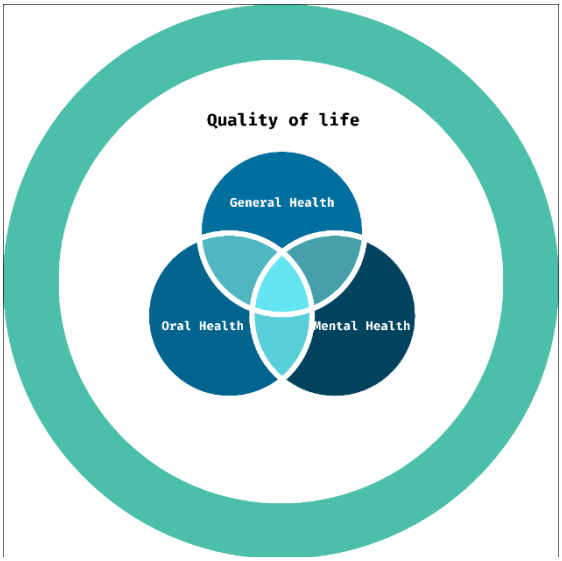

Figure 1: Conceptual framework showcasing the link between the concepts. Areas of overlap signify the common risk factors.

Eating Disorders

As explained earlier, EDs are complex conditions that have greatly detrimental effects on health and well-being. The three most common eating disorders are anorexia nervosa, bulimia nervosa & binge eating (Treasure, Duarte and Schmidt, 2020). The causes of eating disorders are influenced by a complex interaction between genetic and environmental factors. Heritability of eating disorders is estimated between 50% and 60%, with a significant part of said heritability being due to common genetic variations, of which single nucleotide polymorphisms (SNPs) account for 11% to 17%. (Culbert, Slane and Klump, 2018; Donato *et al.*, 2022). The onset of eating disorders was found to be typically between the ages of 16 and 22 in the general population and between 14 and 19 in clinical settings, while onset after the age of 25 is considered unusual in Western settings.(Javaras *et al.*, 2015; Watson *et al.*, 2022). Although the mean age of onset of eating disorders is around adolescence,

a rising phenomenon of early onset eating disorders is alarming; where eating disorders such as anorexia nervosa can be detected as early as 8 years old, early onset eating disorders have higher morbidity and mortality rates than adolescent-onset eating disorders, particularly due to longer duration of illnesses (Lask and Bryant-Waugh, 1992; van Noort *et al.*, 2018).

Anorexia nervosa (AN) is characterised by severe restriction of food intake, leading to significantly low body weight, due to an intense fear of gaining weight. People with anorexia nervosa also experience a distorted body image and may engage in behaviours such as excessive exercise or self-induced vomiting (SIV). It is associated with significant physical complications, including malnutrition, hormonal imbalances, and organ damage (Hoek, 2006; Morris and Twaddle, 2007). Anorexia nervosa is more prevalent in females than males, with a ratio of approximately 10:1 (Puckett *et al.*, 2021).

Bulimia nervosa (BN) on the other hand is characterised by episodes of binge eating followed by compensatory behaviour such as SIV and excessive exercise. This typically results in metabolite & electrolyte imbalances, gastrointestinal problems & other physical healthcare consequences (Kourkouta *et al.*, 2019). Due to the rapid shift between the episodes of binge eating and purging behaviour, GIT abnormalities are extremely common. Those include bloating, flatulence, pharyngeal irritation, blood in vomitus, and difficulty swallowing(Carney, Rushing and Jones, 2003). Evidence regarding Bulimia nervosa prevalence is more limited than anorexia nervosa, it however shows the same trend where it is much more prevalent amongst females than males(Smink, van Hoeken and Hoek, 2012; Van Eeden, Van Hoeken and Hoek, 2021; P. Hay *et al.*, 2023). This might be attributed to the difficulty in the detection of BN as opposed to AN, which occurs due to the extreme secrecy about the binge eating episodes and the purging behaviours in BN coupled with the normal weight, which is less conspicuous than the extreme weight loss, associated with AN(Kourkouta *et al.*, 2019).

Binge eating (BE) is characterised by recurrent episodes of binge eating, but as opposed to Bulimia Nervosa, no compensatory behaviours are utilised. It can contribute to obesity and its associated health problems, such as high blood pressure, diabetes, and cardiovascular diseases (Giel *et al.*, 2022).

Other than the three main eating disorders mentioned above, other conditions can occur and could be classified as Other Specified Feeding or Eating Disorder (OSFED) or Unspecified Feeding or Eating Disorder (UFED). OSFED stands for when clear clinical signs of distress related to eating habits are presented but do not fulfil the full criteria of other conditions, such as atypical anorexia nervosa (normal weight but with restrictive behaviours), purging disorder, and night eating syndrome. On the other hand, UFED allows for flexibility and stands for when the behaviours result in substantial distress or impairment in daily functioning, yet they do not fully align with the diagnostic criteria for any specific feeding or eating disorder, nor do they closely resemble those categorised under OSFED(American Psychiatric Association, 2013).

It is also worth noting that in addition to the above-mentioned physical comorbidities, eating disorders are often accompanied by psychiatric comorbidities, in particular depression and anxiety disorders, which heavily impact the prognosis and the progression of eating disorders (Hambleton *et al.*, 2022; Momen *et al.*, 2022).

Eating Disorders & Oral Health

EDs are complex mental health conditions, some of which involve behaviours such as SIV & binge eating. ED has also been linked to a myriad of oral health problems, most notably enamel erosion.

A. Dental Erosion

Enamel erosion was the most commonly reported finding, particularly in patients who practice SIV. The enamel erosion pattern was reported to start at the palatal surface of maxillary anterior teeth, then move on slowly to the palatal surface of maxillary posterior teeth as well as their occlusal surfaces. Infrequently extends to the lingual surface of mandibular teeth, and very rarely to the facial surface of maxillary posterior teeth (De Moor, 2004).

A 2023 systematic review and meta-analysis concluded that "54.4% of patients with bulimia nervosa and 26.7% with anorexia nervosa experienced tooth erosion"(Nijakowski *et al.*, 2023). This is a finding that showcases the alarming prevalence of erosion and the correlation between SIV and erosive lesions.

The pattern of dental erosion in eating disorders is unique and has been extensively researched. The most affected surfaces are the palatal of the maxillary posterior teeth, the occlusal of posterior teeth, and the lingual surface of mandibular posterior teeth. All surfaces can be involved; however, it is rare for the buccal surfaces of mandibular anterior teeth to be affected as they are commonly protected by the tongue. Furthermore, dental erosion is not only limited to enamel, as it commonly extends into dentin (Lo Russo *et al.*, 2008; Otsu *et al.*, 2014). Even though eating disorders are often coupled with other potential etiologic factors of dental wear, patients with eating disorders, particularly those who practice SIV, are at a higher risk of developing severe dental erosion lesions (de Carvalho Sales-Peres *et al.*, 2014).

B. Caries

While some studies claim no significance (Johansson *et al.*, 2012; Hermont *et al.*, 2013), others have shown that there is a correlation between Caries & ED. However, the rationale behind this correlation is not as properly understood as that of the erosion, where some studies claim, it is related to the typical increase in consumption of sugary food(Lo Russo *et al.*, 2008). Studies that assess dental caries did not typically rely on the caries pattern, however, the most commonly reported caries patterns include proximal caries and molar cupping as opposed to pits and fissure caries(Johansson *et al.*, 2012).

C. Periodontal Disease

As with caries, the association between ED & Periodontal disease is not conclusive(Rangé *et al.*, 2021), with some authors reporting an association (Lourenço *et al.*, 2018), while others reporting non significance(Garrido-Martínez *et al.*, 2019). However, there is a growing body of evidence that both explains and elaborates on how ED can result in gingival inflammation, primarily due to nutritional deficiency (Rangé *et al.*, 2021). Malnutrition and imbalance of micronutrients can negatively impact periodontal health and collagen synthesis(Lo Russo *et al.*, 2008; Sheetal *et al.*, 2013).

D. Mucosal Lesions

Mucosal lesions have been previously reported with ED with varying presentations, some including ulcerations (Panico *et al.*, 2018), presumably due to actions inducing the vomiting, and others including exfoliative and haematologic lesions(Schlosser, Pirigyi and Mirowski, 2011; Romanos *et al.*, 2012).

E. Saliva & Salivary Glands

The other commonly reported finding related to ED is related to saliva and salivary glands. While caries and periodontal disease remain debatable, xerostomia and changes in saliva and salivary glands have been more commonly reported with ED. Hyposalivation and xerostomia are commonly reported (Lourenço *et al.*, 2018; Garrido-Martínez *et al.*, 2019) and could affect the salivary function, thus contributing to the erosive lesions as well as possibly explaining the increased incidence of caries if it is confirmed. Parotid enlargement associated with ED has been reported since the 1980s (Walsh, Croft and Katz, 1982), with parotid dysfunction and sialadenosis being primarily caused by eating disorders in the

Western world (as opposed to severe malnutrition in developing countries) (Garcia *et al.*, 2018).

F. Enamel Hypoplasia

Although very rare, if eating disorders do occur at a very young age, they would result in nutritional deficiencies which would, in theory, impact tooth mineralisation (Sheetal *et al.*, 2013).

The Role of The Dentist

When looking at the link between oral and mental health, the role of the dentist comes front and centre of the discussion, whether due to their role as healthcare professionals or due to how the career path affects their mental health.

Even though historically, talks about mental health have been heavily stigmatised, there is a shift with a degree of openness in discussions related to mental health and the dental profession focusing on the value of supporting the professionals in maintaining their health and wellbeing(Westgarth, 2022).

When it comes to eating disorders, a 2023 scoping review has clearly shown that there is a lack of research into the connection between dental practitioners & eating disorders, with most research showing that there is inadequate knowledge and/or training (Presskreischer *et al.*, 2023). The review concluded that "While there has been significant research on the impact of eating disorders on oral health, there is a need for research in all other aspects of the intersection between eating disorders and oral health." It is also worth noting that while the review assessed different domains of research on eating disorders & oral health, including research on the knowledge of eating disorders amongst dentists, most of the research included was conducted in the USA & Europe, and none of which were conducted in the Arab or African regions. Furthermore, the review included 44 studies, only 7 involved understanding the oral health indicators of eating disorders, recognising the symptoms associated with these conditions, knowing how to broach concerns with a patient, and being aware of appropriate referrals for treatment when required. knowledge of dental practitioners, and only two of which explicitly focus on the knowledge of dentists.

Another 2023 article underscored the pivotal role of dental practitioners in the identification and management of oral manifestations pertaining to eating disorders. It accentuates the propensity of dental professionals to discern early signs of these disorders owing to their conspicuous presentation within the oral cavity. Emphasis is placed on the imperative for dental teams to approach affected individuals with the utmost sensitivity, offering supportive measures while addressing the concomitant dental sequelae associated with eating disorders. Additionally, the article accentuates the heterogeneous nature of individuals afflicted by such disorders and enumerates prevalent oral manifestations thereof. It underscores the indispensable function of dentists in promptly recognising these clinical indicators, fostering effective communication with patients, and guiding them toward appropriate therapeutic interventions and support networks. Finally, it advocates for the referral of patients to general practitioners or dedicated eating disorder support networks to ensure comprehensive management (Anderson and Gopi-Firth, 2023).

As such, the role of the pediatric dentist in the detection & management of eating disorders can be summarised as follows:

Recognition and Referral: Pediatric dentists play a crucial role in recognising and managing mental health conditions, including eating disorders. They can identify signs such as dental decay from vomiting, which is common in disorders like bulimia nervosa. Early identification and appropriate referral by dental professionals can significantly contribute to better management of these conditions(P. J. Hay *et al.*, 2023). Early identification is

particularly crucial in early onset eating disorders, where the long term duration of the disease tends to cause substantial increase in morbidity(Lask and Bryant-Waugh, 1992; van Noort *et al.*, 2018). Disorders like BN which can be under recorded, reported and diagnosed due to seemingly normal body weight would be easily discernable orally due to the common SIV practices, further highlighting the importance of the role of the dentist(Kourkouta *et al.*, 2019). A mental health-gap approach for dentists could also be of value in addressing the growing mental health service gap, an area that is promising but requires proper research(Keynejad *et al.*, 2018).

Researching the Oral Health and Mental Health Interaction: The relationship between oral health and mental health is of paramount importance, where the role of dentists in early diagnosis and preventive measures for eating disorders is but a single facet of the connection. Dental professionals can detect dental erosion, a common symptom of anorexia and bulimia, and contribute to a holistic approach to treating mental health disorders(Skallevold *et al.*, 2023). Additionally, the reverse may be needed. Where dentists play a key role in the management of oral comorbidity of psychiatric conditions(Kisely, 2016; Mills, Berlin-Broner and Levin, 2023), this two-way relationship between oral health and mental health requires dentists to be capable of properly identifying certain conditions and establishing a referral pathway with mental health experts. Research into this area is much needed to further allow better patient-centric care.

Enhancing Patient Well-being: Pediatric dentists are encouraged to adopt a broader perspective, considering their role in crisis management and professional support for patients aiming at a holistic well-being approach(Mills, Berlin-Broner and Levin, 2023).

Follow & Promote Interdisciplinary Approaches: Dentists, Dental regulatory bodies and educational institutes could emphasise the need for interdisciplinary collaboration between dental professionals and other healthcare providers to ensure comprehensive care for patients with eating disorders. This approach can lead to better outcomes through early detection and coordinated treatment strategies(Monteleone *et al.*, 2023).

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Furthermore, the authors affirm that there are no conflicts of interest, financial or otherwise, that could have influenced the research process, findings, or conclusions. The research was conducted with complete independence and integrity, and no external parties had any involvement in shaping the study's outcomes.

Author Contribution Statement

Ahmed O. M. Mohamed: Conceptualization; Writing - Original Draft **Basma M Nagi:** Conceptualization; Writing- Reviewing and Editing; Supervision **Amira Badran**: Conceptualization; Writing- Reviewing and Editing, Supervision.

All authors take collective responsibility for the content of this work and affirm its accuracy and reliability. They are accountable for addressing any questions related to the integrity of the research and its recommendations.

Ethical Approval Statement

The research has obtained ethical approval from the Ethics Committee at Ain Shams University Faculty of Dentistry, as part of an MSc research project of the corresponding author. The committee operates in full compliance with the ethical principles outlined in the Declaration of

Helsinki and adheres to international standards of research and medical ethics. The ethical approval was granted under the reference number FDASU-REC IM122123.

It is important to note that this research paper is a review paper. As such, it does not involve direct human or animal subjects but rather synthesizes existing literature to provide insights and recommendations within the field.

Data Availability Statement

As this research is a review article, no primary data was collected or generated. All data and information presented in this study are derived from secondary sources, which are duly referenced throughout the manuscript. Readers seeking further details on specific data points are encouraged to refer to the cited sources.

This statement is made in adherence to research transparency and best practices.

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