UNIVERSIDADE FERNANDO PESSOA

THE PSYCHOLOGICAL IMPACT OF ORAL AND MAXILLOFACIAL TRAUMA: A SYSTEMATIC REVIEW

[O impacto psicológico do trauma oral e maxilofacial: uma revisão sistemática]

Dissertação de Mestrado

Mestrado em Medicina Dentária

Simone Gabriela Gomes Pereira

Orientadora:

Doutora Mónica Cristina Morado Pinho

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I dedicate this thesis to my parents, who have been my constant support throughout this journey. I’m forever grateful for their endless encouragement, sacrifices and unwavering belief in my abilities. Your love and faith in me has been my greatest motivation.

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Thank you all for helping me achieve this goal.

RESUMO

Objetivo: Realizar uma revisão sistémica baseada na estratégia PICO (Pop*ulation, Intervention, Control, Outcome) p*ara avaliar o impacto psicológico do trauma oral e maxilofacial. Mét**o**dos: Na pesquisa foram utilizadas as seguintes bases de dados: PUBMED, Cochrane Library e SciELO. Os critérios de inclusão foram artigos que focassem o impacto psicológico do trauma oral e maxilofacial em indivíduos independentemente da idade, incluindo fatores psicológicos como ansiedade, depressão, transtorno de *stress* pós-traumático ou qualidade de vida. Como critérios de exclusão tivemos os estudos que não relataram impactos psicológicos, que não estavam relacionados com trauma facial, estudos muito amplos e artigos que não eram de pesquisa primária. Foi utilizada a ferramenta Cochrane ROBINS-2, para avaliar o risco de viés dos estudos. Resultados: Após a pesquisa inicial, foram recuperados 78 artigos, 68 foram excluídos. Foram incluídos um total de 10 artigos. A avaliação do viés indicou 5 artigos com alto risco, 3 artigos com baixo risco e 2 artigos com alguma preocupação. Conclusão: O estudo concluiu que a forma mais eficaz de avaliar os impactos psicológicos do trauma oral e maxilofacial é através da utilização de questionários e ferramentas psicométricas, como o *Impact of Event Scale-Revised* (IES-R) e o *Hospital Anxiety and Depression Scale* (HADS). Estes métodos permitem uma avaliação fiável do transtorno de *stress* pós-traumático, da ansiedade e da depressão, assegurando consistência entre populações diversas e facilitando a identificação de tendências importantes. A revisão das intervenções psicológicas revelou que abordagens terapêuticas, incluindo a terapia cognitivo-comportamental e o aconselhamento psicologico, foram mais eficazes na redução do sofrimento psicológico em comparação com a ausência de intervenção.

Palavras-chave: lesões maxilofaciais, lesões faciais, trauma psicológico e *stress* pós-traumático.

ABSTRACT

Objective: Conducting a systematic review based on the PICO strategy (Population, Intervention, Control, Outcome), to evaluate the psychological impact of oral and maxillofacial trauma. Methods: The following databases were used in research: PUBMED, Cochrane Library and SciELO. Inclusion criteria was primary research articles, if they focused on the psychological impact of oral and maxillofacial trauma in individuals of any age, including a measurement of psychological outcomes such as anxiety, depression, post- traumatic stress disorder or quality of life. Exclusion criteria was studies not reporting psychological outcomes, not relating to facial trauma, studies that were too broad and studies that were not primary research articles. The risk of bias of the studies was assessed using the Cochrane ROBINS-2 tool. Results: After the initial search, 78 articles were retrieved, 68 were excluded. Total of 10 articles were included. Bias assessment indicated 5 articles with high risk of bias, 3 articles with low risk of bias and 2 articles posing some concern. Conclusion: The study concluded that the most effective way to evaluate the psychological impacts of oral and maxillofacial trauma is through the use of questionnaires and psychometric tools like the Impact of Event Scale-Revised (IES-R) and the Hospital Anxiety and Depression Scale (HADS). These methods allow for reliable assessments of post-traumatic stress disorder, anxiety and depression, ensuring consistency across diverse populations and facilitating the identification of trends. A review of psychological interventions revealed that therapeutic approaches, including cognitive-behavioral therapy and counseling, were more effective in reducing psychological distress compared to no intervention.

Keywords: maxillofacial injuries, facial injuries, psychological trauma and post-traumatic stress.

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LIST OF ABBREVIATIONS AND ACRONYMS

CBT	Cognative- Behavioral Therapy
EMDR	Eye Movement Desensitization and Reprocessing
GABA	Gamma-AminoButyric Acid
GAD	General Anxiety Disorder
HADS	Hospital Anxiety and Depression Scale
HPA	Hypothalamic- Pituary- Adrenal
IPT	Interpersonal Therapy
MDD	Major Depressive Disorder
PICO	**P** Population **I** Intervention **C** Comparisson **O** Outcome
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
PTSD	Post Traumatic Stress Disorder
QoL	Quality of Life
SNRIs	Seratonin Norepinephrine Reuptake Inhibitors
SSRIs	Selective Seratonin Reuptake Inhibitors

1. INTRODUCTION

Oral and maxillofacial trauma refers to a broad spectrum of injuries that affect the mouth, face and jaws, including anything from minor cuts to severe fractures and dislocations. These injuries frequently result from a variety of incidents, including accidents like car crashes or falls, sports-related injuries, violent altercations and complications due to surgical procedures. The immediate physical damage inflicted by such traumas can be quite severe, often involving deep lacerations, complex fractures of the facial bones and dislocations that require urgent medical intervention to prevent further complications and promote healing.

However, the ramifications of these injuries extend far beyond the initial physical damage. While the urgent need for medical attention is clear, the long-term consequences of oral and maxillofacial trauma are often overlooked, particularly the complex psychological effects that can follow. The combination of physical disfigurement, functional impairments and psychological distress creates a complex challenge for patients and healthcare providers. As highlighted by researchers such as Lee et al. (2018) and Alvi & Doherty (2020), this intricate interplay between the physical and psychological dimensions of trauma highlights the critical importance of adopting a comprehensive and holistic approach to patient care.

The psychological impact of oral and maxillofacial trauma is both varied and profound, manifesting in several distressing conditions. Anxiety, depression, and post-traumatic stress disorder (PTSD) are common among those who have suffered such injuries, leading to a significant reduction in their overall quality of life. Research conducted by Gassner et al. (2019) and Cornelius et al. (2019) has documented the prevalence and severity of these psychological conditions, shedding light on the mental health challenges that often accompany physical injuries to the face and jaws.

One of the most challenging aspects of these psychological effects is the impact caused by the visibility of facial injuries. Unlike other forms of trauma that might be hidden beneath clothing or remain unseen, facial injuries are often prominently visible. This visibility can lead to social stigmatization, as individuals with facial disfigurements may face judgment from others. The heightened self-consciousness that accompanies such visible disfigurement can significantly reduce psychological recovery, creating a vicious cycle of distress, as noted by Morrison et al. (2017). This cycle is further aggravated by

the functional impairments that often accompany oral and maxillofacial injuries, such as difficulties with essential activities like eating, speaking and breathing. These impairments not only challenge the patient's daily life but also add to the emotional and psychological burden they must bear, as highlighted by Hoefert et al. (2018).

Despite the clear and pressing need to understand the psychological dimensions of oral and maxillofacial trauma, research in this area has remained somewhat fragmented and incomplete. There is a significant gap in the literature regarding a comprehensive synthesis of the existing studies, which is necessary to fully explain the psychological effects of these injuries. It is crucial to identify the risk factors that contribute to psychological distress in these patients and to develop effective interventions that can provide the necessary support for affected individuals. Wright et al. (2017) have argued that a systematic review of the literature is essential for advancing our understanding in this domain, particularly to consolidate the fragmented research findings and to pave the way for more effective clinical practices.

In response to this gap, this systematic review aims to provide a critical examination of the current literature on the psychological impact of oral and maxillofacial trauma. The primary research question guiding this systematic review is: "What are the psychological impacts of oral and maxillofacial trauma in patients, and how effective are various psychological interventions compared to no interventions or different interventions?" By applying the PICO framework, this review will facilitate a structured analysis of the available evidence, focusing specifically on the outcomes of psychological interventions for individuals who have experienced such trauma (see Table 1 for the PICO framework details).

Table 1

PICO Framework

Parameters	Description
Population (P)	Individuals who have experienced oral and maxillofacial trauma
Intervention (I)	Assesment and management strategies aimed at adressing the psychological impact of oral and maxillofacial trauma
Comparisson (C)	Comparison of psychological outcomes in patients who recieved different types of interventions or no intervention at all
Outcome (O)	Psychological outcomes following oral and maxillofacial trauma

The ultimate goal of this systematic review is to provide a comprehensive understanding of the psychological results associated with oral and maxillofacial injuries. It will explore the prevalence of various psychological conditions in individuals affected by these injuries, examining the factors that intensify these conditions and evaluating the effectiveness of different interventions in alleviating psychological distress. Drawing on the work of Smith & Fieldsend (2021) and Van der Ploeg et al. (2020), this review will offer insights that can inform clinical practice. These insights are intended to guide healthcare professionals in delivering care that is not only focused on the physical healing of patients but also on addressing the psychological needs that are equally critical to their overall recovery. By doing so, healthcare providers can ensure a more holistic approach to treatment, ultimately improving the quality of life for individuals recovering from oral and maxillofacial trauma.

1.1. Materials and methods

1.1.1. Study Design

This systematic review was meticulously and comprehensively conducted in accordance with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-

Analyses) guidelines, as established by Moher et al. in 2020. The PRISMA guidelines are widely regarded as a gold standard in the field of evidence-based research, offering a structured and detailed framework for conducting systematic reviews and meta-analyses. These guidelines are specifically designed to ensure a high level of transparency, accuracy and thoroughness in the reporting of systematic reviews, which are critical components for maintaining the integrity and reliability of scientific research.

The PRISMA guidelines involves a multi-step process that begins with the clear definition of the research question, followed by a systematic and exhaustive search of the literature to identify all relevant studies. In this systematic review, every step of the process was carefully planned and executed to adhere to these rigorous standards, involving two investigators (SP and MMP). The initial stage involved the development of a comprehensive search strategy, tailored to identify studies that specifically addressed the psychological impact of oral and maxillofacial trauma. This strategy included the use of multiple databases (PubMed, Cochrane library and SciElo) and the application of specific keywords (Maxillofacial injuries, Facial injuries, psychological trauma and Post-traumatic stress) and search terms (AND, OR) to capture a wide range of studies, ensuring that no relevant research was overlooked.

The next step in the process was the screening and selection of studies from three research databases based on predefined inclusion and exclusion criteria. The PRISMA guidelines emphasize the importance of transparency in this selection process, which is why the criteria used in this review were clearly outlined and consistently applied. Table 2, for example, provides a detailed overview of these criteria, demonstrating the rigorous approach employed to ensure that only studies meeting the highest standards of relevance and quality were included in the final analysis. This careful selection process is crucial for minimizing bias and ensuring that the findings of the review are based on the most reliable and relevant evidence available.

Table 2

Inclusion and Exclusion Criteria

Inclusion Criteria	Studies were considered eligible if they were primary research articles, if they focused on the psychological impact of oral and maxillofacial trauma in individuals of any age, included a measurement of psychological outcomes such as anxiety, depression, post-traumatic stress disorder (PTSD) or quality of life and if they were full text articles published in peer-review journals.
Exclusion Criteria	Studies were excluded if they were not reporting psychological outcomes, not related to facial trauma, if the study was too broad, if the study was not in English and if they were not primary research articles (eg, other systematic reviews).

The data extraction and synthesis stages of the review were also conducted with meticulous attention to detail, as prescribed by the PRISMA guidelines. The characteristics of the included studies, such as study design, sample size, and key findings, were systematically extracted and organized into a series of tables and figures. These tables and figures are designed to provide a clear and brief summary of the evidence, making it easier for readers to understand the scope and implications of the findings. For instance, the tables summarize the methodological quality of the studies, the types of psychological conditions examined and the various interventions assessed. The narrative summaries complement these visual aids by providing a more detailed explanation of the results, highlighting the key themes and trends identified across the studies. Table 3 summarizes key data extracted from the studies, detailing participant demographics such as; sample size, age range and gender distribution as well as timing of assessments and questionnaires utilized.

Table 3

Data extraction summary

Author, Year	Participants				Key findings	Timing of questionnaires	Questionnaire utilized
	Sample size (n)	Age range	Gender distribution	Additional details			
Glynn et al., 2003	336	18+	89% ♂ (n=255) 11% ♀ (n=32)		25% met PTSD symptoms at 1 month, higher rates were linked to higher age, being female, unmet social support during recovery, prior psychological disturbances, injury pain	1 month post trauma	SUADS PDS SRRS MHI-5
Hull et al., 2003	39	17-56	85% ♂ (n=33) 15% ♀ (n6)		PTSD was initially assessed in 54% of patients, and 41% at 4-6 weeks. Females displayed poorer outcomes.	10 days post trauma 4-6 weeks post trauma	IES-R DTS HADS GHQ-28
Roccia et al., 2005	50	18-65	88% ♂ (n=44) 12% ♀ (n=6)		44% had symptoms of stress and 26% had PTSD symptoms. Both of these values presenting higher in woman. 8 of the 13 patients presenting PTSD had had aesthetic and functional sequelae	48 hours post surgery and 3 months after surgery	Zungs self rating depression scale DTS STAI
Ukpong et al., 2007	51	18-60	88% ♂ (n=45) 12% ♀ (n=6)		Psychological disturbances were found in 91% of patients, 41% above threshold values for hospital anxiety and 12% above threshold values for hospital depression.	10 days post trauma, 6-8 weeks post trauma and 10-12 weeks post trauma	HADS GHQ-28 TSQ

**DTS (Davidson Trauma Scale), GHQ-28 (General Health Questionnaire), HADS (Hospital Anxiety and Depression Scale), IES-R (Impact of Event Scale), MHI-5 (Mental Health Inventory 5-item questionnaire), PDS (Post-Traumatic Distress Scale), SRRS (Social Readjustment Rating Scale), STAI (State-Train Anxiety Inventory), SUADS (The service use and adjustment problem screen), TSQ (Trauma Screening Questionnaire).*

Author, Year	Participants				Key findings	Timing of questionnaires	Questionnaire utilized
	Sample size (n)	Age range	Gender distribution	Additional details			
Sharma & Kaur, 2017	100	18+	72% ♂ (n=72) 28% ♀ (n=28)		84% of patients showed decreased quality of life	6 months post trauma	NEI VFQ-5
Vatsala et al., 2018	88	20-40	82% ♂ (n=72) 18% ♀ (n=16)	patients divided into groups of only cosmetic deficits (A), functional deficits (B) and cosmetic and functional deficits (C)	In the post trauma stage all patients in group A showed severe depression, group B showed 8,8% and group C showed 81,4%. Depression scores decreased gradually at all intervals.	>12 months	Zungs self rating depression scale
Wilson et al., 2018	150	18-66	83% ♂ (n=125) 17% ♀ (n=25)		At 3 months, 23% of patients met the requirements for PTSD, which dropped to 10% at 6 months. At 3 months, 29% met the requirements for major depressive disorder which dropped to 17% at 6 months.	3 months post trauma and 6 months post trauma	DSM-IV MINI
Nayak et al., 2021	147	18-65	63% ♂ (n=93) 37% ♀ (n=54)		The study diagnosed 42 patients with PTSD (29%), out of these 42 patients, 34 had a perceptible face scar caused due to a traumatic event.	>12 months	IES-R

**DSM-IV (Diagnostic and Statistical Manual of Mental Disorders, Fourth edition), IES-R (Impact of Event Scale), MINI (Mini International Neuropsychiatric Interview), NEI VFQ-5 (National Eye Institute 25-item Visual Function).*

Author, Year	Participants				Key findings	Timing of questionnaires	Questionnaire utilized
	Sample size (n)	Age range	Gender distribution	Additional details			
Hu et al., 2022	241	18+	78% ♂ (n=189) 22% ♀ (n=52)		Patients with facial disfigurement injuries had higher levels of PTSD as compared to those suffering from non disfigurement injuries. Females and patients between the ages of 18-40 had higher scores of IES-R.	Day of discharge, 1 month and 6 months after	IES-R
Nazarevych et al., 2022	112	18-75	79% ♂ (n=88) 21% ♀ (n=24)		The HADS test shower varying degrees of anxiety on all patients, the severity of the anxietyand depression was directly correlated to the severity of the injury.	>12 months	IES-R HADS

**HADS (Hospital Anxiety and Depression Scale), IES-R (Impact of Event Scale).*

The systematic review analyzed studies from diverse geographic regions, reflecting the global nature of research on psychological outcomes following trauma. Table 4 highlights the countries of publication and the number of studies conducted in each.

Table 4

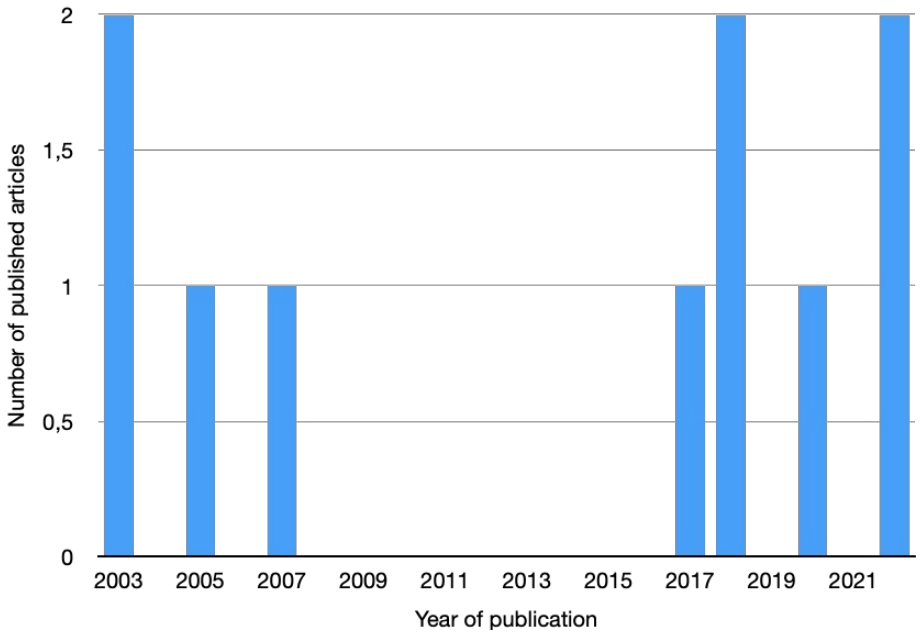
List of countries and the number of publications per country

Country of Publication	Number of publications
India	4
Uk	2
Italy	1
Ukraine	1
USA	1
Nigeria	1

This review included studies published in different years and Figure 1 illustrates the number of publications included within a particular year and the distribution of articles withing this timeframe.

Figure 1

Number of publications per year



The systematic review incorporated a range of validated psychiatric questionnaires to assess psychological outcomes across the included studies. The analysis revealed variability in the selection tools, with some questionnaires being more widely utilized than others, as can be seen in Table 5.

Table 5

List of psychiatric questionnaires

Questionnaire	Number of articles
Impact of Event scale (IES-R)	4
Hospital Anxiety and Depression scale (HADS)	3
Zungs Self-Rating depression scale	2
Davidson trauma scale (DTS)	2
General Health Questionnaire (GHQ-28)	2
State-Train Anxiety Inventory (STAI)	1
National Eye institute 25-item visual function questionnaire (NEI VFQ25)	1
DSM-IV	1
Mini International neuropsychiatric interview (MINI)	1
EQ-5D	1
The service use and adjustment problem screen (SUADS)	1
Post-traumatic distress scale (PDS)	1
Social readjustment rating scale (SRRS)	1
Mental health inventory 5-item questionnaire (MHI-5)	1
Trauma screening questionnaire (TSQ)	1

By adhering to the PRISMA guidelines, this systematic review not only ensures a methodical and transparent approach to synthesizing the existing literature on the psychological impact of oral and maxillofacial trauma but also enhances the overall reliability and validity of the review's findings. The use of these guidelines helps to eliminate potential biases, such as publication bias or selection bias, that can undermine the credibility of a systematic review. Moreover, the structured and comprehensive

reporting required by PRISMA allows other researchers and practitioners to critically assess the methodology and findings, facilitating the replication of the review or the application of its findings in clinical practice.

The rigorous methodology employed in this review, as guided by the PRISMA framework, ultimately contributes valuable insights that can inform both clinical practice and future research in the field of oral and maxillofacial trauma. The transparent reporting and thorough analysis of the existing literature provide a solid foundation for evidence-based decision-making, enabling healthcare providers to better understand the psychological challenges faced by patients with oral and maxillofacial trauma. Furthermore, the insights gained from this review can guide future research efforts, helping to identify gaps in the literature and prioritize areas where additional studies are needed. In this way, the systematic review not only synthesizes current knowledge but also paves the way for ongoing advancements in the understanding and treatment of psychological conditions associated with oral and maxillofacial trauma.

1.1.2. Search Strategy

To ensure that the systematic review included all relevant studies addressing the psychological impact of oral and maxillofacial trauma, a comprehensive and systematic search of the existing literature was conducted using three research databases. This thorough search was designed to gather all pertinent studies and to provide a solid foundation for the review's conclusions and recommendations.

The search process was extensive, encompassing three major electronic databases: PubMed, the Cochrane Library and SciElo. These databases were specifically chosen because of their broad and diverse coverage of medical, psychological and scientific research. Each of these databases plays a crucial role in ensuring that the literature review was wide-ranging and inclusive, capturing studies from various fields and perspectives.

The search strategy itself was meticulously crafted to maximize the retrieval of relevant studies. This involved the careful selection of specific keywords that were directly related to the physical and psychological dimensions of oral and maxillofacial injuries. The primary keywords used in the search included:

- "maxillofacial injuries"

- “facial injuries”
- “psychological trauma”
- “post-traumatic stress”

These keywords were chosen because they represent the core aspects of the research question, encompassing both the physical injuries and the psychological impacts that are central to the study. The selection of these terms was guided by their relevance and their ability to capture the full scope of the literature related to oral and maxillofacial trauma.

To further enhance the effectiveness of the search, Boolean operators such as AND and OR were used to combine these keywords in various configurations. Boolean operators are essential tools in literature searches, as they allow for the creation of complex search queries that can narrow or broaden the scope of results depending on the needs of the review. For instance, using "AND" between “Maxillofacial injuries” and “Psychological trauma” ensured that the search retrieved studies that specifically addressed the psychological effects of maxillofacial injuries. Meanwhile, the use of "OR" allowed the inclusion of studies that might use different terminology but still pertain to the same concepts, such as combining "Facial injuries" OR "Maxillofacial injuries." (See Table 6 for the Database search details).

This approach ensured that the search was comprehensive, capturing studies that thoroughly explored the intersection of maxillofacial trauma and psychological outcomes. By combining these keywords and employing Boolean operators strategically, the search strategy was able to retrieve a wide range of relevant studies, contributing to the depth and quality of the systematic review. This meticulous and carefully planned search process was critical in ensuring that the review was based on a robust and comprehensive set of evidence.

Table 6

Database search

PubMed	#1: ("Maxillofacial Injuries"[Mesh]) OR "Facial Injuries"[Mesh] #2: ("Psychological Trauma"[Mesh]) OR "Stress Disorders, Post-Traumatic"[Mesh] #3: #1 AND #2
Cochrane Library	#1: maxillofacial injuries OR facial injuries #2: psychological trauma OR post-traumatic stress #3: #1 AND #2
SciElo	((maxillofacial injuries) OR (facial injuries)) AND ((psychological trauma) OR (post-traumatic stress))

1.1.3. Study selection

After completing the initial search across the selected electronic databases, the next critical step involved implementing a systematic and thorough review process to carefully evaluate all titles and abstracts of the retrieved studies. This process was designed with precision to ensure that each study was meticulously assessed against the predefined inclusion and exclusion criteria that had been established at the outset of the systematic review.

The initial search yielded a substantial number of studies, but not all were directly relevant to the specific research question or met the stringent criteria necessary for inclusion in the review. Therefore, a detailed and methodical approach was essential to filter out studies that did not meet the required standards for relevance and quality. This step involved a multi-layered screening process by 2 methods beginning with the review of titles and abstracts. Each title and abstract was carefully examined to determine whether the study addressed the psychological impact of oral and maxillofacial trauma, as well as whether it adhered to the quality standards set forth in the inclusion criteria.

During this stage, studies that clearly did not align with the research question, or that failed to meet the basic quality thresholds, were excluded from further consideration. This initial screening was a crucial step in narrowing down the large pool of studies to a more manageable and relevant subset. The studies that passed this preliminary review were then subjected to a more detailed examination, where the full texts were reviewed

to ensure they met all the inclusion criteria.

The inclusion and exclusion criteria were defined to ensure that only studies of the highest relevance and quality were included in the final analysis. These criteria were based on factors such as the study's focus on the psychological aspects of oral and maxillofacial trauma, the methodology used, the population studied, and the overall quality of the research design. For example, studies that did not specifically address the psychological outcomes of maxillofacial injuries, or that were based on small or non-representative samples, were excluded to maintain the rigor and focus of the review.

Moreover, the meticulous methodology employed in this screening process not only enhances the reliability of the findings but also contributes to the overall credibility of the systematic review. It ensures that the conclusions drawn from the review are based on the best available evidence, and that these conclusions can be trusted by clinicians, researchers and policymakers. The careful selection of studies, grounded in a rigorous and systematic review process, is what ultimately provides a robust foundation for advancing our understanding of the psychological consequences of oral and maxillofacial trauma and for informing future research and clinical practice in this important area.

1.1.4. Data Extraction

During data extraction a comparative table was composed including the following details: Author name, year of publication, information about the participants, key findings, the timing of questionnaires and the type of questionnaire utilized.

1.1.5. Risk of Bias

Articles were analyzed for risk of bias using the Cochrane method (ROBINS-2) (Sterne et al., 2019) (See Appendix A) There were 6 domains of bias that were measured:

1. Overall Bias
2. Selection of the reported results
3. Measurement of the outcome
4. Missing outcome data

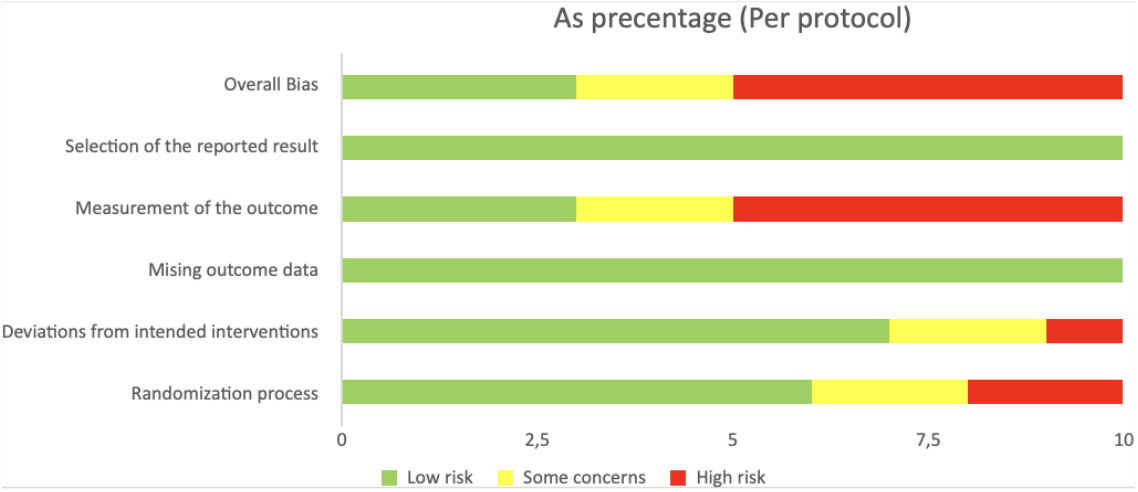
5. Deviations from intended interventions

6. Randomization Process

After evaluation the articles for risk of bias, they were classified as “Low risk”, “Some concern” or “High risk”.

Table 7

Rob2- Risk of Bias



2. DEVELOPMENT

2.1. Anxiety

Anxiety is a common and often crippling mental health condition characterized by persistent feelings of worry, fear and restlessness that are disproportionate to actual situations or threats (American Psychiatric Association, 2013). This emotional response can be triggered by perceived danger or stress and is often accompanied by physiological changes such as increased heart rate, muscle tension, and sweating (Bandelow et al., 2017). Anxiety manifests through a variety of symptoms, including excessive worry, restlessness, fatigue, difficulty concentrating, irritability, muscle tension and sleep disturbances (National Institute of Mental Health, 2018). These symptoms can vary in intensity and duration, significantly impacting an individual's daily functioning and quality of life.

Anxiety disorders encompass a range of specific conditions, such as generalized anxiety disorder (GAD), panic disorder, social anxiety disorder and specific phobias, each with distinct diagnostic criteria but sharing core features of excessive fear and anxiety (Craske & Stein, 2016). For instance, GAD is characterized by excessive worry about various aspects of daily life, while social anxiety disorder involves intense fear of social situations where one might be scrutinized by others (Stein, 2015). Panic disorder is marked by recurrent, unexpected panic attacks and the persistent concern about having more attacks, whereas specific phobias involve irrational fear and avoidance of particular objects or situations (American Psychiatric Association, 2013).

The prevalence of anxiety disorders is notably high worldwide, affecting approximately 264 million people, making it one of the most common mental health issues globally (World Health Organization, 2017). These disorders often co-occur with other psychiatric conditions, including depression and substance use disorders, which can complicate diagnosis and treatment (Kessler et al., 2005). Anxiety disorders typically have an early onset, often beginning in childhood or adolescence, and can persist if left untreated, highlighting the importance of early identification and intervention (Bandelow & Michaelis, 2015).

The etiology of anxiety is multifactorial, involving a complex interplay of genetic, neurobiological, environmental and psychological factors (Grillon, 2008). Genetic predisposition plays a significant role, with studies indicating that anxiety disorders can

run in families (Hettema et al., 2001). Neurobiologically, dysregulation in neurotransmitter systems, particularly those involving serotonin, norepinephrine and gamma-aminobutyric acid (GABA), has been implicated in the pathophysiology of anxiety (Nutt, 2001). Environmental factors, such as traumatic experiences, chronic stress and adverse childhood events, also contribute to the development and aggravation of anxiety disorders (McLaughlin et al., 2012).

The impact of anxiety extends beyond mental health, significantly affecting physical health and quality of life. Chronic anxiety can lead to cardiovascular problems, gastrointestinal issues and weakened immune function, contributing to an overall decline in well-being (Meyer & Quenzer, 2013). Furthermore, individuals with anxiety disorders often experience significant impairments in social, occupational and academic functioning, which can perpetuate the cycle of anxiety and stress (Stein, 2015).

Effective treatment options for anxiety include psychotherapy, particularly cognitive-behavioral therapy (CBT), pharmacotherapy, such as selective serotonin reuptake inhibitors (SSRIs) and lifestyle interventions, which can help manage symptoms and improve functioning (Hofmann et al., 2012). CBT is considered the gold standard for psychological treatment, focusing on identifying and challenging maladaptive thought patterns and behaviors (Cuijpers et al., 2016). Pharmacotherapy, primarily SSRIs and serotonin-norepinephrine reuptake inhibitors (SNRIs), is effective for many individuals, particularly when combined with psychotherapy (Bandelow et al., 2017). Lifestyle interventions, including regular physical activity, mindfulness practices and stress management techniques, also play a critical role in the comprehensive management of anxiety (Jayakody et al., 2014).

2.2. Depression

Depression is a prevalent and serious mental health condition characterized by persistent feelings of sadness, hopelessness and a lack of interest or pleasure in previously enjoyed activities (American Psychiatric Association, 2013). It affects how a person feels, thinks and handles daily activities, such as sleeping, eating and working. Major depressive disorder (MDD), commonly referred to as depression, is the most well-known form and is diagnosed when an individual experiences these symptoms nearly every day for at least two weeks (National Institute of Mental Health, 2018).

Symptoms of depression are diverse and can vary widely among individuals. Common symptoms include persistent sad or anxious mood, feelings of hopelessness or pessimism, irritability, feelings of guilt or worthlessness, loss of interest in activities, decreased energy, difficulty concentrating, changes in appetite and sleep patterns, and thoughts of death or suicide (Murray et al., 2012). The severity and duration of these symptoms can significantly impair an individual's ability to function in their personal, social and professional life.

Depression is a complex disorder with a multifactorial etiology, involving genetic, biological, environmental, and psychological factors. Genetic predisposition plays a significant role, with family and twin studies indicating a heritable component to the disorder (Sullivan et al., 2000). Neurobiologically, depression is associated with dysregulation in neurotransmitter systems, particularly those involving serotonin, norepinephrine and dopamine, as well as abnormalities in brain structures such as the prefrontal cortex and hippocampus (Nestler et al., 2002). Environmental factors, such as chronic stress, traumatic events and adverse childhood experiences, also contribute to the development and intensity of depression (Heim & Nemeroff, 2001).

The global prevalence of depression is substantial, with an estimated 322 million people affected, making it a leading cause of disability worldwide (World Health Organization, 2017). Depression is often linked with other mental health disorders, such as anxiety disorders and substance use disorders, which can complicate diagnosis and treatment and lead to poorer outcomes (Kessler et al., 2004).

The impact of depression extends beyond mental health, significantly affecting physical health and quality of life. Individuals with depression are at increased risk for developing chronic medical conditions such as cardiovascular disease, diabetes and obesity (Pan et al., 2021). Additionally, depression can lead to impaired cognitive function, reduced work productivity and strained interpersonal relationships, further increasing the burden of the disorder (Ferrari et al., 2013).

Effective treatment options for depression include psychotherapy, pharmacotherapy, and lifestyle interventions. Cognitive-behavioral therapy (CBT) and interpersonal therapy (IPT) are evidence-based psychotherapeutic approaches that have been shown to be effective in treating depression (Cuijpers et al., 2008). Pharmacotherapy, particularly with selective serotonin reuptake inhibitors (SSRIs) and serotonin-norepinephrine reuptake inhibitors (SNRIs), is commonly used and can be especially

beneficial for individuals with moderate to severe depression (Cipriani et al., 2018). Lifestyle interventions, such as regular physical activity, healthy diet, and stress management techniques, also play a crucial role in the comprehensive management of depression (Schuch et al., 2016).

2.3. Post-traumatic stress disorder

Post-Traumatic Stress Disorder (PTSD) is a debilitating mental health condition that arises after experiencing or witnessing a traumatic event, such as natural disasters, serious accidents, terrorist acts, war/combat, rape or other violent personal assaults (American Psychiatric Association, 2013). PTSD is characterized by a set of symptoms that persist for more than a month and significantly impair social, occupational and other important areas of functioning (National Institute of Mental Health, 2018).

PTSD symptoms are categorized into four clusters: **intrusive memories, avoidance, negative changes in thinking and mood** and **changes in physical and emotional reactions**. Intrusive memories include recurrent, involuntary and distressing memories of the traumatic event, nightmares and flashbacks. Avoidance refers to efforts to avoid reminders of the trauma, including people, places, conversations, activities, objects, and situations. Negative changes in thinking and mood may involve negative thoughts about oneself or the world, feelings of hopelessness, memory problems, difficulty maintaining close relationships and emotional numbness. Changes in physical and emotional reactions, or arousal symptoms, include being easily startled or frightened, always being on guard, self-destructive behavior, trouble sleeping, trouble concentrating, irritability, angry outbursts or aggressive behavior (Bisson et al., 2015).

The prevalence of PTSD varies depending on the population and the nature of the trauma. In the general population, lifetime prevalence rates are estimated to be around 8%, with women being more than twice as likely as men to develop PTSD (Kessler et al., 2004). Among populations exposed to significant trauma, such as military personnel or survivors of sexual assault, the prevalence can be substantially higher (Kilpatrick et al., 2013).

The etiology of PTSD is complex and multifactorial, involving genetic, neurobiological, psychological and environmental factors. Genetic factors contribute to an individual's susceptibility to PTSD, with heritability estimates around 30% (Koenen et al., 2017).

Neurobiological factors include dysregulation of the hypothalamic-pituitary-adrenal (HPA) axis and alterations in brain structures and functions, particularly in the amygdala, hippocampus and prefrontal cortex, which are involved in fear processing and memory (Yehuda & LeDoux, 2007). Psychological factors such as prior mental health issues, personality traits and coping mechanisms also play a crucial role (Brewin, et al., 2000). Environmental factors include the severity, duration and proximity of the traumatic event, as well as subsequent social support and life stressors (Bonanno et al., 2010).

The impact of PTSD extends beyond mental health, significantly affecting physical health and quality of life. Individuals with PTSD are at increased risk for a range of medical conditions, including cardiovascular disease, diabetes and autoimmune disorders, as well as increased rates of substance abuse and suicidal behavior (Boscarino, 2004). The disorder also contributes to substantial social and occupational impairments, often resulting in difficulties in relationships, maintaining employment, and engaging in everyday activities (Schnurr & Green, 2004).

Effective treatments for PTSD include psychotherapy, pharmacotherapy and combined approaches. Evidence-based psychotherapies, particularly trauma-focused cognitive-behavioral therapy (CBT) and eye movement desensitization and reprocessing (EMDR), are considered first-line treatments (Watts et al., 2017). These therapies help individuals process and integrate traumatic memories and reduce PTSD symptoms. Pharmacotherapy, primarily selective serotonin reuptake inhibitors (SSRIs) and serotonin-norepinephrine reuptake inhibitors (SNRIs), can be effective, especially for individuals with co-occurring conditions such as depression or anxiety (Hoskins et al., 2015). A comprehensive approach that includes lifestyle modifications, such as regular physical activity, mindfulness practices, and social support, is also beneficial in managing PTSD symptoms and improving overall functioning (Gallegos et al., 2017).

2.4. Quality of life

Quality of life (QoL) is a broad, multidimensional concept that encompasses an individual's overall well-being, encompassing physical health, psychological state, level of independence, social relationships, personal beliefs and their relationship to primary features of the environment (World Health Organization, 1997). It reflects how

individuals perceive their position in life within the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns (Fayers & Machin, 2007).

Quality of life is subjective and unique to each person, involving both positive and negative facets of life. It is not merely the absence of disease or infirmity but includes a full range of life experiences (Schalock, 2004). Physical health aspects of QoL involve the presence or absence of physical ailments, the degree of physical fitness and the ability to perform everyday tasks. Psychological well-being encompasses emotional status, cognitive function and the presence of mental health conditions such as anxiety or depression. Social well-being includes interpersonal relationships, social support networks, and community involvement (Haas, 1999).

Several tools and measures have been developed to assess quality of life, including the WHOQOL-BREF, SF-36 and EQ-5D. These instruments aim to capture the multifaceted nature of QoL by evaluating various domains such as physical functioning, role limitations due to physical health problems, bodily pain, general health perceptions, vitality, social functioning, role limitations due to emotional problems and mental health (Ware & Sherbourne, 1992).

The determinants of quality of life are numerous and interrelated. Socioeconomic factors, such as income, employment status and education, significantly influence QoL, as they affect access to resources and opportunities. Environmental factors, including living conditions, access to healthcare services, and community infrastructure, also play a crucial role. Personal factors, such as age, gender and individual health behaviors, further impact QoL (Schalock, 2004).

Chronic diseases and mental health conditions can profoundly affect an individual's quality of life. For instance, people with chronic illnesses such as diabetes, heart disease and arthritis often experience significant limitations in physical functioning, which can lead to decreased independence and social isolation (Testa & Simonson, 1996). Mental health conditions, such as depression and anxiety, can diminish an individual's enjoyment of life and ability to engage in meaningful activities (Hays et al., 1995).

Improving quality of life involves a comprehensive approach that addresses the physical, psychological and social dimensions of well-being. Interventions may include medical treatments to manage chronic conditions, psychological therapies to address

mental health issues and social programs to enhance community support and social integration. Lifestyle modifications, such as regular physical activity, healthy eating and stress management techniques, are also essential in enhancing QoL (Patrick & Erickson, 1993).

In healthcare, the concept of quality of life is particularly important for understanding the impact of diseases and treatments from the patient's perspective. This patient-centered approach is crucial for making informed decisions about medical interventions, ensuring that they not only extend life but also improve its quality (Guyatt et al., 1993).

2.5. Results

2.5.1. Study Characteristics

Following the completion of the initial search process, a total of 78 articles were identified and retrieved for potential inclusion in the systematic review. The search was conducted in strict accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, which are widely recognized for ensuring transparency and rigor in systematic reviews.

Once the articles were retrieved, they underwent a detailed and structured review process to determine their relevance and suitability for inclusion in the final analysis. This process involved multiple stages, beginning with an initial screening of titles and abstracts. At this stage, studies that clearly did not meet the predefined inclusion criteria were excluded from further consideration. As a result of this initial screening, a significant number of articles were deemed irrelevant or did not meet the necessary quality standards, leading to the exclusion of 74 articles.

The exclusion of these 74 articles was based on several factors. Some articles were excluded because they did not specifically address the psychological impact of oral and maxillofacial trauma, which was the central focus of the review. Others were excluded due to methodological weaknesses, such as small sample sizes, lack of control groups or insufficiently rigorous research designs. Additionally, studies that were not peer-reviewed, or that were published in non-scientific or non-academic sources, were also excluded to ensure the integrity and quality of the systematic review.

After this rigorous screening and exclusion process, a total of 10 articles were found to

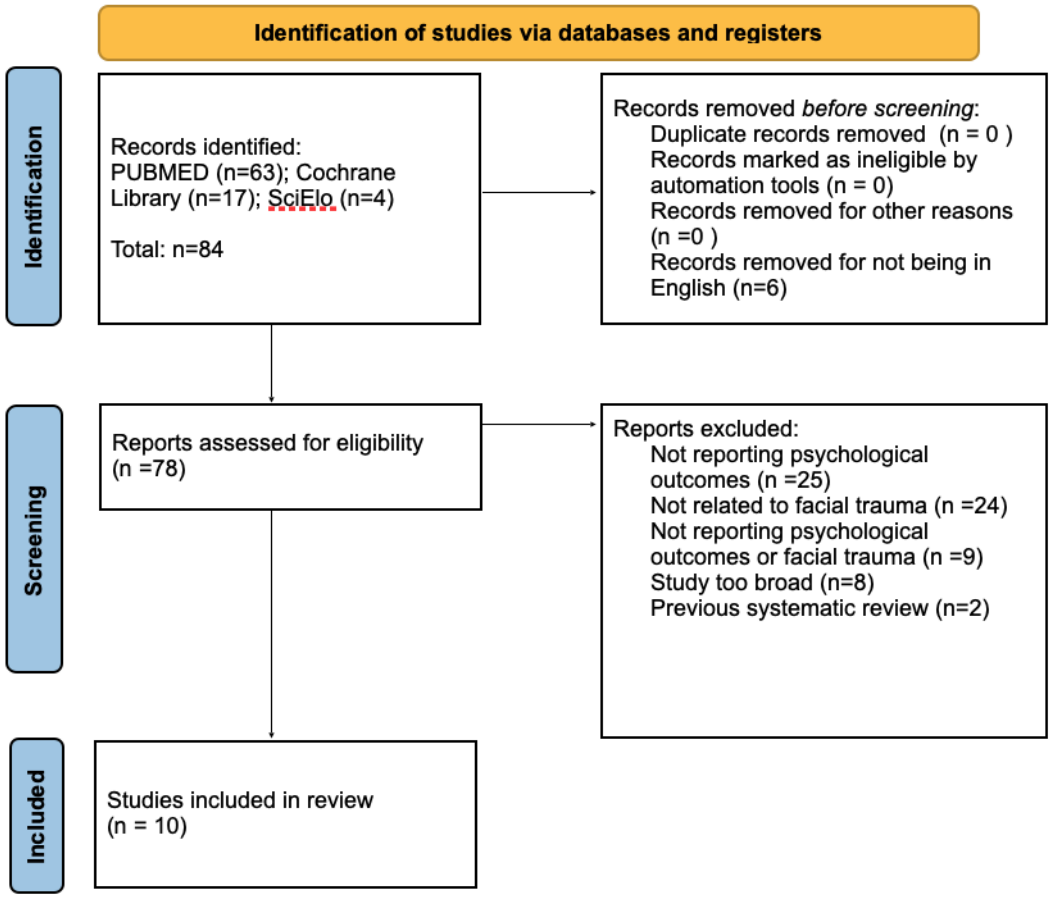
meet all the inclusion criteria and were therefore included in the final review. These 10 studies represent the most relevant and high-quality research available on the psychological impact of oral and maxillofacial trauma. They were selected based on their alignment with the research objectives, the robustness of their methodologies and the significance of their findings.

To provide a clear and transparent overview of the review process, a flow diagram was created and is presented as Figure 1. This diagram visually illustrates the various phases of the review process, including the stages of identification, screening, eligibility assessment and the final inclusion of studies. The flow diagram is a critical component of the PRISMA guidelines, as it provides a concise and easily interpretable summary of the decision-making process that led to the final selection of studies. It highlights the number of articles at each stage of the process, offering insight into how the initial pool of studies was narrowed down to the final set of included articles.

Overall, the systematic and methodical approach taken in this review process, as depicted in the flow diagram, ensures that the conclusions drawn from the included studies are based on the best available evidence. The final set of 10 articles provides a solid foundation for understanding the psychological effects of oral and maxillofacial trauma and contributes valuable insights to the field.

Figure 2

PRISMA flow diagram



2.5.2. Data synthesis

Articles were published from 6 countries: India, UK, Italy, Ukraine, USA and Nigeria (Table 5). Articles included in this study range from 2003 to 2022 (Figure 2). The most commonly used questionnaire was the IES-R scale, followed by the Hospital Anxiety and Depression scale (HADS). There were eight questionnaires specific to PTSD, 5 specific to Anxiety and 3 specific to depression (Table 6).

In the assessment of the risk of bias across the studies included in the review, it was found that the majority of the studies exhibited a high overall risk of bias. This finding raises important concerns about the reliability and validity of the evidence presented in these studies.

Specifically, there were five studies that were determined to have an overall high risk of bias. These studies, conducted by Nayak et al. in 2021, Hu et al. in 2022, Vatsala et al.

in 2018, Roccia et al. in 2005, and Wilson et al. in 2018, were evaluated based on several criteria commonly used to assess bias, such as study design, sample size, randomization methods, blinding procedures and the potential for selective reporting. The high risk of bias in these studies suggests that there may be significant limitations in their findings, which could affect the conclusions drawn from them.

In addition to the studies with a high risk of bias, there were two studies that were categorized as showing some concern regarding the risk of bias. These studies, conducted by Sharma & Kaur in 2017 and Hull et al. in 2003, did not fully meet all the criteria to be classified as low risk of bias, but they also did not exhibit as many or as severe issues as those categorized with a high risk. The designation of "some concern" indicates that while these studies have certain strengths, there are also some elements of their methodology or reporting that could potentially introduce bias and therefore their findings should be interpreted with caution.

Finally, three studies were identified as having a low risk of bias. These studies, conducted by Nazarevych et al. in 2022, Glynn et al. in 2003, and Ukpong et al. in 2007, were evaluated as being well-designed with minimal concerns about bias. The low risk of bias in these studies suggests that their findings are more likely to be reliable and valid, making them particularly valuable in contributing to the overall conclusions of the review.

The variation in the risk of bias across these studies highlights the importance of carefully considering the methodological quality of research when drawing conclusions from a systematic review. The presence of a high risk of bias in several studies means that the findings of those studies should be interpreted with caution, and the potential for bias should be taken into account when synthesizing the evidence and making recommendations based on the review. On the other hand, the studies with low risk of bias provide stronger evidence and can be given more weight in the final analysis.

Overall, this assessment of the risk of bias underscores the need for continued efforts to improve the quality of research in this area, ensuring that future studies are designed and conducted in ways that minimize bias and maximize the reliability of their findings.

2.6. Discussion

2.6.1. Post-traumatic stress disorder

There were 9 articles analysing PTSD through various forms of questionnaires. One study highlighted that 29% of patients with face scars showed symptoms of PTSD (Nayak et al., 2021), while another highlighted 26% of patients with PTSD (Roccia et al., 2005), these values being fairly similar noting the relevance in these findings. Another study agreed that patients with facial disfigurements had higher levels of PTSD as compared to those suffering from non-disfigurement injuries (Hu et al., 2022). Two studies also noted the symptoms of PTSD seemed to decrease over time, at 3 months values of PTSD being present in 23% of patients which declined to 10% at 6 months (Wilson et al., 2018). While the other study assessed an initial value of 54% of patients presenting symptoms of PTSD which later dropped to 41% at 4-6 weeks post trauma (Hull et al., 2003). Of these scientific papers, 3 noted that females presented greater cases of PTSD and higher values of IES-R (Hu et al., 2022; Hull et al., 2003; Roccia et al., 2005). Moreover 2 studies correlated higher age being linked to higher rates of PTSD (Glynn et al., 2003; Hu et al., 2022).

2.6.2. Anxiety and Depression

Higher rates of anxiety and depression were found when correlating to cosmetic deficits, in one study group A consisting of only cosmetic deficits all showed signs of severe depression, group B consisting of only functional deficits scored far lower at 8,8% and group C consisting of individuals with both cosmetic and functional deficits consisted of 81,4% of patients (Vatsala et al., 2018). The HADS test displayed varying degrees of anxiety on all patients, the severity of the anxiety and depression was directly linked to the severity of the injury (Nazarevych et al., 2022) (Ukpong et al., 2007).

2.6.3. Quality of Life

In a quality of life analysis showed that this value had decreased in 84% of post trauma survivors (Sharma & Kaur, 2017). Another study supported this by concluding that psychological disturbances were found in 91% of patients, 41% above the threshold values for hospital anxiety and 12% above the threshold values for hospital depression

(Ukpong et al., 2007).

3. CONCLUSION

This systematic review has highlighted the significant and far-reaching psychological consequences experienced by individuals who suffer from oral and maxillofacial trauma. The evidence presented in this review clearly demonstrates that such trauma often leads to elevated levels of post-traumatic stress disorder (PTSD), anxiety and depression, which can endure long after the physical injuries have healed. These psychological challenges are not only prevalent but also persistent, profoundly impacting the lives of those affected.

Based on the finding in this study, it was concluded that the most effective method for evaluating the psychological impacts of oral and maxillofacial trauma involved the use of questionnaires and psychometric tools such as IES-R and HADS tests. These methods allowed for consistent measurement of PTSD, anxiety and depression across diverse patient populations, enabling comparability of results and indication of key trends. The review also revealed that therapeutic approaches, including cognitive-behavioral therapy and counseling, were more effective in reducing psychological distress compared to no intervention.

Moreover, this review points to the necessity for future research to focus on identifying the most effective therapeutic strategies and support systems that can alleviate the long-term psychological effects associated with oral and maxillofacial trauma. By prioritizing this area of research, healthcare professionals can work towards improving overall treatment outcomes and enhancing the quality of life for individuals who are in the process of recovering from such traumatic injuries.

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APPENDIX

Appendix A ROB-2 Risk of Bias complete table

Reference	Randomization process	Deviations from intended intervention	Missing outcome data	Measurement of the outcome	Selection of the reported result	Overall bias
Sunil S. Nayak, 2020	Some Conserns	Some Conserns	Low risk	High risk	Low risk	High Risk of Bias
Weihsin Hu, 2022	High risk	High risk	Low risk	High risk	Low risk	High Risk of Bias
Vatsala, VDS, 2018	High risk	Some Conserns	High risk	High risk	High risk	High Risk of Bias
Roccia, F, 2005	Low risk	Low risk	Low risk	High risk	Low risk	High Risk of Bias
Nazarevych, M, 2022	Low risk	Low risk	Low risk	Low risk	Low risk	Low Risk of Bias
Sharma, G, 2017	Low risk	Low risk	Low risk	Some Conserns	Low risk	Some Conserns
Wilson, N, 2018	Some Conserns	Low risk	Low risk	High risk	Low risk	High Risk of Bias
Hull, AM, 2003	Low risk	Low risk	Low risk	Some Conserns	Low risk	Some Conserns
Glynn, SM, 2003	Low risk	Low risk	Low risk	Low risk	Low risk	Low Risk of Bias
Ukpong, DI, 2007	Low risk	Low risk	Low risk	Low risk	Low risk	Low Risk of Bias