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Integrating Forensic Odontology and Forensic Psychology in Medico-Legal and Public Health Contexts: A Scoping Review

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Abstract:

Background & objectives:Forensic odontology and forensic psychology contribute independently to medico-legal investigations; however, their interdisciplinary integration remains limited despite overlapping relevance to violence, abuse, disaster victim identification, and justice systems with public health implications. Dental findings such as bite marks, oral trauma, dental wear, and identification records frequently occur in contexts influenced by psychological factors including aggression, coercion, stress, and trauma. This scoping review aimed to map existing evidence on the integration of forensic odontology with forensic psychology and to identify applications, gaps, and future research priorities relevant to medico-legal and public health practice.
Methods:A scoping review was conducted in accordance with the PRISMA-ScR guidelines. Electronic databases (PubMed/MEDLINE, Scopus, Google Scholar, and IndMED) were searched for peer-reviewed literature examining forensic dental evidence alongside behavioral, psychological, or trauma-related interpretations. Eligible studies were screened and thematically synthesized.
Results:Thirty-eight studies were included. Interdisciplinary overlap was identified across five domains: bite mark analysis and aggressive behaviour, oral trauma in abuse and violence, human identification and psychological closure, stress-related dental wear, and expert testimony in courts. Most studies were descriptive or conceptual, with limited empirical validation of behavioral inferences derived from dental evidence.
Interpretation & conclusions:Integration of forensic odontology and forensic psychology may enhance medico-legal interpretation and trauma-informed justice, with potential public health relevance. Ethical caution and methodological rigor remain essential. Further interdisciplinary research is required to validate integrated forensic approaches and inform evidence-based policy.

Keywords: forensic odontology; forensic psychology; bite marks; oral trauma; medico-legal investigation; public health

1. Introduction

Forensic science operates at the intersection of medicine, law, and public health. In India, medico-legal systems routinely address interpersonal violence, abuse, custodial deaths, disaster victim identification, and unidentified human remains—contexts characterized by both biological and psychological dimensions. Forensic odontology contributes through dental identification, age estimation, bite mark analysis, and assessment of oral injuries, while forensic psychology focuses on behavioral interpretation, trauma assessment, and legal decision-making.

Despite shared objectives, collaboration between these disciplines remains limited in routine practice. Dental findings often arise from human behavior shaped by emotional states, coercive dynamics, or chronic stress, yet are frequently interpreted without psychological context. This separation may constrain the interpretative value of forensic evidence, particularly in cases involving vulnerable populations. This scoping review examines existing literature on interdisciplinary integration of forensic odontology and forensic psychology, emphasizing medico-legal relevance and public health-oriented justice.

Rationale for the scoping review

The available literature is heterogeneous, comprising reviews, case reports, guidelines, and conceptual discussions, with limited controlled empirical studies. A scoping review methodology was therefore selected to map the breadth and nature of existing evidence rather than to assess study quality or perform meta-analysis.

Review question

What evidence exists on the integration of forensic odontology and forensic psychology in medico-legal investigations with implications for public health and justice systems?

Methods

Protocol and reporting

This scoping review was conducted and reported in accordance with the **PRISMA-ScR (Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews)** guidelines.

Information sources

PubMed/MEDLINE, Scopus, Google Scholar, and IndMED were searched. Reference lists of relevant articles were manually screened.

Search strategy

Search terms included combinations of:

(“forensic odontology” OR “bite mark analysis” OR “dental identification” OR “oral trauma”)
AND
(“forensic psychology” OR behavior OR aggression OR trauma OR stress)

Eligibility criteria

Inclusion criteria

- Peer-reviewed articles
- Forensic dental evidence with behavioral or psychological interpretation
- English-language publications
- All study designs

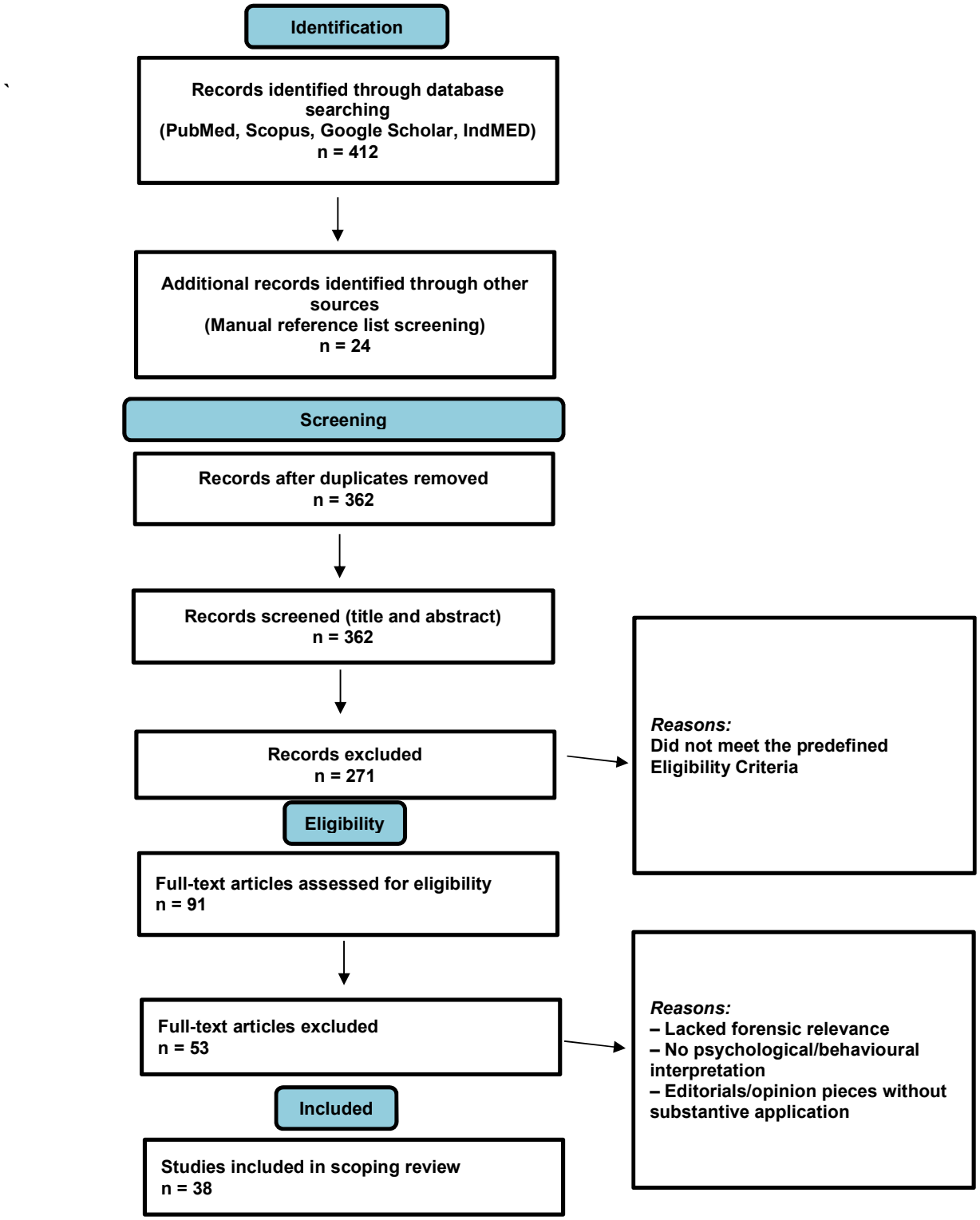
Exclusion criteria

- Purely clinical dental studies without forensic relevance
- Psychological studies lacking physical forensic evidence

- Editorials without substantive application

2. Study selection

A total of 436 records were identified. After removal of duplicates and screening, 38 studies were included. The selection process is illustrated using a PRISMA-ScR flow diagram (Figure 1).



3. Results

Characteristics of included studies

The included studies comprised narrative reviews, guidelines, case series, observational studies, and conceptual analyses. Studies originated from forensic medicine, forensic dentistry, psychology, and legal medicine domains.

Tables 1 and 2 present representative and additional studies included in the scoping review. All included studies contributed to the thematic synthesis.

Table 1. Representative studies included in the scoping review (n = 19)

(Key studies illustrating major thematic areas)

No.	Author (Year)	Country	Study type	Dental focus	Psychological / behavioural relevance
1	Pretty & Sweet (2001)	UK	Review	Dental identification	Psychological closure, ambiguous loss
2	Sweet & Pretty (2001)	UK	Review	Bite marks	Interpersonal aggression
3	Bush et al. (2010)	USA	Review	Bite mark analysis	Behavioural context, caution
4	ABFO (2018)	USA	Guideline	Bite marks	Cognitive bias, ethics
5	Jessee (1995)	USA	Review	Bite marks	Sexual aggression, dominance
6	Shepherd et al. (1988)	UK	Clinical–forensic	Facial trauma	Impulsive violence
7	Avon (2004)	UK	Review	Oral injuries	Child abuse trauma
8	Maguire et al. (2007)	UK	Observational	Oral trauma	Domestic violence
9	Vale et al. (2012)	Brazil	Case series	Oral trauma	Chronic abuse patterns
10	Kanchan & Krishan (2013)	India	Review	Forensic odontology	Multidisciplinary practice
11	Saxena et al. (2015)	India	Review	Dental age estimation	Developmental maturity
12	Krishan et al. (2020)	India	Review	Human identification	Psychosocial relevance

No.	Author (Year)	Country	Study type	Dental focus	Psychological / behavioural relevance
13	Forrest (2019)	Australia	Review	DVI	Family mental health
14	INTERPOL (2018)	International	Guideline	Dental ID	Disaster psychology
15	Hinchliffe (2011)	UK	Review	Dental wear	Stress, bruxism
16	Manfredini et al. (2010)	Italy	Observational	Bruxism	Anxiety, stress
17	Dror et al. (2015)	UK	Review	Expert evidence	Cognitive bias
18	Shrigiriwar & Jadhav (2017)	India	Review	Bite marks	Ethical limitations
19	Pretty (2012)	UK	Review	Forensic odontology	Behavioural interpretation

Abbreviations: ABFO – American Board of Forensic Odontology; DVI – disaster victim identification; ID - Identification

Table 2. Additional studies included in the scoping review (n = 19)

(Remaining studies contributing to the thematic synthesis)

No.	Author (Year)	Country	Study type	Dental focus	Psychological / behavioural relevance
20	Lobbezoo et al. (2013)	Netherlands	Review	Bruxism	Emotional regulation, stress
21	Dror & Kukucka (2021)	USA	Review	Expert testimony	Bias mitigation
22	de Boer et al. (2016)	Netherlands	Review	Court evidence	Jury perception
23	Blau & Briggs (2011)	USA	Textbook chapter	Forensic ID	Cognitive interpretation
24	Bowers et al. (2017)	USA	Review	Bite marks	Reliability concerns
25	Saks & Koehler (2005)	USA	Review	Forensic science	Decision-making bias
26	Silva et al. (2016)	Brazil	Review	Oral trauma	Violence exposure

No.	Author (Year)	Country	Study type	Dental focus	Psychological / behavioural relevance
27	da Silva et al. (2018)	Brazil	Observational	Facial trauma	Alcohol-related violence
28	WHO (2003)	International	Guideline	Oral injuries	Trauma-informed care
29	Nuzzolese (2012)	Italy	Review	Forensic odontology	Victim-centred justice
30	Berketa et al. (2015)	Australia	Review	DVI	Psychological impact
31	Adams et al. (2018)	USA	Review	Forensic reporting	Communication clarity
32	Laskey et al. (2013)	UK	Observational	Facial injuries	IPV dynamics
33	Maloth et al. (2016)	India	Review	Oral injuries	Abuse indicators
34	Subramanian et al. (2019)	India	Review	Forensic dentistry	Legal interface
35	Ferreira et al. (2014)	Portugal	Observational	Oral trauma	Assault patterns
36	Barsley et al. (2019)	UK	Review	Expert evidence	Cognitive load
37	Saks et al. (2016)	USA	Review	Forensic interpretation	Bias control
38	Ramchandran et al. (2021)	India	Review	Dental identification	Disaster mental health

Abbreviations: DVI – disaster victim identification; IPV – intimate partner violence; ID - Identification

Thematic synthesis

Bite marks and aggressive behaviour

Bite marks represent a direct interface between physical evidence and human behavior. Odontological analysis focuses on pattern characteristics, while psychological interpretation considers impulsivity, dominance, and emotional arousal. The literature consistently emphasizes cautious interpretation due to methodological limitations.

Oral trauma in abuse and violence

Oral and facial injuries are frequently documented in child abuse, domestic violence, and custodial assault. Dental documentation supports psychological interpretations of chronic trauma, coercive control, and victim vulnerability, with implications for public health surveillance.

Human identification and psychological closure

Dental identification plays a central role in disaster victim identification and missing persons investigations. Psychological literature highlights its importance in reducing ambiguous loss and supporting mental health of affected families.

Dental wear, bruxism, and stress

Associations between chronic psychological stress and dental attrition or bruxism have been reported. In forensic contexts, such findings may contribute to contextual interpretation of unidentified remains.

Courtroom testimony and cognitive bias

Forensic psychology contributes to understanding expert bias, communication clarity, and jury perception. Integrated approaches may improve judicial interpretation of complex dental evidence.

Critical appraisal

Consistent with scoping review methodology, formal quality appraisal of individual studies was not undertaken.

Ethical and public health considerations

Behavioral interpretation of dental evidence must be approached with restraint to avoid cognitive bias and speculative conclusions. Interdisciplinary integration should strengthen objectivity and support trauma-informed, victim-centred justice. From a public health perspective, improved forensic interpretation may contribute to prevention strategies and policy development.

Limitations

This review is limited by the predominance of descriptive literature, scarcity of empirically validated interdisciplinary studies, under-representation of Indian population-based data, and potential publication bias.

4. Conclusions

Integration of forensic odontology and forensic psychology offers a holistic framework for medico-legal investigation with relevance to justice systems and public health. While current evidence remains largely conceptual, interdisciplinary collaboration has the potential to enhance forensic interpretation, trauma-informed practice, and policy-relevant research. This scoping review provides a structured foundation for future empirical studies and doctoral-level inquiry.

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